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## **EVALUATION OF THE GEF-UNIDO GLOBAL CLEANTECH INNOVATION PROGRAMME**

(Prepared by the Independent Evaluation Office of the GEF)

## EXECUTIVE SUMMARY

### Introduction to the Evaluation

1. The Global Environment Facility has a long history of engagement with the private sector<sup>1</sup>. The Global Environment Facility-United Nations Industrial Development Organization (GEF-UNIDO) Global Cleantech Innovation Programme (GCIP) is the major product of Modality 3 of the GEF-5 Revised Private Sector Strategy<sup>2</sup>.
2. The GCIP is one example of GEF's support to development of small and medium enterprises (SMEs). SMEs are, by definition, modest in size and constitute the backbone of developing economies where they account for the majority of employment and jobs created. Under the GCIP, support was focused on SMEs developing clean technologies and solutions that can deliver global environmental benefits (GEBs).
3. As part of the GEF Independent Evaluation Office's evaluations of GEF's engagement with the private sector, this report presents a summary of results of an independent evaluation of the GCIP. The following questions have been investigated based on implementation of GCIP projects in 8 countries since 2013:
  - (a) What is the relevance of the GCIP in the participating countries?
  - (b) How effective has GCIP been in meeting its planned outputs and outcomes?
  - (c) How efficient was project delivery?
  - (d) What direct and indirect impacts did the GCIP deliver? What was the additionality of the projects?
  - (e) To what extent are the GCIP's results likely to be sustained in the long term?
4. This report is intended to be useful to a broad range of audiences. It will inform the GEF Council, GEF Secretariat, participating country Operational Focal Points, and UNIDO, the GCIP implementing agency, about the relevance, additionality, outcomes and sustainability of this programme to improve the design, performance and impacts of similar future projects/programs.
5. The evaluation adopted a mixed methods approach, encompassing qualitative and quantitative data and analysis. The Evaluation Team began with a focused document review and then interviewed GEF Secretariat staff, UNIDO staff, government representatives and private sector stakeholders (GCIP participants as well as other actors). The Evaluation Team met with GCIP 2017 national winners of the competition-based Accelerator at the annual Cleantech Open

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<sup>1</sup> The GEF has undertaken work with private sector engagement since 1996, when the first strategy for engaging the private sector was finalized based on a recognition that in order to bring about transformational change to the global environment, public and private sectors must work together.

<sup>2</sup> [Revised Strategy for Enhancing Engagement with the Private Sector](#). GEF/C.41/09/Rev.01, 10 November 2011

(CTO)<sup>3</sup> Global Forum in California. GEF IEO also collaborated with the UNIDO Evaluation Office to reflect the above questions in the Terminal Evaluations (TEs) that were being carried out for GCIP projects in India, Pakistan, South Africa and Turkey. Terminal Evaluations completed over the past 2 years for Armenia and Malaysia were also part of the evidence base. Online surveys were administered to GCIP participants in India, Turkey, Pakistan and South Africa as well as to all UNIDO GCIP project managers, both in country and at headquarters. The survey of GCIP participants had an overall response rate of 24%, and participation varied across the four countries. The project managers survey had a 100% response rate.

6. Labelled as a global *program*, UNIDO implemented GCIP as 9 separate national level *projects*. Six of the countries had completed implementation at the time of evaluation (Armenia, Malaysia, India, Pakistan, South Africa and Turkey). Information (project implementation reports, available mid-term reviews, and interviews) from GCIP projects underway in Thailand, Morocco, and Ukraine was also considered in this evaluation. Lack of a fully shared understanding of indicators, targets, and definitions has limited the comparability and aggregation of results.

### **GCIP Origin and Overview**

7. The GCIP traces its origins to the 2011 UN Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP) in South Africa where the “Greening the COP17” project (GEF ID 4514) was launched with GEF-UNIDO support. The objective of the project was to lower the ecological footprint of the COP17 and showcase targeted activities under the National Greening Programme and the South Africa-GEF Partnership. The Innovative Technology Competition for small- and medium-sized enterprises (SME) was one of 4 components of the medium-sized project (MSP) and was intended to increase awareness of the role of clean technologies in enhancing SME competitiveness<sup>4</sup>. The terminal evaluation<sup>5</sup> concluded that the competition was successfully organized, delivered a comprehensive business training program and created capacity for a future cleantech competition.

8. Based on the success of the COP17 competition and as recommended in the project’s TE, GEF and UNIDO made a joint decision to develop a global flagship programme on Cleantech for SMEs: the GCIP. According to interviews, UNIDO initially proposed a programmatic approach and the GEF Secretariat indicated that it would be more effective and efficient to implement GCIP through separate country projects. Global coordination was implicitly indicated in project documents, however without a specific budget for this management activity.

9. The GCIP set out to reduce/mitigate several barriers to a functioning cleantech entrepreneurial ecosystem:

- (a) Lack of an enabling regulatory environment
- (b) Limited access to finance (mismatch of startup needs and offers of

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<sup>3</sup> CTO is a Silicon Valley-based accelerator. It hosts an annual Global Forum which brings together winners of national cleantech competition, including winners from participating GCIP countries, to pitch their ideas and meet investors, other entrepreneurs, sponsoring companies, academia and the press.

<sup>4</sup> Greening the COP17. GEF ID 4514. Request for CEO Endorsement.

<sup>5</sup> Independent Terminal Evaluation of the Greening the COP17 in Durban-South Africa Project. September 2013. UNIDO.

government/financing institutions; lack of interaction between SME innovators and potential investors)

- (c) Lack of public awareness regarding market potential of low-carbon innovation technologies
- (d) Lack of startups' strategic business planning and marketing skills
- (e) Lack of coordination amongst sectoral players on market intelligence research (undermining decision-making regarding market opportunities and penetration strategies)
- (f) Lack of public awareness regarding low-carbon innovation technology's market potential

10. GCIP projects were designed to address incremental reasoning/additionality of GEF involvement in the projects. The rationale cited for GEF support was to address the above-mentioned barriers. Without GEF, it was deemed unlikely that the countries could run a cleantech SME competition and support business acceleration of startups in the coming years. This would result in lost opportunities to nurture entrepreneurs, reduce emissions and strengthen partnerships with the private sector.

11. The GCIP Theory of Change design relies on a structured approach focusing on 3 components:

- (1) Establishing a national platform for an annual competition-based Accelerator. This component would identify/nurture emerging cleantech startups by coordinating amongst existing national initiatives;
- (2) Building the capacity of national institutions and partners to sustain the ongoing organization of the competition-based Accelerator; and
- (3) Strengthen and develop the policy/regulatory framework for cleantech innovation.

12. In 2013, GCIP was launched in Armenia, India, Malaysia, Pakistan, South Africa and Turkey. Morocco and Thailand joined in 2016. The concept for a Ukraine GCIP with an accompanying Project Preparation Grant (PPG) was approved in August 2017. The CEO project approval came in October 2018. All are "smaller" projects, i.e. Medium-Size Projects (MSPs)<sup>6</sup> planned to run for 3 years with a target of 2-3 annual competition-based Accelerator cycles. GEF funding was only between USD 0.5-2 million complemented by co-financing on the order of 2 to 8 times the level of the GEF grant. With the restricted resources, the national projects were expected to initiate the Accelerator, put in place the policies, capacities, institutional frameworks and gather support from public and private sector co-sponsors to sustain the competition-based Accelerator and other project results and benefits, post completion.

13. Within each country, the initiative was anchored through a local host, typically a government agency focused on SME development, science, and/or innovation. The host was

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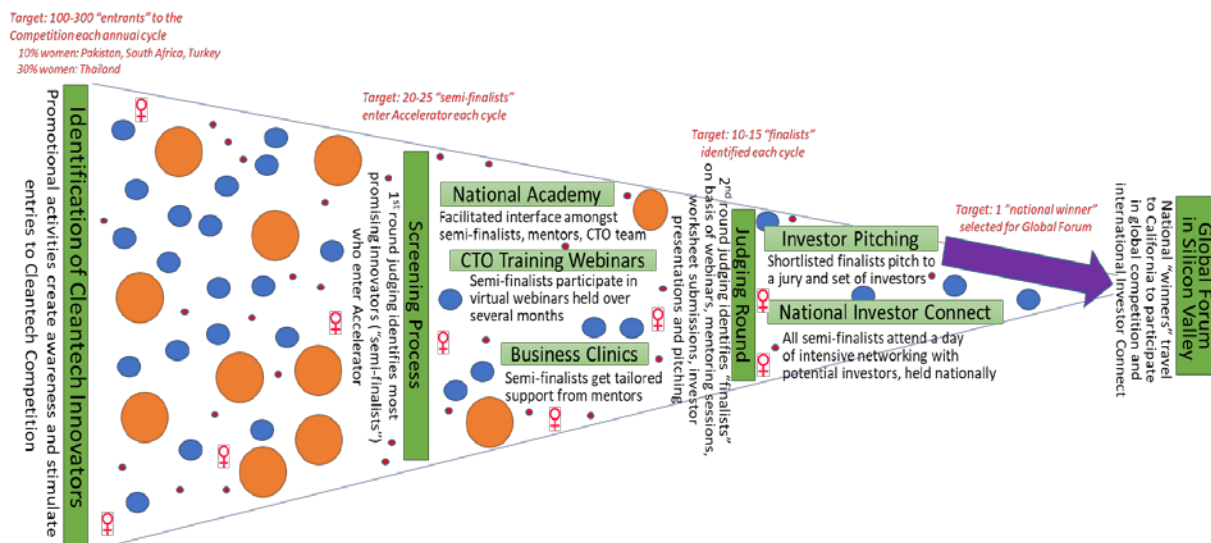
<sup>6</sup> In 1996, when GEF introduced the MSP modality, the initial proposal was for mid-sized grants ranging between USD 50,000 - USD 750,000. This was increased to USD 1 million. The MSP grant ceiling was raised to USD 2 million in November 2012.

supported by a Project Management Unit (PMU) acting as its secretariat, with guidance provided by a Project Steering Committee (PSC) composed of relevant stakeholders and co-financing partners seen to most likely benefit from project outcomes and who could play a role in sustaining results.

14. Projects were designed to have private sector contributions as a key pillar of project delivery. Entities such as Chambers of Commerce and Business Associations were involved as PSC members and could tap into relevant networks to support the PMU. Mentoring, technical know-how, investment, and market access were brought in primarily on a pro-bono basis to contribute to enhanced climate action and job creation.

15. The GCIP mechanism was designed to identify and nurture the most-promising cleantech innovators in a country. The competition-based Accelerator functioned as an ‘innovation funnel’. Entrants were screened and whittled down to a set of ‘semi-finalists’. Their ideas were shaped through training delivered by UNIDO’s knowledge partner, Cleantech Open, and mentoring sessions with local private sector actors (mentors, technical experts). GCIP participants then pitched to investors at national and international fora (see Figure 1). This process filtered out many of the entrepreneurs that applied to the Competition. Stakeholders attested that those who completed the GCIP process were widely seen as ‘high quality’. In principle this would increase the likelihood for their innovations to reach the market, reduce GHG emissions, and create jobs.

Figure 1 The GCIP Model’s Process and Key Milestones



Source: GEF IEO Reconstruction of GCIP Model

16. Although GCIP projects were structured similarly, in response to country conditions and national priorities, there was some variation in country implementation strategies. Partly in response to local circumstances, and partly due to steering by local actors’, participating startups differed in their stage of organizational maturity<sup>7</sup> and technology development<sup>8</sup>. In India, almost

<sup>7</sup> Referring to organizational practices/processes, business skills, leadership competences, etc.

<sup>8</sup> Spanning alpha testing to actively deploying technology and already being profitable.

half of surveyed startups had been in existence for over 4 years. In Armenia, Pakistan and Turkey, the majority had been established for less than 1 year. In South Africa, a higher percentage of supported startups had existed for 1-2 years. GCIP projects also achieved varying degrees of social inclusivity. Pakistan paid attention to recruiting teams led by women, youth; and in the case of South Africa, they also included black entrepreneurs. Dedicated resources to translation of training materials was not the same across countries. Turkey, Morocco and Thailand translated materials, which enhanced access of non-English speakers.

17. By the end of 2017, GCIP had supported 795 ‘semi-finalists’ across 8 countries<sup>9</sup>, spanning a variety of cleantech categories. An average of 32 startups per cycle per country benefitted from the business acceleration activities and inputs. In 2017, the majority of startups were active in the field of Energy Efficiency (26%) followed by Renewable Energy (23%), Waste to Energy (20%), Water Efficiency (20%), and through more recently-introduced categories of Green Building (10%), Transportation (1%), and Advanced Material (1%)<sup>10</sup>.

## MAJOR FINDINGS

18. All 6 completed projects were rated in the satisfactory range for outcomes. Table 1 shows the performance ratings for the six GCIP projects evaluated to date. The overall assessment suggests that performance has improved overtime. The first project implemented in Armenia was rated as ‘moderately satisfactory’ and Pakistan, which was most recently closed rated as ‘highly satisfactory’. In comparison, the overall outcomes rating for the climate change portfolio, as reported in the GEF IEO Annual Performance Review was 72% for the 2017 cohort and 77% for the total portfolio<sup>11</sup>.

19. There is consistency in ratings for relevance and donor performance. Some variation in effectiveness, and efficiency and slightly more variation is seen in ratings for sustainability, gender mainstreaming and monitoring and evaluation. Four (4) of the 6 completed projects rated sustainability of outcomes only as ‘Moderately Likely’ and pointed to limited country engagement on the part of key agencies as a contributing factor. A strategic approach to Gender Mainstreaming materialized more in some countries than in others. In Armenia, Malaysia, India there was little systematic monitoring and reporting, resulting in these TEs rating M&E as less than “Satisfactory”. Pakistan has the highest ratings on almost categories. The TE attributes this to the high degree of engagement that national institutions displayed in collectively implementing GCIP and UNIDO’s refinements in project management and monitoring approaches that better considered lessons learned from previous projects.

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<sup>9</sup> Not all national projects set targets for the number of teams/startups that would be supported. It is, therefore, difficult to put this number into context. Several countries set targets for number of *applicants* at 80-100 per annum (South Africa, Turkey, Pakistan and Thailand). Only South Africa explicitly set a target for support to “semi-finalist” startups (initially 40-50/year and then revised down to 20-25).

<sup>10</sup> Percentage distribution for recently introduced categories should not be seen as a trend or standard.

<sup>11</sup> [GEF IEO Annual Performance Report 2017](#). Unedited. Cohort of 2017 climate change projects is 71 projects; total portfolio is 376 projects.

Table 1: Performance Ratings from Terminal Evaluations of GCIP Projects, by Country

| Evaluation Criterion                         | ARMENIA   | MALAYSIA  | INDIA     | TURKEY    | SOUTH AFRICA | PAKISTAN  |
|--|-----------|-----------|-----------|-----------|--------------|-----------|
| <b>A. Impact Rating</b>                      | n/a       | S         | S         | S         | S            | HS        |
| <b>B. Project Design</b>                     | MS        | S         | MS        | S         | S            | HS        |
| Overall Design                               | MS        | MS        | MS        | S         | HS           | S         |
| Logframe                                     | MS        | MS        | S         | MS        | MS           | S         |
| <b>C. Project Performance</b>                |           |           |           |           |              |           |
| Relevance                                    | HS        | HS        | HS        | HS        | HS           | HS        |
| Effectiveness                                | MS        | S         | S         | S         | S            | HS        |
| Efficiency                                   | MS        | S         | HS        | HS        | S            | S         |
| Overall Outcomes Rating                      | MS        | S         | S         | S         | S            | HS        |
| <b>D. Sustainability of Benefits</b>         | <b>ML</b> | <b>ML</b> | <b>ML</b> | <b>ML</b> | <b>L</b>     | <b>HL</b> |
| <b>E. Cross-cutting performance criteria</b> |           |           |           |           |              |           |
| Gender Mainstreaming                         | n/a       | MS        | U         | S         | S            | HS        |
| M & E  | MU        | MS        | MU        | S         | S            | S         |
| Results-Based Management                     | n/a       | n/a       | HS        | S         | S            | HS        |
| <b>F. Performance of partners</b>            |           |           |           |           |              |           |
| UNIDO  | MS        | S         | HS        | S         | HS           | S         |
| National Counterparts                        | n/a       | n/a       | HS        | S         | HS           | S         |
| Donor  | n/a       | n/a       | HS        | HS        | HS           | HS        |
| <b>G. Overall assessment</b>                 | MS        | S         | S         | S         | S            | HS        |

Source: Independent Terminal Evaluations of completed GCIP projects. UNIDO.

### Strategic Relevance

20. All 6 of the completed GCIP projects have been rated “Highly Satisfactory” for relevance. GCIP’s focus on a cleantech business model development distinguished it from other accelerators. In 2017, the Global Cleantech Innovation Index (GCI) <sup>12</sup> ranked the GCIP implementing countries in the lower half of 45 countries with functioning cleantech ecosystems. Malaysia was the highest ranked amongst the GCIP countries analysed and Armenia, Morocco and Pakistan formed the bottom 3 of the 45 countries reviewed. This suggests there was a need and opportunity in these countries to develop the cleantech space.

21. GCIP is consistent with national environmental and economic priorities. GCIP supports country strategies to accelerate transformation to a low-carbon economy and is valued by governments and other stakeholders for its support to national startup/SME agendas. The delivery of assistance to early stage startups filled a gap not covered by existing mechanisms. Four countries, Pakistan, South Africa, Thailand and Turkey, thus far, have conceptualized a phase 2 and are planning to request support under the GEF-7 cycle. Both Armenia and Malaysia expressed interest in continuing implementation of the competition-based Accelerator beyond project completion. However, their submissions for a second phase were not endorsed. The reasons for these decisions are not known to the Evaluation Team.

<sup>12</sup> The GCI identifies countries with the greatest potential to produce startups that will commercialize clean technology innovations over the next 10 years. [GCI’s 2017 Report](#) was extended to include GCIP partner countries.

22. GCIP supports GEF's climate change focal area, private sector and gender mainstreaming objectives as well as UNIDO's mandate. GCIP is aligned with: the GEF Revised Strategy for Enhancing Engagement with the Private Sector, GEF Climate Change objectives to support countries in the transition to low carbon economies through market transformation, and GEF Gender Mainstreaming Policy. GCIP is also supportive of UNIDO's mandate to promote Inclusive and Sustainable Industrial Development and furthers the agency's Green Industrial Initiative.

#### *Results: Environmental Outcomes*

23. All assisted GCIP startups are developing innovations with climate benefits and other environmental and social co-benefits. Profiles in this report describe startups that are illustrative of the hundreds of the innovations with global environmental/social benefits that GCIP has supported, including access to environmentally-friendly, affordable sanitary pads; reduction of agricultural waste; access to cleaner water; reduced health risks, etc. Some of these benefits are also being realized through focus on biodiversity, chemicals, prevention of land degradation. GHG reductions are foreseen over a 10-year period (e.g. 2013-2023), which is substantially beyond the duration of the national projects. Based on 14 startups in 5 countries<sup>13</sup>, UNIDO has *projected* GHG reductions at 4.8 Mtons CO2 by 2020. The reliability of these projected achievements is difficult to verify.

24. Only 2 TEs (South Africa and Pakistan) included projections of GHG emissions reduced and described the methodology used to make the assessments. Tracking and communicating positive environmental impacts (global climate stress reductions and improvement in environmental status) is difficult for many GEF projects as they usually take place well beyond project completion. This challenge is exacerbated by a lack of GCIP standardized methodology for target setting and projection of impacts.

#### *Results: Benefits for SMEs*

25. GCIP helped startups to develop skills in business modelling, market segmentation, customer validation and financial projections. Startups highly valued the use of mentors, peer to peer networking and exposure to local investors.

26. *Business Development Training* was most frequently ranked as the most beneficial component of GCIP by respondents, with 40% of all respondents ranking it #1 out of the eight components listed<sup>14</sup>. 68% of respondents ranked it as one of the top 3. This is followed by *Mentorship on Business Development*, which 19% of all respondents ranked as the #1, and 56% ranked as one of the top 3, and *Opportunities to Showcase Technologies*, which 13% of respondents ranked as #1, and 47% ranked as one of the top 3 most beneficial components (see Table 2). Respondents ranked *Connection with an investor network/Potential business partners*,

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<sup>13</sup> Armenia, India, Pakistan, South Africa and Turkey

<sup>14</sup> GCIP support elements include: Business Development Training, Connection with an Investor Network, Technical Advice through Sector Experts, Mentorship on Business Development, Opportunities to Showcase Technology, Connection with Potential Business Partners, Improving the Policy and Regulatory Environment for Business Operations, Increased Capacity of Supporting Government Institutions



*Increased capacity of supporting government institutions and Improving the policy and regulatory environment as the least beneficial*<sup>15</sup>.

*Table 2: Top 3 Responses to Survey Question: Rank the following components of GICP from most to least beneficial*

| Values   |                              | India<br>(n=24) | Pakistan<br>(n=45) | S.Africa<br>(n=29) | Turkey<br>(n=22) | Overall<br>(n=120) |
|--|------------------------------|-----------------|--------------------|--------------------|------------------|--------------------|
| <b>Training for business plan development</b>  | Ranked as #1 most beneficial | 33%             | 44%                | 34%                | 45%              | 40%                |
|  | Ranked in top 3              | 67%             | 71%                | 59%                | 73%              | 68%                |
| <b>Mentorship on business plan development</b> | Ranked as #1 most beneficial | 25%             | 13%                | 17%                | 27%              | 19%                |
|  | Ranked in top 3              | 54%             | 38%                | 66%                | 82%              | 56%                |
| <b>Opportunities to showcase technologies</b>  | Ranked as #1 most beneficial | 25%             | 13%                | 10%                | 0%               | 13%                |
|  | Ranked in top 3              | 67%             | 47%                | 48%                | 23%              | 47%                |

Source: Evaluation Survey Results based on 120 participant responses from 4 countries, where N is number of responses in the country

27. All respondents rated *Business development training* as the very highest quality service provided by GICP, especially appreciated by Turkey and South Africa. This was followed by *mentorship*, and *opportunities to showcase their technology*. The results also pointed to limitations related to quality of networking activities with investors and business partners. India participants also rated technical advice through sector partners as lower quality (Table 2<sup>16</sup>).

<sup>15</sup> GICP Project Managers ranked *Opportunities to Showcase Technology*, *Connection with Potential Business Partners* and *Connection with an Investor Network* as the top three benefits and ranked lowest *Improving the Policy and Regulatory Environment for Business Operations* (Annex V).

<sup>16</sup> Respondents were asked to rate the quality of various inputs on a 6-point scale from 'Very Poor' to 'Excellent'. Weighted Average Score was calculated by first assigning numeric values to response choices (Very Poor = 0, Excellent = 10), then calculating the overall average according to the number of responses to each choice. An overall score above 5.00 is positive; above 7.50 is highly positive. N/A and blank responses were omitted.

*Table 3: Responses to Survey Question: How Would You Rate the Quality of Services You Received?*

|   | India |       | Pakistan |       | South Africa |       | Turkey |       | Overall |       |
|---|-------|-------|----------|-------|--------------|-------|--------|-------|---------|-------|
|   | N     | Score | N        | Score | N            | Score | N      | Score | N       | Score |
| Number of responses, Weighted Score (out of 10) |       |       |          |       |              |       |        |       |         |       |
| Training for business plan development          | 20    | 7.50  | 45       | 7.51  | 29           | 8.00  | 22     | 8.27  | 116     | 7.78  |
| Connection with an investor network             | 23    | 4.61  | 45       | 4.76  | 29           | 4.69  | 21     | 4.86  | 118     | 4.73  |
| Technical advice through sector experts         | 22    | 3.64  | 44       | 4.91  | 29           | 4.76  | 21     | 5.33  | 116     | 4.71  |
| Mentorship on business development              | 21    | 5.90  | 45       | 6.04  | 29           | 6.41  | 21     | 7.33  | 116     | 6.34  |
| Opportunities to showcase technology            | 24    | 5.92  | 45       | 5.91  | 29           | 5.66  | 22     | 5.45  | 120     | 5.77  |
| Connection with potential business partners     | 23    | 3.76  | 44       | 4.64  | 29           | 4.28  | 21     | 4.76  | 117     | 4.40  |

Source: Evaluation Survey Results based on 120 participant responses from 4 countries, where N is number of responses in the country

28. GCIP’s uniform approach allowed for consistency in delivery of training components, however there was opportunity for further country contextualization. There is a fine balance between maintaining standardization and customizing benefits for SMEs. In some instances, GCIP succeeded in providing specific assistance based on needs of SMEs. In India, where companies were at later stages of development, support was provided to gauge the technical feasibility of technologies. The slight majority of all participating startups entered at an early alpha phase. These startups reported that they too could have benefitted from increased focus on the technical feasibility of their innovative idea, before advancing into the Accelerator, which focused mainly on the business model and customer validation. Guidance on country-specific regulatory environment and country-specific export market considerations would also have been helpful.

29. Select participating startups were able to access capital for their cleantech enterprises and attributed this to the GCIP. At least 12 startups in Armenia, India, Turkey and South Africa had success in gaining access to venture capital, more so at the national-level in comparison to the international-level Investor Connect held as part of the annual CTO Global Forum. These investments, ranging from USD 5,000 to USD 1.9 million, helped address a major hurdle in the commercialization of technology, i.e. access to capital, especially in a new domain like cleantech that does not easily qualify for traditional banking instruments.

### **Results: Supporting National Entrepreneurship Ecosystems**

30. New job creation is expected as a result of GCIP support, but it is not being systematically tracked. Based on 14 startups in 5 countries<sup>17</sup>, UNIDO has *projected* creation of 1219 new jobs by 2020. Furthermore, a recent World Bank Group report<sup>18</sup> describes the significant potential of cleantech SMEs in developing countries to generate profits and create jobs, estimating this to be a USD 1.6 trillion market opportunity. It is still too early to judge the quality of the UNIDO estimate, as many of the GCIP teams still lack the financial resources needed to test and transform their concepts into reality. Longer term monitoring is required.

31. GCIP succeeded in building capacities of relevant institutions through ‘on-the-job’ training to support subsequent organization of the competition-based Accelerator. GCIP projects had positive effects in terms of enabling the local host institution to strengthen its reputation and convenor role within the national entrepreneurship system. These effects were particularly noticeable in South Africa, Turkey, and Thailand. Factors such as shifting staff, fewer competitions, and slow starts meant that in some countries (Armenia, Malaysia) there was less organizational competence built and as of the date of this evaluation, the projects were not set to pursue a second phase.

32. National coordination through cross-departmental and cross-institutional partnerships was not explored to its full potential. The GCIP was expected to dynamize the national entrepreneurship ecosystem by exerting a national-level coordinating force. Respondents interviewed for this evaluation asserted that *“the GCIP should be linked with other support programs and the startups should see these as a sequence; for example, after being supported by GCIP, the startup can be automatically forwarded to another program”*. All projects were able to promote some collaboration across relevant entities through their involvement in the Project Steering Committees. However, in general, the envisaged national coordination function was not uniformly clear and understood and insufficiently leveraged.

### **Results: Strengthening of Policy and Regulatory Frameworks**

33. GCIP projects did not realize their intended outcome to strengthen the policy/regulatory environment to foster the growth of cleantech innovation. This is a risk factor for sustaining the projects’ results. Policy strengthening activities were limited. As MSPs there is a cap on GEF financing, but this component had relatively fewer resources and was generally embarked on at a later stage, using an ad hoc approach. In most countries (except Pakistan and South Africa), no direct structured policy work was undertaken. Project support prioritized other components due to a desire to quickly establish the competition-based Accelerator and generate outputs that could be immediately seen and promoted. This often took longer than expected due to a need to identify collaborating institutions, to build up understanding of what was meant by cleantech innovation and generate entrepreneurs’ interest to enter the program.

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<sup>17</sup> Armenia, India, Pakistan, South Africa and Turkey

<sup>18</sup> [Building Competitive Green Industries: The Climate & Clean Technology Opportunity for Developing Countries. 2014. World Bank](#). This report illustrates the nature and likely size of the clean technology opportunity for SMEs in 145 developing countries over the next decade. In this period, expected investment across 15 clean technology sectors in developing countries is expected to exceed USD 6.4 trillion. Of that total market, roughly \$1.6 trillion is expected to be accessible to SMEs.

**Results: Gender Mainstreaming and Social Inclusiveness**

34. Twenty-five percent of teams supported by GCIP were led by women. To date, from a total of 795 semi-finalists teams, 198 semi-finalists (25%) with women as team leaders have been supported. This is within the range for projects that set targets for female entrepreneurs (10-30% of entrants). In addition to targets, the GCIP approach included the creation of special category awards; selection criteria to provide preferential entry for women and specific efforts to attract female mentors, judges, and trainers. Results materialized more in some countries (Pakistan, South Africa, Turkey) than in others. In general, projects lacked insight into how gender mainstreaming and social inclusion could enhance project impact. Pakistan’s achievements in the highest number of female entrants and semi-finalists can be attributed to a gender-based priority and significant resources for communications and advocacy. In response to national priorities and context, South Africa attracted women, youth, and black entrepreneurs and had special award categories for women, youth, and innovation with social impact. Turkey’s social inclusiveness was through a Women-Led Entrepreneur and Youth-Led Entrepreneur Award in the 2015 cycle.

**GCIP’s Additionality**

35. Project steering and country conditions influenced elements of additionality, resulting in varying benefits across countries. A summary of elements contributing to GCIP’s additionality are depicted in Table 4. A new and unique value add for the innovation ecosystem was GCIP’s focus on early stage cleantech business acceleration that encouraged environmental outcomes (particularly GHG emissions reductions). GCIP encouraged a risk-taking mindset and provided startups with privileged access to local private experts. Entrepreneurs who are close to environmental and social problems were encouraged to use their indigenous insights for innovations that will help address them. To varying degrees, GCIP promoted collaboration among relevant entities and equipped national institutions and other ecosystem support actors with the capacities to sustain the ongoing organization of the competition-based Accelerator. GCIP was also able to leverage private sector finance to support promising cleantech solutions, however, policy and regulatory strengthening additionality was not realized.

*Table 4: GCIP’s Additionality in Project Design and Implementation*

| Additionality Elements              | Project Design | Results Achieved |
|-------------------------------------|----------------|------------------|
| <b>Innovation Additionality</b>     |                |                  |
| Focus on Clean Technology           | ✓              | ✓                |
| Early Stage Business Assistance     | ✓              | ✓                |
| Networking and Exposure             | ✓              | ○                |
| <b>Socio-Economic Additionality</b> |                |                  |
| Fostering Entrepreneurial Mindset   | ✓              | ✓                |
| Encouraging of Local Solutions      | ✓              | ✓                |

|  |   |   |
|--|---|---|
| Social Inclusiveness                                   | ✓ | ○ |
| Social and Economic Benefits                           | ✓ | ○ |
| <b>Institutional/Governance Additionality</b>          |   |   |
| Strengthening of Convener Role and Reputation          | ✓ | ○ |
| Collaboration and Partnerships                         | ✓ | ○ |
| <b>Financial Additionality</b>                         |   |   |
| Access to Venture Capital                              | ✓ | ○ |
| <b>Policy/Regulatory Additionality</b>                 |   |   |
| Strengthening of the Policy and Regulatory Environment | ✓ | × |
| <b>Environmental Additionality</b>                     |   |   |
| Fostering Cleantech Ideas, Solutions and Services      | ✓ | ✓ |
| GHG Emission Reduction                                 | ✓ | ○ |

Legend: ✓ Yes; × No; ○ Partial

### Factors Affecting GCIP Function and Sustainability

36. Likelihood of outcome sustainability at project completion is influenced by the quality of project preparation, quality of implementation and execution, country context, government support, and materialized co-financing<sup>19</sup>. These same factors affected GCIP function and sustainability.

#### ***UNIDO as Implementing Agency.***

37. UNIDO was well-suited to implement the GCIP. As the implementing agency, UNIDO's performance was rated in the satisfactory range for all GCIP completed projects. Armenia received a lowest rating of "mostly satisfactory" due to poor documentation of the project's activities and achievements. UNIDO has expertise developed over 20 years in technical cooperation for industry (especially SMEs) through technology transfer, low-carbon/resource-efficient industrial production, clean energy access for productive use, and capacity building for the implementation of multilateral environmental agreements. These competencies were leveraged under the GCIP framework.

38. UNIDO's GCIP implementation in 8 countries has generated experience and lessons from each national context. Although envisioned in each country Project Approval Document, the absence of a formal, cross-country systematic approach, and accompanying budget to support a global coordination effort, meant it was not fully realized. UNIDO experienced some challenges in identifying the management capacity to supervise and support projects. In 2016, responsibility for GCIP countries was distributed across several Project Managers. Varying project management/leadership approaches and understanding of terminology were observed, which complicates extrapolation and comparison of results. In Pakistan, and South Africa where the

<sup>19</sup> [GEF IEO Annual Performance Report 2017](#). Special focus on Sustainability. Unedited.

implementing teams felt especially empowered, the PMU was able to pilot new approaches, which have subsequently offered valuable models for replication (e.g. gender mainstreaming, national-level Investor Connect, Industry Challenge award). GCIP has enabled UNIDO to build up its expertise business acceleration for cleantech innovation, which is a new domain for international cooperation.

### ***Project Duration***

39. GCIP projects were designed to have a 3-year duration which was insufficient in all cases. Almost all had no-cost extensions, which prolonged their activities by up to an additional 26 months. Most extensions stemmed from delays in the initial stages related to understanding the concept, engaging the counterpart, and establishing the PMU. Nonetheless, the project duration was clearly insufficient, even in Armenia which had no extension, for pursuing the envisaged outcomes, particularly policy strengthening. This necessitated frugal spending to remain within the original budget covering a longer period. Projects with a longer duration would have the positive effect of deepening country ownership. It is also too short to expect to begin to gather meaningful impact data (on GHG emissions avoided, jobs created, investment leveraged).

### ***Cost Effectiveness***

40. All projects were in the satisfactory range for efficiency, with projects in India and Turkey rated as “Highly Satisfactory”. Seven (7) of 8 countries ran 3-5 cycles of the competition-based Accelerator<sup>20</sup>. Private sector contributions leveraged by GCIP were valued at just over USD 3 million. The mostly in-kind support was through sponsorship of prizes and pro bono activities of mentors, judges, trainers, advocates, and technical assistance provided by experts secured on an annual basis and matched to the extent possible, with the needs of each cohort. These activities formed a key pillar of project delivery, enlarged the available pool of resources and contributed to strengthening the national entrepreneurial ecosystem. However, the logistics related to regularly renewing these voluntary contributions do create an administrative burden on the implementing teams.

### ***Monitoring & Evaluation (M&E)***

41. There was little systematic monitoring and reporting in the projects where GCIP was first launched (Malaysia, Armenia, India). M&E was strengthened in subsequent delivery, where it also had higher expenditures. M&E allocations ranged from 1.5-5% of the GEF grant. Only the Thailand GCIP project has undertaken a mid-term review (MTR), although this was planned and budgeted for several other (Armenia, Malaysia, India, South Africa, Turkey, Pakistan) GCIP countries.

42. Implementing teams focused on tracking outputs rather than outcomes. Project Approval Documents mentioned indicators for outputs, outcomes, specific targets, and a means of verification. However, baseline information did not exist for most envisaged outcomes. Without orientation to develop the baselines and accompanying resourcing, the projects were more focused on tracking outputs rather than outcomes (e.g. received/eligible applications, semi-

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<sup>20</sup> The target for countries was 2-3 cycles. The additional Competition-Accelerator cycles were facilitated due to significant extensions in project duration, albeit covered with the original financing.

finalists, female-led teams, mentors, business clinics). Outcome formulation was also hampered by differences in understanding across the countries of key terminology (entrant, accreditation, commercialization, etc.)

### ***Country Selection***

43. There was no explicit strategy or established criteria for selecting countries to take part in the GCIP. Involvement depended primarily on a country's willingness to use some of its STAR allocation for GCIP, together with UNIDO's own institutional set up and presence of a regional office that could support the PMU. Thereafter, certain national conditions (interest of suitable local executing partner; vibrant academic scene; large SME sector; governmental interest in SME promotion; available infrastructure i.e. access to Internet, electricity) were considered positive factors for nurturing cleantech entrepreneurs. Countries that could potentially play a role as a regional hub (Armenia, Malaysia, South Africa, Turkey) were highlighted.

44. Encouraging countries to invest portions of their STAR allocation in GCIP ensured the initiative was 'demand-driven' and confirmed country buy-in and relevance. A more 'top-down' approach that reviews national conditions/criteria as part of country readiness to develop the cleantech entrepreneurial ecosystem and then 'selling GCIP' also has merit for its consideration of the potential of the initiative to be continued, scaled up or replicated in the region post-completion. A more balanced and integrated approach would serve to increase likelihood of sustainability.

### ***Host Institution***

45. The selection and engagement of the 'right' institution to host the GCIP, one with a convening role, was a critical factor in pursuing and sustaining project outcomes. GCIP project design documents did not mention any guiding criteria in the selection of host institution. In South Africa, GCIP supported the Technology Innovation Agency's (TIA) strategic objectives. Turkey's host, the Scientific and Technological Research Council (TÜBİTAK), used GCIP to support its mandate to stimulate transformation of research into products to invigorate the role of SMEs. Both these countries have successfully continued the GCIP initiative using more of their own resources. In India, GCIP was hosted by the Ministry of Micro-Small & Medium Enterprises (MSME). In its last year, the MSME turned the project over to IDEMI, its technology centre. Given IDEMI's highly technical focus, stakeholders were concerned about its capacity to play a convening role in the entrepreneurship ecosystem. The extent to which the PMU was embedded within the physical premises of the local host was also a key positive factor in terms of providing 'on-the-job' training opportunities for staff and cost efficiencies.

### ***Country Engagement***

46. National governments that prioritized cleantech technology, understood its strategic leverage, and made tangible links between GCIP and other initiatives, typically had higher country engagement and ownership for the initiative. Turkey, South Africa, Pakistan, Morocco have succeeded in making these tangible linkages more than in Armenia, Malaysia and India. The number of competition-based Accelerator cycles undertaken and the contribution of local

financial/human resources during the project period and after to assure continuity of activities were also key factors for national ownership of GCIP.

### ***Co-Financing***

47. In almost every country, no systematic mechanism was used to track the large portion of planned GCIP support that was committed by national governments and co-financing partners. In Pakistan, the PMU did successfully track these contributions. Co-financing commitments ranged from USD 2.6 to 6.3 million, which was 2 to 8 times the GEF grant level in the beneficiary countries. The total GEF grant of USD 11,130,426 for the 9 countries matched by the planned USD 38,150,169 attests to the intended catalytic effect, however no valuation methodologies were put forward from either UNIDO or the GEF.

### ***Financial Planning***

48. Except in Armenia and India, all countries allocated the highest proportion of the available GEF MSP grant to establishing the competition-based Accelerator. The institutional capacity building was next in level of resourcing. Across countries, the policy strengthening component was comparatively under-resourced (4-17.5% of the GEF grant), which may account for the limited effects achieved.

### ***Post-Program Support***

49. Once an annual competition-based Accelerator cycle concludes, there is no formal engagement between the GCIP and beneficiary entrepreneurs. There has been comparatively more informal post-program interaction with startups in India and South Africa, where international trainers, executing partners, and/or mentors have kept in touch in ad hoc ways, providing occasional advice and facilitating networking with investors and other startups. These interactions have remained opportunistic and have not been initiated with *all* former participants.

50. Stakeholders identified the lack of formal, systematic post-program engagement as an important shortcoming of the project's design, potentially compromising the sustainability of results. Post-project follow-up (e.g. through knowledge exchange platforms that would be maintained by the host institution or periodic networking events bringing participants together) is also critical for measuring the viability and growth rate of supported starts ups and necessary for verification of environmental and social benefits.

### ***Knowledge Management***

51. National knowledge management and exchange was more successful than envisaged South-South cooperation and international exchange. Even with UNIDO as the implementing agency for all 9 projects, GCIP has not systematically developed and shared knowledge across national projects through a global network. This may have been linked to the GCIP's implementation as individual level projects as opposed to a programmatic/global project approach with resources provided for this aspect. Exchanges could have taken the form of



networking events, regional Investor Connects, and relay of stories and lessons between countries.

### ***Exit Strategy***

52. Handover has been most successful in South Africa and Turkey. An exit strategy was not explicitly described in the project documents, however, UNIDO undertook implicit actions to assure handover to national structures. These included:

- (a) identified and worked with institutions that would retain the knowledge and skills developed under the project;
- (b) pursued country ownership through engagement of relevant public and private sector actors;
- (c) built local capacities (trainers, mentors, judges) to sustain the ongoing organization of the competition-based Accelerator;
- (d) assured access to training materials and infrastructure to manage applications (whether local, international, or centrally-shared);
- (e) provided clarity about the point at which exit would take place, based on targets and outcomes;
- (f) engaged in a handover process and transition where UNIDO support was phased out.

## **CONCLUSIONS AND RECOMMENDATIONS**

53. Conclusion 1: GCIP is highly relevant and will remain so as developing countries realize the economic and environmental opportunities to take up cleantech innovation as an engine of low-carbon growth.

54. GCIP projects are aligned with the mandates of GEF and UNIDO and national priorities and strategies for helping countries transition to low carbon economies. GCIP supported entrepreneurship ecosystems and fostered startups so that they may contribute to creation of 'green jobs' in countries ranked<sup>21</sup> lower in terms of having functioning cleantech innovation ecosystems. Institutional partners have confirmed the value and relevance of the GCIP, although not all countries are pursuing a second phase. Beneficiary startups have developed and advanced their cleantech ideas through project support. Going forward, the potential for cleantech SMEs in developing countries is estimated to be a USD 1.6 trillion market opportunity.

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<sup>21</sup> Ranking was undertaken by the Global Cleantech Innovation Index (GCII) which identifies countries with the greatest potential to produce startups that will commercialize clean technology innovations over the next 10 years. UNIDO/GEF partnered with GCI for the [GCI's 2017 Report](#) which was undertaken several years after the selection of the 9 GCIP countries to investigate, relative to GDP, where cleantech companies are most likely to emerge and why.

**Conclusion 2: GCIP projects have meaningfully contributed to development of cleantech innovation ecosystems with improved performance over time through business acceleration, capacity-building, and institutional strengthening. Effectiveness could have been improved through a more globally coordinated delivery, sufficient timeframe, and adequate resourcing.**

55. With the relatively limited resources of an MSP, all GCIP projects succeeded in promoting clean technology innovation by conducting annual business competitions and acceleration activities. Startups benefited through the development of business skills and access to mentoring, new markets, and investment. The GCIP also delivered outcomes *beyond* the level of individual businesses. In Turkey, Pakistan, and South Africa, the projects' host institutions further established platforms with relevant organizations to assure the continued organization of the competition-based Accelerator.

56. Cross-country scrutiny would have been more naturally carried out on a regular basis and generated less transaction cost if it had been under an overall program or global project framework with resources for coordination between projects. GCIP did not readily realize the results aggregation, cross-country network building and knowledge exchange foreseen in the individual Project Approval Documents. In addition, among the completed projects, almost all had no-cost extensions, which prolonged their activities by up to an additional 26 months. This mostly stemmed from delays in the initial stages, related to understanding the concept, engaging the counterpart, and establishing a PMU.

57. Conclusion 3: GCIP has demonstrated additionality but not in its planned strengthening of national policy and regulatory environments.

58. The GCIP demonstrated additionality through its promotion and results in innovation for clean technology; socio-economic returns; institutional capacity; realization of financing for some startups; and business support to enterprises whose products and services have environmental benefits.

59. Policy and regulatory strengthening additionality was not realized in a meaningful way because these project activities were limited, under-resourced, and generally embarked on at the later stage of implementation. Attention was diverted to the competition-based Accelerator which was requested by national counterparts and generated relatively fast outputs that could be immediately seen and promoted, giving the GCIP project a national standing and branding.

60. Conclusion 4: GCIP's operating model successfully enlarged the available pool of resources through catalyzing the support of private ecosystem actors, although this reliance on their voluntary contributions presents some vulnerabilities.

61. The reliance on annually customized private sector involvement is part of an operational model that contributes to strengthening the national ecosystem and sustaining project results and benefits, but one which requires significant local logistics. Individuals tapped for participation are not always available for each annual run. This meant that for each competition-based accelerator cycle, the PMUs were tasked with securing and renewing participation, which imposes a burden on administrators.

62. Conclusion 5: Commitment by a national entity, adequate funding and a planned exit strategy at project completion enhances prospects for sustainability.

63. The handover to TIA in South Africa and TÜBITAK in Turkey attest to the importance of ensuring that the transition to full national ownership takes place during the project period. The experience thus far attests that without this attribute, the initiative seems destined to not continue or may continue with significant delay, sacrificing important momentum (as evidenced by the case of GCIP Pakistan). All institutions involved in the implementation of GCIP projects expressed strong interest in continuation of the GCIP after project completion. However, the ability to finance the project initiatives remained mostly unsecured. Countries that ran more than 2-3 competition-based Accelerator cycles had greater success in transitioning the project to national institutions for continued delivery. UNIDO's continued association was indicated as vital to successful continuation and project reputation.

**Conclusion 6: The direct and indirect results of the GCIP are not easy to gauge due to generally weak monitoring and evaluation, including inconsistency in measurement and the lack of systematic guidance for project beneficiaries to estimate global environmental and socio-economic benefits.**

64. The projects' Theory of Change to higher-level impacts was found to be sound. However, M&E was amongst the GCIP's weakest areas of implementation. UNIDO has estimated impacts suggesting some tangible progress being made along this route, however long-term results cannot be verified at this stage. The short duration of GCIP projects requires systematic mechanisms for follow-up and verification with startups that go through the GCIP.

**Recommendation 1: Any future "GCIP" or similar program should be structured using a more globally coordinated approach with appropriate choice of interventions based on strategic country selection.**

65. A globally coordinated approach would allow for the establishment of a 'platform' to support more effective coordination, learning and exchange across national projects. Provided that the right metrics are in place for systemic monitoring and evaluation, this would usefully inform decision-making and support the measurement of impact. Country ownership of such a platform would facilitate measurement of impact after project completion.

66. Countries should be selected strategically based not only on their willingness to use STAR allocation but also factors concerning their current state and readiness to support cleantech innovation, particularly the mandate and capacities of the host institution and the way in which cleantech innovation is a part of national environmental and development strategy. This could be assessed during a project preparation phase.

**Recommendation 2: The GCIP should actively support national-level coordination to dynamize the cleantech entrepreneurship ecosystem.**

67. GCIP should focus on catalyzing the national host's mandate to coordinate, convene and communicate with actors already working in-country to support clean technology innovation. This includes using a more explicit system to categorize the significant volume of entrants who

apply, but are not selected, and channelling them to more suitable ecosystem actors according to their stage of development (of enterprise maturity and technology phase). This would require adequate resourcing and understanding of the national coordination role.

**Recommendation 3: Allow sufficient time to customize and sharpen the focus on policy strengthening and regulatory frameworks to foster cleantech innovation and its adoption.**

68. A conducive policy environment is needed to support the growth of the cleantech SMEs. The GCIP policy strengthening component needs to be adequately scoped, sufficiently resourced, embarked on at an early stage, with appropriate steering and according to local conditions. Allocating government co-financing commitments to this outcome would be a suitable dedication of national resources for creating inputs to ongoing processes, even post-project completion. Entities tasked with this outcome should have policy engagement as core to their own institutional mandate.

**Recommendation 4: Expand the network of private sector partners to address GCIP participants' needs for business expertise and early stage technology validation.**

69. GCIP should be more strategic in its approaches to access the desired external expertise of the private sector and integrate the private sector-specific technology challenges in its competition-based Accelerator for more beneficial collaborations. GCIP should tap into broader established private sector networks, e.g., technology associations, business school alumni, business owners' clubs, SME associations, trade associations, communities of practice, women's business associations, etc. Ideally, forming collaborations with such networks would be mutually beneficial as often such communities are looking for ways to provide services and opportunities to their own members. Processes that are involved in regularly renewing private sector should be streamlined.

**Recommendation 5: Measure direct and indirect impacts of the GCIP by establishing adequate monitoring and evaluation systems and ensure that they are implemented using standardized and relevant indicators.**

70. GCIP results frameworks should systematically gather information on outcomes and higher-level impacts/results. A common methodology and terminology is required for data collection and comparison. This could potentially include a *requirement* that beneficiary startups periodically provide relevant data to the local host organization (or platform) for a period into the future, when impacts are primarily felt and can be reliably quantified and verified.

71. GCIP attracts applications from startups that are developing technologies with environmental and social co-benefits beyond climate change. GCIP should also capture and report on these co-benefits. Startups should be able to present standardized GEB benefits to a large and growing impact investment community that is looking specifically for the creation of GEBs as part of the return on investment. The requirements of these investors should be carefully considered in the development of GEB targets, clarifying how aspirational GEB goals will be measured at the project- and global-level.

**Recommendation 6: Deepen country engagement during the project period, including a plan and resourcing, to sustain activities and expand outcomes after project closure.**

72. GCIP projects should dedicate greater effort to developing *national- and regional-level* initiatives. This would deepen country engagement and connect startups with investors and other business partners. GCIP should consider procuring trainers and materials through more open competition for service providers, with preference given to qualified vendors based locally and regionally.

## **ABBREVIATIONS AND ACRONYMS**

|         |  |
|---------|--|
| COP     | (UN Climate Change) Conference of the Parties  |
| CTO     | Cleantech Open   |
| EIF     | Armenia’s Enterprise Incubator Foundation  |
| GCII    | Global Cleantech Innovation Index  |
| GCIP    | Global Cleantech Innovation Programme  |
| GDP     | Gross Domestic Product   |
| GEF     | Global Environment Facility  |
| IDEMI   | India’s Institute for Design of Electrical Measuring Instruments                           |
| IEO     | Independent Evaluation Office  |
| MIGHT   | Malaysia Industry-Government Group for High Technology                                     |
| MSME    | Ministry of Small and Medium Enterprises (MSME)  |
| MSP(s)  | Medium-sized project(s)  |
| Mtons   | Million tonnes (of CO2) emission   |
| MTR     | Mid-term review  |
| M&E     | Monitoring and Evaluation  |
| NSTD    | National Science and Technology Development Agency (Thailand)                              |
| OFP     | Operational Focal Point  |
| PMU     | Project Management Unit  |
| PSC     | Project Steering Committee   |
| R&D     | Research and Development   |
| SME(s)  | Small- and Medium-Sized Enterprise(s)  |
| STAR    | System for Transparent Allocation of Resources   |
| STRIKE  | Malaysia’s Sustainable Technology for Resilient Innovative and Knowledgeable Entrepreneurs |
| TDF     | Technology Development Fund (Pakistan)   |
| TE      | Terminal Evaluation  |
| TIA     | South Africa’s Technology Innovation Agency  |
| ToC     | Theory of Change, Reconstructed Theory of Change   |
| ToR     | Terms of Reference   |
| TÜBITAK | Turkey’s Scientific and Technological Research Council                                     |
| UNFCCC  | United Nations Framework Convention on Climate Change                                      |
| UNIDO   | United Nations Industrial Development Organization   |
| USD     | US dollar  |

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## I. INTRODUCTION

### Evaluation Purpose and Objectives

73. The Global Environment Facility has a long history of engagement with the private sector<sup>22</sup>. The Global Environment Facility-United Nations Industrial Development Organization (GEF-UNIDO) Global Cleantech Innovation Programme (GCIP) is the major product of Modality 3 of the GEF-5 Revised Private Sector Strategy<sup>23</sup>.

74. The GCIP is one example of GEF's support to development of small and medium enterprises (SMEs). SMEs are, by definition, modest in size and constitute the backbone of developing economies where they account for the majority of employment and jobs created. Under the GCIP, support was focused on SMEs developing clean technologies and solutions that can deliver global environmental benefits (GEBs).

75. As part of the GEF Independent Evaluation Office's evaluations of GEF's engagement with the private sector, this report presents a summary of results of an independent evaluation of the GCIP. Incorporating both accountability and learning objectives, the following questions have been investigated:

- (a) What is the relevance and additionality of the GCIP in the participating countries?
- (b) How effective has GCIP been in meeting its planned outputs and outcomes?
- (c) How efficient was GCIP delivery?
- (d) What direct and indirect impacts did GCIP deliver? What was the additionality of the projects?
- (e) To what extent are the GCIP's results likely to be sustained in the long term?

### Evaluation Scope and Audience

76. The evaluation covers the implementation of the GCIP in 8 countries<sup>24</sup> (6 of which were launched in 2013). This evaluation was guided by a Concept Note prepared by the GEF IEO (Annex I). This report is intended to be useful to a broad range of audiences. It will inform the GEF Council, GEF Secretariat, participating country Operational Focal Points and UNIDO, as the implementing agency of the GCIP, to assist in improving the design, performance, and impacts of similar future initiatives.

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<sup>22</sup> The GEF has undertaken work with private sector engagement since 1996, when the first strategy for engaging the private sector was finalized based on a recognition that in order to bring about transformational change to the global environment, public and private sectors must work together.

<sup>23</sup> [Revised Strategy for Enhancing Engagement with the Private Sector](#). GEF/C.41/09/Rev.01, 10 November 2011

<sup>24</sup> At the time of evaluation, implementation has not yet begun in the 9<sup>th</sup> country – Ukraine, however project design documents were reviewed.

## Evaluation Methodology

77. A mixed-methods approach was applied for the evaluation encompassing quantitative and qualitative information. The evaluation draws on in-depth analysis and field verification by international consultants leading the Terminal Evaluations (TEs) in India, Pakistan, South Africa, and Turkey conducted just ahead of this global review. As part of these TEs, in-country interviews were held with participating startups, mentors, judges, investors, government counterparts, UNIDO project management, and other relevant stakeholders. Evaluative evidence was also retrieved from TEs of projects in Armenia and Malaysia, which closed in the previous 2 years. The following tools were used to gather and analyze data:

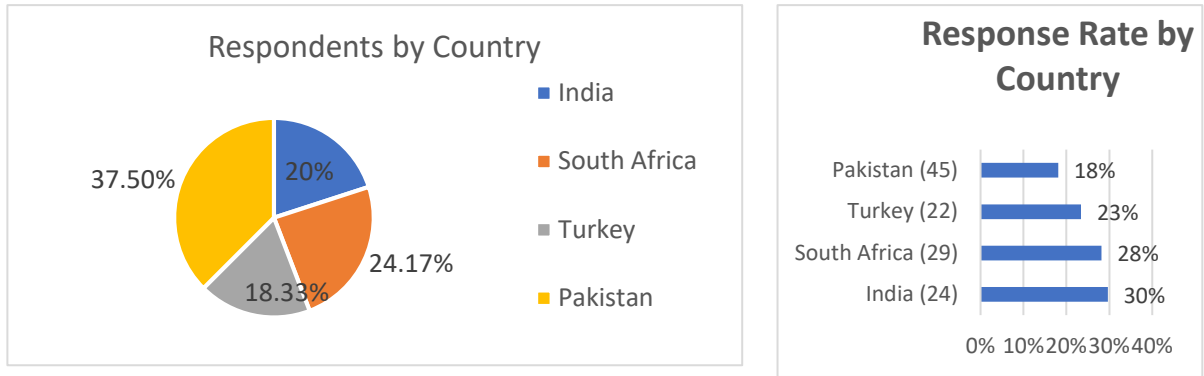
(a) A desk review of documents associated with the 9 country projects, including design documents, progress reports, TEs, promotional material and UNIDO-GCIP materials (Annex II)

(b) Interviews with 52 individuals in Washington, Los Angeles, Austria, and Switzerland (Annex III). Findings from interviews held as part of the TEs were also triangulated with other evidence and evaluative judgements used for reporting. The following groups provided input:

- (i) Participating entrepreneurs
- (ii) Mentors, Judges, Assistant Trainers
- (iii) Other ecosystem actors (incubators, accelerators, investors)
- (iv) UNIDO project management
- (v) Cleantech Open management and trainers
- (vi) GEF Secretariat Staff
- (vii) Experts in business acceleration and entrepreneurship ecosystems

(c) An online survey sent to GCIP participants in India, Pakistan, South Africa, and Turkey. In total, 493 people received the survey (see Figure 2).

Figure 2: Response Rates by GCIP Implementing Country to Online Evaluation Survey



(d) A second survey targeted UNIDO Project Managers at the Vienna headquarters and in-country (covering 17 respondents). This survey had a 100% response rate. Results from the surveys are presented in Annex IV and Annex V. Their findings are referenced throughout the main report.

78. Data analysis and development of findings was based on triangulation of information from multiple sources. This was undertaken collectively by the Evaluation Team to ensure the robustness and validity of the assessment.

### Limitations

79. Labelled as a global *programme*, UNIDO implemented GCIP as 9 separate national level *projects*. This evaluation, therefore, relies on data from these standalone country projects. Lack of a fully shared understanding of indicators, targets, and definitions has limited the comparability and aggregation of results.

80. GCIP projects were still underway in Morocco, Ukraine, and Thailand at the time of this review. The Evaluation Team has relied primarily on their project information forms, project implementation reports, available mid-term reviews, and relevant interviews.

81. The survey of GCIP participants had an overall response rate of 24%. Participation levels across the four countries differed (see Figure 2).

## II. HISTORY AND OVERVIEW OF THE GLOBAL CLEANTECH INNOVATION PROGRAM (GCIP)

### Background Theory for GCIP

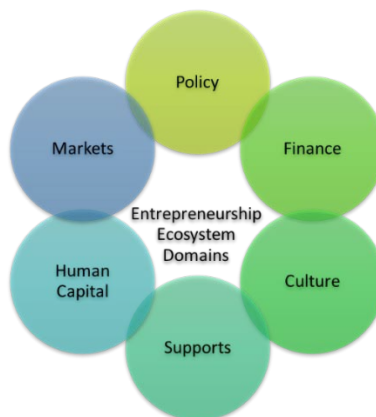
82. Providing early stage business assistance to support and advance entrepreneurs towards commercialization first emerged in the United States in the 1980s. This was in response to perceived limitations in prevailing economic development strategies, which focused primarily on large corporate expansions and recognition that entrepreneurs who take risks to commercialize new ideas, generated by the diffusion of science and technology, are pivotal for driving economic growth.

83. Accelerators and incubators are the most recognizable form of start-up assistance. They are both similar and different to one another. They both have positive spillover effects of facilitating firm growth/competitiveness, promoting innovation/entrepreneurship, generating employment, and reducing search costs for investors, while creating a pipeline of vetted technologies<sup>25</sup>.

84. GCIP has closely followed the accelerator model. Accelerators typically provide time-limited support to startups through structured programming and mentorship services designed to accelerate high-potentials to success or failure in a high-pressure environment that distinguishes the teams that prove most resilient. In contrast, incubators are of longer tenure (1-3 years), provide access to physical space, and a broad suite of services in a context where innovators can germinate and refine their ideas in the company of a supportive network of peers with guidance from experienced mentors.

85. The predominant metaphor for fostering entrepreneurship as an economic development strategy is the “entrepreneurship ecosystem”. This refers to the culture, enabling policies and leadership, availability of appropriate finance, quality human capital, venture-friendly markets and a range of institutional and infrastructural supports for startups as key elements for building a conducive environment. See Figure 3.

*Figure 3: Domains of the Entrepreneurship Ecosystem*



<sup>25</sup> Evaluating Business Acceleration and Incubation in Canada: Policy, Practice and Impact. Deep Centre: 2015

Source: D. Isenberg, 2011. Babson Entrepreneurship Ecosystem Project <http://entrepreneurial-revolution.com/>

86. A constellation of actors need to collectively contribute and benefit from the success of the overall ecosystem. For public officials, job creation and tax revenues may be primary drivers. For banks, a larger and more profitable loan portfolio is a benefit. For universities, knowledge generation and enhanced reputation are desired effects. For entrepreneurs and investors, wealth creation is the main motivating factor. Together, these actors contribute to eventual self-sustaining of the ecosystem with limited government involvement.

87. Entrepreneurship, innovation, and clean technology have been identified as vital instruments to deal with climate change challenges. The term 'cleantech' emerged after the 2001 'tech' boom collapse, when venture capitalists turned their attention to solar, biofuels, fuel cells, and renewable power generation<sup>26</sup>. In practice, a large portion of 'cleantech' involves energy-related technologies; however, the term includes a broad range of sustainable technologies in areas such as water, agriculture, waste, and materials.

### **GCIP Origin and Overview**

88. The GCIP traces its origins to the 2011 UN Climate Change Conference of the Parties (COP) in South Africa where the 'Greening the COP17' project (GEF ID 4515) was launched with GEF-UNIDO support. The objective of the project was to promote and scale up several activities under South Africa's National Greening Programme to reduce the carbon footprint of the COP 17 event<sup>27</sup>. The Innovative Technology Competition for private sector small- and medium-sized enterprises (SME) was one of 4 components<sup>28</sup> of this medium-sized project (MSP) and was intended to increase awareness of the role of clean technologies<sup>29</sup> in enhancing SME competitiveness.

89. The evaluation of the South Africa project<sup>30</sup> concluded that the competition for cleantech SMEs component was successfully organized, delivered a comprehensive business training program and created capacity for a future cleantech competition. Its limitation was the short timeframe to invite entries and sponsorships. The IEO review<sup>31</sup> of the TE agreed with the overall assessment of the competition pointing out the only target not met was attracting private sector sponsorship.

90. Based on the success of the South Africa project and its TE's recommendation, and as part of GEF's private sector strategy, GEF and UNIDO made a joint decision to develop a new global flagship program on cleantech for SMEs: GCIP. According to interviews, UNIDO initially proposed a programmatic approach and the GEF Secretariat indicated that it would be more

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<sup>26</sup> Cleantech Venture Capital: Continued Declines and Narrow Geography Limit Prospects, Devashree Saha and Mark Muro. Brookings Institute: May 2017

<sup>27</sup> Greening the COP17. Request for CEO Endorsement.

<sup>28</sup> The other three components were: Communication and awareness raising; Low-carbon public transport and Pilot installation of solar water heaters for health clinics to generate emission offsets.

<sup>29</sup> Cleantech held the promise of addressing ecological problems with new science, emphasizing natural approaches (including biomimicry and biology) in contrast to 'enviro tech', which represented the highly regulatory-driven 'end-of-pipe' technology of the past (e.g. smokestack scrubbers) with limited opportunity for attractive returns. [www.cleantech.org/what-is-cleantech/](http://www.cleantech.org/what-is-cleantech/)

<sup>30</sup> Independent Terminal Evaluation of the Greening the COP17 in Durban-South Africa Project. September 2013. UNIDO.

<sup>31</sup> Terminal Evaluation Review. GEF IEO. April 2013.

effective and efficient to implement GCIP through separate country projects. With a simpler approval process, these MSPs could be approved and executed more quickly. Global coordination was implicitly indicated in the Project Approval Documents, however without a specific budget for this management activity. It was not clear to the Evaluation Team if the decision to implement GCIP through 9 individual projects as opposed to a global program/project, was taken to test the viability, impact, and cost advantages of this alternative method.

91. GCIP focuses on the human capital, institutional support and policy domains of the entrepreneurial ecosystem. The focus considered the interlinked issues of employment, green growth, and the role of science and innovation in SME development. The projects also intended to establish linkages between the competition and the private sector at local and international levels. These interactions were limited at the time of GCIP's introduction in the implementing countries <sup>32</sup>.

92. In 2013, GCIP was launched in Armenia, India, Malaysia, Pakistan, South Africa and Turkey. Morocco and Thailand joined in 2016. The concept for a Ukraine GCIP with an accompanying Project Preparation Grant (PPG) was approved in August 2017. The CEO project approval came in October 2018. All are planned to run for 3 years with between USD 0.5-2 million in GEF funding, complemented by national co-financing (see Table 5). Only the most recent project in Ukraine has requested a PPG.

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<sup>32</sup> According to [Global Cleantech Innovation Index 2012](#). Cleantech Group Ltd. and WWF

Table 5: GEF Grants and National Co-Financing for GCIP in 9 Countries

| Country           | GEF Grant         | National Co-Financing<br>(X times level of GEF Grant)                      | Implementation Start Date | Extension of Duration, plus any added funds | Actual end date | # of cycles completed |
|-------------------|-------------------|--|---------------------------|---|-----------------|-----------------------|
| Malaysia          | 990,000           | 3,000,000 (3X)   | April 2013                | 6 months, at no cost                        | 31 Aug 2017     | 3                     |
| Armenia           | 547,946           | 2,600,000 (5X)   | May 2013                  | No extension                                | 30 April 2016   | 2                     |
| India             | 1,000,000         | 7,590,169 (8X)   | May 2013                  | 25 months, at no cost                       | 30 June 2018    | 4                     |
| Pakistan          | 1,369,863         | 4,000,000 (3X)   | Sept 2013                 | 22 months; USD 100'000 from UN funds        | 30 June 2018    | 4                     |
| South Africa      | 1,990,000         | 6,310,000 (3X)   | October 2013              | 23 months, at no cost                       | 30 Sept 2018    | 4                     |
| Turkey            | 990,000           | 2,950,000 (3X)   | October 2013              | 26 months, at no cost                       | 31 Dec 2018     | 5                     |
| Thailand          | 1,826,500         | 4,200,000 (2X)   | March 2016                | 22 months, no cost <sup>33</sup>            | 30 June 2019    | 3                     |
| Morocco           | 913,242           | 2,900,000 (3X)   | August 2016               | Probably; in discussion                     | Sept 2019       | 3                     |
| Ukraine           | 1,502,875         | 12,200,000 (8X)  | October 2018              | N/A   | Oct 2021        | -                     |
| <b>Total GCIP</b> | <b>11,130,426</b> | <b>38,150,169, which is 3.4 times the level of the total of GEF grants</b> |                           |   |                 |                       |

Source: Project Approval Documents, PMUs, and respective Terminal Evaluation Reports

<sup>33</sup> Expected to launch in August 2014, a 22-month extension was requested and led to an official start of the project in March 2016, following signature of the agreement with Thailand's Ministry of Industry's Department of Industrial Promotion, following cabinet approval granted on 12 January 2016



## Project Components

93. All GCIP projects are designed using a template based on 3 components, underpinned by monitoring and evaluation:

- (a) Component 1: National Cleantech Platform (i.e. a competition-based Accelerator) to promote clean technology innovations and business models in SMEs. The platform will organize an annual competition to first identify and then nurture emerging cleantech startups. Selected entrepreneurs benefit from mentoring, training on business plan development, customer validation, pitching, legal and intellectual property issues, government relations, angel/venture capital investment, scaling up and going global – with the aim of accelerating their technology and solutions towards commercialization;
- (b) Component 2: Institutional capacity building to sustain operation of the national cleantech competition-based Accelerator. National institutions and partners are trained on best practices in managing a cleantech platform including communication, advocacy, and other tools to stimulate applicants and disseminate results;
- (c) Component 3: Policy and regulatory framework strengthening for scaling up cleantech competition, innovation, and acceleration activities. This involves working with national actors to identify gaps in the policy/regulatory framework to develop and/or strengthen to favor cleantech innovation and support entrepreneurs.

94. Each national project's results framework followed the same logic with the same or similar outputs, outcomes, indicators and targets. Reflecting tailoring to a country's conditions, at times various targets were modified and components were re-sequenced. A Project Implementation Report (PIR) framework was drawn up to guide documentation, share progress on outputs and outcomes, and track activities against annual work plans. A call for an MTR and independent TE completed the M&E architecture.

95. Although GCIP projects were structured similarly, in response to country conditions and national priorities, there was some variation in country implementation strategies. Partly in response to local circumstances and partly due to steering by local actors' participating startups differed in the stage of organizational maturity<sup>34</sup> and technology development<sup>35</sup>. GCIP projects also achieved varying degrees of social inclusivity. Pakistan paid particular attention to recruiting teams led by women, youth and in the case of South Africa, they also included black entrepreneurs. Dedicated resources to translation of training materials was not the same across countries. Turkey, Morocco and Thailand translated training materials, which enhanced access of non-English speakers. Incentives also varied across countries, with Pakistan, for example, piloting an Industry Challenge award and Armenia and Turkey offering cash prizes to winners, whereas others did not.

96. Within each implementing country, the initiative was anchored through a local host (typically a government agency focused on SME development, science, and innovation). The host

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<sup>34</sup> Referring to organizational practices/processes, business skills, leadership competences, etc.

<sup>35</sup> Spanning alpha testing to actively deploying technology and already being profitable.

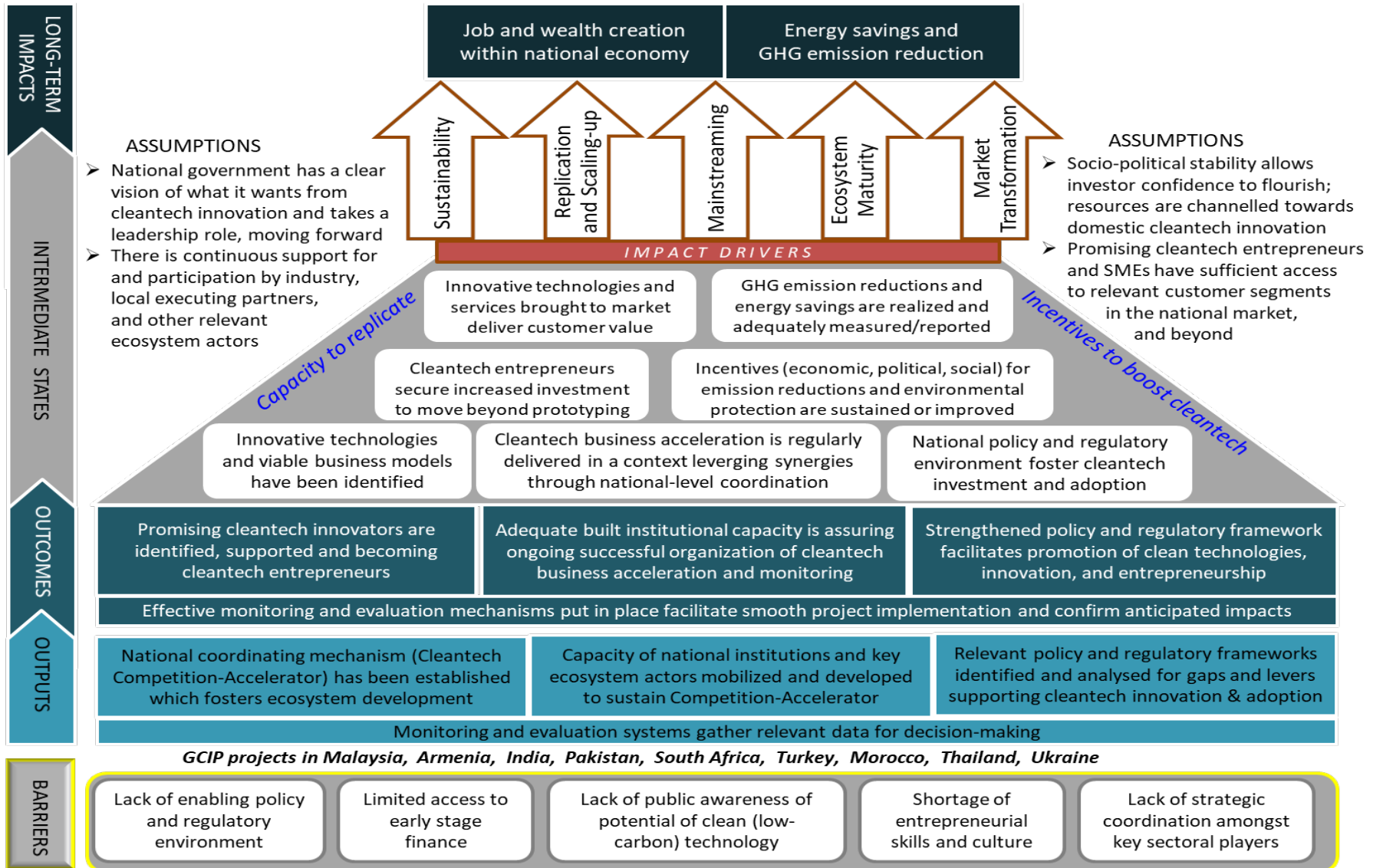
was supported by a Project Steering Committee (PSC) with relevant stakeholders and co-financing partners. Designed with the target to hold 2-3 annual competition-based Accelerator cycles over 36 months, national projects were expected to be fully operational following project closure, i.e. to be able to continue with the Accelerator with the institutional framework, capacities, and support in place to sustain the project's results and benefits.

### GCIP's Theory of Change (ToC)

97. The Evaluation Team constructed a ToC to reflect the GCIP's path to impact based on the documented design logic (see Figure 4). The ToC depicts the following:

- (a) Desired **high-level impacts** to which the intervention ultimately aimed to contribute for intended transformative effects;
- (b) Expected **pathways to impact, viewed as vital to realization of broader adoption** propelled through an array of **intermediate states** which are under the influence of project stakeholders;
- (c) **Assumptions**, which, if present, could positively influence the realization of intended impacts, although they are mostly beyond the control of implementing partners.
- (d) **Program components** (the output-to-outcome sets) underpinned by monitoring;
- (e) **Barriers** to entrepreneurship ecosystem development:
  - (i) Lack of an enabling regulatory environment
  - (ii) Limited access to finance (mismatch of startup needs and offers of government/financing institutions; lack of interaction between SME innovators and potential investors)
  - (iii) Lack of entrepreneurs' strategic business planning and marketing skills
  - (iv) Lack of coordination amongst sectoral players on market intelligence research (undermining decision-making regarding market opportunities and penetration strategies)
  - (v) Lack of public awareness regarding low-carbon innovation technology's market potential

Figure 4: GCIP's Reconstructed Theory of Change



## **Incremental Reasoning/Additionality**

98. GCIP projects were designed to address incremental reasoning/additionality of GEF involvement in the projects. The rationale cited for GEF support was to remove the above-mentioned barriers. Without GEF, it was deemed unlikely that the country could run a cleantech SME competition-based Accelerator in the coming years. This would result in lost opportunities to support entrepreneurs, reduce GHG emissions, strengthen partnerships with the private sector and share experiences with the region.

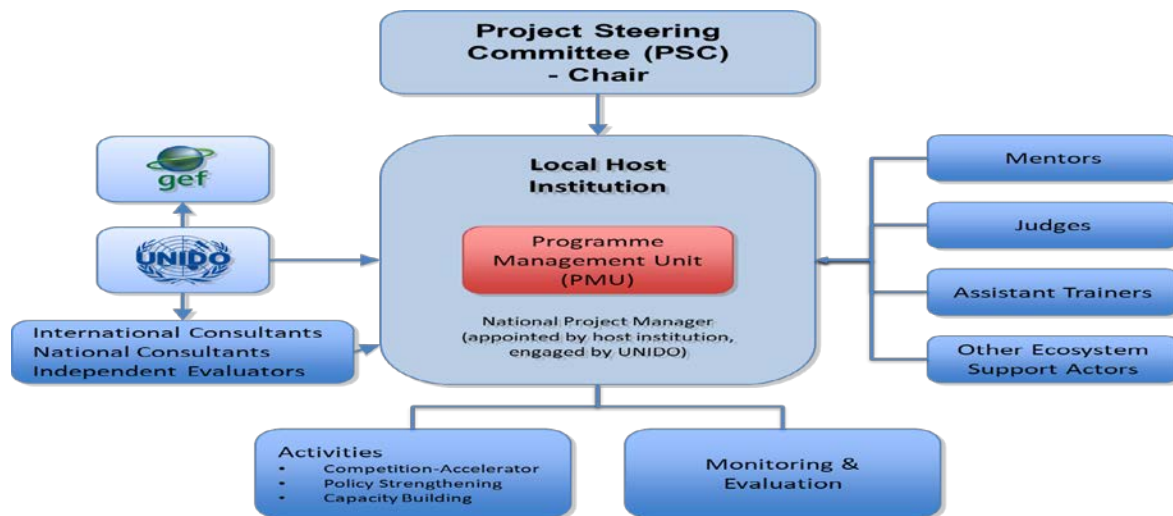
## **Management Arrangements**

99. All GCIP projects established a Project Management Unit (PMU) expected to be physically embedded in the local host organization. Headed by a National Project Manager engaged by UNIDO, the PMU was responsible for daily management and continuous monitoring of project implementation and performance in line with agreed work plans. The PMU established the M&E system according to the project's results framework and maintained the databases that were a prerequisite for efficient and effective project management, compiling details relating to applicants, their progress through the competition-based Accelerator, mentor and expert profiles, etc. The PMU was also responsible for undertaking outreach, awareness-raising, and coordinating all project activities carried out by contracted experts (national and international) and ecosystem actors who contributed primarily on a voluntary basis.

100. The PMU acted as the Secretariat of the Project Steering Committee (PSC) which was made up of public and private sector members. Chaired by the local host, members were those who would most likely benefit from project outcomes and who could contribute to sustaining results. The PSC's role was to provide strategic guidance on project implementation based on national imperatives and market needs; ensure adequate institutional support; and review/endorse annual work plans. PSC meetings were also designed to function as a monitoring device, with the presentation of structured reporting of the project's accomplishments based on which PSC members were to provide supervision and strategic guidance.

101. UNIDO provided the PMUs with management support and supervision. Initially, a single Project Manager in Vienna was responsible for all GCIP countries. In 2016, this responsibility was dispersed over several Project Managers, each handling 1, apart from 1 individual who was responsible for 2 countries (Pakistan, Morocco). UNIDO Project Managers were responsible for tracking overall project milestones and narrative reporting to the GEF (see Figure 5).

Figure 5: GCIP Project Implementation Management Structure. Source: UNIDO



## Delivery Mechanisms

### *Competition-based Accelerator Model*

102. With the lure of prizes and media attention, the Competition generated interest in cleantech, which was a nascent concept in many countries at the time of GCIP’s launch. A pool of innovators applied to GCIP. Those deemed most-promising would benefit from technical assistance<sup>36</sup> provided through the Accelerator. This notion is commonly used in the new product development process to transmit the need to start with many ideas, which are examined and whittled down, then shaped into concepts and tested until a final product is selected and launched. Integrating this notion into the GCIP process naturally filtered out many of the entrepreneurs that applied to the competition.

103. The GCIP’s competition-based Accelerator aimed to identify and nurture the most-promising cleantech startups through an “innovation funnel”. Entrants were screened and whittled down to a set of ‘semi-finalists’. Cleantech business concepts were shaped through training delivered by UNIDO’s partner, Cleantech Open (CTO) and mentoring sessions with local private sector actors (mentors, technical experts). GCIP participants then pitched to investors. From these ‘semi-finalists’, a 2<sup>nd</sup> round of judging identified several national ‘winners’, depending on the number of categories. The finalists were invited to compete against winning teams from other GCIP countries and pitch their ideas at the international Investor Connect during CTO’s annual competition at the Global Forum in Silicon Valley (see Figure 6). The Investor Connect was organized to bridge the gap between startups with innovations and investors who could, in theory, gain exclusive access to cleantech solutions. Stakeholders

<sup>36</sup> Technical assistance was offered for business model validation, customer identification, sales, marketing, intellectual property protection, corporate partnerships, government relations and regulations, funding, angel and venture capital, scaling up, and going global.

attested that those who completed the GCIP process were widely seen as 'high quality'<sup>37</sup>. In principle this would increase the likelihood for their innovations to reach the market, reduce GHG emissions, and create jobs. The GCIP model was described by its Turkish host, TÜBITAK, as "acting like a lever to bring up the quality of the overall eco-system".

Figure 6: GCIP Model's Process and Key Milestones



Source: GEF IEO Reconstruction of GCIP Model

104. 'Winners', 'runners-up' and other 'finalists' within the competition-based Accelerator were also assisted to take part in other various national and international platforms. These events included COP side events, Vienna Energy Forum; Young Enterprise Development Program in France, Grassroots Innovation Program in India, Swiss Start-up Program, etc. They could showcase their innovations at these fora and meet potential investors/ business partners to advance the commercialization of their products and services<sup>38</sup>.

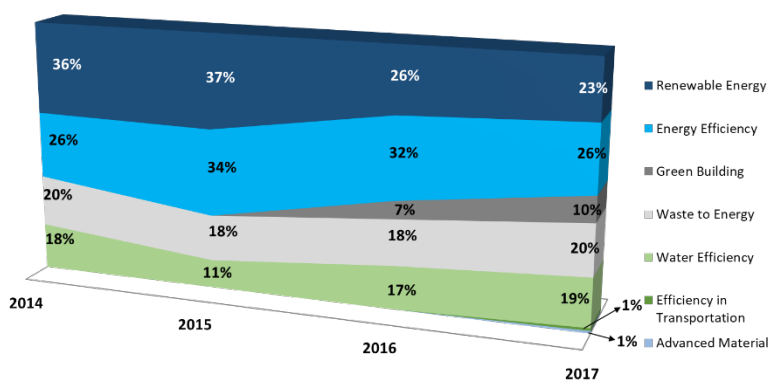
105. The competition-based Accelerator explicitly intended to promote entrepreneurial development and job creation for women. Targets for women entrepreneurs were established in 5 countries: 10% in Pakistan, South Africa and Turkey; 15% in Morocco and 30% in Thailand. Selection criteria were also used to provide preferential opportunities for women and special efforts made to attract female mentors, judges, and trainers. Special category awards were also created for women entrepreneurs. In Pakistan, this was the *Most Promising Woman-Led Business Award*; In Turkey: *Women-Led Entrepreneur*; In South Africa: *Best Female Team*; In Morocco (only in the last competition, in 2016), *Woman Entrepreneur Award*.

<sup>37</sup> Interviews with the Evaluation Team and Terminal Evaluations referring to their interviews with stakeholders in the field both attested to this finding.

<sup>38</sup> Such exposure enables innovation to flourish as startups question established techniques and approaches and develop a "pioneering spirit" Dr. Hervé Lebre, VP for Innovation, Ecole Polytechnique Fédérale de Lausanne; Martin Kenney, U of C Davis. *Understanding Silicon Valley: Anatomy of an Entrepreneurial Region* (2000). Stanford University Press

106. By the end of 2017, GCIP had supported 795 ‘semi-finalists’ across 8 countries<sup>39</sup>. An average of 32 ‘semi-finalists’ per cycle, per country, proceeded into the Accelerator, where 10-15 ‘finalists’ were identified, i.e. almost 50% of the ‘semi-finalists’ who competed for a national prize including the trip to Silicon Valley<sup>40</sup>. In Malaysia and Armenia where the GCIP was first launched, the annual average number of applicants was 55, whereas in the 5 countries that subsequently implemented the initiative, the average hovered around 240. GCIP Pakistan reached the highest number of total applicants (1,635) and ‘semi-finalists’ (249) over 4 annual cycles. (see Annex VI). The GCIP was designed exclusively as Climate Change focal area projects. The majority of startups in 2017 were active in Energy Efficiency (26%) followed by Renewable Energy (23%), Waste to Energy (20%), Water Efficiency (19%), and through more recently-introduced categories of Green Building (10%), Transportation (1%), and Advanced Material (1%) (see Figure 7)<sup>41</sup>. Profiles spread throughout the body of this report describe startups that are illustrative of the hundreds of innovations with global environmental/social benefits that have been supported by GCIP.

Figure 7: Evolution of Categories of Cleantech Solutions Generating Global Environmental Benefits



Source: UNIDO statistics based on total applications initiated during 2014-2017; see Annex VI

107. Participating startups entered the GCIP with varying levels of organizational maturity<sup>42</sup>. There were marked differences on this dimension across the national projects, as shown in Table 6. In India, almost half of surveyed startups had been in existence for over 4 years. In Pakistan and Turkey, the majority were less than 1 year old. In South Africa, a higher percentage of supported startups existed for 1-2 years.

<sup>39</sup> Not all national projects set targets for the number of teams/startups that would be supported. It is, therefore, difficult to put this number into context. South Africa, Turkey, Pakistan and Thailand set targets for number of *applicants* at 80-100 per annum. Only South Africa set a target for support to “semi-finalist” startups (initially 40-50/year and then revised down to 20-25/year).

<sup>40</sup> In the response to the GEF IEO survey an average of 51% of ‘semi-finalists’ reported they moved on to become ‘finalists’.

<sup>41</sup> Percentage distribution for recently introduced categories should not be seen as a trend or standard. In South Africa, beginning in 2018, applications from 2 additional GCI sectors, Medical Devices, Bioprocessing, were included, drawing on legacy activities of the host, which shows evidence of GCIP’s potential for replication.

<sup>42</sup> Referring to organizational practices and processes put into place and the business skills and leadership competences developed over time through distinct phases (imagining, incubating, demonstrating, promoting, sustaining). Each phase involves specific tasks, organizational skills, and leadership competences. There are also challenges in transitioning between phases. Professor Vijay K. Jolly, *Commercializing New Technologies: Getting from Mind to Market*. IMD: 2011

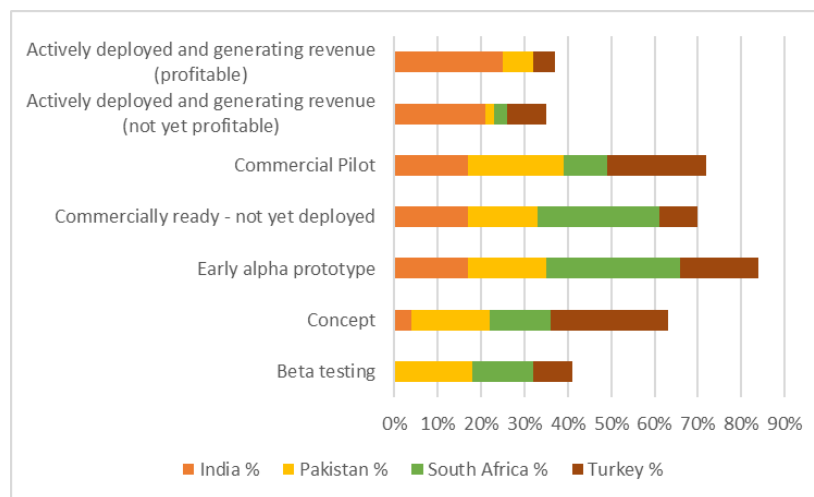
Table 6: Varying Enterprise Maturity Level of GCIP-Supported Startups, by Country

|                   | India (N=24) | Pakistan (N=45) | South Africa (N=29) | Turkey (N=22) | Overall (N=120) |
|-------------------|--------------|-----------------|---------------------|---------------|-----------------|
|                   | %            | %               | %                   | %             | %               |
| Less than 1 year  | -            | 47%             | 14%                 | 36%           | 28%             |
| 1 year            | -            | 22%             | 28%                 | 14%           | 18%             |
| 2 years           | 21%          | 13%             | 34%                 | 14%           | 20%             |
| 3 years           | 29%          | 2%              | 7%                  | 14%           | 11%             |
| 4 years           | 4%           | 4%              | 3%                  | 9%            | 5%              |
| More than 4 years | 46%          | 11%             | 14%                 | 14%           | 19%             |

Source: Evaluation Survey Results based on responses from 120 startups in 4 countries, where N is number of respondents in the country

108. Surveyed startups also entered the GCIP at varying stages of technology development. Most startups in South Africa and Turkey were also still in phases from early alpha to early commercial pilot. By contrast, startups supported in India were referred by other partners and consequently entered GCIP at a more advanced stage of development where they were actively deploying their technology and even working on a commercial basis, as shown in Figure 8

Figure 8: Varying Development Stages at Entry of GCIP-Supported Startups, by Country



Source: Evaluation Survey Results based on responses from 120 startups in 4 countries



109. In Armenia, Morocco and Pakistan, GCIP targeted university students, having identified that their proximity to research results would make them good early stage GCIP candidates. In Armenia, a total of 380 students participated (with a 74% completion rate) in training organized under the GCIP framework for Gyumri University, Yerevan State University, and National Polytechnic University<sup>43</sup>. In Morocco, over 200 students participated in meetings about cleantech and startup competitions, as a prelude to an envisaged Entrepreneurship Training Program designed for 100 students (with a target of 15% women)<sup>44</sup>. A targeted approach to universities was also adopted in South Africa in 2017, resulting in introductory workshops with students and staff from mostly engineering departments at 8 universities.

### *The Role of Cleantech Open*

110. Cleantech Open (CTO)<sup>45</sup> was contracted by UNIDO to manage and deliver the competition-based Accelerator across the GCIP implementing countries. CTO brought with it a long-standing approach to private sector cleantech innovation and business acceleration from Silicon Valley. Its network of experts included investors and serial entrepreneurs who could support GCIP startups during training and at the CTO Global Forum hosted annually in California, which brought together ‘winners’ from participating GCIP countries to meet and pitch their ideas to investors.

111. CTO’s training materials and standardized delivery tied together the experience of the GCIP countries. Online webinars were conducted in English with simultaneous participation across countries. Centrally produced in English, business training materials were assessed by the PMUs, startups, mentors, and judges as very valuable. They were used ‘as is’ in all countries apart from Morocco, Turkey, and Thailand where materials were translated. These materials were the basis for cascading the approach to local trainers who were to be equipped during the project period to deliver the content in subsequent phases. CTO further contributed by providing its online platform to manage applications and shared information gathered through this process in webinars delivered to startups and PMUs.

### *Private Sector Engagement*

112. The focus of GCIP projects is private sector development and engagement in emerging economics for global environmental benefits. Projects were designed to have private sector contributions as a key pillar of project delivery. Private sector engagement consisted of pro bono activities of mentors, judges, trainers, advocates, etc., as well as the assistance provided by technical experts (on intellectual property protection, product development) and sponsorship of prizes (each worth between USD 15,000-20,000). These inputs contributed to

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<sup>43</sup> Independent Terminal Evaluation Report of GEF UNIDO Cleantech Programme for SMEs in Armenia, April 2017

<sup>44</sup> Project Progress Update Report, FY 2017, for GCIP Morocco

<sup>45</sup> This Silicon Valley-based accelerator set up cleantech innovation hubs in the United States to find, fund, foster promising startups. Since 2005, CTO has supported 1200 early-stage startups through training, mentoring, and access to capital \$USD 1.2 billion of capital, creating over 3’000 green economy jobs <https://cleantechopen.org/>

strengthening the national ecosystem. Without them, there would be insufficient capacity to support the startups on their development journey.

### III. GCIP’S RELEVANCE, RESULTS AND ADDITIONALITY

#### Performance Ratings

113. All 6 completed projects were rated in the “Satisfactory” range for outcomes. Table 7 shows the performance ratings for the 6 GCIP projects evaluated to date<sup>46</sup>. In comparison, the overall outcomes rating for the climate change portfolio, as reported in the GEF IEO Annual Performance Review was 72% for the 2017 cohort and 77% for the total portfolio<sup>47</sup>.

*Table 7: Performance Ratings from Terminal Evaluations of GCIP Projects, by Country*

| Evaluation Criterion                         | ARMENIA   | MALAYSIA  | INDIA     | TURKEY    | SOUTH AFRICA | PAKISTAN  |
|--|-----------|-----------|-----------|-----------|--------------|-----------|
| <b>A. Impact Rating</b>                      | n/a       | S         | S         | S         | S            | HS        |
| <b>B. Project Design</b>                     | MS        | S         | MS        | S         | S            | HS        |
| Overall Design                               | MS        | MS        | MS        | S         | HS           | S         |
| Logframe                                     | MS        | MS        | S         | MS        | MS           | S         |
| <b>C. Project Performance</b>                |           |           |           |           |              |           |
| Relevance                                    | HS        | HS        | HS        | HS        | HS           | HS        |
| Effectiveness                                | MS        | S         | S         | S         | S            | HS        |
| Efficiency                                   | MS        | S         | HS        | HS        | S            | S         |
| Overall Outcomes Rating                      | MS        | S         | S         | S         | S            | HS        |
| <b>D. Sustainability of Benefits</b>         | <b>ML</b> | <b>ML</b> | <b>ML</b> | <b>ML</b> | <b>L</b>     | <b>HL</b> |
| <b>E. Cross-cutting performance criteria</b> |           |           |           |           |              |           |
| Gender Mainstreaming                         | n/a       | MS        | U         | S         | S            | HS        |
| M & E  | MU        | MS        | MU        | S         | S            | S         |
| Results-Based Management                     | n/a       | n/a       | HS        | S         | S            | HS        |
| <b>F. Performance of partners</b>            |           |           |           |           |              |           |
| UNIDO  | MS        | S         | HS        | S         | HS           | S         |
| National Counterparts                        | n/a       | n/a       | HS        | S         | HS           | S         |
| Donor  | n/a       | n/a       | HS        | HS        | HS           | HS        |
| <b>G. Overall assessment</b>                 | MS        | S         | S         | S         | S            | HS        |

#### Strategic Relevance

114. All 6 of the completed GCIP projects have been rated “Highly Satisfactory” for relevance. Four countries are currently planning a 2<sup>nd</sup> phase Under GEF-7: Pakistan, South Africa, Thailand and Turkey. In Armenia, a 2<sup>nd</sup> phase was part of the National Portfolio Formulation Exercise,

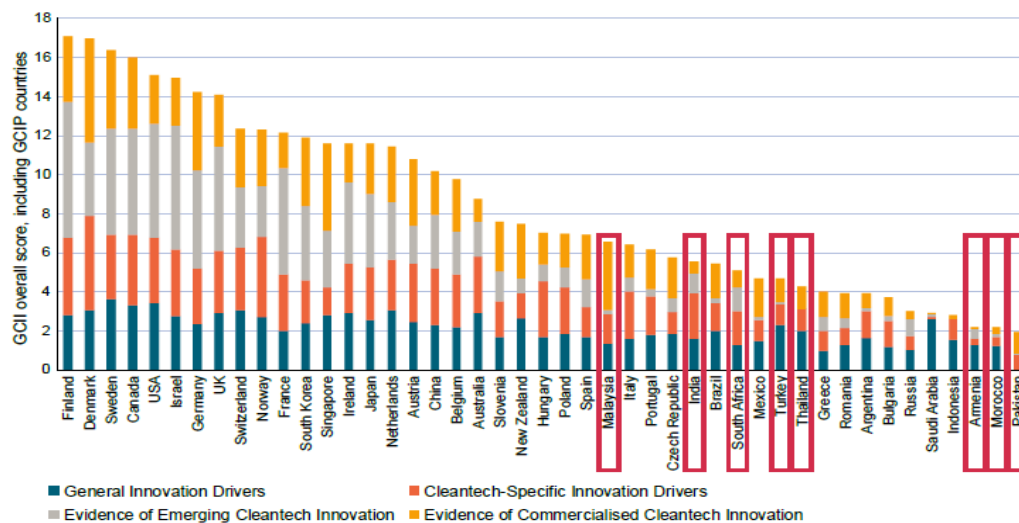
<sup>46</sup> According to GEF/UNIDO’s evaluation criteria and 6-point scale: Highly Satisfactory (HS); Satisfactory (S); Moderately Satisfactory (MS); Moderately Unsatisfactory (MU); Unsatisfactory (U); Highly Unsatisfactory (HU). Sustainability of Benefits is rated from Highly Likely (HL) to Highly Unlikely (HU)

<sup>47</sup> [GEF IEO Annual Performance Report 2017](#). Cohort of 2017 CC projects is 71 projects; total portfolio is 376 projects.

but it was ultimately not supported in GEF-6. In Malaysia, the host, Malaysia Industry-Government Group for High Technology (MIGHT), also expressed interest to continue the competition-based Accelerator beyond project completion; however, its submission for a 2nd phase was also not endorsed. Malaysia has instead rebranded the initiative as Sustainable Technology for Resilient, Innovative & Knowledgeable Entrepreneurs (STRIKE). The reason for decisions not to continue the competition-based Accelerator are not known to the Evaluation Team.

115. In 2017, the Global Cleantech Innovation Index (GCI<sup>48</sup>) placed all GCIP implementing countries (8 at that time) within the lower half of its rankings. This suggests that there was a need and opportunity in all GCIP countries to develop the cleantech innovation ecosystem. Malaysia was the highest ranked amongst the GCIP countries analyzed and Armenia, Morocco and Pakistan formed the bottom 3 of the 45 countries reviewed (see Figure 9).

Figure 9: Comparison of GCIP Implementing Countries within Global Cleantech Innovation Index, 2017



Source: The Global Cleantech Innovation Index 2017. GCIP Country Innovation Profiles

116. The state of the entrepreneurial ecosystem for innovation shows improvements in the profiles of most GCIP countries during GCIP’s implementation (see Table 8<sup>49</sup>). The GCIP cannot take the credit for this. However, the improvement is an indication of the value that can be gained from strengthening the national entrepreneurship ecosystem and supporting the

<sup>48</sup> The GCI identifies countries with the greatest potential to produce startups that will commercialize clean technology innovations over the next 10 years. UNIDO/GEF partnered with GCI for the [GCI's 2017 Report](#) which was undertaken several years after the selection of the 9 GCIP countries to investigate, relative to GDP where cleantech companies are most likely to emerge and why.

<sup>49</sup> The Global Innovation Index contains 80 indicators that explore a broad vision of innovation, including political environment, education, infrastructure, and business sophistication.

development of cleantech-specific innovation drivers, which were limited in these countries at the time of GCIP’s introduction.

*Table 8: Comparison of GCIP Country Rankings on the Global Innovation Index, 2013 and 2018*

| Country      | 2013 ranking (of 142 countries) | 2018 ranking (of 126 countries) |
|--------------|---------------------------------|---------------------------------|
| Malaysia     | 32                              | 35                              |
| Thailand     | 57                              | 43                              |
| South Africa | 58                              | 58                              |
| Armenia      | 59                              | 68                              |
| India        | 66                              | 57                              |
| Turkey       | 68                              | 50                              |
| Ukraine      | 71                              | 44                              |
| Morocco      | 92                              | 76                              |
| Pakistan     | 137                             | 109                             |

117. GCIP was consistent with national priorities to encourage entrepreneurial activity and development of the SME sector<sup>50</sup>. GCIP was also fully relevant to national priorities of environmental protection. All GCIP countries have national plans/strategies that envision achieving prosperity and sustainable socio-economic progress through use of science, technology, and innovation. However, they lack necessary elements of a functioning entrepreneurial ecosystem. GCIP’s focus on cleantech business acceleration aligned it with national commitments to the UNFCCC, including the 2015 Paris Agreement and policies that recognize energy efficiency and renewable energy as keys to ensuring energy security and availability.

118. GCIP projects are fully aligned with GEF’s Revised Strategy for Enhancing Engagement with the Private Sector<sup>51</sup>; relevant to the GEF’s Climate Change Focal Area objectives, and the GEF Policy on Gender Mainstreaming<sup>52</sup>. Modality 3 of the Private Sector Strategy is dedicated to an “SME Competition Pilot for Encouraging Entrepreneurs and Innovators through a

<sup>50</sup> SME development is the economic backbone in all GCIP countries. From the respective project documents: in Armenia, SMEs accounted for 97.7% of registered legal entities/sole proprietors. Pakistani SMEs contributed 40% to GDP, 25% to manufacturing value-add, and provided 79% of non-agriculture jobs. In Thailand, SMEs account for 36% of GDP, 84% of national workforce, spent 16-25% of total production cost on energy. In Malaysia, SMEs were expected to generate 41% of GDP by 2020 [www.sciencedirect.com/science/article/pii/S1877042816305584](http://www.sciencedirect.com/science/article/pii/S1877042816305584)

<sup>51</sup> [Revised Strategy for Enhancing Engagement with the Private Sector](#). GEF/C.41/09/Rev.01, 10 November 2011

<sup>52</sup> [GEF 5 Gender Mainstreaming Policy](#)

Competition/Incubation Pilot”. GCIP supported the “demonstration, deployment, and transfer of innovative low-carbon technologies”; “market transformation for energy efficiency in industry and the building sector”; “investment in renewable energy technologies”; and “energy efficiency, low-carbon transport and urban systems”<sup>53</sup>. Reflecting recognition that gender equality enhances economic growth, household poverty reduction and human development, GCIP included an intention to promote women for entrepreneurs.

119. GCIP was relevant to UNIDO’s mandate for Inclusive and Sustainable Industrial Development and aligned with UNIDO’s Green Industry Initiative<sup>54</sup> and Energy Strategy<sup>55</sup>. UNIDO leveraged its significant experience in technical cooperation for industry (especially SMEs) and introduced the Industry 4.0<sup>56</sup> concept to government officials through visible applications and concrete examples. UNIDO’s appointment of an overall GCIP Coordinator (August 2017) and the creation of a Climate Technology and Innovations Division (June 2018) demonstrate a commitment to support Member States in unlocking global environmental benefits through clean technology innovation and entrepreneurship.

120. The timeliness of the GCIP’s implementation enhanced its relevance. Emerging economies are increasingly powering growth and innovation in clean technology. In 2012, clean technology investment rose by 19% in developing countries (to USD 112 billion per year) compared with an overall decline of 12% globally (to USD 244 billion per year), suggesting that clean technology investment is shifting towards developing economies in the near term<sup>57</sup>. In India, GCIP’s relevance *increased* since its 2013 inception, given the 2014 launch of [Make In India](#) and [Swachh Bharat Abhiyan](#). These initiatives promote nationally-developed clean technology solutions.

## Results – Environmental Outcomes

121. All assisted GCIP startups are developing innovations with climate benefits, as well as environmental and social co- benefits. Table 9 describes *illustrative* innovations that attest to the nature of these benefits. At this stage, their results and continued operations cannot be verified. The information is drawn from GCIP implementation in South Africa. Annex VII (and profiles distributed throughout the report) provides *additional* environmental innovations across countries.

*Table 9: Illustrative GCIP-Supported Innovations in South Africa Delivering Environmental Benefits*

|                   |   |
|-------------------|---|
| Energy Efficiency | <b>AET Africa</b> (2016 most-promising youth-led business): its Hot Spot geyser sleeve can be used in households to conserve, reuse, and improve water heating mechanisms; following market |
|-------------------|---|

<sup>53</sup> [GEF 5 Focal Area Strategies](#)

<sup>54</sup> [UNIDO Green Industry Initiative](#)

<sup>55</sup> UNIDO Energy Programme. [Sustainable Energy for Inclusive Development and Climate Action](#)

<sup>56</sup> Referring to the 4th industrial revolution and current trend of automation and data exchange in manufacturing facilitated by the Internet of Things, cloud computing, and smart factories

<sup>57</sup> [Building Competitive Green Industries: The Climate & Clean Technology Opportunity for Developing Countries](#). 2014.IBRD.

|                  |  |
|------------------|--|
|                  | validation. Under support from TIA and others, a manufacturing plant was to be launched in Eastern Cape’s rural district in September 2018   |
| Renewable Energy | <p><b>Solar Veranda</b> (2015 youth-led team): uses a veranda to provide shade, solar heat and collect rain water for low-cost houses; successfully raised funds to construct prototypes, won 2017 Eco-logic gold award for best eco-innovation, in commercialization</p> <p><b>Eco-V</b> (2015 2<sup>nd</sup> runner up”) its GreenTower microgrid provided affordable electricity, fresh water, hot water, and sanitation from renewable resources for self-sustainable communities. After registering a patent, was investigating industrial scale applications</p> |
| Water Efficiency | <b>Baoberry</b> (2016 ‘winner’ and most-promising woman-led team): developed a compact mobile version of an artificial wetland providing a natural, sustainable way to improve water quality in poor communities; getting ready to offer to various markets  |
| Waste-to-Energy  | <p><b>Clear Sky Energy</b> (2014 ‘winner’): its waste-to-energy plants utilize carbonaceous waste to produce energy, thereby diverting it from landfill; in discussion with European waste companies to license its core technology</p> <p><b>Ekasi Energy</b> (2015 ‘winner’): its micro-gasifier stove efficiently burns biomass, reducing smoke and carbon monoxide fumes by over 90%; is working with the local community to use alien tree vegetation (which threatens water security) as raw bio-waste input</p>   |
| Waste Reduction  | <b>Gracious Nubian</b> (2017 ‘runner up’ and social impact award winner): its reusable biodegradable sanitary pad reduces the environmental impact of modern sanitary protection (disposable pads take 500-800 years to decompose); its products are available to women and girls in rural areas   |
| Green Buildings  | <b>Thevia</b> (2016 ‘runner up’) developed a 99.4% recyclable roof tile that is stronger, lighter, less prone to breakage, and quicker to install than concrete alternatives; the company is already in the market, producing 300,000 to 500,000 tiles per month   |

Source: GCIP South Africa commemorative book, December 2017

122. In the absence of M&E systems operating in each GCIP implementing country beyond the project period, GHG reductions will be difficult to confirm. Emission reductions are foreseen to be achieved over a 10-year period (e.g. 2013-2023), which is substantially beyond the envisaged duration of the national projects (Table 10)<sup>58</sup>. There are no systems currently in place to check the realization of these projected achievements.

<sup>58</sup> Targets were set following the GEF Manual’s calculation approach under the Climate Change Focal Area. The most recent project in Ukraine based its target (which is relatively lower) on the experiences of the preceding GCIP projects and used a different method for GHG calculation.

Table 10: Country Targets for GHG Emissions Avoided due to GCIP Implementation, in tons of CO2 equivalent

| Malaysia  | Armenia  | India   | Pakistan   | South Africa   |
|---|--|---|--|--|
| 425,000 to 849,000  | 18,408.75 to 36,817.5                                      | 350,000 to 700,000  | 452,000 to 904,000   | 815,000 to 1,630,000                                     |
| unit abatement cost from USD 1.18 to 2.36 per ton of CO2  | unit abatement cost from USD 14.88 to 29.77 per ton of CO2 | unit abatement cost from USD 1.43 to 2.86 per ton of CO2  | unit abatement cost from USD 1.50 to 3.03 per ton of CO2   | unit abatement cost from USD 1.22 to 2.44 per ton of CO2 |
| Turkey  | Thailand   | Morocco   | Ukraine  |  |
| 730,000 to 1,460,000                                      | 811,500 to 1,623,000                                       | 200,922.5 to 401,845                                      | 200,000 (new method introduced) based on the estimation that 200 entrepreneurs participate in the project; unit abatement cost was not mentioned |  |
| unit abatement cost from USD 0.68 per 1.36 per ton of CO2 | unit abatement cost from USD 1.23 to 2.46 per ton of CO2   | unit abatement cost (from USD 2.27 to 4.55 per ton of CO2 |  |  |

Source: Request for MSP Approval for the respective country projects

123. Only 2 TEs (South Africa and Pakistan) included projections of GHG emissions reduced and described the methodology used to make the assessments<sup>59</sup>. The respective PMUs tried to gauge potential performance against the set target by gathering information from a small subset of startups and extrapolating this to the larger set. The estimates of GHG emission reductions provide insight into which types of innovations could generate which magnitude of reduction, but these calculations raise questions regarding methods used to arrive at the numbers and the targets.

Pakistan: GHG emission reduction of 7 startups was calculated to reach an emission reduction of 196.96 tCO2e per year. Extrapolated to 95 active projects, this suggested an annual reduction of 2,672 tCO2e<sup>60</sup>, **substantially exceeding the targeted level in the project’s results framework**;

South Africa: Input from 9 startups (see Table 11) arrived at an overall long-term projection. However, estimates were requested for different timeframes (2019, 2025). **A common methodology was not apparent within or across technology categories, making linear extrapolations a challenge for the wider group.** Entrepreneurs based their projections on perceived sales. They were not asked to clarify projected savings (i.e. kWh avoided or reduced, etc.). Within this small sample, the lion’s share of potential GHG savings stemmed from a single respondent in the Energy Efficiency category.

<sup>59</sup> India’s TE states: “Reporting on GHG reductions was not required through GCIP India”.

<sup>60</sup> Drawn from a study which outlined the calculation methodology, presented at the International Science-Policy Conference on Climate Change (18-20 December 2017) published in its journal <http://sp3c.org.pk/>

Table 11: Projected GHG Emission Reductions from Sampling of GCIP Innovations in South Africa

| Company Name                       | Technology and/or Product  | Potential Climate Change Impact in tCO <sub>2</sub> e |                                    |
|------------------------------------|--|---|------------------------------------|
|                                    |  | 2019 (projected)                                      | 2025 (projected)                   |
| Ducere Holdings (Pty) Ltd.         | MISER Hydraulic Hybrid Transmission                                    |   | 30 million                         |
| Volta                              | Volta Flow Battery   |   | 32,000                             |
| NewCarbon (Pty) Ltd.               | Transforms biomass into activated bio-carbon, wood vinegar, and energy |   | 75,500                             |
| Ekasi Energy                       | Smokeless stoves   | 4,131   |                                    |
| Pegasus Engineered Green Mobility  | Pegasus multi-fuel technology  | 3,424   |                                    |
| Solar Turtle                       | Solar Turtle   | 117,945   |                                    |
| Eco-V                              | GreenTower microgrids  | 21,000  |                                    |
| Thevia                             | Thevia Roof tiles  | 35,397  |                                    |
| Sustainability Professionals       | Mashesha Stoves  |   | 52,000                             |
| <b>Total Projected GHG savings</b> |  | <b>181,897 tCO<sub>2</sub>e</b>                       | <b>30,159,000 tCO<sub>2</sub>e</b> |

Source: GCIP South Africa PMU, 2018

### Pakistani Startup Delivers Environmental Benefits and New Jobs

Optimizing Natural Gas, Electricity, and Water Use with Intelligent Device

Zaheen Machines started over a conversation between two friends about developing a product to save natural gas wasted in legacy water heaters due to poor thermal insulation and a 1960s thermostat concept. Users to go outside, turn on the water heater, wait 30 minutes, shower, then go again to turn it off. They created an intelligent device that can be snapped onto an existing water heater's thermostat, which users operate through an app, saving 50% on utility bills for gas-burning water heaters and repaying the price in less than 1 winter season, with continued savings for years to come. Having reached 1<sup>st</sup> runner up in 2015 for Energy Efficiency, the GCIP provided a great way to increase awareness of the company's product and acquainted the team with other entrepreneurs in Pakistan and globally. Zaheen projected GHG emission savings of 150 tCO<sub>2</sub>e per year by 2020, the creation of 100 new jobs, and a doubling of its revenue to USD 1 million.



124. Select startups in 5 countries have also reported on their estimated GHG emission reductions (see Annex VII). While showing promise, it is still too early to judge the quality of these projected impacts. Many of the teams that took part in the GCIP still lack the financial resources needed to test and transform their ideas and concepts into reality, or the enterprises



were still at a nascent stage and concepts had not been sufficiently tested under the GCIP to judge their merits.

125. Tracking and communicating positive environmental impacts (global climate stress reductions and improvement in environmental status) is difficult for many GEF projects as they usually take place well beyond project completion. This challenge for GCIP is exacerbated by a lack of standardized methodology for target setting and projection of impacts.

## Results - Benefits to SMEs

### *Business Development Services*

126. Targets were exceeded in India, Pakistan, South Africa and Turkey, for the number of competition-based Accelerator cycles. Consequently, a higher number of businesses were put on a path to commercialization. This would, in principle, increase the likelihood for their innovations to reduce GHG emissions, reach the market and create jobs.

127. Survey responses indicate that participating startups highly appreciated GCIP's business development training services. Stakeholders supported the notion of a competition as an overarching entry to the GCIP Accelerator. For startups, many typically had an engineering background and were often solely focused on technology, product design, and proof-of-concept. GCIP helped them recognize and address critical barriers to commercialization through the competition-based Accelerator component.

128. *Business development training* was most frequently ranked as the most beneficial element of GCIP by respondents, with 40% of all respondents ranking it #1 out of the eight components listed<sup>61</sup>. 68% of respondents ranked it as one of the top 3. This is followed by *Mentorship on business development*, which 19% of all respondents ranked as the #1, and 56% ranked as one of the top 3, and *Opportunities to showcase technologies*, which 13% of respondents ranked as #1, and 47% ranked as one of the top 3 most beneficial components (Table 12). Respondents ranked *Connection with an Investor Network/Potential Business Partners*, *Increased capacity of supporting government institutions* and *Improving the policy and regulatory environment* as the least beneficial (see Annex IV)<sup>62</sup>.

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<sup>61</sup> GCIP support elements: *Training for Business Plan Development*, *Connection with an Investor Network*, *Technical Advice through Sector Experts*, *Mentorship on Business Development*, *Opportunities to Showcase Technology*, *Connection with Potential Business Partners*, *Improving the Policy and Regulatory Environment*, *Increased Capacity of Government Institutions*.

<sup>62</sup> GCIP Project Managers ranked *Opportunities to Showcase Technology*, *Connection with Potential Business Partners* and *Connection with an Investor Network* as the top three benefits and ranked lowest *Improving the Policy and Regulatory Environment for Business Operations* (Annex V).

Table 12: Top 3 Responses to Survey Question: Rank the following components of GICP from most to least beneficial

| Values                                  |                              | India (n=24) | Pakistan (n=45) | S.Africa (n=29) | Turkey (n=22) | Overall (n=120) |
|---|------------------------------|--------------|-----------------|-----------------|---------------|-----------------|
| Business development training           | Ranked as #1 most beneficial | 33%          | 44%             | 34%             | 45%           | 40%             |
|   | Ranked in top 3              | 67%          | 71%             | 59%             | 73%           | 68%             |
| Mentorship on business plan development | Ranked as #1 most beneficial | 25%          | 13%             | 17%             | 27%           | 19%             |
|   | Ranked in top 3              | 54%          | 38%             | 66%             | 82%           | 56%             |
| Opportunities to showcase technologies  | Ranked as #1 most beneficial | 25%          | 13%             | 10%             | 0%            | 13%             |
|   | Ranked in top 3              | 67%          | 47%             | 48%             | 23%           | 47%             |

Source: Evaluation Survey Results based on 120 responses from 4 countries, where N is number of respondents to the question

129. *Business development training* was rated as the *highest quality* service provided by GICP. This was followed by *mentorship*, and *opportunities to showcase their technology*. The results also pointed to limitations related to quality of networking activities with investors and business partners. India participants also rated *technical advice through sector partners* as lower quality (see Table 13<sup>63</sup>).

Table 13: Responses to Survey Question: How Would You Rate the Quality of Services You Received?

|   | India |       | Pakistan |       | South Africa |       | Turkey |       | Overall |       |
|---|-------|-------|----------|-------|--------------|-------|--------|-------|---------|-------|
|   | N     | Score | N        | Score | N            | Score | N      | Score | N       | Score |
| Number of responses, Weighted Score (out of 10) |       |       |          |       |              |       |        |       |         |       |
| Business development training                   | 20    | 7.50  | 45       | 7.51  | 29           | 8.00  | 22     | 8.27  | 116     | 7.78  |
| Connection with an investor network             | 23    | 4.61  | 45       | 4.76  | 29           | 4.69  | 21     | 4.86  | 118     | 4.73  |
| Technical advice through sector experts         | 22    | 3.64  | 44       | 4.91  | 29           | 4.76  | 21     | 5.33  | 116     | 4.71  |
| Mentorship on business development              | 21    | 5.90  | 45       | 6.04  | 29           | 6.41  | 21     | 7.33  | 116     | 6.34  |
| Opportunities to showcase technology            | 24    | 5.92  | 45       | 5.91  | 29           | 5.66  | 22     | 5.45  | 120     | 5.77  |
| Connection with potential business partners     | 23    | 3.76  | 44       | 4.64  | 29           | 4.28  | 21     | 4.76  | 117     | 4.40  |

Source: Evaluation Survey Results based on 120 responses from 4 countries, where N is number of respondents.

<sup>63</sup> Respondents were asked to rate the quality of various inputs on a 6-point scale from 'Very Poor' to 'Excellent'. Weighted Average Score was calculated by first assigning numeric values to response choices (Very Poor = 0, Excellent = 10), then calculating the overall average according to the number of responses to each choice. An overall score above 5.00 is positive; above 7.50 is highly positive. N/A and blank responses were omitted.

130. Certain direct business-level outcomes can be directly attributed to the GCIP. Based on responses to the survey, participating startups revised business plans, marketing plans and business pitches, among other activities (see Table 14). Pakistan PMU reported that 40% of supported startups were able to successfully sell their product or idea to at least 1 customer during the project period. Other GCIP projects did not report information at this level of granularity, which would have facilitated comparison.

*Table 14: Responses to Have You Made Changes to the Following Elements in Your Business as a result of GCIP?*

|  | India     |     | Pakistan  |     | South Africa |     | Turkey    |     | Overall    |     |
|--|-----------|-----|-----------|-----|--------------|-----|-----------|-----|------------|-----|
|  | N         | %   | N         | %   | N            | %   | N         | %   | N          | %   |
| Revised financing plans                | 13        | 54% | 25        | 56% | 15           | 52% | 13        | 59% | 66         | 55% |
| Revised business planning              | 16        | 67% | 32        | 71% | 19           | 66% | 14        | 64% | 81         | 68% |
| Created new jobs within the enterprise | 13        | 54% | 23        | 51% | 12           | 41% | 6         | 27% | 54         | 45% |
| Made alterations in product            | 16        | 67% | 27        | 60% | 16           | 55% | 5         | 23% | 64         | 53% |
| Revised marketing plan                 | 16        | 67% | 31        | 69% | 18           | 62% | 11        | 50% | 76         | 63% |
| Revised business pitch                 | 18        | 75% | 28        | 62% | 20           | 69% | 9         | 41% | 75         | 63% |
| Other changes                          | 13        | 54% | 5         | 11% | 1            | 3%  | 4         | 18% | 23         | 19% |
| Have made no changes                   | 14        | 58% | 24        | 53% | 12           | 41% | 7         | 32% | 57         | 48% |
| <b>Number of respondents</b>           | <b>24</b> |     | <b>45</b> |     | <b>29</b>    |     | <b>22</b> |     | <b>120</b> |     |

Source: Evaluation Survey Results based on 120 responses from 4 countries, where N is number of respondents to the question

131. Survey responses to which barriers to enterprise development were addressed by GCIP indicated *Access to Markets* and *Access to Finance* (see Table 15). This supports findings reported in a 2014 World Bank study<sup>64</sup> which cited *Access to Finance* as the most common barrier for clean technology SMEs in India.

*Table 15: Responses to Which Barriers to the Development of your Enterprise did GCIP Help Address?*

|                                  | India |     | Pakistan |     | South Africa |     | Turkey |     | Grand Total |     |
|----------------------------------|-------|-----|----------|-----|--------------|-----|--------|-----|-------------|-----|
|                                  | N     | %   | n        | %   | n            | %   | n      | %   | n           | %   |
| Policy or Regulatory Environment | 5     | 21% | 14       | 31% | 6            | 21% | 10     | 45% | 35          | 29% |

<sup>64</sup> Building Competitive Green Industries: The Climate & Clean Technology Opportunity for Developing Countries. 2014.

|                        |    |     |    |     |    |     |    |     |     |     |
|------------------------|----|-----|----|-----|----|-----|----|-----|-----|-----|
| Access to Finance      | 6  | 25% | 18 | 40% | 6  | 21% | 8  | 36% | 38  | 32% |
| Access to Markets      | 7  | 29% | 16 | 36% | 10 | 34% | 11 | 50% | 44  | 37% |
| Skill Shortage         | 4  | 17% | 9  | 20% | 5  | 17% | 8  | 36% | 26  | 22% |
| Not Applicable         | 10 | 42% | 10 | 22% | 10 | 34% | 1  | 5%  | 31  | 26% |
| Other (please specify) | 5  | 21% | 7  | 16% | 9  | 31% | 3  | 14% | 24  | 20% |
| Total                  |    |     |    |     |    |     |    |     | 120 |     |

Source: Evaluation Survey Results based on 120 responses from 4 countries, where N is number of respondents to the question

132. Mentoring was an integral part of GCIP’s capacity development package. The GCIP’s framework was stronger due to the involvement of voluntary mentors, judges, and trainers. As in the survey, interviews with startups consistently stated that they gained substantial value from a mentor’s input on the business, commercial and financial aspects of entrepreneurship and insights that allowed them to leapfrog potentially critical mistakes.

133. The extent to which criteria were systematically applied to the selection of mentors was not clear. Volunteers for these ecosystem support roles were identified each cycle through institutional, professional, and personal networks associated with the PMUs and PSCs. Once identified, guidance was available from CTO to support them in their roles.

134. Most mentors supported the startups with skills for business models and commercial validation rather than technical advice. While highly valued, some entrepreneurs did express concern that mentors were not familiar with an entrepreneur’s technology and raised the need for more technical advisors to also serve on judging panels and as mentors.

135. After the launch of GCIP, Pakistan and South Africa witnessed increases in the number of entities supporting the national entrepreneurship landscape. GCIP continued to be one of the few offering early stage business assistance to cleantech innovators. There is no evidence that these additional support services can be attributed to GCIP. In Pakistan, GCIP was introduced in 2015 when the national innovation ecosystem was in a nascent phase. By the end of its first annual cycle, 20 incubation initiatives were underway across the ‘golden triangle’<sup>65</sup>. Since GCIP’s 2015 launch in South Africa, there was a 58% increase in support entities on the national entrepreneurship landscape (see Figure 10).

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<sup>65</sup> Referring to the major urban centers of Islamabad-Karachi-Lahore; from the Comparative Statement of Different Competition/Incubation Programs being Offered in Pakistan (2015), a study undertaken by GCIP Pakistan’s PMU

Figure 10: Explosion in Support available for South African Entrepreneurs and Startups (2017)



Source: Aspen Network of Development Entrepreneurs (ANDE) South Africa chapter, 2017

### Skills Development

136. Interviewees were near unanimous in their assessment that GCIP helped them to develop skills in business model development, market segmentation and financial projections. As a South African startup team member stated, the focus on business skills was the “*difference that made the difference*”, compared to other accelerators. A GCIP international trainer explained, “*technologists understand how to produce technology, but they don’t understand aspects related to what it takes to run a successful business: how to find customers, make them happy, keep them, and use cash wisely.*”

### India's First Solar Ferry

Running on sunshine, from commercial ferries to fishing boats

Conventional passenger boats cause air and water pollution. Noise, vibration, and diesel fumes also inconvenience passengers. NavAlt Solar and Electric Boats (2017 award winner) developed India's first solar ferry with no fuel on board, advancing the boating industry's technical level. Its boats are currently operating in Kerala. The startup received its first commercial order from the State Water Transport Department of Kerala with all manufacturing to be done in India. The company has recently initiated a research project to make a solar fishing boat to suit the requirements of small fishing communities. Founder Sandith Thandashery explained, "GCIP forces you to start from the beginning, i.e. look at strategy and go through every step of a business plan. One tangible outcome of this program is we are now exploring how to do a lease model. Previously our model was to build the boat and sell it to a client. GCIP helped us explore a different business model."



137. Peer-to-peer connections that emerged led to mutual learning and benefited participants. In interviews All GCIP startups interviewed expressed appreciation for the peer learning and connections made with like-minded entrepreneurs. Many reported that they intended to maintain their participation in national networks established, for example through use of WhatsApp groups to keep in touch and discuss challenges. The CTO Global Forum was appreciated by the national winners for the opportunity to network with international investors/potential partners and meet/ compete against other GCIP national teams for a global prize. This exposure provided insight into what investors look for, and which (even whether) investment options were most appropriate to pursue. This assisted their long-term planning.

138. Startups expressed a desire for a platform that would allow for significantly more direct sharing and exchange across GCIP 'sister' countries and/or through UNIDO's broader international networks. Although such a platform was not a part of GCIP project designs, it would be consistent with a global vision for the GCIP.

### Turkish Startup Helps Small Farmers Maximize Crop Yields and Profits

Turkey's Eriktronik Engineering developed decision support tools (e.g. for irrigation, spraying, plant growth) and offers an app to farmers called Tarla.io (2016 finalist) to help farmers transform their fields into profit centers and support other enabling actors (agronomists, suppliers, traders, producers, creditors, insurers) to maximize yields, profits and save resources across the value chain. The company's founder explained, "we are in a race to get our products to market. There are companies in the USA developing similar ideas. Through GCIP, our visibility in the Turkish ecosystem increased. We met people and develop links with other startups". 100,000 Turkish farmers are using the company's platform, which provides hyperlocal statistics and derived insights regarding precipitation, temperature, hail, thunderstorm distribution and probabilities for determining operations, plant health, credit and insurance risks, all vital to check before deciding cultivation.



139. GCIP's mostly uniform approach allowed for consistency in delivery of training components regardless of an enterprise's state of maturity and technology stage. Those entering at the early alpha prototype phase, which represented a slight majority of all

participating startups, reported that they could have benefitted from increased focus on the technical feasibility of their innovative idea, before advancing into the Accelerator, which focused mainly on the business model and customer validation. There is a fine balance between maintaining standardization and customizing benefits for SMEs.

140. There was opportunity for further country contextualization. For example, In India, where companies were at later stages of development, support was provided to gauge the technical feasibility of technologies. Other Indian startups pointed to a need for guidance on the Indian regulatory environment, India-specific export market considerations, signposts to relevant in-country resources, and non-English promotional material because the lack of Hindi material reduced outreach.

### *Job Creation*

141. New job creation is expected as a result of GCIP support, but it is not being systematically tracked. Based on 14 startups in 5 countries<sup>66</sup>, UNIDO has *projected* creation of 1219 new jobs by 2020. Furthermore, a recent World Bank Group report<sup>67</sup> describes the significant potential of cleantech SMEs in developing countries to generate profits and create jobs, estimating this to be a USD 1.6 trillion market opportunity. Studies carried out by PMUs in two countries indicated their *approach for estimating job creation*:

- (f) South Africa: 12 high-potential startups reported job creation each in the range of 5 to 120 jobs, for a total of 238 new jobs in 2017. However, it was difficult to determine the extent to which job creation effects could be directly attributed to the GCIP or realized, as estimated.
- (g) Pakistan: each supported startup was estimated to generate 4-6 part/full-time jobs<sup>68</sup>, from which the PMU then inferred that the project had generated 500 “green jobs” by 2018

142. The evaluation survey results indicate that the average staff base of these GCIP startups increased (see Table 16 ). Although this trend is encouraging for the participating teams, it was not possible to directly attribute staffing growth to the GCIP as other factors may also have contributed to the growth in employment.

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<sup>66</sup> Armenia, India, Pakistan, South Africa and Turkey

<sup>67</sup> [Building Competitive Green Industries: The Climate & Clean Technology Opportunity for Developing Countries. 2014. World Bank](#). This report illustrates the nature and likely size of the clean technology opportunity for SMEs in 145 developing countries over the next decade. In this period, expected investment across 15 clean technology sectors in developing countries is expected to exceed USD 6.4 trillion. Of that total market, roughly \$1.6 trillion is expected to be accessible to SMEs.

<sup>68</sup> This estimation was made by taking a sample of startups and checking the number of jobs created by them. The resulting average number of jobs created was calculated from this representative sample.

Table 16: Changes to Staffing Base of GCIP Supported Startups

|  | India<br>(N=24) | Pakistan<br>(N=45) | South Africa<br>(N=29) | Turkey<br>(N=22) | Overall<br>(N=120) |
|--|-----------------|--------------------|------------------------|------------------|--------------------|
| Average number of employees pre-Competition  | 16.5            | 18.7               | 3.2                    | 2.4              | 11.5               |
| Average number of employees now (early 2018) | 25.4            | 20.0               | 3.9                    | 3.0              | 14.1               |
| Average change to size of staff base         | +54%            | +7%                | +22%                   | +25%             | +23%               |

Source: Responses to Evaluation Survey by 120 GCIP participants, where N is number of responses in the country

### Investor Connects

143. As reported in the TEs, select participating startups accessed capital for their cleantech enterprises which they attributed to GCIP. These investments helped address a major hurdle in the commercialization of technology, especially in cleantech, that does not easily qualify for traditional banking instruments.

#### In Turkey:

- (a) Positive Energy (2015 alumni): raised USD 320,000, with a further USD 1 million in progress and USD 300,000 commitment in place by December 2017. A valuation of USD 8 million was anticipated.
- (b) Biolive (2017 semi-finalist): raised a TRY 500,000 investment from Turkey's Vestel Ventures
- (c) Episome Biotech (2017 semi-finalist) raised €1.7million in investment through 3 rounds from Diffusion Capital Partners based in The Netherlands

#### In India:

- (a) Agnisumukh Energy Solutions raised USD 1.2 million, with a further USD 1.5 million in the pipeline
- (b) Others raised loans of USD 50,000-250,000 through connections established directly through GCIP

#### In Armenia:

- (a) Nano Hi received USD 120,000 in foreign grants (Germany, Ireland, Spain) to advance its work
- (b) YSU Biofuel (2014 national 'winner') used a USD 50,000 matching grant offered by the GCIP local executing partner to purchase equipment and initiate production



- (c) Several other startups received USD 5,000-10,000 from GCIP Armenia to support customer validation

#### **In South Africa:**

- (a) EcoV received 300,000 rand from The Innovation Hub and Gauteng Department of Infrastructure Development to pilot its Green Tower Microgrid to provide renewable energy and hot water to a community health center and subsequently obtained a further 1 million rand (with involvement of the Development Bank of Southern Africa)
- (b) Lightsperse raised 25% of its resources through private funding, complementing 2.9 million rand funding provided by the South African government through its Department of Trade and Industry

144. The CTOs annual Global Forum in Silicon Valley was not effective in securing investment. In countries where the political climate was perceived as unstable (e.g. Pakistan, South Africa, Turkey), investors were wary. As a Pakistani team member reported, *“We started talking to investors and when they learned we were from Pakistan, they said they were not interested to talk to us at all. We didn’t make any connections that lasted”*. Nevertheless, the Forum was described as a *“nice to have”* and a *“valuable eye-opener”*. GCIP-supported startups are often not at the level of commercialization (i.e. customer pipeline, protectable intellectual property), with substantive cashflow projected beyond timelines that fit within the interest of these international investors.

145. National-level Investor Connects designed to bring the ‘semi-finalists’ undergoing the Accelerator in contact with potential industry partners and investors were more successful. Run twice since 2017 in Pakistan, the national Investor Connect generated additional private sector resources. Two Pakistani firms each offered USD 10,000 equivalent in support, paving the way for award winners to carry out customer validation (a common obstacle faced by all entrepreneurs) in the respective sponsor’s own premises. This Industry Challenge also oriented startups towards developing ideas that could solve real company problems. According to its TE, the Pakistani national Investor Connect resulted in 60 follow-up meetings with 80% of investors reporting their intention to follow-up on business opportunities after the session.

### **Results – Building Country Capacity for Cleantech and Supporting National Entrepreneurship Ecosystems**

#### *National Coordination*

146. The national coordination role was not uniformly understood, insufficiently leveraged and insufficiently resourced. GCIP projects did not systematically track the path of alumni as well as those who did not progress substantially down the ‘innovation funnel’. No specific guidance was provided to host organizations on how to play the expected national-level coordinating role for cleantech entrepreneurship, although Project Approval Documents indicate this role was expected. In some instances (Turkey, South Africa), it was even

mentioned that the GCIP would supply existing in-country funding schemes with applicants, thereby improving their pipelines and disbursement rate. These expectations were not referenced in the results framework and no project activities provided the scope for creating and leveraging such linkages.

147. Demand has consistently outpaced supply due to the ‘innovation funnel’ concept implicit in the competition-based Accelerator. GCIP/CTO processes did not appear well-suited to dealing with those whose applications were not accepted. A small subset, an average of 32 ‘semi-finalists’ per cycle per country from the total number of applicants (240 was the average annual cohort per country) benefited from direct project support each year. Even with support of ‘application mentors’ (South Africa) and ‘infotainers’ (Pakistan) there is significant attrition; 43% attrition in India; 51% in South Africa (see Annex VI). Based on interviews in the field, this filtering approach to the selection of ‘semi-finalists’ had a demoralizing effect for some startups excluded from moving further along the process, i.e. the ‘fallen heroes’. The CTO platform also seemed maladapted to a developing country context. As a South African applicant explained, *“CTO’s platform took us to a US website. People couldn’t understand the questions. In Northern Cape, many people don’t have access to a computer. There were many issues with the sign-up process. It took hours to fill out the application. Many people simply gave up.”*

148. GCIP missed an opportunity to coordinate and channel promising startups to other parts of the ecosystem. This could have provided support to continue their journey towards maturity and commercialization. In South Africa, for example, there are 242 ecosystem support actors, which includes the GCIP, but there is no coordination mechanism amongst them and startups have no idea of who to turn to for what. Interview respondents pointed to a need for significantly more channelling to achieve the desired catalytic effect.

149. Some general concerns emerged regarding the collaboration with CTO:

- (a) CTO controlled the application process and GCIP platform, including storage, use, and access to information. CTO’s program is proprietary. The Evaluation Team did not have access to it so no assessment of the quality of materials was made other than GCIP participants’ perceptions (see Table 7). While CTO has a commercial interest to keep this information proprietary, for the development of a cleantech innovation ecosystem, it is important to have applicant information, methodologies and experiences available in open source.
- (b) CTO has been the main service provider across all countries; yet, the global innovation landscape is growing rapidly.

150. During this evaluation, CTO informed UNIDO that it had made a strategic decision to focus on the United States. CTO would therefore no longer deliver its services to the GCIP, although individuals who had provided training services under the CTO umbrella could continue to do so on a freelance basis.

### *Institutional Strengthening*

151. GCIP succeeded in building capacities of relevant institutions through 'on-the-job' training to support subsequent organization of the competition-based Accelerator. GCIP projects have made good efforts to engage host institution staff. Other actors who could perform the important roles of mentors, judges, and local trainers were also appropriately engaged. Based on findings reported in TEs and MTRs, the following results were documented:

- (a) Thailand: National Science and Technology Development Agency (NSTD) has been able to align its role in the GCIP with its Industrial Technology Assistance Program and support its mandate to help SMEs meet the challenges of introducing technology-based products and processes;
- (b) South Africa: Technology Innovation Agency (TIA) was able to significantly strengthen its remit to organize, coordinate, and develop the national ecosystem; extend its outreach; and boost its own services and system of innovation; furthermore, cleantech complemented its existing verticals, which were supported by its Technology Stations in Agriculture, Energy, Advanced Manufacturing, ICT, and Natural Resources, which could be leveraged to support an expanding pool of entrepreneurs in the cleantech domain;
- (c) Turkey: Scientific and Technological Research Council (TÜBİTAK) was able to help other entities make the connection between cleantech and their objectives and fields of expertise, thereby reinvigorating governmental interest in the potential of cleantech. Other stakeholders viewed its leadership role as highly appropriate and effective, and the institution succeeded in drawing support from over 40 entities to assure the operation a 5<sup>th</sup> annual cycle, launched in Spring 2018, primarily funded from national sources;
- (d) Armenia: Enterprise Incubator Foundation (EIF) integrated the clean technology category into its regular business incubator support services;
- (e) Malaysia: In 2016, as a spill-over from GCIP, MIGHT rebranded GCIP as Sustainable Technology for Resilient Innovative and Knowledgeable Entrepreneur (STRIKE). The new model will focus on strategic support to national entrepreneurs in thematic areas such as Smart Cities, Electric Vehicles, and the Biodegradable Industry.

152. The GCIP also supported further developments beyond the host institutions. These are illustrative of its effects in institutional strengthening, as follows:

- (a) Turkey: TÜBİTAK-TEYDEB launched a Clean Future Fund in 2017 (directly attributable to GCIP) to foster convergence of national public funds and private sector investment to scale-up clean technology;
- (b) Pakistan: Two major public-sector funds (IGNITE, TDF-Technology Development Fund) now also cover cleantech. TDF signed a 2018 Letter of Intent with GCIP Pakistan for its

Social Integration Outreach whose current theme is climate change, environment, and pollution. TDF indicated that it prioritizes GCIP awardees. These are indicators of GCIP's strengthening of the national innovation ecosystem.

## **Results – Strengthening Policy and Regulatory Frameworks**

153. GCIP projects did not realize their intended outcome to strengthen the policy/regulatory environment to foster the growth of cleantech innovation. This is a risk factor for sustaining the projects' results. In most countries, no direct structured policy work was undertaken. Insufficient steering and limited resources meant that this component's activities were limited. Design documents do not go beyond stating that activities would be undertaken to identify and strengthen necessary policies and regulations required for cleantech competitions and ecosystem development. Outcomes that could be achieved over the duration of each national project were not properly considered, even after implementation of the first few projects. Activities were generally embarked on at the later stage, using an ad hoc approach.

154. A few countries did take steps towards policy strengthening. In Armenia, a policy recommendation paper was prepared at the time of project closure, but the TE deemed it to be too late with too few specifics regarding legal frameworks, policies, governance structures and processes. In Turkey, the PMU was able to connect a few startups with relevant policy-making authorities to examine blockages to realizing their innovations. South Africa and Pakistan reported undertaking a gap analysis. With the highest budget allocation for this component, GCIP Pakistan went slightly further to propose policy recommendations to the Pakistan Council for Science and Technology's Science, Technology and Innovation Action Plan (the results of which remain unknown).

155. The Policy Component was given less priority than activities associated with establishment and continuation of the competition-based Accelerator due to a desire to quickly establish it and generate outputs that could be immediately seen and promoted. As most projects did not undertake project preparation activities, there was limited information prior to implementation concerning which policies/regulations needed to be strengthened or newly developed. Budget allocations ranged from between 4%-17.5% (see Table 20). The relatively short timeframe and small budgets to influence national policy made this important part of ecosystem development an unachievable component of the GCIP, albeit a necessary one for assuring a climate conducive to the adoption of cleantech innovation.

156. Cleantech policy and regulatory challenges vary substantially from country to country. Projects aiming to strengthen policy need to be structured to accommodate the time and resources needed to support these outcomes. It requires creation of awareness amongst the different stakeholders about the regulatory barriers for low-carbon technologies, good understanding of the variety and complexity of cleantech concepts, and sufficient capacity to implement a facilitating policy framework.

**Results – Gender Mainstreaming/Social Inclusion**

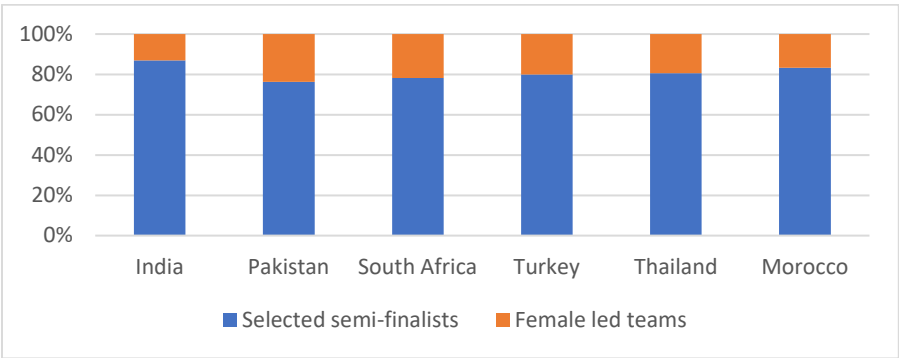
157. Twenty-five percent of teams supported by GCIP were led by women. To date, from a total of 795 semi-finalists teams, 198 semi-finalists (25%) with women as team leaders have been supported. Responses from GCIP participants to the evaluation survey reveal the same trend (Table 17). This is within the range for projects that set targets for female entrepreneurs (10-30% of entrants) (see Annex VI). In addition to targets, the GCIP approach included the creation of special category awards; selection criteria to provide preferential entry for women and specific efforts to attract female mentors, judges, and trainers. In 2017, of the 216 ‘semi-finalists’ supported; 25.9% of these were women-led. Pakistan had the highest proportion (30.4%) (26 of 84 ‘semi-finalists’, see Figure 11)

*Table 17: Responses of Surveyed Startups Regarding the Gender Leadership of their Team*

|                 | India (N=24) |     | Pakistan (N=45) |     | South Africa (N=29) |     | Turkey (N=22) |     | Overall (N=120) |     |
|-----------------|--------------|-----|-----------------|-----|---------------------|-----|---------------|-----|-----------------|-----|
|                 | N            | %   | N               | %   | N                   | %   | N             | %   | N               | %   |
| Female-led team | 2            | 8%  | 10              | 22% | 6                   | 21% | 6             | 27% | 24              | 20% |
| Male-led team   | 22           | 92% | 35              | 78% | 23                  | 79% | 16            | 73% | 96              | 80% |

Source: Evaluation Survey Results based on 120 responses from GCIP participants in 4 countries, where N is number of responses in the country

*Figure 11: GCIP's Success in Attracting Woman-Led Teams*



Source: UNIDO presentation on the GCIP, 2014-2017

158. A strategic approach to gender mainstreaming/social inclusion materialized more in some countries than in others (see performance ratings in Table 7):

- (f) Pakistan: The project’s achievements exceeded those in other countries. During 2014-

2017, women figured in 25-40% alumni team leader positions (Annex VI) due to adequate resourcing, engaged supervision (the GCIP Project Manager was also UNIDO's Gender Mainstreaming Focal Point), competent advocacy and outreach and encouraging startups to include women.

- (g) Turkey: The 10% target set for recruiting female trainers, mentors and judges and promoting women entrepreneurs was substantially exceeded. During 2014-2017, women held 18%-32% team leader positions. Social inclusiveness was bolstered through delivery of a 'Women-Led Entrepreneur Award' and 'Young-Led Entrepreneur Award' in the 2015 cycle;
- (h) South Africa: In 2017 introduced a more tailored approach and broadened outreach to encompass more Women, Youth and Black Entrepreneurs (supporting national imperatives). Strategic outreach (university visits, affirmative action), use of special category awards (throughout the project period, 2014-2017), and media profiling tangibly and rapidly enhanced the inclusion of under-represented groups and markedly improved the project's performance. Nevertheless, an important minority of female-led startups reported that the GCIP's stringent pace, expectations, and ruthless approach to prepare for pitching to investors was unwittingly serving to maintain the disparity of disadvantaged groups;
- (i) India: The gender dimensions of cleantech entrepreneurship were not substantively addressed. The project did not apply a gender sensitive approach, partly due to an absence of gender analysis in the original design. The program document contained brief references to gender mainstreaming but did indicate that gender specific targets would be established and pursued. No systematic monitoring was undertaken. The Evaluation team concurs with the project's TE conclusion that the lack of gender sensitivity across program design and implementation has almost certainly reduced its outreach and potential and may also have reduced GCIP India's overall effectiveness.

#### **South African Team Delivers Energy Efficiency and Social Benefits with Solar-Powered Hot Water**

This 2015 youth-led team winner devised a photovoltaic system, ideal for low-cost houses/rural homes, which provides people with hot water when they have little or no electricity. Attached above a doorway supported by 2 large diameter pillars, which act as hot water storage tanks, this "solar veranda" shades inhabitants from sun/rain and provides 70 liters of 60°C water per sun-day. Due to GCIP participation, the team was able to subsequently raise funds to construct a prototype and won a prestigious national award for best "eco innovation". Solar Veranda is now commercially available in South Africa.



## GCIP's Additionality

159. Project steering and country conditions influenced elements of additionality, resulting in varying benefits across countries. A review of GCIP projects identified several elements which contribute to additionality. These are summarized in Table 18 and elaborated in detail below.

*Table 18: Summary of GCIP's Additionality*

| <b>Additionality Elements</b>                          | <b>Conceived in Project Design</b> | <b>Results Achieved</b> |
|--|------------------------------------|-------------------------|
| <b>Innovation Additionality</b>                        |                                    |                         |
| Focus on Clean Technology                              | ✓                                  | ✓                       |
| Early Stage Business Assistance                        | ✓                                  | ✓                       |
| Networking and Exposure                                | ✓                                  | ○                       |
| <b>Socio-Economic Additionality</b>                    |                                    |                         |
| Fostering Entrepreneurial Mindset                      | ✓                                  | ✓                       |
| Encouraging of Local Solutions                         | ✓                                  | ✓                       |
| Social Inclusiveness                                   | ✓                                  | ○                       |
| Social and Economic Benefits                           | ✓                                  | ○                       |
| <b>Institutional/Governance Additionality</b>          |                                    |                         |
| Strengthening of Convener Role and Reputation          | ✓                                  | ○                       |
| Collaboration and Partnerships                         | ✓                                  | ○                       |
| <b>Financial Additionality</b>                         |                                    |                         |
| Access to Venture Capital                              | ✓                                  | ○                       |
| <b>Policy/Regulatory Additionality</b>                 |                                    |                         |
| Strengthening of the Policy and Regulatory Environment | ✓                                  | ×                       |
| <b>Environmental Additionality</b>                     |                                    |                         |
| Fostering Cleantech Ideas, Solutions and Services      | ✓                                  | ✓                       |
| GHG Emission Reduction                                 | ✓                                  | ○                       |

Legend: ✓ Yes; × No; ○ Partial

## **Innovation**

### *Focus on Clean Technology*

160. GCIP's focus on cleantech business acceleration was new, unique, and a value add for the innovation ecosystem. The transversal concept of 'cleantech' enabled many types of entrepreneurs to identify and situate their innovations within this category, and thereby seek and find support. While there was a recognition that the cleantech concept could stimulate economic growth, few such schemes existed, or those that did tended to operate in silos. The GCIP could be therefore characterized as joining a handful of forerunners schemes in the cleantech acceleration space.

### *Early Stage Business Assistance*

161. GCIP business assistance services primarily to early stage entrepreneurs filled a gap on the national landscape not covered by other existing mechanisms. These were often government schemes that offered technology validation to later stage entrepreneurs.

### *Mentorship*

162. The 1:1 nature of interactions with mentors under the GCIP was a distinguishing element from other offerings. This approach allowed for tailored advice and was more conducive to the development of closer, longer-term relationships between mentors and teams. An Indian startup observed that "in comparable *business incubators, entrepreneurs often had to share mentors with several other businesses during joint sessions*". The strategy of approaching alumni (entrepreneurs who had 'graduated' from previous GCIP rounds) to play roles as mentors, judges, and local trainers was a novel idea. Many who subsequently took up these roles were motivated to "*give something back*" to other early stage entrepreneurs.

### *Networking and Exposure*

163. The GCIP provided startups with privileged access to local private experts through their participation on Project Screening Committees and juries and as mentors and judges. These interactions often cascaded into links for the startups with the professional networks in which the experts were more broadly embedded. Those who voluntarily contributed their time and expertise readily acknowledged their participation was mutually beneficial: entrepreneurs gained from expert input and the involved experts were exposed to business and investment opportunities that they would not otherwise have identified. For example, as reported in the India TE, some business relationships arose solely and directly through a mentor or judge meeting an entrepreneur during the GCIP.



## Socio-Economic

### *Fostering Entrepreneurial Mindset*

164. GCIP stressed the importance of a risk-taking mindset<sup>69</sup>. In South Africa, GCIP supported an important cultural shift where the population was being empowered to take economic destiny into their own hands. In Turkey, the TE reported that GCIP offered a space to experiment with how to foster innovation.

### *Encouraging Local Solutions*

165. Entrepreneurs who are close to the problems were encouraged to use their insights for innovations that will help address them. This helped to dispel the perception that technology in one part of the (usually developed) world must be transferred to another part of the world (developing). GCIP also promoted indigenous technology development because of reduced costs of equipment for SMEs and easier adoption for urgent development priorities such as access to clean and affordable energy, clean water, and climate resilient agriculture. This leaning towards developing 'homegrown solutions' and technology convergence meant that even countries with weak R&D could participate in the generation of global solutions.

#### **Pakistani Solution for a Low-Cost House that can be Assembled in 3 Hours**

Karachi-based ModulusTech designed mobile, low cost, earthquake and cyclone-resistant, energy-efficient housing that can be assembled within a few hours, with plumbing and electricity included. Having set its sight on solving housing problems for displaced people, the team originally thought about targeting international charities and the refugee community. To its surprise, the company found its first customer at home in the mining industry, where its innovation is being used to fulfill a need for temporary accommodation.



### *Social Inclusiveness*

166. GCIP Pakistan mobilized additional stakeholders to support its gender mainstreaming agenda. This is seen as an indication of the catalytic potential of the GCIP. The Islamabad Chamber of Commerce (ICCI) took up a significantly larger role than was initially envisaged, by establishing a Women Business Growth Center in 2016 under its own auspices, which included an incubation facility for women-led startups within its own premises. This initiative leveraged support offered by USAID to promote business startups and improve economic empowerment of women.

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<sup>69</sup> *What Makes an Entrepreneurial Ecosystem?*, N. Colin (October 2015) asserts 3 ingredients are key: **Capital**: new business can only be launched with money and relevant infrastructure; **Know-how**: engineers, developers, designers, salespeople collectively have skills necessary for launching/growing innovative businesses; **Rebellion**: entrepreneurs always challenge the status quo. If they wanted to play by the book, they would innovate within big, established companies, where they would be better paid and would have access to more resources.

167. In South Africa, the GCIP team broadened its social inclusiveness efforts to also encompass Youth and Black Entrepreneurs. Special category awards (Most Promising Youth Team, Innovation for Social Impact Award) had a beneficial impact on communities outside the country's main industrial areas<sup>70</sup>.

### *Social and Economic Benefits*

168. Under the GCIP framework, entrepreneurs have developed and commercialized ideas with meaningful social and economic impact. For example:

- (a) Innovations in sanitary pads (developed by Gracious Nubian in South Africa and Saathi Eco Innovations in India) have provided affordable solutions for women and girls (especially in rural areas) who were previously prevented from working and attending school during menstruation.

#### **Women-Led Team Commercializes Affordable Solution that Reduces Waste and Supports Women**

World's 1<sup>st</sup> biodegradable compostable sanitary pad made from banana fiber  
Saathi Eco Innovations (2017 global winner) reported that the GCIP gave them insight & collaboration opportunities. "It was a roller coaster ride for us from the enthusiasm of reaching California to the anxiety of preparing the pitch to the exhilaration of receiving the Global Award". Leveraging the highly absorbent properties of fiber locally sourced from banana tree stems (discarded after harvest), the company manufactures a sanitary pad that degrades within 6 months (1200 times faster than conventional pads, which are 90% plastic with correspondingly high disposal issues). Produced using no water, the annual projected reduction in CO<sub>2</sub> emissions is 1,011 metric tons and 1,323 metric tons of plastic waste.



- (b) A Malaysian entrepreneur (Free the Seed) is buying rice straw and waste husks left over after harvest and using it to produce biodegradable packaging. In addition to providing local farmers with additional income, this avoids the burning of rice straw, reducing smoky haze pollution that results in respiratory problems for humans and interferes with regional aviation.

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<sup>70</sup> Based in Mpumalanga province (330km east of Johannesburg and 110km west of the Mozambique border), Mashsha's energy efficient stoves won the 2016 Social Impact Award; based in Free State province (400km south of Johannesburg) Nubian Gracious Nubian's reusable, recyclable sanitary pads won the 2017 Social Impact Award

### Malaysian Team's GCIP Participation was a Game-Changer for Local Farmers

Free the Seed (2014 national winner) used its patented biotechnology process to convert previously burned rice straw and husks (bought from 1318 local farmers who each earned an additional USD 300 per year for selling their waste) into non-toxic, biodegradable packaging that replaces polystyrene and plastic containers. Participating in the GCIP was a game-changer for the company, which, by 2016, had struck a 10-year supply agreement with farmers harvesting 32,000 hectares (over 10% of rice paddy production on the Malaysian Peninsula) worth €1.5 million for biomass supply delivering 600,000 kg of CO<sub>2</sub> reduction (2015-2020).



## **Institutional/Governance**

### *Strengthening of Convener Role and Reputation*

169. To varying degrees, GCIP has equipped national institutions and other ecosystem support actors with the capacities to sustain the ongoing organization of the competition-based Accelerator. Beyond this building of local organizational, training, and mentoring competence, GCIP projects had positive effects in terms of enabling the host institution to strengthen its role and reputation. The focus and time needed to engage with partners for participation in the competition-based Accelerator, however, led to national institutions losing sight of their role with respect to the envisaged national coordinating function.

### *Collaboration and Partnerships*

170. GCIP projects were able to promote a degree of collaboration across relevant entities. This effect was observed, even though the projects were relatively small and involved only 1-2 Ministries as executing partners, thereby limiting the scope to pursue broad, cross-departmental partnerships. Partnerships have developed not just across government departments but across other institutions, such as universities, chambers of commerce and other business associations. While a “*sensitivity to stepping on others’ mandates*” emerged in the South African context, this issue could still be tackled, and collaborations could be cultivated. In Turkey, the Directorate for Renewable Energy’s interest in and commitment to the project and the local executing partner, TÜBITAK, measurably increased as indicated by the PMU’s recent reporting to the Evaluation Team on new technology-based startups founded and recognition of the way in which GCIP outputs could serve its own objectives and be inputs to other government programs.

## **Financial Additionality**

### *Access to Venture Capital*

171. GCIP was able to leverage private sector finance to support promising cleantech solutions. The startups had more success in gaining access to venture capital through the national-level Investor Connects in comparison to the international-level Investor Connect held as part of the CTO Global Forum.

## **Policy/Regulatory**

### *Strengthening of the Policy and Regulatory Environment*

172. The policy and regulatory strengthening component was not fully realized. This has potential negative implications on sustainability of outcomes. Implementing teams tended to focus project support on other outcomes due to a desire to quickly establish the competition-based Accelerator.

## **Environmental**

### *Fostering Cleantech Ideas, Solutions, and Services*

173. Within the private sector cleantech agenda, GCIP has focused on innovators working on indigenous solutions for major environmental challenges. This includes startups in energy efficiency, generation, distribution and storage, air and water pollution, waste management, new forms of transport and construction techniques.

### *GHG Emission Reduction*

174. Targets for GHG emissions directly/indirectly avoided were set and their respective abatement cost was calculated for each national project (see Table 10). Projections cannot be verified due to still early stage of enterprise operations and lack of longer term systematic monitoring systems.

#### **Indian SME Innovates Ceiling Fan, Slashing Energy Costs for Households**

A conventional 75-watt ceiling fan consumes about 20% a typical Indian household's electricity needs. By using permanent magnets as rotors (which eliminated power and heat losses), together with its algorithms and electronics, the 28-watt efficient, high performance, noiseless, smart ceiling fan developed by Atomberg Technologies (2017 global winner energy efficiency category) can slash electricity use by 65%. The company already sold over 50,000 fans, raised USD 1 million in venture capital, and is now looking for impact funds to support its bid to establish itself throughout India, generating 500 direct new jobs by 2020. A team member explained, "GCIP gave us access to the entire ecosystem with a network of mentors, venture capitalists and investors working in the cleantech space. We also had a lot of peer-to-peer learning".



## **IV. FACTORS AFFECTING GCIP FUNCTION AND SUSTAINABILITY**

### **UNIDO as Implementing Agency**

175. UNIDO was well suited to implement the GCIP. UNIDO's performance was rated in the satisfactory range for all projects (see Table 7). The agency has relevant expertise, developed through 20 years in technical cooperation for industry (especially SMEs) through resource-efficient industrial production, clean energy access for productive use and capacity building, all

of which were leveraged under the GCIP framework. The UNIDO brand brought considerable value. Startups indicated that its reputation led their customers to associate the GCIP with respectability, quality, and international recognition. In India, for instance, the project's TE reported that without the visible UNIDO association, the Competition's attractiveness would be reduced.

176. Following the initial implementations, UNIDO experienced some capacity challenges to manage, supervise and support projects. In early 2016, responsibility for GCIP countries was distributed among multiple project managers, in line with the regional portfolio distribution approach adopted within the Department of Energy of UNIDO.

177. Varying approaches to project management were observed including understanding of definitions and indicators, which makes direct comparisons across countries challenging. In countries where the first GCIP projects were launched (Armenia, Malaysia, India), there was little monitoring and systematic reporting. All other countries launched since, adopted a more rigorous approach.

178. All UNIDO Project Managers surveyed agreed that interaction, communication, and coordination between implementation partners (UNIDO headquarters, UNIDO PMU, Executing Agencies) regarding roles, responsibilities, and accountabilities was clear (see Annex V). In contexts where the national implementing team felt especially empowered (Pakistan, South Africa), the PMU was able to pilot approaches, which have offered valuable models for the overall initiative (e.g. gender mainstreaming; national-level Investor Connect; Industry Challenge award).

179. Implementation of GCIP in 8 countries has generated experience and lessons for UNIDO from each national context. However, without a formal, cross-country approach, a global coordination effort was not fully realized. UNIDO has been able to build up its expertise in cleantech business acceleration, which is a new domain for international cooperation.

## **Country Selection**

180. There was no explicit strategy or established criteria for selecting countries to take part in the GCIP. Involvement depended primarily on a country's willingness to use some of its STAR allocation. According to interviews, a list of ~ 25 candidate countries, which had not yet joined the clean technology wave, was jointly developed by GEF and UNIDO.

181. UNIDO played a pivotal role in promoting the GCIP to GEF OFPs. It was often down to the persuasive ability of UNIDO Project Managers as to which countries took up the GCIP opportunity. South Africa was a natural choice, having piloted the first cleantech SME competition at COP17. South Africa was also seen to potentially have a regional hub role to play in the wider South African Development Community.

182. Encouraging countries to invest portions of their STAR allocation in GCIP ensured the initiative was 'demand-driven' and confirmed country buy-in and relevance. A more 'top-down'

approach that reviews national conditions as part of country readiness to develop the cleantech entrepreneurial ecosystem and then ‘selling GCIP’ also has merit for its consideration of the potential of the initiative to be continued, scaled up or replicated in the region post-completion. A balanced and integrated approach would serve to increase likelihood of sustainability.

183. After willingness to use STAR, the selection seemed to consider a mix of factors: i) UNIDO’s institutional presence, i.e., a regional office that could support the PMU; ii) national conditions: interest of a suitable local executing partner, a vibrant academic scene, a large SME sector, governmental interest in SME promotion, presence of relevant entities (e.g. R&D institutes, technology incubators, innovation centers), and a level of infrastructure services that could support the development of startups (access to Internet, electricity, etc.); and iv) countries that could potentially play a role as a regional hub (e.g. Armenia, Malaysia, Turkey, South Africa).

184. In 2017, the GCII placed the GCIP implementing countries within the lower half of its rankings. This suggests that although countries were not so strategically selected, the GCIP addressed a need and opportunity in these countries to develop the cleantech innovation ecosystem.

## Host Institution

185. The selection and engagement of the ‘right’ institution that could play a convening role and host the GCIP was a critical factor in pursuing and *sustaining* project outcomes. This speaks to the importance of careful selection of the national host and associated partners who will retain a vested interest in the ecosystem and assure the project’s results are sustained after closure. GCIP project design documents did not mention any guiding criteria in the selection of host institution. For the most part, Project Preparation Phases were not carried out to scope out the most appropriate organizations. Illustrative experiences with host organizations are drawn from:

- (a) South Africa’s Technology Innovation Agency (TIA): GCIP supported the local host’s strategic objective “to provide an enabling environment for technology innovation in collaboration with other role players” With technology expected to “drive job creation, innovation, and skills into Africa”, GCIP was well-suited to fostering the needed mindset and capabilities;
- (b) Turkey’s Scientific and Technological Research Council (TÜBİTAK): with its role to advise on science, technology, and innovation policy and its access to direct funding, exemptions, and incentives, TÜBİTAK used the GCIP to support its mandate to stimulate transformation of research results into products/services and invigorate the role of SMEs in the national innovation system;
- (c) India’s Institute for Design of Electrical Measuring Instruments (IDEMI): GCIP was hosted by the Ministry of Micro-Small & Medium Enterprises, which it turned over to its

technology centre, IDEMI, during the final year of implementation as part of strategy to take national ownership. While seen as able to manage the PMU's administrative tasks, there is a concern that IDEMI does not have a convening role in the country's entrepreneurship system. Furthermore, given IDEMI's highly technical focus, stakeholders expressed concerns about its capacity to identify and manage a mentor pool with a business skill base and to build networks with investors and entrepreneurs beyond India. Challenges and tensions were documented in the handover process during GCIP's closure period, undermining prospects for sustainability.

186. The extent to which the PMU was embedded directly within the physical premises of the local host also proved to be a positive factor in terms of providing 'on-the-job' training opportunities for staff. This link also served to deepen country ownership as well as providing cost efficiencies (access to infrastructure, services).

### Country Engagement

187. Terminal evaluations for 4 of the 6 completed projects rated the sustainability of outcomes only as 'Moderately Likely' (see Table 7) and pointed to reduced country engagement on the part of key agencies as a contributing factor. This was a missed opportunity for GCIP to support hosts as active partners contributing to the development and maintenance of cleantech startups and sustainability of the entrepreneurship ecosystem.

188. The presence or absence of several elements influences the development of national ownership and laying the foundation for continued benefits. These are:

- (a) *Extent to which the national government has prioritized cleantech technology, understood its strategic leverage, and made tangible links between GCIP results and other initiatives and entities:*
  - (i) Morocco: Ministry of Environment took full ownership, housed the project in its own premises, defined what they saw as important, added cash funding, got buy-in from the private sector (i.e. Chamber of Commerce), brought in French-speaking trainers;
  - (ii) Turkey: TÜBİTAK's increased its financial support and strengthened linkages with its existing Individual Young Enterprise (BiGG) to allow GCIP alumni to gain access to further support, paving the way for transforming GCIP into a national program.
- (b) "Right choice" of local host, engagement and energy level of its leadership, and the organization's absorption capacity (see Host Institution)
- (c) *Extent of engagement beyond government entities:*
  - (i) Pakistan: there was active collaboration and contribution from 3 government agencies (PCST, NPO, PIM) as well as from the private sector

(Islamabad Chamber of Commerce). In September 2017, the PMU formalized a National Clean Tech Platform (NCTP) with multi-stakeholder membership (513 members, of which 9 are public sector organizations and 12 are academic institutions; the rest are private sector actors), which is poised to carry on activities, although it is understood that a second phase will only start in 2019;

- (ii) Armenia: GCIP implementation partners were all from government agencies; with limited private sector consultation, it was therefore difficult to motivate their engagement and counter-productive, given the project's aims which undoubtedly required active involvement of business actors). While several promising innovations were identified (see Annex VII), private sector funding was limited; it was the GCIP project itself that offered USD 5,000-10,000 grants in several cases to facilitate further development).

*Availability and contribution of local financial/human resources during project implementation and after to assure continuity of the competition-based Accelerator:*

- (i) Turkey: TÜBITAK provided USD 33,000 in cash and USD 100,000 of in-kind to the project's physical/logistical support; a key anchor for local ownership. Primarily Turkish resources/funding/trainers/mentors are being used in a 5<sup>th</sup> cycle launched in 2018; costs of national activities are being covered by TÜBITAK, TBS Investment [Turkish angel partnering with GCIP Turkey]. Monetary prizes are covered by TÜBITAK, TBS and OSTIM (one of Turkey's organized industrial zones, which signed a Letter of Intent for further cooperation);
- (ii) South Africa: the initiative to build up local training capacity (5 promising candidates) started relatively late (in 2017) but was intended to assure that adequate capacities would be available following project closure. Consequently, the 5<sup>th</sup> cycle launched in 2018 under TIA's leadership is being supported primarily by a CTO trainer brought in from California;
- (iii) Armenia: the PMU was housed in the local host's premises, which were located outside the capital of Yerevan, where most innovation events were concentrated. Based on the TE, overall, there was a lack of ownership and inadequate capacity transfer. UNIDO took the lead in project execution relying on the strength of the local National Project Coordinator supported by an experienced Head of UNIDO operations in Armenia. This led to a widespread perception that GCIP was a UNIDO project, resulting in the relatively passive role played by EIF, the project partner and SMEDNC, who was originally identified as the host as well as other institutional counterparts. The lack of active involvement of project partners was not conducive for building local institutional capacity to



sustain the GCIP's results and benefits;

- (iv) Malaysia: local host staff resources allocated to the GCIP were reduced over time from 3-4 to a single individual, the National Project Coordinator, who played a crucial connecting role. While 22 mentors were registered in 2016 to support further cycles, these did not take place following project closure and the Terminal Evaluation report indicated that full ownership of the project by the government had not occurred, although the STRIKE program was initiated. The 2017 GCII GCIP report found that Malaysia led the 8 GCIP countries studies with particular strength in evidence of commercialized cleantech due to public R&D expenditures and domestic investors. However, the report states there is little evidence of emerging cleantech and still a need to fill this gap.

(d) *Number of competition-based Accelerator cycles undertaken during the project period:*

- (i) Armenia and Malaysia ran the fewest number of cycles of all national projects (2 and 3 respectively, compared to 5 in Turkey and 4 in the other countries). While it could be deduced that running more than 3 cycles provided more anchors for sustainability, arguably, this phenomenon is also linked with the comparatively longer extensions in duration that other GCIP projects requested, which provided more time to put in place elements to deepen national ownership.

## **Project Duration**

189. GCIP projects were designed to have a 3-year duration which was insufficient in all cases. Almost all had no-cost extensions, which prolonged their activities by up to an additional 26 months. (see Table 5). Extensions were related to: i) delays in the initial stage (understanding the concept of cleantech, ii) identifying and engaging collaborating institutions (even when partner institutions were identified, they were sometimes later switched out with others deemed to be more appropriate (i.e. in Armenia; Pakistan); iii) establishing/staffing the PMUs); iv) generating entrepreneurs' interest to enter the program. Duration was too short to embed policy strengthening initiatives or expect to begin to gather meaningful long-term impact data. Projects with a longer duration would also have the positive effect of deepening country ownership.

## **Cost Effectiveness**

190. Performance ratings for efficiency (see Table 20) rated all projects in the satisfactory range, with projects in India and Turkey rated as "highly satisfactory". Project Approval Documents indicated that cost-effectiveness was considered as a priority. Stakeholders reported that implementing teams seemed conscientious and respectful of the use of resources, expert time, etc.

191. Most countries ran 3-4 competition-based Accelerator cycles. This was facilitated by the extensions in project duration for most projects (7 of 8). The originally allocated resources were stretched to cover the longer time (up to 75% extension), necessitating frugal spending to remain within the originally provided budget covering a longer period and more competitions. This intensified pressure on staff, e.g. longer supervision, and they rose to the occasion, but to what extent is such a strategy sustainable?

192. GCIP projects leveraged significant pro-bono support. This was provided by project screening committees<sup>71</sup>, mentors, judges<sup>72</sup>, technical partners, local trainers, and international judges<sup>73</sup>. Securing these contributions also served to strengthen the national entrepreneurial ecosystem. Given that projections of co-financing from volunteer contributions of these mostly private sector, ecosystem actors (a key source of external expertise for sustaining the competition-based Accelerator) were not included in the project documents, it appears that the extent of support was not clear or anticipated. Table 19 shows the magnitude of these, mostly in-kind, contributions as well as provision of prizes.

*Table 19: Contribution from Private Sector Actors, by Country (2014-2018)*

| Country      | Period       | Estimated Value of Volunteer Contributions of Local Mentors, Judges, Trainers, in USD | Estimated Value of Private Sector Contributions of Prizes and Technical Assistance |
|--------------|--------------|---|--|
| Armenia      | 2014-2015    | 44,300  | N/A  |
| Morocco      | 2016-2018    | 18,000  | N/A  |
| Thailand     | 2016-2017    | 50,225  | N/A  |
| India        | 2014-2017    | 100,512   | N/A  |
| Turkey       | 2014-2018    | 258,410   | 151,000  |
| Pakistan     | 2014-2017    | 636,920   | N/A  |
| South Africa | 2014-2017    | 2,140,048   | 1,860,000  |
|              | <b>TOTAL</b> | 3,248,415   | N/A  |

Source: PMU estimations

193. Reliance on volunteer participation introduced a degree of vulnerability. Individuals who had freely participated as mentors, judges, and trainers were not always the right ones or available for each annual run. As the South Africa case attests, even though a training plan was

<sup>71</sup> In recent cycles, GCIP India paid a small honorarium to members of the Screening Committee

<sup>72</sup> In Pakistan, the value of what they brought in terms of experience, networks, and knowhow was estimated to be significantly more than the symbolic compensation provided to judges out of project funds

<sup>73</sup> CTO estimated that these pro bono contributions were valued at USD 60,730 during 2015-2017 Global Forums

well-structured by the PMU, communicated in advance, and the 5 designated local trainers-in-training were well-motivated, they were finally not all able to consolidate their competences due to scheduling conflicts related to work for which they were being compensated (regular day jobs or consultancy mandates). Volunteer resources enlarged the pool of 'available funds' but heightened the administrative burden related to regularly securing and renewing participation with each annual cycle. Furthermore, startups across the participating countries raised the need for more qualified technical advisors to serve on judging panels and as mentors, which has implications for relying on a purely volunteer system.

## Co-Financing

194. In almost every country, no systematic mechanism was used to track the large portion of planned GCIP support that was committed by national governments and co-financing partners. In Pakistan, the PMU did successfully track these contributions. A large portion of planned GCIP support was in the form of co-financing commitments from national government partners and private sector actors, which ranged from USD 2.6 million to 6.3 million; 2 to 8 times the GEF grant level (see Table 5). Inputs from the GEF and UNIDO were quantified and reported but no systematic mechanisms were adopted to track the support that was contributed by national governments and co-financing partners. Apart from Pakistan, where the PMU made a serious and successful effort, the overall level of co-financing has never been truly quantified and confirmed, largely due to the absence of valuation methodologies from either UNIDO or the GEF.

## Financial Planning

195. GCIP budgeting was linked to envisaged outcomes. Except in Armenia and India, all countries allocated the highest proportion of the available GEF grant to establishing the competition-based Accelerator. As Table 20 shows, institutional capacity building was next in level of resourcing. The policy strengthening component was comparatively under-resourced, ranging between 4-17.5% of the GEF grant, which may account for the limited effects achieved. Allocations for M&E ranged from 1.5-5%<sup>74</sup> of the GEF grant.

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<sup>74</sup> According to KPMG's 2014 survey of Monitoring and Evaluation in the Development Sector, programs typically allocate 1% of their overall budgets to this activity and fewer than 5% of projects allocate more than 5% of their budget to M&E

Table 20: Expenditure by Component, by Country

| Outcome | Country/Component   | Malaysia <sup>75</sup> | Armenia <sup>76</sup> | India <sup>77</sup> | Pakistan <sup>78</sup> | South Africa <sup>79</sup> | Turkey <sup>80</sup> | Thailand       | Morocco        | Ukraine      |
|---------|---|------------------------|-----------------------|---------------------|------------------------|----------------------------|----------------------|----------------|----------------|--------------|
|         | Amounts listed in USD thousand and as % of the total GEF grant provided   |                        |                       |                     |                        |                            |                      |                |                |              |
| 1       | <b>Platform to Organize National Cleantech Competition</b>                | 579<br>(67%)           | 172<br>(33%)          | 280<br>(28%)        | 559<br>(42%)           | 1,309<br>(68.4%)           | 680<br>(69%)         | 820<br>(45%)   | 440.2<br>(48%) | 650<br>(43%) |
| 2       | <b>Building national capacity for clean energy technology innovations</b> | 130<br>(15%)           | 198<br>(44%)          | 460<br>(46%)        | 382<br>(29%)           | 333<br>(17.4%)             | 125<br>(13%)         | 500.5<br>(27%) | 300<br>(33%)   | 500<br>(33%) |
| 3       | <b>Policy/regulatory framework strengthening</b>                          | 138<br>(16%)           | 52<br>(10%)           | 150<br>(15%)        | 230<br>(17.5%)         | 76.5<br>(4%)               | 75<br>(7.5%)         | 270<br>(15%)   | 50<br>(5.4%)   | 146<br>(10%) |
| 4       | <b>Monitoring &amp; Evaluation</b>  | 12<br>(1.4%)           | 16.6<br>(3.7%)        | 20<br>(2%)          | 41<br>(3%)             | 195<br>(10%)               | 20<br>(2%)           | 70<br>(4%)     | 40<br>(4%)     | 75<br>(5%)   |

## Monitoring & Evaluation

196. Half of the Terminal Evaluations rated the projects' M&E performance as less than "satisfactory". In Armenia, Malaysia, India there was little systematic monitoring and reporting, which had correspondent effects in terms of provision of relevant information into decision-making processes. M&E was strengthened in subsequent delivery. The other half were satisfactory and had higher expenditures on M&E. The relatively weak orientation for M&E

<sup>75</sup> Figures are as per the Terminal Evaluation for the Malaysia GCIP. Proposed expenditures were 69% for Component 1; 13% for Component 2; 7.5% for Component 3 and 2% for Component 4.

<sup>76</sup> Figures are per the Terminal Evaluation for the Armenia GCIP. The proposed budget allocation was 28% to Component 1, 39% to Component 2, 19% for Component 3 and 4.5% for Component 4. At project end, 82% of the budget had been spent. As much as 17% allocated to achieve Component 2 and 82% of budget allocated to Project Management remained unspent, reflected in the project's limited success in building national capacity and a "mostly unsatisfactory" rating for project management.

<sup>77</sup> Information on actual disbursements by Component is not available in the India GCIP Terminal Evaluation.

<sup>78</sup> In GCIP Pakistan, projected expenditures were budgeted as 41% - Component 1; 29% -Component 2; 18% - Component 3 and 3.6% - Component 4. Comparison of the planned allocation versus actual expenses indicates very little variation.

<sup>79</sup> Figures are per the Terminal Evaluation for the South Africa GCIP. As of July 2018, total expenditures recorded represented 98% of the planned budget. Component 4 actual expenditures includes project management costs. Projected budget in the design document was 73% for Component 1; 10% on Component 2; 6% on Component 3 and 1.5% on Component 4.

<sup>80</sup> Information on actual disbursements by Component is not available in the Turkey GCIP Terminal Evaluation.

reflects 2017 observations made by the UN's Joint Inspection Unit and is a concern that has been repeatedly highlighted in internal evaluation reports and external reviews of UNIDO.<sup>81</sup>

197. Implementing teams focused on tracking outputs related to the competition-based Accelerator. Baseline information did not exist for most envisaged outcomes. No suggestions were offered for areas that could be explored to develop baselines to facilitate the assessment of change. Without resourcing and orientation from the logframe to develop these baselines, the implementing teams focused on tracking and tabulating outputs related to the competition-based Accelerator; for example, received applications, eligible applications, semi-finalists, female-led teams, mentors, business clinics, etc. Table 21 summarizes the results data related to the national projects' M&E systems that was meant to be systematically captured and which could be then used by the PSCs and UNIDO.

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<sup>81</sup> G. Tarasov and G. Achamkulangare, UN Joint Inspection Unit (JIU) 2017 Report # 1, Review of Management and Administration in the United Nations Industrial Development Organization (UNIDO)

Table 21: Summary of GCIP Project Outputs and Outcomes from Project Approval Documents.

| <i>Outcome-Level Indicators for the overall project</i>  | <i>Related Targets</i>  |
|--|---|
| <p># of SMEs to pursue innovations in clean technologies; successful Cleantech programs organized after project completion</p> <p>Additional investment into clean technology innovations due to increased interest in the Cleantech program</p> <p># of SMEs as members of the national platform</p> <p>Tons of GHG emissions directly and indirectly avoided</p> | <p># of clean technology startups/SMEs increased by 15%</p> <p>investment in clean technology increased by 15%</p> <p>Minimum 450 SMEs participating in Cleantech program are trained and connected with funding partners and investors</p> <p>Indirect savings of the project are in the range of 815,000 to 1,630,000 tons of CO2 equivalent)</p> |

| <p>Outcome Component 1: A coordinating mechanism/platform established at national level to promote clean technology innovations and entrepreneurship in SMEs; clean technology innovators identified, coached, supported during and beyond Cleantech competition</p> |   |
|--|---|
| <p><i>Outcome-Level Indicators for Component 1</i></p>   |   |
| <p># of innovative businesses created/accredited</p> <p># of prizes for innovators with great impact on women entrepreneurial development and job creation</p>   |   |
| <i>Programmed Outputs</i>  | <i>Output-Level Indicators (Target) for Component 1</i>   |
| <p>1.1 Three annual national Cleantech competitions organized</p>  | <p># of entries (100-300 per Competition; 10% women participants)</p> <p># of semi-finalists (20-25)</p> <p># of finalists (10-15)</p>        |
| <p>1.2 Three associated accelerator programs organized, including post competition support</p>   | <p># of boot camps, training workshops, mentoring sessions organized</p> <p>Improvement of disbursement rate of existing funding programs</p> |
| <p>1.3 Participation in regional and global networking activities</p>  | <p># of participants of regional and global networking activities (15)</p>  |

|  |
|--|
| <p>Outcome Component 2: National institutional capacity built for mentoring and training programs as part of competition-based Accelerator</p> |
|--|

|  |  |
|--|--|
| <i>Outcome-Level Indicators for Component 2</i>  |  |
| # of human/financial resources of host institution and other counterparts with built capacity<br>Wide platform of all stakeholders operationalized |  |
| <i>Programmed Outputs</i>  | <i>Output-Level Indicators (Target) for Component 2</i>  |
| 2.1 Capacity building of host institution strengthened and wide platform with all stakeholders of the project established                          | # of host institution staff trained to be able to organize the competition-based Accelerator program<br><br># of partners involved in the platform<br><br># of mentors recruited and trained |
| 2.2 Experience shared with other countries   | # of regional workshops and training courses organized   |

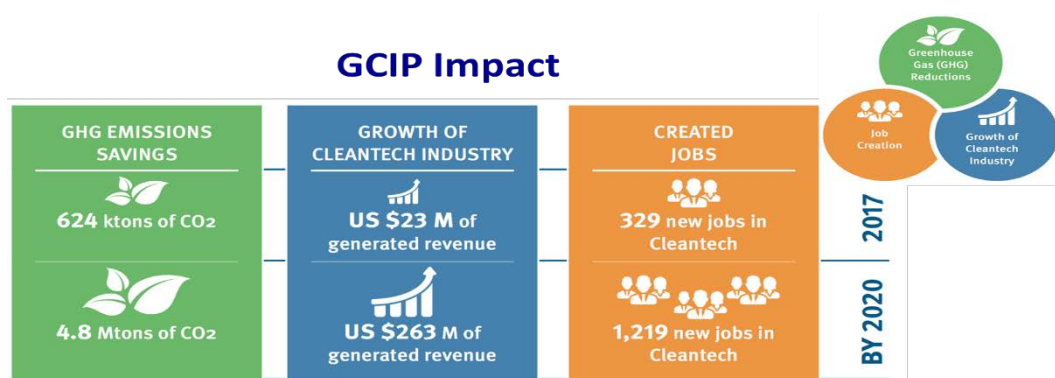
|  |   |
|--|---|
| Outcome Component 3: Strengthened policy/regulatory framework for the development of a supportive local innovation ecosystem |   |
| <i>Outcome-Level Indicators for Component 3</i>  |   |
| Extent to which these policies and regulations are amended or implemented  |   |
| <i>Programmed Outputs</i>  | <i>Output-Level Indicators (Target) for Component 3</i>   |
| 3.1 Necessary policies and regulations required for Cleantech competition and ecosystem identified and developed             | # of new policies and regulations developed to create a conducive policy environment for cleantech implementation<br><br># of policy makers to receive training on policy development |

198. The M&E data that was tracked is not directly comparable across countries. Due to different understandings of key terminology (applicant, entrant, accreditation, commercialization), there was confusion about the ways in which the national projects gauged and communicated their success. Interpretations were not commonly shared across the implementing countries which is illustrative of the challenge of comparing national performance. Furthermore, there was a tendency to exclusively report ‘good news’ stories. The lack of GCIP India’s analysis and reporting on the reasons behind the business failure of the country’s 2016 ‘winner’ were highlighted as a missed opportunity to learn and strengthen the program.

199. The projects did not establish a system for long-term monitoring of outcomes and impacts. Targets were indicated for GHG emission reduction, but it was understood from the

outset that actual GHG savings and other longer-term impacts would be achieved beyond the projects' life and scope<sup>82</sup>. UNIDO, according to its own performance review<sup>83</sup>, has tried to *estimate* impact in emission reduction, job creation and economic growth, projected to exponentially increase by 2020 (see Figure 12). As indicated earlier, a lack of standardized accounting methodology for establishing targets during project design and lack of systematic reporting on projected GHG reductions at project completion creates uncertainty regarding the robustness of projections. In the absence of M&E systems operating in each GCIP implementing country beyond the project period, GHG reductions and other impacts will be difficult to confirm.

Figure 12: Projected Impacts of GCIP-Supported Startups



Source: UNIDO projections based on 14 selected startups spanning 5 countries (2011-2017)

200. Only the Thailand project has undertaken a Mid-Term Review. All other national projects have missed out on the opportunity to gain insights into progress and recommendations to inform the continued roll-out. GEF and UNIDO evaluation policy encourages MSPs to carry out an MTR, but it is not obliged. Most<sup>84</sup> project documents indicated that such a review would be undertaken and budgeted for it. The utility of an MTR, whether executed internally or supported through external facilitation, and its contribution to adaptive management seem to be insufficiently understood. There seemed to be a feeling that if the project was on track, there was no need to undertake a strategic reflection mid-way.

<sup>82</sup> On average, it takes about 3-4 years to incubate a successful enterprise. To measure the impact and growth rate of the incubated firms, one would need to wait at least another 3-4 years (see Annex 1).

<sup>83</sup> As these projections are based on only 14 startups located in 5 countries (out of the total of 795 'semi-finalists' supported in 8 countries under the GCIP during 2014-2017), the Evaluation Team has concerns about the extent to which these startups are representative of the entire universe of teams that participated in the GCIP and the credibility of the methodology used to develop these estimates and the exponential extrapolation for 2020

<sup>84</sup> Project Approval Documents for GEF-6 funded projects (Morocco, Ukraine) mention "periodic reviews" and Terminal Evaluation. All others also specifically mention both a Mid-Term Review and Terminal Evaluation.



**Post-Program Support**

201. Once an annual competition-based Accelerator cycle concludes, there is no formal engagement between the GCIP and beneficiary entrepreneurs. Evaluation survey responses (

202. Table 22) indicate that 38% of all respondents have *not* had post-program contact with the PMU. Among the 4 countries surveyed, there has been more informal post-program interaction with Indian and South African startups. These interactions have remained opportunistic and have not been initiated with *all* former participants.

*Table 22: Responses to the question: Have you had any contact with GCIP after completion of the program?*

|                            | India     |     | Pakistan  |     | South Africa |     | Turkey    |     | Overall    |     |
|----------------------------|-----------|-----|-----------|-----|--------------|-----|-----------|-----|------------|-----|
|                            | <i>n</i>  | %   | <i>N</i>  | %   | <i>n</i>     | %   | <i>n</i>  | %   | <i>n</i>   | %   |
| No                         | 5         | 21% | 27        | 60% | 5            | 17% | 9         | 41% | 46         | 38% |
| Yes                        | 19        | 79% | 18        | 40% | 24           | 83% | 13        | 59% | 74         | 62% |
| <b>Number of responses</b> | <b>24</b> |     | <b>45</b> |     | <b>29</b>    |     | <b>22</b> |     | <b>120</b> |     |

Source: Responses to Evaluation Survey of GCIP Startups

203. In ad-hoc ways, executing partners and mentors are in touch with individual startups. They support them through occasional advice and by facilitating networking with investors and other startups. Similarly, on an individual basis, CTO trainers are in touch and support their journeys as personal relationships have developed, which have also been observed to link with discussions about taking up equity positions.

204. Stakeholders identified the lack of formal, systematic post-program engagement as an important shortcoming of the project’s design, potentially compromising the sustainability of results. The lack of systematic long-term support for and contact with former participants was not part of the original project design. Based on interviews, some participants were confident that the cohort-level networks were self-sustaining, but they invariably also felt that GCIP and the host institution could be more involved in these networks and in providing longer-term support (help to identify new opportunities and linkages) to alumni through periodic networking, periodic ‘check-ins’, etc. Post-project follow-up is also critical to measure the viability and growth rate of supported startups and necessary for verification of environmental and social contributions.

## Knowledge Management

205. National knowledge management and exchange was more successful than envisaged South-South cooperation and international exchange. Even with UNIDO as the implementing agency across the 9 projects, GCIP has not systematically developed and shared knowledge across national projects through a global network as originally envisaged in the design. GCIP projects<sup>85</sup> in Malaysia, South Africa, India, and Armenia published entrepreneurs' stories, videos, brochures and promotional materials. In 2016, the GCIP Project Manager for Pakistan was designated as the overall GCIP Coordinator. This move provided an institutional mechanism to promote sharing of experience and lessons learned under the GCIP framework. However, the extent to which knowledge management was addressed across the country projects remains undocumented and is related to the strength of M&E and succession planning. This may be linked to the implementation as individual country projects as opposed to a programmatic approach with resources provided for this aspect.

206. Similarities across the GCIP projects under review have allowed for a degree of interaction amongst startups across the countries. This has been achieved through virtual participation in the CTO online training webinars. A smaller number of startups were able to meet face-to-face during CTO's Global Forum in Silicon Valley, on which considerable reliance was placed for international knowledge sharing.

## Exit Strategy

207. Handover has been most successful in South Africa and Turkey. The strategy for how UNIDO planned to withdraw externally-provided program resources from GCIP projects was not explicitly described in project documents. It appears to not have been planned for. Nevertheless, from what was observed across the countries, as project support has ended, the notion of an exit strategy was implicitly pursued by GCIP projects.

208. UNIDO undertook the following actions which should be considered in future design of exit architecture:

- (a) identified and worked with institutional structures that would retain the knowledge and skills developed under the project; in this light, the selection of the host institution was critical
- (b) pursued country ownership through engagement of relevant public and private sector actors
- (c) built local capacities (trainers, mentors, judges) to sustain the ongoing organization of the competition-based Accelerator

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<sup>85</sup> These materials provided a consolidated view of the projects' achievements during implementation, including showcasing the startups that benefitted from project support and illustrated the innovations advanced under the GCIP and which contributed to global environmental benefits.

- (d) assured access to training materials and infrastructure to manage applications (whether local, international, or centrally-shared)
- (e) provided clarity about the point at which exit would take place, based on targets and outcomes
- (f) engaged in a handover process and transition where UNIDO support was phased out (in Armenia, India, and Malaysia, this process did not work out very well; whereas, South Africa and Turkey have created longer transitions with UNIDO support being slowly withdrawn, with higher prospects that GCIP activities will be sustained).

## V. CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

***Conclusion 1: GCIP is highly relevant and will remain so as developing countries realize the economic and environmental opportunities to take up cleantech innovation as an engine of low-carbon growth.***

209. All completed GCIP projects rated relevance as “highly satisfactory”. Going forward, the potential for cleantech SMEs in developing countries is estimated to be a USD 1.6 trillion market opportunity. Studies have confirmed the countries in which GCIP has been implemented are ranked lower in terms of countries with functioning clean innovation ecosystems, suggesting there was a need and opportunity in these countries to develop the cleantech space. GCIP is also fully complementary of the GEF-5 Revised Private Sector Strategy. GCIP projects are aligned with GEF’s focal area strategy under climate change mitigation and GEF’s Policy on Gender Mainstreaming. GCIP projects are also supportive of UNIDO’s Inclusive and Sustainable Development mandate and objectives to implement its Green Industry Initiative. GCIP projects have addressed national climate change mitigation issues, energy challenges, and “green job” strategies in line with key environmental and economic priorities developed in-country. Institutional partners have confirmed the value and relevance of the GCIP, although not all countries have moved forward in pursuing a second phase.

***Conclusion 2: GCIP projects have meaningfully contributed to development of cleantech innovation ecosystems with improved performance over time through support for business acceleration, capacity-building, and institutional strengthening. Effectiveness could have been improved through a more globally coordinated delivery, sufficient timeframe and adequate resourcing.***

210. With the relatively limited resources of an MSP, all GCIP projects succeeded in promoting clean technology innovation by conducting annual business competitions and acceleration activities. Startups benefited through the development of business skills and access to mentoring, new markets, and investment. Only a limited number of business-related impacts can be directly *attributable* to GCIP participation. However, there are numerous examples of GCIP’s *contribution* to business improvements. Results include:

- (a) Seven hundred and ninety (795) teams supported;
- (b) Help to entrepreneurs in leveraging grants and other financing;
- (c) Networks of national-level cleantech entrepreneurs created;
- (d) Increased interest of innovators in cleantech;
- (e) Demonstration that cleantech ideas can become businesses;
- (f) Built capacity of executing agencies to further replicate project results;
- (g) Cleantech products and services produced with resulting impact on the economy.

211. The GCIP also delivered outcomes *beyond* the level of individual businesses. Host institutions developed interest and supportive capacities in cleantech and established relations with relevant other organizations, including government departments, universities, and chambers of commerce to anchor the overall concept. Projects could have been more proactive in deepening involvement from additional stakeholders, particularly the private sector, to sustain project results and benefits.

212. Cross-country scrutiny would have been more naturally carried out on a regular basis and generated less transaction cost if it had been coordinated under an overall program framework or global project framework. The initiative did not readily realize the results aggregation, cross-country network building and knowledge exchange foreseen in the individual Project Approval Documents. In addition, among the completed projects, almost all had no-cost extensions, which prolonged their activities by up to an additional 26 months. This mostly stemmed from delays in the initial stages, related to understanding the concept, engaging the counterpart, and establishing a PMU.

***Conclusion 3: GCIP has demonstrated additionality, although not in its planned strengthening of national policy and regulatory environments.***

213. The GCIP demonstrated additionality through its promotion and results in innovation for clean technology; socio-economic returns; institutional capacity; realization of financing for some startups; and business support to enterprises whose products and services have environmental benefits.

214. Policy related activities were limited, under-resourced, and generally embarked on at the later stage of implementation. The lack of focus on the policy arena is linked to the priority given to the competition-based Accelerator. Requested by national counterparts, running a competition-based Accelerator generated relatively fast outputs that could be immediately seen and promoted, giving the GCIP project a national standing and branding. Customized efforts in the creation of enabling policy and regulatory environment to promote SME cleantech would have contributed to increasing the likelihood of project sustainability.

***Conclusion 4: GCIP's operating model successfully enlarged the available pool of resources through catalyzing the support of private ecosystem actors, although this reliance on their voluntary contributions presents some vulnerabilities.***

215. The reliance on private sector involvement is part of a strong, potentially self-sustaining operational model, which contributes to strengthening the national entrepreneurial ecosystem and sustaining project outcomes. The projects have secured extensive pro-bono support from the private sector. This has come in the form of their sponsorship of prizes, technical assistance, and volunteer contributions of mentors, judges, trainers, advocates, etc. To date, these contributions are in the range of USD 3 million. The same individuals were often tapped and they were not always available, particularly in view of competition with other activities for which they were being compensated. This meant that for each competition-based Accelerator cycle, the PMUs were tasked with securing and renewing participation, which imposes a burden on administrators.

***Conclusion 5: Commitment by a national entity, adequate funding and a planned exit strategy at project completion enhances prospects for sustainability.***

216. The handover to TIA in South Africa and TÜBITAK in Turkey attest to the importance of ensuring that the transition to full national ownership takes place during the project period. The experience thus far attests that without this attribute, the initiative seems destined to not continue or may continue with significant delay, sacrificing important momentum (as evidenced by the case of GCIP Pakistan). All institutions involved in the implementation of GCIP projects expressed strong interest in continuation of the GCIP after project completion. However, the ability to finance the project initiatives, particularly the competition-based Accelerator, remained mostly unsecured. Countries that ran more than 2-3 Accelerator cycles had greater success in transitioning the project to national institutions for continued delivery. In all instances, UNIDO's continued association was indicated as vital to successful continuation and project reputation.

***Conclusion 6: The direct and indirect impacts of the GCIP are not easy to gauge due to generally weak monitoring and evaluation, including inconsistency in measurement and the lack of systematic guidance for beneficiaries to estimate global environmental and socio-economic benefits.***

217. The projects' anticipated pathway to impact, as portrayed in GCIP's reconstructed Theory of Change, i.e. GHG reductions, job creation, and investment mobilized was found to be sound. However, M&E was amongst the GCIP's weakest areas of implementation. The projects' results measurement systems have inconsistencies in indicators and definitions, e.g. 'commercialization' or 'accredited' company. Structured reporting on the projects' accomplishments was absent from PSCs as they did not convene as frequently as intended and were characterized by high turnover, though the key involved actors had high legitimacy. This limited the benefit of ongoing supervision and strategic guidance.

218. UNIDO has estimated impacts suggesting some tangible progress being made along this route, however long-term results cannot be verified at this stage. The short duration of GCIP projects requires systematic mechanisms for follow-up and verification with startups that go through the GCIP.

## Recommendations

***Recommendation 1: Any future “GCIP” or similar program should be structured using a more globally coordinated approach with appropriate choice of interventions based on strategic country selection.***

219. A globally coordinated approach would allow for the establishment of a ‘platform’ to support coordination across national projects, global networking, synergy with other international initiatives, capacity-building, standardized metrics, and knowledge management. Provided that the right metrics are in place for systemic monitoring and evaluation, this would usefully inform decision-making and support the measurement of impact. Country ownership of such a platform after project completion would facilitate measurement of impact beyond the life of national implementations.

220. Countries should be selected strategically based not only on their willingness to use STAR allocation but also factors concerning their current state and readiness to support cleantech innovation, particularly the mandate and capacities of the host institution and the way in which cleantech innovation is part of national environmental and development strategy. This could be assessed during a project preparation phase. Strategic pre-implementation scoping would allow for assessing the policy/regulatory environment to determine priorities to support national implementation; identifying the most suitable local host and other public/private sector partners; developing in-country understanding of the cleantech concept, including ability to scale up and replicate activities in other countries as a regional hub; gathering baselines for outputs and outcomes; and undertaking a social inclusiveness analysis prior to project launch.

***Recommendation 2: The GCIP should actively support national-level coordination to dynamize the cleantech entrepreneurship ecosystem.***

221. GCIP should focus on catalyzing the national host’s mandate to coordinate and convene actors already working in-country to support technology innovation. This involves using a more explicit system to categorize the significant volume of entrants who apply, but are not selected, and channelling them to proceed to other more suitable ecosystem actors who can support them according to their stage of development (of enterprise maturity and technology phase). This would require adequate resourcing and understanding of the national coordination role. Selected startups with readiness for GCIP’s approach to business acceleration would move towards the competition-based Accelerator and other startups could be channelled to different actors. The intention would be to get startups at their varying stages into the ‘right’ setting and give them a path that leverages the support that is available. GCIP should further support

national hosts in strengthening and communicating this coordination role, which can act as further assurance of sustainability.

***Recommendation 3: Customize and sharpen the focus on policy strengthening and regulatory frameworks to foster cleantech innovation and its adoption.***

222. A conducive policy environment is needed to support the growth of the cleantech SMEs. The GCIP policy strengthening component needs to be adequately scoped, sufficiently resourced, embarked on at an early stage, with appropriate steering and according to local conditions.

223. Allocating government co-financing commitments to this outcome would be a suitable dedication of national resources for creating inputs to ongoing processes, even post-project completion. Entities tasked with this outcome should have policy engagement as core to their institutional mandate. GCIP was successful in identifying and engaging such national institutions, but they did not seem to have any role other than to attend PSC meetings and play an executive review role. They should be encouraged to view policy outcomes as a mechanism to help them to meet their own institutional objectives.

***Recommendation 4: Expand the network of private sector partners to address GCIP participants' need for business expertise and early stage technology validation.***

224. GCIP should be more strategic in its approaches to access the desired external expertise of the private sector and integrate the private sector-specific technology challenges in its competition-based Accelerator for more beneficial collaborations. GCIP should tap into broader established private sector networks, e.g. business school alumni, business owners' clubs, SME associations, trade associations, communities of practice, women's business associations, etc. Processes that are involved in regularly renewing private sector support should be streamlined.

***Recommendation 5: Measure direct and indirect impacts by establishing adequate monitoring and evaluation systems and ensure that they are implemented using standardized and appropriate indicators.***

225. GCIP results frameworks should incorporate programmatic approaches that systematically gather information on outcomes and higher-level impacts/results. A common methodology is required for data collection that allows for comparison and extrapolation and shared understanding of GCIP-associated terminology amongst the involved actors. This could potentially include a *requirement* that beneficiary startups periodically provide relevant data to the local host organization (or platform) for a period into the future, when impacts are primarily felt and can be reliably quantified and verified.

226. GCIP attracts applications from startups that are developing technologies with environmental and social co-benefits beyond climate change. GCIP should also capture and report on these co-benefits. GCIP should be able to present standardized GEB benefits to a large and growing impact investment community. These investors looking specifically for the

creation of GEBs as part of their returns. The requirements of these investors should be carefully considered in the development of GEB targets, clarifying how aspirational GEB will be measured at the project- and global-level.

***Recommendation 6: Deepen country ownership during the project period, including a plan and resourcing to sustain activities and expand outcomes after project closure.***

227. GCIP projects should dedicate more effort to developing *national- and regional-level* initiatives. This would deepen country ownership and connect startups with investors and other business partners that can support their advance towards commercialization. GCIP should consider procuring trainers and materials through more open competition for service providers, with preference given to qualified vendors based locally and regionally. GCIP should be woven into the fabric of the national innovation ecosystem. By just being another ‘donor-funded’ business accelerator, albeit distinguished by its cleantech focus, the risk is that local actors cease to be interested when GEF/UN funding stops.



## VI. ANNEXES

### Annex I – Concept Note

#### Introduction

1. The GEF is the financial mechanism for several multi-lateral environmental conventions. It works primarily with the public sector in developing countries providing grants to national governments and aims to expand private sector engagement in developing environmental solutions across GEF's focal areas and initiatives. Since its inception in 1991, the GEF has provided developing countries and countries with economies in transition with more than US \$ 10.5 billion in grants. The GEF Secretariat provides support to GEF Council and ensures that Council decisions are implemented. Projects financed by the GEF are implemented by 18 GEF Agencies. The GEF Independent Evaluation Office has a central role in ensuring the independent evaluation function within the GEF. More information about the GEF Evaluation Office can be found at Office's website: [www.gefio.org](http://www.gefio.org).

#### Background

2. An effective way for countries to meet their commitments under various international environmental conventions and agreements is to promote the development and deployment of clean technologies. This is particularly the case in the case of the United Nations Framework Convention on Climate Change (UNFCCC). In order to promote development of and deployment of clean technologies, various support programs and initiatives have been implemented to identify innovators and support innovative small medium enterprises (SMEs) during their start-up phase.
3. The concept of providing business assistance services to early stage companies first emerged in the United States in the 1980s in response to perceive limitations in the prevailing economic development strategies, which focused largely on large corporate expansions. As others recognized the potential economic value of investing in and supporting new business, communities around the world developed business incubation programs to support the growth of new ventures<sup>86</sup>. Accelerators and incubators are the most recognizable start-up assistance programs and there are distinctions between the two. Accelerators usually provide time limited support to startup teams using structured programming and mentorship services designed to accelerate high-potential firms to success or failure. Incubators cater to early stage entrepreneurs usually providing longer tenure for participating firms and a broader suite of services in terms of access to physical space and mentorship.
4. The predominant metaphor for fostering entrepreneurship as an economic development strategy is the "entrepreneurship ecosystem" which describes the culture, enabling policies and leadership, availability of appropriate finance, quality human capital, venture friendly markets and a range of institutional and infrastructural supports for SMEs. Each entrepreneurship

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<sup>86</sup> Evaluating Business Acceleration & Incubation in Canada: Policy, practice and Impact. Deep Centre 2015.

ecosystem is unique and the various actors have different motivations for the success of the ecosystem. For public officials, job creation and tax revenues may be primary objectives, for banks a larger and more profitable loan portfolio may be the benefit. For universities, knowledge generation and reputation may be the benefits and for entrepreneurs and investors wealth creation could be the main motivating factor. Collectively, many stakeholders must benefit and these characteristics lead to eventual self-sustaining of the ecosystem and tipping points arise where government involvement can and should be reduced.

### Global Cleantech Innovation Programme

5. In 2011, UNIDO, with support from the GEF, implemented the “Greening the COP17 program. One of the components was focused on the design of the first South Africa Clean Technology competition for green entrepreneurs and SMEs. This competition was in line with the GEF’s Revised Strategy for Enhancing Engagement with the Private Sector and a specific modality to encouraging innovation in small and medium enterprises through a competition and incubation pilot<sup>87</sup>.
6. The need for further support to policy and regulatory frameworks and to build institutional capacity for cleantech entrepreneurship as learnings of the South Africa pilot resulted in the expansion of the program by UNIDO and GEF into the [Global Cleantech Innovation Programme](#) (GCIP) into other countries in 2013, namely Armenia, India, Malaysia, Pakistan, Turkey. Thailand joined in 2014, Morocco in 2016 and Ukraine in 2017. The GCIP has now operated in nine countries. See Table 1. Another dozen or more additional countries have been identified for further expansion as part of a Phase II.

**Table 1. GCIP Countries and Grant Amount**

| GEF ID | COUNTRY      | GEF GRANT (\$USD) | START          | DURATION |
|--------|--------------|-------------------|----------------|----------|
| 5146   | Malaysia     | 990000            | September 2012 | 36 mos   |
| 5505   | Turkey       | 990000            | July 2013      | 36 mos   |
| 5515   | South Africa | 1,999,000         | August 2013    | 36 mos   |
| 5145   | Armenia      | 547946            | January 2013   | 36 mos   |
| 5218   | India        | 1,000,000         | January 2013   | 36 mos   |
| 5553   | Pakistan     | 1,369,863         | August 2013    | 36 mos   |
| 5800   | Thailand     | 1,826,500         | April 2014     | 36 mos   |
| 9485   | Morocco      | 913,242           | April 2016     | 36 mos   |
| 9811   | Ukraine      | 1,452,875         | March 2017     | 36 mos   |
| Total  |              | 11,089,426        |                |          |

<sup>87</sup> Revised Strategy for Enhancing Engagement with the Private Sector. GEF/C.41/09/Rev.01 November 10, 2011

7. The GCIP is in line with the GEF's Climate Change Mitigation Focal Areas Strategy under the GEF-6 Programming Directions and the Private Sector Strategy as well as UNIDO's mandate to promote Inclusive and Sustainable Industrial Development. The programme uses a similar model in each country and supports a cleantech competition from which winners are selected to be trained through a business accelerator program. Entrepreneurs are chosen across four main clean technology categories:
  - Renewable energy,
  - Energy efficiency,
  - Waste to energy, and
  - Water efficiency.
8. Additional categories such as Green Building, Transportation and Advanced Materials and Chemicals have also been included in competitions for certain countries.
9. The nature of the business assistance spans topics such as business model validation, product/technology validation, finance, funding, legal and intellectual property issues, sustainability, corporate partnerships, government relations and regulations, sales, marketing, crowdfunding, angel and venture capital investment, scaling up and going global.
10. National winners are then invited to a global competition hosted by the US-based CleanTech Open in California every year. Platforms at the national and international level introduce the entrepreneurs and link them with investors, business and commercial partners with a view to commercialization of the services or products.
11. Through program planning, GCIP also has an aim to promote an innovation ecosystem in the countries where it operates by coordinating existing national programs relating to the promotion of development and deployment of clean technologies. Figure 1 presents the GCIP approach to build an entrepreneurship ecosystem. Through this cleantech ecosystem and accelerator approach, the GCIP expects to catalyze investment to support and accelerate start-up entrepreneurs towards the development and commercialization of their innovative ideas.
12. Strengthening the policy and regulatory framework for the development of a supportive local innovation ecosystem is another hallmark of the project and entails reviewing the policies and regulations relating to the promotion of SMES working on clean technologies in order to identify those that need to be developed or improved upon including those governing the protection of intellectual property rights, sponsorship agreements and rights of different stakeholders (competition organizers, entrants, judges, mentors, etc.).
13. A third component entails institutional capacity building for the executing organizations, namely the government ministries and research institutions associated with the competition and accelerator program. This can include communication and advocacy strategies and other

tools to support the collection of contestant entries and subsequent sustainable delivery of the program. Figure 2 presents the IEO reconstructed Theory of Change of the GCIP

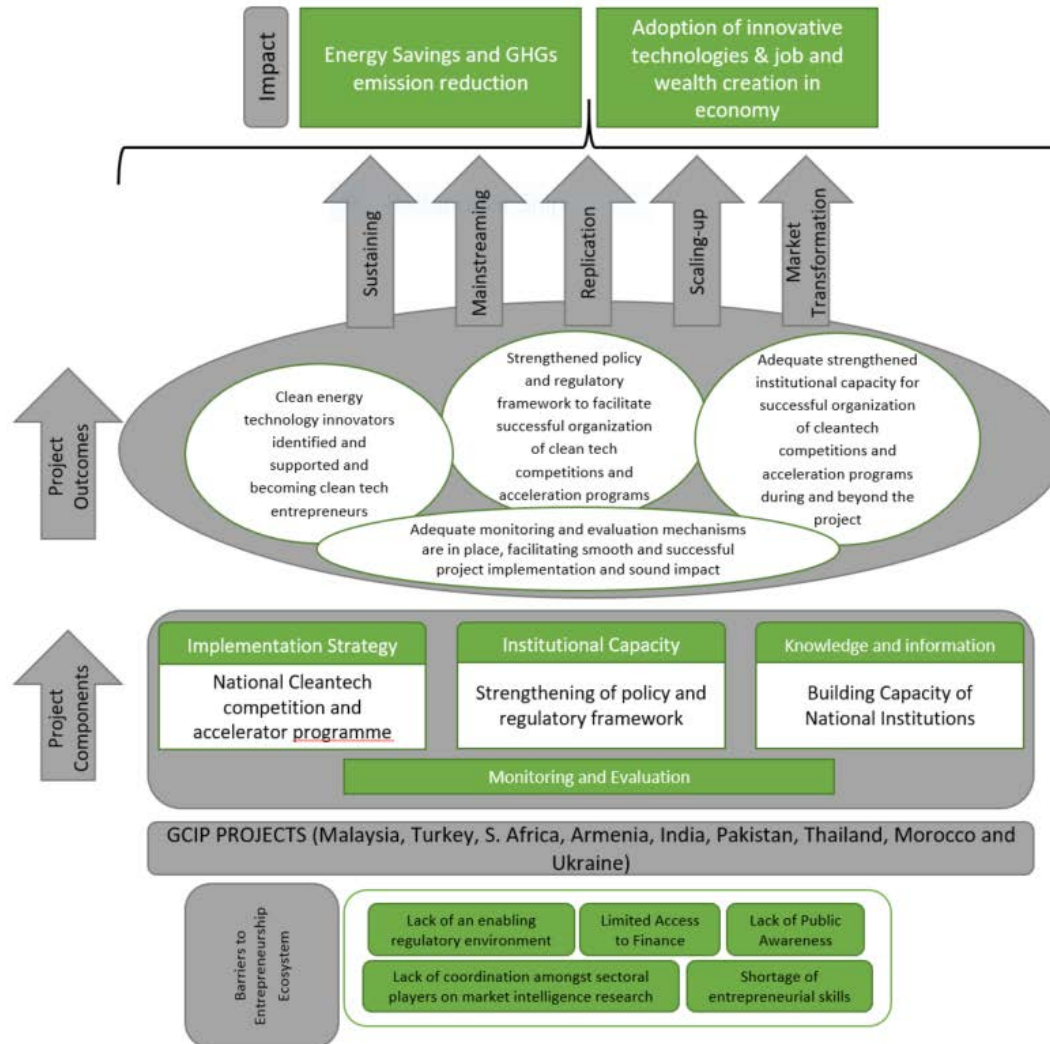
14. Each national project is a Medium Sized Project (MSP) receiving between \$1-\$2M in funding for about 3 years. The intention is to hold 2-3 cycles of the annual program. At the end of three years the aim is for each national project to be fully operational with sustainable support from the public sector and private sector co-sponsors.

Figure 1: GCIP approach to an innovation and entrepreneurship ecosystem



Source: UNIDO brochure - Fostering Clean Technology Innovation, 2015)

Figure 2: GCIP Theory of Change



Source: Developed by the IEO based on project documentation

### **Scope and Purpose of the Review:**

15. The scope of the evaluation will cover the GCIP as a whole but will do in-depth case studies on a sample of SMEs in four partner countries that have participated in the GCIP since its inception in 2013: India, South Africa, Turkey and Pakistan. These four countries are approaching the end of their project duration and have a cadre of entrepreneurs that have gone through the accelerator with whom one can assess outcomes and progress to impact.
16. The purpose of the evaluation is to independently assess the benefits and effect on SMEs after having gone through the GCIP program. Have the accelerators produced viable companies? Created jobs? Produced windfalls for the founders and investors? Elicited greater private investment in start-ups? Generated global environmental benefits?

### **Evaluation Objectives:**

- (a) Assess the quality of advisory services provided by the program
- (b) Assess the outcomes and benefits of the program in a variety of ways – environmental outcomes and economic outcomes of SMEs;
- (c) Assess the legal regulatory frameworks introduced and whether they have enabled cleantech SME ecosystem innovation
- (d) Assess the demonstration effects of the program—replication/scaling up?

### **Approach and Methodology**

17. The Evaluation will be carried out as an independent study using a participatory approach whereby all key parties associated with the project will be informed and consulted throughout the process.
18. The review will use mixed methods to collect data and information from a range of sources and informants. It will pay attention to triangulating the data and information before forming an assessment. The main instruments for data collection will be:
  - (a) Desk and literature review of documents related to the projects including but not limited to:
    - (i) Original project documents (endorsements), monitoring reports, mid-term review reports and terminal evaluations and relevant correspondence
  - (b) Stakeholder Consultations will be conducted through structured and semi-structured interviews and focus group discussions. Key stakeholders to be interviewed include:
    - (i) UNIDO Management and staff involved in the project
    - (ii) GEF Secretariat staff involved in the design of the projects

- (iii) Representative SMEs
- (iv) Representative stakeholders from academic institutions, research institutions and private sector such as competition judges, mentors and sponsors
- (v) Country government officials
- (c) Online Survey with SMEs that have been through the accelerator program
- (d) Field visits associated with Terminal Evaluations to Turkey, India, South Africa and Pakistan will also be factored into the analysis.

### **Key Evaluation Questions**

- (a) What is the relevance and additionality of this initiative in the participating countries?
- (b) What gaps is this program seeking to address?
- (c) What is the comparative advantage of the GCIP? How is the GCIP any different?
- (d) What is the rationale for selection of country in the program?
- (e) How effective has the programme been in meeting its planned outputs and outcomes?
- (f) What direct and indirect impacts did this initiative deliver?
- (g) Is the program on track to bring SMEs to commercialization? (evidence of contracts, evidence of investment?)
- (h) What are the most important benefits to SMES of going through the GCIP?
- (i) If GCIP was designed as a Programme right from the beginning (rather than individual country projects), what would have happened to the Programme's performance and results? Would the benefits and effects on SMEs been different?
- (j) Which policies or regulations were initiated, established or supported to create an enabling environment for the scale-up of project initiatives?
- (k) What types of institutional capacity has been created in the country because of the GCIP?
- (l) How efficient was project/programme delivery?
- (m) Were resources allocated sufficiently to achieve the expected results, particularly for the 'strengthening of policy and regulatory framework' component

- (n) Is the timeframe and budget realistic to support the startup companies to reach commercialization?
- (o) To what extent are the program's results likely to be sustained in the long term?
- (p) What is the likelihood of scale-up and/or replication in the representative country?
- (q) Has there been a viable entrepreneur ecosystem created for cleantech SMEs?
- (r) What is the likelihood of the program continuing after the GEF project ends?

### **Team Composition**

19. The Evaluation Team will be managed by Ms. Baljit Wadhwa, Senior Evaluation Officer, IEO with oversight and backstopping from Geeta Batra, Chief Evaluation Officer and Deputy Director, IEO. The team will be supported by one international consultant, an expert in entrepreneurial ecosystems evaluation and an IEO Evaluation Analyst, Molly Watts Sohn.



## Workplan

| Activity   | Nov 2017 | Dec 2017 | Jan 2018 | Feb 2018 | March 2018 | April 2018 | May 2018 | June 2018 | July-Aug 2018 | September 2018 | October 2018 | Nov. 2018 | Dec. 2018 |
|--|----------|----------|----------|----------|------------|------------|----------|-----------|---------------|----------------|--------------|-----------|-----------|
| Document Collection                              | ■        | ■        |          |          |            |            |          |           |               |                |              |           |           |
| Document Analysis                                |          | ■        | ■        |          |            |            |          |           |               |                |              |           |           |
| Interviews with SMEs                             |          |          | ■        | ■        | ■          |            |          |           |               |                |              |           |           |
| Interviews with UNIDO/GEFSEC/Cleantech Open Mgmt |          |          | ■        | ■        |            |            | ■        |           |               |                |              |           |           |
| Survey design                                    |          | ■        |          |          |            |            |          |           |               |                |              |           |           |
| Survey administration                            |          |          |          | ■        |            |            |          |           |               |                |              |           |           |
| Survey Analysis                                  |          |          |          |          | ■          | ■          |          |           |               |                |              |           |           |
| Cleantech Open Global Forum                      |          |          | ■        |          |            |            |          |           |               |                |              |           |           |
| Field visit to India                             |          |          |          | ■        |            |            |          |           |               |                |              |           |           |
| Field visit to S. Africa/Pakistan                |          |          |          |          |            |            |          |           | ■             |                |              |           |           |
| Report drafting                                  |          |          |          |          |            |            |          |           |               | ■              | ■            |           |           |
| Report presentation                              |          |          |          |          |            |            |          |           |               |                |              |           | ■         |
| Knowledge dissemination                          |          |          |          |          |            |            |          |           |               |                |              |           | ■         |

## Annex 1: Evaluation Matrix Global Cleantech Innovation Programme

| <b>Key Evaluation Question</b>   | <b>Pillar</b>        | <b>Information Sources</b>  | <b>Possible Approaches</b>  |
|--|----------------------|---|---|
| <p><b>What is the relevance and additionality of this program in the countries selected?</b></p> <ul style="list-style-type: none"> <li>• What gaps is this program seeking to address?</li> <li>• What is the comparative advantage of the GCIP? How is the GCIP any different?</li> <li>• What is the rationale for selection of country in the program?</li> </ul>  | <b>Relevance</b>     | <p>Council and GEFSEC Documents</p> <p>Data/Results from Surveys, Interviews</p> <p>Terminal evaluations</p>  | <p>Document review</p> <p>Interviews</p> <p>Surveys</p> <p>Meta-Evaluations</p> <p>Comparative analysis with other accelerator programs</p> |
|  |                      |   |   |
| <p>(s) How effective has the programme been in meeting its planned outputs and outcomes?</p> <p>(t) What direct and indirect impacts did this initiative deliver? Is the program on track to bring SMEs to commercialization? (evidence of contracts, evidence of investment?)</p> <ul style="list-style-type: none"> <li>• What are the most important benefits to SMES of going through the GCIP?</li> </ul> | <b>Effectiveness</b> | <p>Data/Results from Surveys, Interviews</p> <p>Terminal Evaluations</p> <p>Supervision documents</p> <p>Interviews with UNIDO staff</p> <p>Interviews with GEFSEC staff</p> <p>Interviews with PMU Staff</p> | <p>Document review</p> <p>Interviews</p> <p>Surveys</p> <p>Meta-Evaluation</p>  |

|   |                          |  |  |
|---|--------------------------|--|--|
| <ul style="list-style-type: none"> <li>• If GCIP was designed as a Programme right from the beginning (rather than individual country projects), what would have happened to the Programme’s performance and results? Would the benefits and effects on SMEs been different?</li> <li>• Which policies or regulations were initiated, established or supported to create an enabling environment for the scale-up of project initiatives?</li> <li>• What types of institutional capacity has been created in the country because of the GCIP?</li> </ul> |                          |  |  |
|   |                          |  |  |
| <p>(u) How efficient was project/programme delivery?</p> <ul style="list-style-type: none"> <li>• Were resources allocated sufficiently to achieve the expected results, particularly for the ‘strengthening of policy and regulatory framework’ component</li> <li>• Is the timeframe and budget realistic to support the startup companies to reach commercialization?</li> </ul>   | <p><b>Efficiency</b></p> | <p>Council and GEFSEC Documents</p> <p>Terminal evaluations</p> <p>Supervision Documents</p> | <p>Document review</p> <p>Interviews</p> <p>Surveys</p> <p>Meta-Evaluation</p> |
|   |                          |  |  |

|   |                              |   |  |
|---|------------------------------|---|--|
| <p><b><i>To what extent are the program's results likely to be sustained in the long term?</i></b></p> <ul style="list-style-type: none"> <li>• What is the likelihood of scale-up and/or replication in the representative country?</li> <li>• Has there been a viable entrepreneur ecosystem created for cleantech SMEs?</li> <li>• What is the likelihood of the program continuing after the GEF project ends?</li> </ul> | <p><b>Sustainability</b></p> | <p>Terminal evaluations</p> <p>Interviews with PMU Staff, Cleantech Open and UNIDO Staff</p> <p>Data/Results from Surveys, Interviews</p> | <p>Document review</p> <p>Interviews</p> <p>Surveys</p> <p>Meta-Evaluation</p> |
|---|------------------------------|---|--|

## Annex 2: Literature Review

1. The following section presents a brief review of some key pieces of literature. The review is not meant to be exhaustive or describe the entirety of information reviewed in considering the impact of business acceleration, training and mentoring.
2. The development community has for long supported the idea that a prosperous private sector is essential for economic growth. Enterprises have been praised as the engine of economic growth, playing a critical role at the heart of entrepreneurship, especially in developing countries. Enterprise development has been hailed as the source of most new employment and productive investment, and the basis for growth and poverty reduction. But despite their enormous potential, enterprises face several challenges related to access to resources, finances and services, which limit their potential for growth. Financial and non-financial services to support enterprises in their start-up and growth stage are being provided by governments, NGOs, microfinance organizations and business centers. While these services are common and widespread out, the measuring of the impact of business incubation, investment, training and mentoring is limited, mainly due to the challenges of doing so.
3. At the outset it is important to note that there is a distinction between accelerators and incubators. Accelerators are typically for-profit organizations, owned and operated by venture capital investors who intend to generate returns from equity-based investments in their client firms. Accelerators provide a range of services to early stage firms, including financial support, business advice and complementary services offered by partner organizations. Incubators are typically not-for profit organizations that offer similar services to accelerators but tend to provide longer tenure for participating firms and a broader suite of services in terms of physical space and mentorship. Incubators are often sponsored by universities, colleges, or economic development corporations<sup>88</sup>.
4. Accelerators offer impact enterprises support across their spectrum of needs as they seek to scale. There are several different platforms that can support enterprises as they grow. Many focus on just one of the myriad of challenges that face enterprises. For instance, impact investment firms, challenge funds, grant-making organizations, and crowd-funding platforms all address financing needs but rarely support enterprises in refining their business models or establishing relationships with partners. Conversely, social entrepreneurship schools and social venture networks provide enterprises with this support, but they often do not help with funding or with establishing a rigorous monitoring and evaluation system. Accelerators focus not just on a single issue but typically aim to support a broad spectrum of impact enterprise needs as they seek to scale. This support is provided through an array of resources and services, offered both by accelerators themselves and through their networks.
5. Over the past several years, several incubators and accelerators focused specifically on impact enterprises have emerged. In a 2013 landscaping exercise conducted by The Rockefeller

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<sup>88</sup> Circum Network for the National Research Council Canada. Evaluation of the Canada Accelerator and Incubator Program. Evaluation Report. September 2016.

Foundation and Monitor Deloitte<sup>89</sup>, more than 160 of these “impact accelerators” were found just in the United States, Sub-Saharan Africa (SSA), and Southeast Asia. The average age of the accelerators surveyed through this work was less than five years.

6. In their study for the Rockefeller Foundation, Monitor Deloitte sought to identify best practices and innovative new ideas for scaling impact enterprises. There were several phases of work under this project. The first phase focused on understanding the needs of impact enterprises as they seek to scale. In the second phase, the team conducted primary and secondary research and developed a landscape of more than 160 impact accelerators in the United States, Sub-Saharan Africa, and Southeast Asia to understand both the typical support accelerators provide for impact enterprises as well as promising new practices. The Rockefeller Foundation and Monitor Deloitte team began this research project by identifying the eight discrete needs or steps that impact enterprises follow in order to grow their organizations. They are:

- **Market Research:** Research and analytics on market dynamics, relevant policies, customers, and potential competitors. This research informs and shapes the development of business strategy.
- **Business Development and Strategic Planning:** Business structures and strategies that enhance the performance and impact of the enterprise. This category includes all the needs of an impact enterprise as they establish and develop their business, such as the procurement of physical office space, establishment of back-office functions (such as information technology (IT) support and human resources (HR)), recruitment of human capital, and any legal support. In addition, this category includes the development of a business plan and ongoing business strategy.
- **Financing:** Seed funding; funds for ongoing operations, such as equipment, raw materials, marketing, and inventory; and funds for expansion.
- **Supply Sourcing and Production:** Sourcing of raw materials and production of goods.
- **Sales and Marketing:** Promotion and sales of goods or services.
- **Distribution and Market Access:** Access to appropriate distribution channels - both individuals and organizations - to reach target markets and consumers.
- **Monitoring and Evaluation:** Performance and impact metrics of the enterprise that provide insights on how to adjust and optimize the business model.
- **Leadership Skills and Business Acumen:** Leadership and business skills of the enterprise team — this component is the core of the enterprise and supports success in all other areas. It addresses the inherent qualities that make an impact enterprise leader not just

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<sup>89</sup> Monitor Deloitte. Accelerating Impact. Exploring Best Practices, Challenges and Innovations in Impact Enterprise Acceleration. Funded by the Rockefeller Foundation. February 2015.

a social visionary, but also someone who has the skills to commercialize an idea and perform basic management tasks, such as conducting meetings, overseeing employees, and coordinating disparate workstreams.

7. As an impact enterprise grows, it will repeat the cycle and go through these eight steps again, but with nuanced needs depending on the stage. For instance, an early stage company will focus on developing the right business plan and getting seed funding while a more mature company will need to refine its strategy on an ongoing basis and secure growth capital.
8. A literature review on the impact of business incubation, mentoring, investment and training on startup companies by the Overseas Development Institute<sup>90</sup> assessed the existing literature and discussed the challenges of measuring impact in these areas including that there is no standard methodology for measuring incubator performance, which makes comparisons between studies challenging. There is limited data available to measure the impact of business incubation which can be explained by a number of reasons. Incubation can be difficult to assess as the outcomes may take years to materialize, basically, the time it takes an enterprise to develop its market and scale its production.
9. On average it takes about three to four years to incubate a successful enterprise, and if one would like to measure the viability and growth rate of the incubated firms one would have to wait at least another three or four years after graduation. Few studies capture the full impact of business incubation, for example taking a measure of incubation impact over the incubation period rather than longer term, ignoring entrepreneurial learning and subsequent activity as a result of business failure. Moreover, lack of data is also due to the fact that many business incubators do not track their results beyond the number of enterprises they graduate. For those incubators that do track results, many times the data is not reliable.
10. Another constrain in measuring the impact of business incubation is that few studies have applied a robust evaluative approach to assessing the economic contributions of incubators. Many quantitative academic studies aim at assessing the impact of incubators on enterprises have more conservative results than industry studies, and their findings are often contradictory. Dee et al<sup>91</sup>, argues that taken together these studies are indicative of the approaches that might work, but given the relatively small number of studies and the lack of comparability between them, any conclusions should be treated as indicative at best.
11. The most common type of accelerator support is capacity building for impact enterprises. Accelerators often provide formal training or workshops to teach entrepreneurs how to refine their model and scale their business. This can include specific courses regarding financing, marketing, or business plan development. Many accelerators also provide access to useful

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<sup>90</sup> Pompa, C. Literature Review on the Impact of Business Incubation, Mentoring, Investment and Training on Start-up Companies. Overseas Development Institute. February 2013.

<sup>91</sup> Dee, N.J. et al. Incubation for Growth. A review of the impact of business incubation on new ventures with high growth potential. London. NESTA. 2011.

networks for enterprises - introducing them to investors and other funders, potential partners, suppliers, mentors, and customers and beneficiaries.

12. Looking across grantees and the broader impact accelerator landscape, Monitor Deloitte identified a number of best practices for successfully accelerating impact enterprises. They are:

***Develop a localized or sector-specific model***

13. As the impact accelerator market matures, there is increasing recognition that a one-size-fits-all approach is not effective. Market dynamics are highly unique in different industries or geographies, and thus it is most useful to give enterprises lessons and resources that are directly related to their specific niche. Accelerators are increasingly developing customized models of support with local or sector-specific case studies, mentors, and instructors.

***Build a strong ecosystem of support***

14. No accelerator can provide support for all enterprise needs on its own. They must build a strong ecosystem of support around the enterprise — including mentors, investors, and sector stakeholders. Through partnerships, accelerators can provide better curriculum, connections, and expertise on specific geographic or sector dynamics

***Carefully screen impact enterprises for appropriate fit***

15. Depending on the type of support provided by an accelerator program, some impact enterprises will benefit more than others. Accelerators must screen their applicants to ensure an appropriate fit with the program. A robust, up-front screening process ensures impact accelerators can be effective in providing support and prevents impact enterprises from wasting time in a program that addresses skills they already have or that they are not ready for.

***Develop a holistic model, but tailor support for individual enterprises***

16. Accelerators distinguish themselves from other intermediaries by offering holistic support across multiple scaling needs. They have a range of resources and curriculum from which they can draw. However, they are increasingly tailoring this holistic support to the needs of individual enterprises - taking the customized model highlighted above one level deeper.

***Foster collaboration amongst impact enterprises***

17. Impact enterprises share a motivation to address complex social and environmental issues. Additionally, starting a business to address these issues involves common growth challenges, which all impact enterprises face. This creates a unique opportunity for collaboration. These enterprises can provide highly constructive guidance to their peers given their on-the-ground perspective. Collaboration also allows impact enterprises to share best practices, make connections for one another, and even partner together.



### ***Maintain long-term enterprise engagement***

18. The scaling process is often long and arduous. Impact enterprises must test new ideas, fail, and refine them over time. Accelerators acknowledge that providing long-term support through this process is desirable to ensure enterprises remain on track with their plans. It is also beneficial to provide new connections for enterprises as their needs evolve over time.
19. The Monitor Deloitte report also highlighted common impact accelerator challenges. Below is an overview of the common challenges that face impact accelerators as they seek to support impact enterprises and scale their impact.

### ***Lack of awareness***

20. The relative nascence of the impact accelerator market means many investors, impact enterprises, and other key stakeholders are unaware of their benefits. This challenge is especially acute in developing economies, where knowledge of even traditional accelerator models is not widespread. This limited awareness constrains accelerators' ability to attract both enterprises and relevant partners to their program. To mitigate, many accelerators cultivate strategic partnerships with other ecosystem players to raise awareness. These partnerships allow accelerators to present their work at industry trainings and conferences and make connections to investors, enterprises, and other key partners such as potential mentors. Other accelerators have taken to traditional advertising mediums, such as radio interviews, to reach broader audiences.

### ***Developing a sustainable funding model***

21. The majority of impact accelerators cite funding as an acute constraint to their program. Accelerators reliant on philanthropic capital often find that donor timelines and spending requirements misalign with their own needs. For example, donors often need to fund specific initiatives that generate easily identifiable, large-scale impact, while accelerators often need funding to simply maintain and scale their operations or to test (potentially failing) innovations that could enhance their models. To mitigate, accelerators focused on philanthropic capital are more consciously selecting funders who have long-term goals that align with their program. Partnering with more niche funders allows accelerators to develop ongoing relationships with fewer spending restrictions.

### ***Balancing business versus social impact***

22. For impact accelerators, "scaling" enterprises has many different facets. Impact enterprises need to focus on business growth, measured through traditional metrics such as revenue growth or employee growth. At the same time, they also need to increase social impact, measured through impact-specific metrics such as jobs created or GHG emission reduced. It is challenging for impact accelerators to determine the right models where enterprises repay the cost of services over time, or equity stakes that enterprises can focus between scaling business impact versus scaling social impact. Often, they struggle to balance these two objectives and

identify the appropriate support to provide enterprises. To mitigate, some accelerators inherently link these two goals, whereby the social impact only increases as the business scales. Other accelerators focus on defining clear impact goals for an individual enterprise and then help the enterprise develop a strategy to meet these goals.

### ***Balancing standardization and customization***

23. Standardized curriculum enables materials to be refined and perfected over many iterations and eases the process of scaling an accelerator program. On the other hand, customized curriculum, case studies, and other tools allow impact enterprises to understand how to apply general lessons or theory to their own businesses. Accelerator programs need both, but finding the right balance is a challenge. Furthermore, customized programming is highly resource intensive. To mitigate, some accelerators have identified a set of issues that nearly all impact enterprises experience and have crafted a standard curriculum that addresses them. They then layer on tailored services by drawing on relevant case study examples or appropriate mentors from their network.

### ***Human capital resource constraints***

24. Impact accelerators need talented human capital to both deliver existing programs effectively and to scale their model. However, limited philanthropic funding for overhead costs, lower salaries compared to other private sector jobs, and often “unattractive” locations means that impact accelerators frequently cannot obtain the necessary talent. To mitigate, many impact accelerators rely on mentors or sector experts who are willing to contribute their time free of charge. Some accelerators utilize private sector secondees or graduate students to provide temporary support on a specific initiative (e.g., developing a new course). Others focus on finding members of the local community that are capable of implementing a program and have the passion to support impact enterprises.

### ***Limited quantitative data to support insights on best practices***

25. Right now, there is limited data being collected and analyzed to understand the quantitative impact of different accelerator methods and approaches. Insights remain qualitative. To help accelerators feel even more confident in their choices and help other accelerators make informed decisions, the field must augment the types of qualitative insights found in this report with quantitative verification. Greater impact measurement by impact enterprises and impact accelerators, and better tracking by all parties will ensure innovative models and initiatives can be tested, validated, and scaled. To mitigate, nearly all impact accelerators are prioritizing monitoring and evaluation, both for themselves and their impact enterprises. The key is to standardize this data collection and share it with researchers, who can develop cross-cutting quantitative insights around what is working and what is not working in impact acceleration. To make this successful, accelerators and researchers need to collaborate and work together on standardizing data.

## Annex II – Documents Consulted

### GEF and UNIDO Project Documents

Greening the COP17. GEF ID 4514. Request for CEO Endorsement

Independent Terminal Evaluation of the Greening the COP17 in Durban-South Africa Project. September 2013. UNIDO

Original Project Concept: Clean Technology Innovation Programme “Promoting Innovations in Clean Energy Technologies in Selected SMEs (contained as an Annex in the Project Approval Document for GCIP Armenia)

Independent Terminal Evaluation, GEF UNIDO Cleantech Programme for SMEs in Armenia, April 2017

Independent Terminal Evaluation, GEF UNIDO Cleantech Programme for SMEs in Malaysia,

Independent Terminal Evaluation, GEF UNIDO Cleantech Programme for SMEs in India, July 2018

Independent Terminal Evaluation, GEF UNIDO Cleantech Programme for SMEs in South Africa, July 2018

Independent Terminal Evaluation, GEF UNIDO Cleantech Programme for SMEs in Pakistan, August 2018

Independent Mid-Term Evaluation, GEF UNIDO Cleantech Programme for SMEs in Thailand, 2017

Project Identification Form (PIF) for GEF UNIDO Cleantech Programme for SMEs in Ukraine, March 2018

CEO Approval Form for GEF UNIDO Cleantech Programme for SMEs in Ukraine, October 2018

A variety of project documentation provided across the GCIP implementing countries, including: Project Progress Update Reports; annual Project Information Reports (PIRs); Project Steering Committees minutes; commemorative books (South Africa, India); assorted promotional media, articles, videos; traction statistics; UNIDO presentations; financial information; case studies

GEF 5 Focal Area Strategies [www.thegef.org/sites/default/files/documents/GEF-5\\_FOCAL\\_AREA\\_STRATEGIES.pdf](http://www.thegef.org/sites/default/files/documents/GEF-5_FOCAL_AREA_STRATEGIES.pdf)

Revised Strategy for Enhancing Engagement with the Private Sector. GEF/C.41/09/Rev.01, 10 November 2011

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Integrating Human Rights and Gender Equality in Evaluations, Guidance Document (United Nations Evaluation Group, August 2014)

Monitoring and Evaluation in the Development Sector, KPMG International, 2014

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G. Tarasov and G. Achamkulangare, UN Joint Inspection Unit (JIU) 2017 Report # 1, Review of Management and Administration in United Nations Industrial Development Organization (UNIDO)

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Accelerating Success: Strategies to Support Growth-Oriented Companies (2012), International Economic Development Council

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Financing Innovation: Opportunities for the GEF, A. S. Miller and S. A. Swann, Prepared for GEF's Science and Technical Advisory Panel (STAP)

Expanding Networks of Disadvantaged Entrepreneurs (2015), S. Drakopouou Dodd, J. Keles OECD Centre Entrepreneurship

GEF Engagement with the Private Sector, GEF's Independent Evaluation Office Brief, 2017

Global Cleantech Innovation Index 2017, published in partnership by Cleantech Group and WWF

Global Innovation Index 2018, published in partnership by Cornell SC Johnson College of Business, INSEAD, WIPO

Green Technology Trends: Rise of 'Cleantech' (2017) [www.thesouthafrican.com/green-technology-trends-the-rise-of-cleantech/](http://www.thesouthafrican.com/green-technology-trends-the-rise-of-cleantech/)

Expanding Networks of Disadvantaged Entrepreneurs (2015), S. Drakopouou Dodd, J. Keles  
OECD Centre Entrepreneurship, S. Susman. *Why SMEs have the Potential to Transform the  
Economy*, 30 October 2017 [www.fin24.com](http://www.fin24.com)

SMEs and Local Development

[www.oecd.org/cfe/leed/Expanding%20the%20networks%20of%20disadvantaged%20entrepreneurs.pdf](http://www.oecd.org/cfe/leed/Expanding%20the%20networks%20of%20disadvantaged%20entrepreneurs.pdf)

Swiss Entrepreneurial Ecosystem Report 2015-/2016, Swiss Startup Monitor Foundation

TechStars Sustainability Accelerator: 10 Start-Ups Driving Innovation for the Planet

<https://www.forbes.com/sites/marktercek/2018/08/07/techstars-sustainability-accelerator-10-start-ups-driving-innovation-for-the-planet/#2deec5a19e98>

UNDP's Human Development Report 2016 <http://hdr.undp.org>

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### **Materials Cited in Footnotes of this Report**

Evaluating Business Acceleration and Incubation in Canada: Policy, Practice and Impact. Deep Centre: 2015

Cleantech Venture Capital: Continued Declines and Narrow Geography Limit Prospects, D. Saha and M. Muro. Brookings Institute: May 2017

Dr. Hervé Leuret, Vice Presidency for Innovation in Switzerland's Ecole Polytechnique Fédérale de Lausanne, [www.startup-book.com/](http://www.startup-book.com/)

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Professor Vijay K. Jolly, *Commercializing New Technologies: Getting from Mind to Market*. IMD: 2011

*Building Competitive Green Industries: The Climate & Clean Technology Opportunity for Developing Countries*. 2014. IBRD

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What Makes an Entrepreneurial Ecosystem?”, N. Colin (October 2015)

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<https://saathipads.com/>

<https://www.unido.org/news/good-business-malaysia-free-seed>

## **Annex III – Stakeholders Interviewed**

### **GEF Secretariat**

David E. Rodgers, formerly Senior Climate Change Specialist, Programs Unit

### **Cleantech Open**

Kevin Braithwaite, Vice President, Global Programs, Cleantech Open

Rex Northern, Senior International Trainer, Cleantech Open

### **UNIDO**

James New, GCIP Project Manager for South Africa, Industrial Development Officer, Energy Department

Gerswynn McKuur, GCIP National Project Coordinator for South Africa

Marco Matteini, GCIP Project Manager for Turkey, Industrial Development Officer, Energy Department

Alois Posekufa Mhlanga, GCIP Project Manager for Pakistan and Morocco, Chief, Climate Technology and Innovations Division, Department of Energy

Jutamanee (Jip) Martchamadol, GCIP National Project Coordinator for Thailand

Jossy Thomas, GCIP Project Manager for Thailand, Industrial Development Officer, Energy Department

Mark Draek, GCIP Project Manager for Armenia and Ukraine, Industrial Development Officer, Energy Department

Sanjaya Shrestha, GCIP Project Manager for India, Industrial Development Officer, Energy Department

Sandeep Tandon, GCIP National Project Coordinator for India

Tareq Emtairah, Director, Energy Department

Stefan Sicars, Director, Environment Department

Pradeep Monga, ex-GCIP Project Manager; currently Deputy Executive Secretary at UN Convention to Combat Desertification (UNCCD)

Tiep Nyguen-Khac, ex-GCIP Project Manager, formerly Industrial Development Officer, Energy Department

Sunyoung Suh, GCIP Project Team, Cleantech Innovation Expert, Department of Energy

Olga Gordiievska, GEF Coordination Office, Partnership Coordination Division, Department of Programmes, Partnerships and Field Integration

Pamela Mikschofsky, Associate GEF Coordination Expert, Partnership Coordination Division, Department of Programmes, Partnerships and Field Integration

Thuy Thu Le, Evaluation Officer, Independent Evaluation Division

Javier Guarnizo, Chief, Independent Evaluation Division

Muge Ulvinur Dolon, Evaluation Officer, Independent Evaluation Division

### **National Stakeholders**

Ram Mohan Mishra, Ministry of Micro, Small, and Medium Enterprises (MSME), India

Sanjeev Rasal, Institute for Design of Electrical Measuring Instruments (IDEMI), India

Sansanee Huabsomboon, National Science and Technology Development Agency (NSTDA), Thailand

Seloua Amaziane, Direction du Partenariat, de la Communication et de la Coopération, Secrétariat d'Etat chargé du Développement Durable, Morocco

### **Startups** (interviewed during their participation in the Global Forum, January 2018)

Tarun Bothra, Saathi Eco Innovations, India

Kristin Kagetsu, Saathi Eco Innovations, India

Mousumi Mondal, Aspartika Biotech, India

Mridul Babb, Sagar Defence, India

Shilpa Parashar, Sagar Defence, India

Sandith Thandasherry, NavAlt Solar, India

Bandile Dlabantu, Khepri Innovations, South Africa

Sara Andreotti, Sharksafe, South Africa

Euodia Naanyane-Bouwer, Gracious Nubian, South Africa

Clive B, Bouwer, Gracious Nubian, South Africa



Murat Bahadır Kiliç, Chief Executive Officer, Episome Biotech, Turkey

Murat Balaban, Chief Technology Officer, Episome Biotech, Turkey

Ali Acur, General Manager, Delphisonic, Turkey

Demet Seyhan, Team Leader, Re-Nu (Mitos Ltd.), Turkey

Guray Canli, Chief Technology Officer, Re-Nu (Mitos Ltd.), Turkey

Sevda Koksall Daban, Ecologic Leather, Turkey

Duygu Yilmaz, Biolive, Turkey

### **Innovation Experts**

Lea Firmin, CEO Venture Competition, Partner at McKinsey Consultants Switzerland

Hervé LeBret, Manager of Innogrants, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Peter Vogel, Professor of Family Business and Entrepreneurship, International Institute for Management Development (IMD, Switzerland)

Matthew Simmons, Research Fellow, International Institute for Management Development (IMD, Switzerland)

Nanci Govinder, Startup Advisor for Coaching Impact, Innosuisse Swiss StartUp Program

Mary Jean Burrer, Energy Researcher, Haute École d'Ingénierie et de Gestion du Canton de Vaud (HEIG-VD), Yverdon, Switzerland

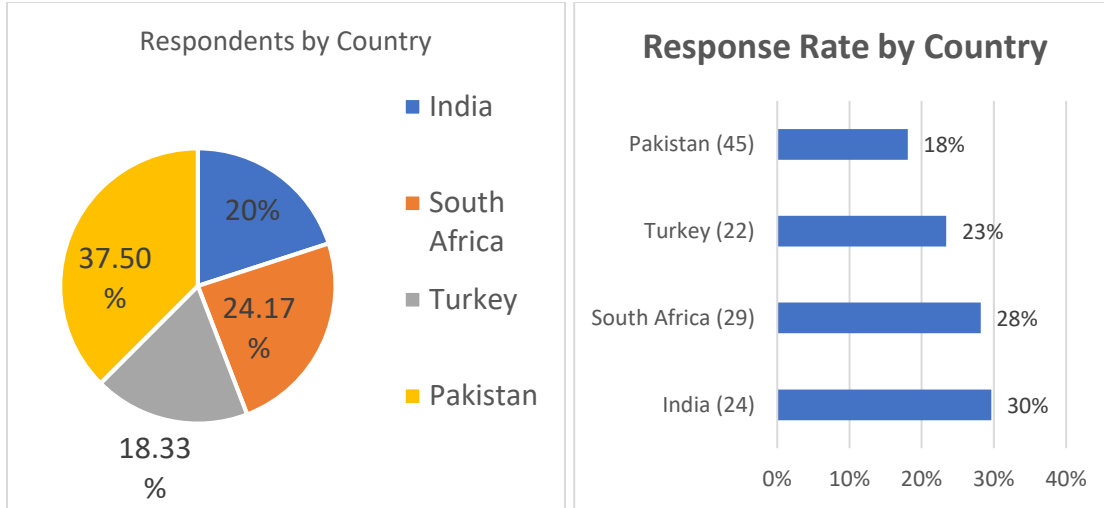
Susan Gladwin, Senior Director, Entrepreneur Impact Program of Autodesk, San Francisco, USA

George Tilesch, Managing Partner, Innomine Group, San Francisco, USA

Albert Fischer, Venture Capitalist and Co-Owner, Yellow & Blue, Utrecht, The Netherlands

Brigitte Baumann, Early Stage Business Angel Investor, Founder & Chief Investment Officer of Go Beyond Investing

## Annex IV – Survey Results: Participating Startups Response Rates



### Response Summaries by Country

#### Q1. Is your team leader:

|        | India     |     | Pakistan  |     | South Africa |     | Turkey    |     | Grand Total |     |
|--------|-----------|-----|-----------|-----|--------------|-----|-----------|-----|-------------|-----|
|        | n         | %   | n         | %   | n            | %   | n         | %   | n           | %   |
| Female | 2         | 8%  | 10        | 22% | 6            | 21% | 6         | 27% | 24          | 20% |
| Male   | 22        | 92% | 35        | 78% | 23           | 79% | 16        | 73% | 96          | 80% |
|        | <b>24</b> |     | <b>45</b> |     | <b>29</b>    |     | <b>22</b> |     | <b>120</b>  |     |

#### Q2: What sector does your enterprise primarily work in?

|                     | India     |     | Pakistan  |     | South Africa |     | Turkey    |     | Grand Total |     |
|---------------------|-----------|-----|-----------|-----|--------------|-----|-----------|-----|-------------|-----|
|                     | n         | %   | n         | %   | n            | %   | n         | %   | n           | %   |
| Energy Efficiency   | 13        | 54% | 17        | 38% | 9            | 31% | 6         | 27% | 45          | 38% |
| Green Building      |           | 0%  | 3         | 7%  | 2            | 7%  | 1         | 5%  | 6           | 5%  |
| Renewable Energy    | 4         | 17% | 13        | 29% | 7            | 24% | 5         | 23% | 29          | 24% |
| Waste Beneficiation | 3         | 13% | 2         | 4%  | 5            | 17% | 1         | 5%  | 11          | 9%  |
| Water Efficiency    | 2         | 8%  | 5         | 11% | 4            | 14% | 4         | 18% | 15          | 13% |
| Other               | 2         | 8%  | 5         | 11% | 2            | 7%  | 5         | 23% | 14          | 12% |
| <b>Grand Total</b>  | <b>24</b> |     | <b>45</b> |     | <b>29</b>    |     | <b>22</b> |     | <b>120</b>  |     |

**Q3: What stage would you characterize your technology pre-GCIP?**

|   | India     |     | Pakistan  |     | South Africa |     | Turkey    |     | Grand Total |     |
|---|-----------|-----|-----------|-----|--------------|-----|-----------|-----|-------------|-----|
|   | n         | %   | n         | %   | n            | %   | n         | %   | n           | %   |
| Beta testing  |           | 0%  | 8         | 18% | 4            | 14% | 2         | 9%  | 14          | 12% |
| Concept   | 1         | 4%  | 8         | 18% | 4            | 14% | 6         | 27% | 19          | 16% |
| Early alpha prototype   | 4         | 17% | 8         | 18% | 9            | 31% | 4         | 18% | 25          | 21% |
| Commercially ready - not yet deployed                         | 4         | 17% | 7         | 16% | 8            | 28% | 2         | 9%  | 21          | 18% |
| Commercial Pilot  | 4         | 17% | 10        | 22% | 3            | 10% | 5         | 23% | 22          | 18% |
| Actively deployed and generating revenue (not yet profitable) | 5         | 21% | 1         | 2%  | 1            | 3%  | 2         | 9%  | 9           | 8%  |
| Actively deployed and generating revenue (profitable)         | 6         | 25% | 3         | 7%  |              | 0%  | 1         | 5%  | 10          | 8%  |
| <b>Grand Total</b>  | <b>24</b> |     | <b>45</b> |     | <b>29</b>    |     | <b>22</b> |     | <b>120</b>  |     |

**Q4: How long had your enterprise been in existence when you went through the GCIP program?**

|                    | India     |     | Pakistan  |     | South Africa |     | Turkey    |     | Grand Total |     |
|--------------------|-----------|-----|-----------|-----|--------------|-----|-----------|-----|-------------|-----|
|                    | n         | %   | n         | %   | n            | %   | n         | %   | n           | %   |
| Less than 1 year   | -         | -   | 21        | 47% | 4            | 14% | 8         | 36% | 33          | 28% |
| 1 year             | -         | -   | 10        | 22% | 8            | 28% | 3         | 14% | 21          | 18% |
| 2 years            | 5         | 21% | 6         | 13% | 10           | 34% | 3         | 14% | 24          | 20% |
| 3 years            | 7         | 29% | 1         | 2%  | 2            | 7%  | 3         | 14% | 13          | 11% |
| 4 years            | 1         | 4%  | 2         | 4%  | 1            | 3%  | 2         | 9%  | 6           | 5%  |
| More than 4 years  | 11        | 46% | 5         | 11% | 4            | 14% | 3         | 14% | 23          | 19% |
| <b>Grand Total</b> | <b>24</b> |     | <b>45</b> |     | <b>29</b>    |     | <b>22</b> |     | <b>120</b>  |     |

**Q5A: Is your enterprise incorporated?**

|    | India |     | Pakistan |     | South Africa |     | Turkey |     | Grand Total |     |
|----|-------|-----|----------|-----|--------------|-----|--------|-----|-------------|-----|
|    | n     | %   | n        | %   | n            | %   | n      | %   | n           | %   |
| No | 4     | 17% | 27       | 60% | 4            | 14% | 11     | 50% | 46          | 38% |

|                    |           |     |           |     |           |     |           |     |            |     |
|--------------------|-----------|-----|-----------|-----|-----------|-----|-----------|-----|------------|-----|
| Yes                | 20        | 83% | 18        | 40% | 25        | 86% | 11        | 50% | 74         | 62% |
| <b>Grand Total</b> | <b>24</b> |     | <b>45</b> |     | <b>29</b> |     | <b>22</b> |     | <b>120</b> |     |

**Q5B: If your enterprise is incorporated, how many years has it been incorporated?**

|                    | India     |     | Pakistan  |     | South Africa |     | Turkey    |     | Grand Total |     |
|--------------------|-----------|-----|-----------|-----|--------------|-----|-----------|-----|-------------|-----|
|                    | n         | %   | n         | %   | n            | %   | n         | %   | n           | %   |
| Less than 3 years  | 2         | 10% | 11        | 61% | 6            | 24% | 4         | 36% | 23          | 31% |
| 3-5 years          | 8         | 40% | 4         | 22% | 12           | 48% | 6         | 55% | 30          | 41% |
| 6 to 10 years      | 4         | 20% | 1         | 6%  | 3            | 12% | 1         | 9%  | 9           | 12% |
| More than 10 years | 6         | 30% | 2         | 11% | 4            | 16% |           | 0%  | 12          | 16% |
| <b>Grand Total</b> | <b>20</b> |     | <b>18</b> |     | <b>25</b>    |     | <b>11</b> |     | <b>74</b>   |     |

**Q6: What is the range of your enterprise's capitalization (\$USD)?**

|                         | India     |     | Pakistan  |     | South Africa |     | Turkey    |     | Grand Total |     |
|-------------------------|-----------|-----|-----------|-----|--------------|-----|-----------|-----|-------------|-----|
|                         | n         | %   | n         | %   | n            | %   | n         | %   | n           | %   |
| <100K                   | 8         | 33% | 25        | 56% | 11           | 38% | 13        | 59% | 57          | 48% |
| 100K – 500K             | 2         | 8%  | 8         | 18% | 12           | 41% | 4         | 18% | 26          | 22% |
| 500K – 1 Million        | 5         | 21% | 5         | 11% | 3            | 10% | 4         | 18% | 17          | 14% |
| 1 Million – 1.5 Million | 5         | 21% | 1         | 2%  | 2            | 7%  | 1         | 5%  | 9           | 8%  |
| 1.5 Million – 2 Million | 1         | 4%  | 2         | 4%  |              | 0%  |           | 0%  | 3           | 3%  |
| Greater than 2 Million  | 3         | 13% | 4         | 9%  | 1            | 3%  |           | 0%  | 8           | 7%  |
| <b>Grand Total</b>      | <b>24</b> |     | <b>45</b> |     | <b>29</b>    |     | <b>22</b> |     | <b>120</b>  |     |

**GCIP Participation**

**Q7: In what year did you go through GCIP?**

|      | India |     | Pakistan |    | South Africa |     | Turkey |     | Grand Total |     |
|------|-------|-----|----------|----|--------------|-----|--------|-----|-------------|-----|
|      | n     | %   | n        | %  | n            | %   | n      | %   | n           | %   |
| 2013 | 3     | 13% | -        | -  | -            | -   | -      | -   | 3           | 3%  |
| 2014 | 5     | 21% | 2        | 4% | 3            | 10% | 3      | 14% | 13          | 11% |

|                    |           |     |           |     |           |     |           |     |            |     |
|--------------------|-----------|-----|-----------|-----|-----------|-----|-----------|-----|------------|-----|
| 2015               | 4         | 17% | 7         | 16% | 9         | 31% | 7         | 32% | 27         | 23% |
| 2016               | 5         | 21% | 10        | 22% | 6         | 21% | 3         | 14% | 24         | 20% |
| 2017               | 7         | 29% | 25        | 56% | 11        | 38% | 9         | 41% | 52         | 43% |
| both 2016 and 2017 | -         | -   | 1         | 2%  | -         | -   | -         | -   | 1          | 1%  |
| <b>Grand Total</b> | <b>24</b> |     | <b>45</b> |     | <b>29</b> |     | <b>22</b> |     | <b>120</b> |     |

**Q8: What stage did you reach in the competition?**

|                    | India     |     | Pakistan  |     | South Africa |     | Turkey    |     | Grand Total |     |
|--------------------|-----------|-----|-----------|-----|--------------|-----|-----------|-----|-------------|-----|
|                    | n         | %   | n         | %   | n            | %   | n         | %   | n           | %   |
| Finalist           | 11        | 46% | 21        | 47% | 17           | 59% | 12        | 55% | 61          | 51% |
| Semi-Finalist      | 13        | 54% | 24        | 53% | 12           | 41% | 10        | 45% | 59          | 49% |
| <b>Grand Total</b> | <b>24</b> |     | <b>45</b> |     | <b>29</b>    |     | <b>22</b> |     | <b>120</b>  |     |

**Q9: How did you hear about GCIP?**

|                          | India     |     | Pakistan  |     | South Africa |     | Turkey    |     | Grand Total |     |
|--------------------------|-----------|-----|-----------|-----|--------------|-----|-----------|-----|-------------|-----|
|                          | n         | %   | n         | %   | n            | %   | n         | %   | n           | %   |
| Internet Search          | 4         | 17% | 12        | 27% | 4            | 14% | 13        | 59% | 33          | 28% |
| Direct Contact From GCIP | 7         | 29% | 13        | 29% | 7            | 24% | 3         | 14% | 30          | 25% |
| GCIP Alumni              | 3         | 13% | 10        | 22% | 2            | 7%  |           | 0%  | 15          | 13% |
| Government Outreach      | 8         | 33% |           | 0%  | 6            | 21% | 1         | 5%  | 15          | 13% |
| Other                    | 2         | 8%  | 10        | 22% | 10           | 34% | 5         | 23% | 27          | 23% |
| <b>Grand Total</b>       | <b>24</b> |     | <b>45</b> |     | <b>29</b>    |     | <b>22</b> |     | <b>120</b>  |     |

[Changes to Staffing Profile](#)

**Q9A: How many employees did/does the enterprise have?**

| India     |          |     |     |     |
|-----------|----------|-----|-----|-----|
|           | Pre-GCIP |     | Now |     |
|           | N        | %   | n   | %   |
| 5 or less | 5        | 21% | 1   | 4%  |
| 6-10      | 8        | 33% | 9   | 38% |

|                     |                 |     |            |     |
|---------------------|-----------------|-----|------------|-----|
| <i>11-25</i>        | 8               | 33% | 8          | 33% |
| <i>more than 25</i> | 3               | 13% | 6          | 25% |
|                     | 24              |     | 24         |     |
| <b>Pakistan</b>     |                 |     |            |     |
|                     | <b>Pre-GCIP</b> |     | <b>Now</b> |     |
|                     | N               | %   | n          | %   |
| <i>5 or less</i>    | 32              | 71% | 27         | 60% |
| <i>6-10</i>         | 9               | 20% | 12         | 27% |
| <i>11-25</i>        | 2               | 4%  | 4          | 9%  |
| <i>more than 25</i> | 2               | 4%  | 2          | 4%  |
|                     | 45              |     | 45         |     |
| <b>South Africa</b> |                 |     |            |     |
|                     | <b>Pre-GCIP</b> |     | <b>Now</b> |     |
|                     | N               | %   | n          | %   |
| <i>5 or less</i>    | 24              | 83% | 23         | 79% |
| <i>6-10</i>         | 4               | 14% | 5          | 17% |
| <i>11-25</i>        | 1               | 3%  | 1          | 3%  |
| <i>more than 25</i> |                 |     |            |     |
|                     | 29              |     | 29         |     |
| <b>Turkey</b>       |                 |     |            |     |
|                     | <b>Pre-GCIP</b> |     | <b>Now</b> |     |
|                     | N               | %   | n          | %   |
| <i>5 or less</i>    | 21              | 95% | 19         | 86% |
| <i>6-10</i>         | 1               | 5%  | 3          | 14% |
|                     | 22              |     | 22         |     |

| <b>Total</b>     |                 |     |            |     |
|------------------|-----------------|-----|------------|-----|
|                  | <b>Pre-GCIP</b> |     | <b>Now</b> |     |
|                  | N               | %   | n          | %   |
| <i>5 or less</i> | 82              | 68% | 70         | 58% |
| <i>6-10</i>      | 22              | 18% | 29         | 24% |
| <i>11-25</i>     | 11              | 9%  | 13         | 11% |

|              |     |    |     |    |
|--------------|-----|----|-----|----|
| more than 25 | 5   | 4% | 8   | 7% |
|              | 120 |    | 120 |    |

**% change to size of staff base (derived from survey results)**

|                                       | India     |     | Pakistan  |     | South Africa |     | Turkey    |     | Grand Total |     |
|---------------------------------------|-----------|-----|-----------|-----|--------------|-----|-----------|-----|-------------|-----|
|                                       | n         | %   | n         | %   | n            | %   | n         | %   | n           | %   |
| Less than 0% (staff base has reduced) | 2         | 8%  | 9         | 20% | 3            | 10% | 4         | 18% | 18          | 15% |
| 0% (no growth)                        | 5         | 21% | 15        | 33% | 12           | 41% | 8         | 36% | 40          | 33% |
| Up to 25%                             | 4         | 17% | 6         | 13% | 1            | 3%  | 1         | 5%  | 12          | 10% |
| 26%-50%                               | 3         | 13% | 4         | 9%  | 1            | 3%  | 3         | 14% | 11          | 9%  |
| 51%-100%                              | 7         | 29% | 6         | 13% | 7            | 24% | 5         | 23% | 25          | 21% |
| more than 100%                        | 3         | 13% | 5         | 11% | 5            | 17% | 1         | 5%  | 14          | 12% |
| <b>Grand Total</b>                    | <b>24</b> |     | <b>45</b> |     | <b>29</b>    |     | <b>22</b> |     | <b>120</b>  |     |

**Summary (derived from survey results)**

|  | India     | Pakistan  | South Africa | Turkey    | Grand Total |
|--|-----------|-----------|--------------|-----------|-------------|
| <b>n</b>                               | <b>24</b> | <b>45</b> | <b>29</b>    | <b>22</b> | <b>120</b>  |
| Average no. employees pre-competition  | 16.5      | 18.7      | 3.2          | 2.4       | 11.5        |
| Average no. employees now (early 2018) | 25.4      | 20.0      | 3.9          | 3.0       | 14.1        |
| Average change to size of staff base   | +54%      | +7%       | +24%         | +25%      | +22%        |

(note, in error, India TE said 78%)

**Q9B: How many employees did/does the enterprise have...? (Female: Male ratio)**

| <b>India</b>  |                 |          |            |          |
|---|-----------------|----------|------------|----------|
|   | <b>Pre-GCIP</b> |          | <b>Now</b> |          |
|   | <b>n</b>        | <b>%</b> | <b>n</b>   | <b>%</b> |
| No female staff   | 5               | 21%      | 3          | 13%      |
| Less than 1 Female to 2 Male                                | 12              | 50%      | 14         | 58%      |
| Greater than 1 Female:2 Male, less than Female: Male Parity | 2               | 8%       | 4          | 17%      |
| Female: Male parity   | 1               | 4%       |            | 0%       |
| More Female than Male staff                                 | 4               | 17%      | 3          | 13%      |
| Grand Total   | 24              |          | 24         |          |
| <b>Pakistan</b>   |                 |          |            |          |
|   | <b>Pre-GCIP</b> |          | <b>Now</b> |          |
|   | <b>n</b>        | <b>%</b> | <b>n</b>   | <b>%</b> |
| No female staff   | 12              | 27%      | 12         | 27%      |
| Less than 1 Female to 2 Male                                | 14              | 31%      | 16         | 36%      |
| Greater than 1 Female:2 Male, less than Female: Male Parity | 12              | 27%      | 11         | 24%      |
| Female: Male parity   | 4               | 9%       | 5          | 11%      |
| More Female than Male staff                                 | 3               | 7%       | 1          | 2%       |
| Grand Total   | 45              |          | 45         |          |
| <b>South Africa</b>   |                 |          |            |          |
|   | <b>Pre-GCIP</b> |          | <b>Now</b> |          |
|   | <b>n</b>        | <b>%</b> | <b>n</b>   | <b>%</b> |
| No female staff   | 19              | 66%      | 14         | 48%      |
| Less than 1 Female to 2 Male                                | 3               | 10%      | 7          | 24%      |
| Greater than 1 Female:2 Male, less than Female: Male Parity | 5               | 17%      | 4          | 14%      |
| Female: Male parity   |                 | 0%       | 3          | 10%      |
| More Female than Male staff                                 | 2               | 7%       | 1          | 3%       |
| Grand Total   | 29              |          | 29         |          |



| <b>Turkey</b>   |                 |          |            |          |
|---|-----------------|----------|------------|----------|
|   | <b>Pre-GCIP</b> |          | <b>Now</b> |          |
|   | <b>n</b>        | <b>%</b> | <b>n</b>   | <b>%</b> |
| No female staff   | 12              | 55%      | 10         | 45%      |
| Less than 1 Female to 2 Male                                | 2               | 9%       | 2          | 9%       |
| Greater than 1 Female:2 Male, less than Female: Male Parity |                 | 0%       | 1          | 5%       |
| Female: Male parity   | 1               | 5%       | 4          | 18%      |
| More Female than Male staff                                 | 7               | 32%      | 5          | 23%      |
| Grand Total   | 22              |          | 22         |          |

| <b>Grand Total</b>  |                 |          |            |          |
|---|-----------------|----------|------------|----------|
|   | <b>Pre-GCIP</b> |          | <b>Now</b> |          |
|   | <b>n</b>        | <b>%</b> | <b>n</b>   | <b>%</b> |
| No female staff   | 48              | 0.4      | 39         | 0.325    |
| Less than 1 Female to 2 Male                                | 31              | 26%      | 39         | 33%      |
| Greater than 1 Female:2 Male, less than Female: Male Parity | 19              | 16%      | 20         | 17%      |
| Female: Male parity   | 6               | 5%       | 12         | 10%      |
| More Female than Male staff                                 | 16              | 13%      | 10         | 8%       |
| Grand Total   | 120             |          | 120        |          |

### Summary (derived from survey results)

| <b>Country</b>                    | <b>India</b> | <b>Pakistan</b> | <b>South Africa</b> | <b>Turkey</b> | <b>Grand Total</b> |
|-----------------------------------|--------------|-----------------|---------------------|---------------|--------------------|
| Average of pre-GCIP gender ratio  | 0.53         | 0.41            | 0.21                | 0.64          | 0.42               |
| Average of Post-GCIP gender ratio | 0.59         | 0.35            | 0.31                | 0.58          | 0.43               |
| Average change of F:M staff Ratio | +6%          | -6%             | +11%                | -5%           | +1%                |

### Quality Assessment of GCIP

**Q10: Please Rank the following Components of GCIP from most to least beneficial to your enterprise:**

| Values   |                              | India<br>(n=24) | Pakistan<br>(n=45) | S.Africa<br>(n=29) | Turkey<br>(n=22) | Overall<br>(n=120) |
|--|------------------------------|-----------------|--------------------|--------------------|------------------|--------------------|
| <b>Training for business plan development</b>  | Ranked as #1 most beneficial | 33%             | 44%                | 34%                | 45%              | 40%                |
|  | Ranked in top 3              | 67%             | 71%                | 59%                | 73%              | 68%                |
| <b>Mentorship on business plan development</b> | Ranked as #1 most beneficial | 25%             | 13%                | 17%                | 27%              | 19%                |
|  | Ranked in top 3              | 54%             | 38%                | 66%                | 82%              | 56%                |
| <b>Opportunities to showcase technologies</b>  | Ranked as #1 most beneficial | 25%             | 13%                | 10%                | 0%               | 13%                |
|  | Ranked in top 3              | 67%             | 47%                | 48%                | 23%              | 47%                |

### India

|   |   |
|---|---|
| 1 | Opportunities to showcase technology                                    |
| 2 | Training for business plan development                                  |
| 3 | Mentorship on business development                                      |
| 4 | Connection with an investor network                                     |
| 5 | Connection with potential business partners                             |
| 6 | Technical advice through sector experts                                 |
| 7 | Increased capacity of supporting government institutions                |
| 8 | Improving the policy and regulatory environment for business operations |

### Pakistan

|   |   |
|---|---|
| 1 | Training for business plan development                                  |
| 2 | Opportunities to showcase technology                                    |
| 3 | Mentorship on business development                                      |
| 4 | Connection with an investor network                                     |
| 5 | Technical advice through sector experts                                 |
| 6 | Improving the policy and regulatory environment for business operations |
| 7 | Connection with potential business partners                             |
| 8 | Increased capacity of supporting government institutions                |

### South Africa

|   |  |
|---|--|
| 1 | Mentorship on business development     |
| 2 | Training for business plan development |

|   |   |
|---|---|
| 3 | Opportunities to showcase technology                                    |
| 4 | Connection with potential business partners                             |
| 5 | Technical advice through sector experts                                 |
| 6 | Connection with an investor network                                     |
| 7 | Increased capacity of supporting government institutions                |
| 8 | Improving the policy and regulatory environment for business operations |

### Turkey

|   |   |
|---|---|
| 1 | Training for business plan development                                  |
| 2 | Mentorship on business development                                      |
| 3 | Opportunities to showcase technology                                    |
| 4 | Technical advice through sector experts                                 |
| 5 | Increased capacity of supporting government institutions                |
| 6 | Connection with potential business partners                             |
| 7 | Connection with an investor network                                     |
| 8 | Improving the policy and regulatory environment for business operations |

### Q11: How would you rate the quality of services you received?

|  | India |       | Pakistan |       | South Africa |       | Turkey |       | Grand Total |       |
|--|-------|-------|----------|-------|--------------|-------|--------|-------|-------------|-------|
| Number of responses and Weighted Score (out of 10) | n     | Score | n        | Score | n            | Score | n      | Score | n           | Score |
| Training for business plan development             | 20    | 7.50  | 45       | 7.51  | 29           | 8.00  | 22     | 8.27  | 116         | 7.78  |
| Connection with an investor network                | 23    | 4.61  | 45       | 4.76  | 29           | 4.69  | 21     | 4.86  | 118         | 4.73  |
| Technical advice through sector experts            | 22    | 3.64  | 44       | 4.91  | 29           | 4.76  | 21     | 5.33  | 116         | 4.71  |
| Mentorship on business development                 | 21    | 5.90  | 45       | 6.04  | 29           | 6.41  | 21     | 7.33  | 116         | 6.34  |
| Opportunities to showcase technology               | 24    | 5.92  | 45       | 5.91  | 29           | 5.66  | 22     | 5.45  | 120         | 5.77  |
| Connection with potential business partners        | 23    | 3.76  | 44       | 4.64  | 29           | 4.28  | 21     | 4.76  | 117         | 4.40  |

Question 11 required respondents to rate the quality of various GCIP inputs, using a 6-point scale ranging from 'Very poor' to 'Excellent'. Weighted Average Score is calculated by first assigning numeric values to response choices (Very poor = 0, Excellent = 10), then calculating (weighting) the overall average according to the number/frequency of responses to each

choice. An overall score above 5.00 is therefore positive, above 7.50 is highly positive. (N/A and blank responses are omitted and not included in response count)

**Q12: Have you made changes to any of the following elements in your business as a result of GCIP?**

|  | India     |     | Pakistan  |     | South Africa |     | Turkey    |     | Grand Total |     |
|--|-----------|-----|-----------|-----|--------------|-----|-----------|-----|-------------|-----|
|  | n         | %   | n         | %   | n            | %   | n         | %   | n           | %   |
| Revised financing plans                | 13        | 54% | 25        | 56% | 15           | 52% | 13        | 59% | 66          | 55% |
| Revised business planning              | 16        | 67% | 32        | 71% | 19           | 66% | 14        | 64% | 81          | 68% |
| Created new jobs within the enterprise | 13        | 54% | 23        | 51% | 12           | 41% | 6         | 27% | 54          | 45% |
| Made alterations in product            | 16        | 67% | 27        | 60% | 16           | 55% | 5         | 23% | 64          | 53% |
| Revised marketing plan                 | 16        | 67% | 31        | 69% | 18           | 62% | 11        | 50% | 76          | 63% |
| Revised business pitch                 | 18        | 75% | 28        | 62% | 20           | 69% | 9         | 41% | 75          | 63% |
| Other changes                          | 13        | 54% | 5         | 11% | 1            | 3%  | 4         | 18% | 23          | 19% |
| Have made no changes                   | 14        | 58% | 24        | 53% | 12           | 41% | 7         | 32% | 57          | 48% |
| <b>Total</b>                           | <b>24</b> |     | <b>45</b> |     | <b>29</b>    |     | <b>22</b> |     | <b>120</b>  |     |

**Q13: What is the main strength of GCIP (Open-ended responses were clustered by theme)**

Business expertise: 25%

Other: 18%

Mentors: 16%

Networking: 12%

Overall quality of support: 11%

Global Reach/Focus: 9%

None given: 8%

Brand: 2%

**Q14: What is the main weakness of GCIP ((Open-ended responses were clustered by theme)**

Quality of Support: 29%

Other: 19%

None listed: 17%

More focus on investor outreach needed: 13%

Coordination issues: 7%

Burdensome time commitment: 5%

More follow up support needed: 4%

Too short: 3%

Coverage is too small: 2%

Lack of funding/financial support: 2%

**Q15: Have you had any contact with GCIP after completion of the program?**

|                    | India     |     | Pakistan  |     | South Africa |     | Turkey    |     | Grand Total |     |
|--------------------|-----------|-----|-----------|-----|--------------|-----|-----------|-----|-------------|-----|
|                    | n         | %   | n         | %   | n            | %   | n         | %   | n           | %   |
| No                 | 5         | 21% | 27        | 60% | 5            | 17% | 9         | 41% | 46          | 38% |
| Yes                | 19        | 79% | 18        | 40% | 24           | 83% | 13        | 59% | 74          | 62% |
| <b>Grand Total</b> | <b>24</b> |     | <b>45</b> |     | <b>29</b>    |     | <b>22</b> |     | <b>120</b>  |     |

**Q.14 Which barriers to the development of your enterprise did GCIP help address?**

|                                  | India |     | Pakistan |     | South Africa |     | Turkey |     | Grand Total |     |
|----------------------------------|-------|-----|----------|-----|--------------|-----|--------|-----|-------------|-----|
|                                  | n     | %   | n        | %   | n            | %   | n      | %   | n           | %   |
| Policy or Regulatory Environment | 5     | 21% | 14       | 31% | 6            | 21% | 10     | 45% | 35          | 29% |
| Access to Finance                | 6     | 25% | 18       | 40% | 6            | 21% | 8      | 36% | 38          | 32% |
| Access to Markets                | 7     | 29% | 16       | 36% | 10           | 34% | 11     | 50% | 44          | 37% |
| Skill Shortage                   | 4     | 17% | 9        | 20% | 5            | 17% | 8      | 36% | 26          | 22% |
| Not Applicable                   | 10    | 42% | 10       | 22% | 10           | 34% | 1      | 5%  | 31          | 26% |
| Other (please specify)           | 5     | 21% | 7        | 16% | 9            | 31% | 3      | 14% | 24          | 20% |

**Annex V – Survey Results: GCIP Project Managers**

**1. Name of Respondent (Confidential)**

**2. Respondents**

| <b>Countries Managed</b> | <b>Number of Respondents</b> |
|--------------------------|------------------------------|
| Malaysia                 | 2                            |
| Turkey                   | 2                            |
| South Africa             | 2                            |
| Armenia                  | 2                            |
| India                    | 2                            |
| Pakistan                 | 2                            |
| Thailand                 | 2                            |
| Morocco                  | 2                            |
| Ukraine                  | 1                            |
| <b>Total Respondents</b> | <b>17</b>                    |

**3. What are the market failures this programme is looking to address? Please rank these barriers from most to least important:**

1. Access to markets
2. Access to Finance
3. Skill Shortage (cleantech innovations developed by scientists and engineers with limited business expertise)
4. Policy or Regulatory Environment
5. Other

**4. On a scale of “0” to “10” (where “0” is not at all and “10” is fully), where would you rank the country in terms of the extent to which the GCIP is now anchored in the country? Which criteria have you used to make this assessment?**

Average answer: 6.9

Explanation:

#### **More anchored-**

- The national counterpart (TIA) has hardwired the GCIP-SA programme into to operations going forwards - with a large operational budget.
- In 2018 activities are financed largely by EA
- Project is relevant to country goals

#### **Less anchored-**

- GCIP only accelerator program for cleantech in country, unfortunately nothing to take its place (Turkey)
- More work needs to be done to anchor program
- Some lack of commitment by in-country agency to promote program
- 2<sup>nd</sup> phase might be useful

#### **5. Please list the ways (be specific, including naming of organizations) in which entrepreneurs were made aware of the GCIP program in order of importance.**

- Specific organizations mentioned:
- Council for Scientific & Industrial Research
- National Cleaner Production Centre
- National Hosting Institution, TUBİTAK Distribution Channel
- Startup India database (Department of Industrial Policy and Promotion - DIPP)
- GCIP Thailand website
- Alive-to-Green
- Cape Media
- MAGIC
- Twitter
- Facebook

**Other methods:** Roadshows, university networks and school visits, newspaper advertisements, information sessions and presentations, incubation centers, email campaigns, promotional materials, word of mouth, through sponsors, outreach to other accelerators

#### **6. What do you think are the most important impacts of the GCIP for the participating entrepreneurs?**

1. Opportunities to showcase technology
2. Connection with potential business partners

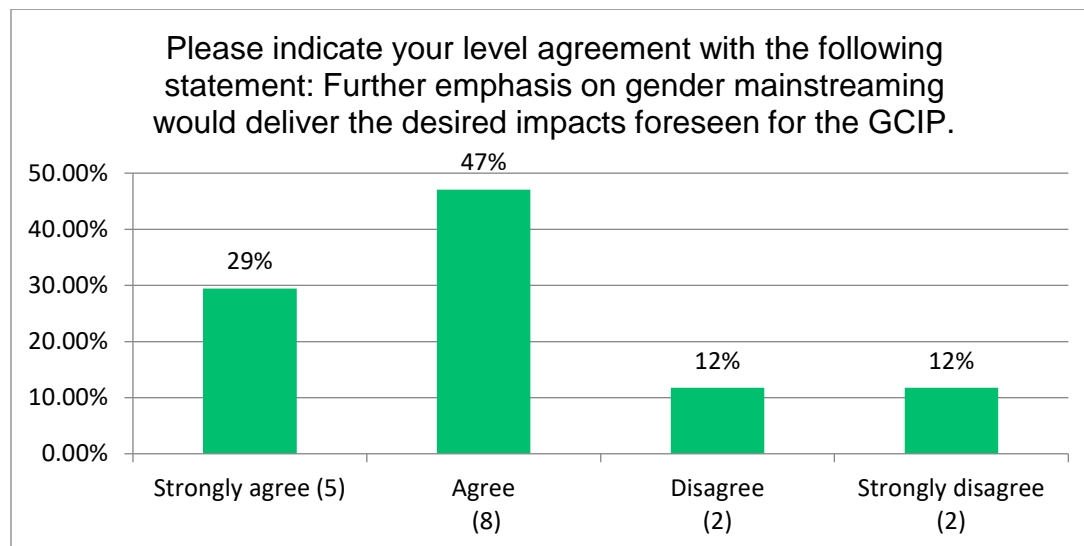
3. Connection with an investor network
4. Mentorship on business development
5. Training for business plan development
6. Technical advice through sector experts
7. Increased capacity of supporting government institutions
8. Improving the policy and regulatory environment for business operations

Examples from Explanation:

“GCIP programme emphasized on the non-technological aspects of business development. Participants often came from an engineering and/or academic background and were invariably focused (often solely focused) on technology, product design and proof-of-concept. By insisting that competition participants engage in training, mentoring and webinars on ‘softer’ aspects such as business model development, market segmentation, and financial projections, GCIP India helped participants to recognize and address critical barriers to the commercialization of their products. For many participants, the fact that they only identified such barriers as a direct result of their participation in the programme represented a clear indicator of the work’s relevance to their needs, even if such needs were only appreciated retrospectively. Moreover, GCIP India provided entrepreneurs various platforms nationally and internationally to showcase their technology such as Festival of Innovation hosted by the President of India, Vienna Energy Forum, CoP 22 & 23, and World Environment Day 2018 in New Delhi.”

“A comment on the Policy and Regulatory Environment. The original design/intentions in this area should be revised to make the projects' impact greater. Policy and Regulatory challenges vary substantially from country to country. In the case of Turkey, the challenges/gaps are not at the level of general policies, but rather at the level of policy and regulatory compliance for the individual technology innovations.”

## 7.



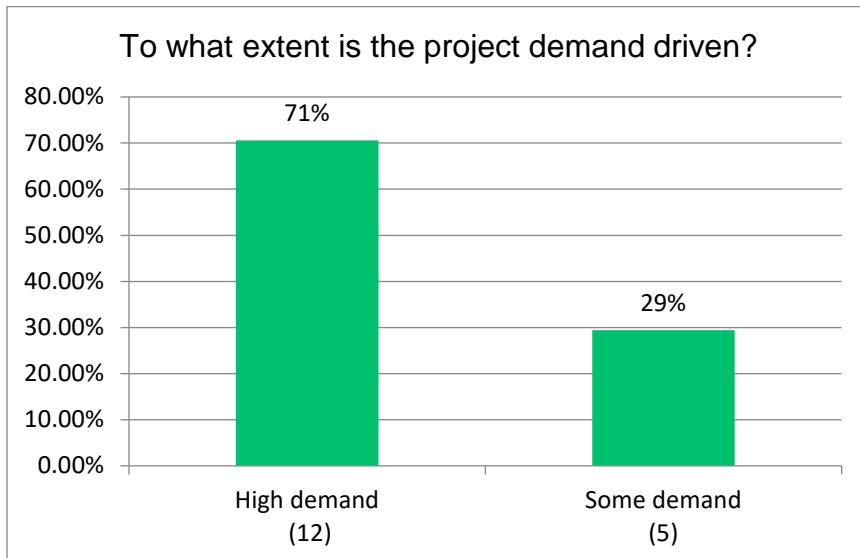


Explanation: Some respondents said innovation is gender neutral. Others discussed the strong efforts at gender mainstreaming already made, while others said program had done a good job (for example Pakistan’s best female led team prize) but improvements were possible. Further emphasis has obvious impact in terms of greater reach.

**8. Please explain the ways that gender mainstreaming could add value to the GCIP's objectives?**

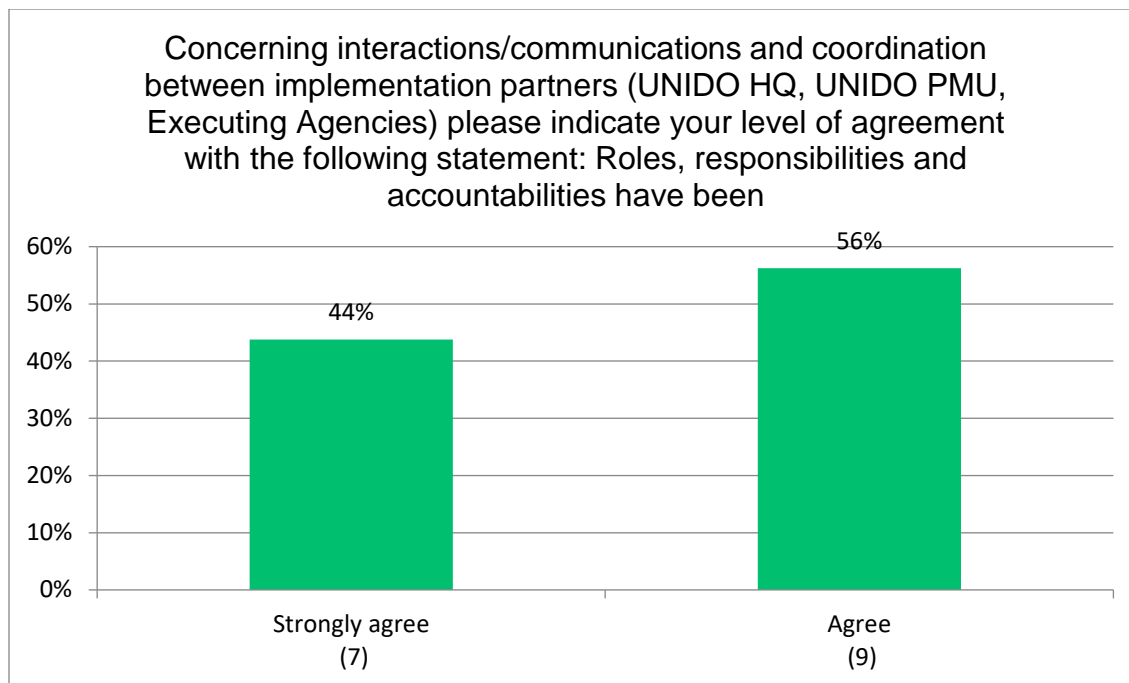
- Increased participation (women half of the productive economy) would broaden impact, more applicants to program
- More gender diversity and balance could lead to more tailored and effective innovations, better fitting differentiated needs, Increased focus in innovations that address issues women face
- Women are more abundant at university base start-ups and thus need to be supported further
- Gender mainstreaming contributes towards innovation agenda.

**9. To what extent is the project demand driven?**



Explanation: Demand was driven by government and entrepreneurs.

**10.**



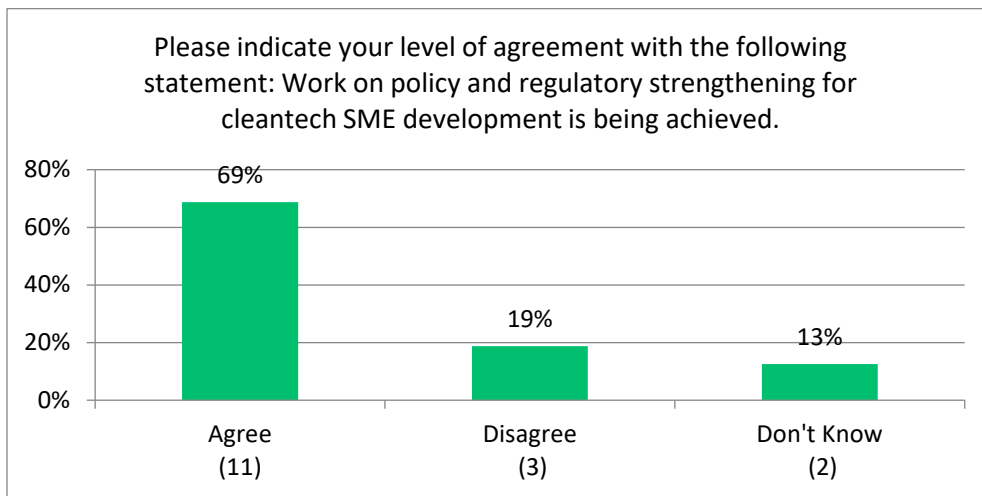
Explanation: Roles have been clear, communication and coordination has worked well, years of implementation have made roles clear

**-11. How would you change project management and implementation? Please explain.**

- No recommended changes
- By getting more local institutions involved in the execution in different geographic regions, project management and implementation will be more effective. While responsibilities were sufficiently clear throughout the project period, a stronger push for the local executing partner from the start of the project could have had even better results (rather than the national partner only getting more active in the final project period). Nevertheless, results were positive, but this could have led to even more achievement. Increased focus on transferring the process to a national entity that has both financial resources, mandate and capacity to run GCIP. National executing agencies managing the project under the government regulations also need longer lead time to process and approve.
- Stronger control at UNIDO level i.e. managing the platform internally by UNIDO and not the Cleantech Open. Diversify service providers. Cleantech Open has been the main service provider so far and this bring complacency. But the global innovations landscape is rapidly. Some countries are more connected to Europe than to US. China, Korea are also increasingly active in the innovations space and this brings opportunities. As such, we can also consider bringing other service providers on board. Especially as GCIP is planned to expand to 20 countries

- More room for innovation at the implementation end
- Capacity assessment should be done before selection of agencies hired for implementation of various components
- I think that there is a need for an adaptive approach. Some National Execution Partners would be able to take more responsibility now for some activities. At the same time, new activities would be added to the follow-up project and for these UNIDO's direct involvement would be needed and bring added value. About the international networking with investors, customers and business partners and the capitalization of the knowledge assets and value generated by the aggregation of the individual country GCIPs, UNIDO would remain uniquely positioned.
- New coordinators should be trained and learning by doing of GCIP activities again and again.

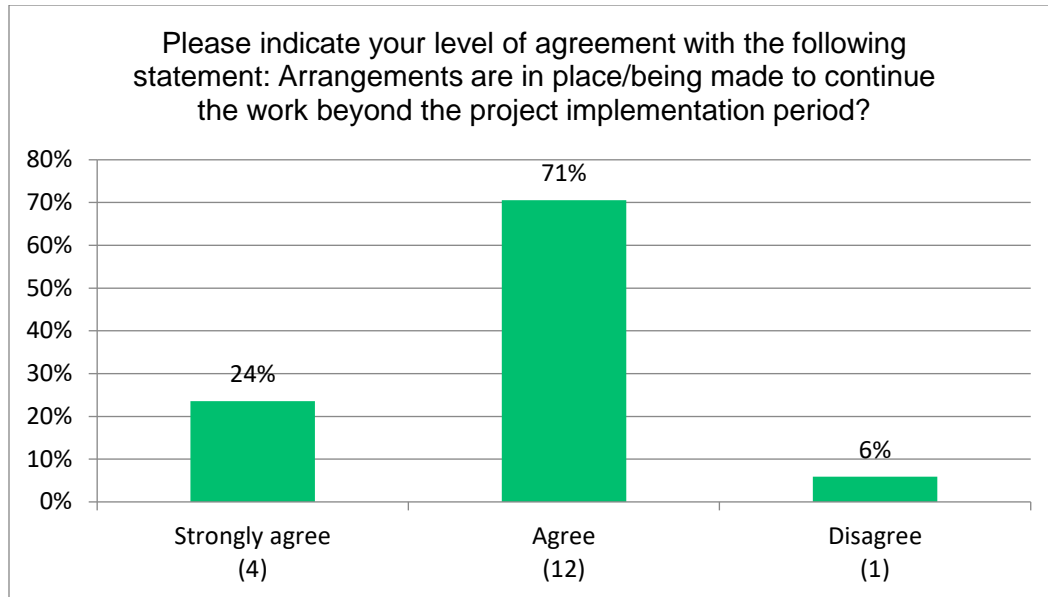
**12.**



Explanation: example- “Partly; a number of initiatives were taken, but a comprehensive policy (across Ministries) on innovation and cleantech turned out to be rather ambitious. Longer-term efforts, and inter-ministerial coordination could partly address this.”

Multiple respondents said the implementation length was not sufficient for regulatory change, “policy is a long-term process”. In some countries, work on studies of government innovation frameworks and advisory materials were developed as part of program. In other countries (Malaysia), program was in line with government development priorities from start.

**13.**



Explanation: In some cases, the national partner has clearly stepped in to take over (TIA, TUBITAK) or expressed interest. Other respondents said even with national partners stepping in or expressing interest, more handholding, or second phase is needed.

#### 14. What is the single most significant result that the GCIP work has contributed to?

##### Summary of combined answers:

- (a) High number of teams supported, and number still surviving after program, their success after going through program
- (b) Help to entrepreneurs in leveraging grants
- (c) Network of cleantech entrepreneurs created, increased interest in clean tech from entrepreneurs, demonstration that clean tech ideas can become businesses
- (d) Building capacity of the executing agency to further scale up project results
- (e) Launch of the Clean Future Fund in Turkey
- (f) The ideas/products produced and resulting impact on economy
- (g) Establishment of high quality green economy/environmental incubation system, International platform

## Annex VI – Performance of GCIP’s competition-based Accelerator by Country (2014-2017)

‘Applications Initiated’ refers to people who started the online application process (i.e. responded to the call for applications), including those who a) completed the process, and b) didn’t complete the application process, or c) were deemed ineligible

### Malaysia: Launched April 2013, Closed August 2017

| Annual Cycle       | Total # of Applications Initiated | Attrition of Applications (due to non-completion or deemed ineligible) | Total # of Applications Deemed Eligible to Enter the Competition | Semi-Finalists Selected (# with female team leader) | Teams that Finished Accelerator (# with female team leader) |
|--------------------|-----------------------------------|--|--|---|---|
| 2014               | 57                                | N/A  | N/A  | 25 (4, i.e 16%)                                     | N/A   |
| 2015               | 58                                | 19 (33%)   | 39   | 25 (3, i.e 12%)                                     | 17  |
| 2016               | 51                                | 2 (4%)   | 49   | 29 (4, i.e 14%)                                     | N/A   |
| Total              | 166                               | N/A  | 60   | <b>79</b>   | N/A   |
| Annual Average: 55 |                                   |  |  |   |   |

### Armenia: Launched May 2013, Closed April 2016

| Annual Cycle       | Total # of Applications Initiated | Attrition of Applications (due to non-completion or deemed ineligible) | Total # of Applications Deemed Eligible to Enter the Competition | Semi-Finalists Selected (# with female team leader) | Teams that Finished Accelerator (# with female team leader) |
|--------------------|-----------------------------------|--|--|---|---|
| 2014               | 64                                | N/A  | N/A  | 24  | N/A   |
| 2015               | 45                                | N/A  | N/A  | 30 (4, i.e. 13%)                                    | N/A   |
| Total              | 109                               | N/A  | N/A  | <b>54 (4, i.e. 7%)</b>                              | 48  |
| Annual Average: 55 |                                   |  |  |   |   |

### India: Launched May 2013, Closed June 2018

| Annual Cycle | Total # of Applications Initiated | Attrition of Applications (due to non-completion or deemed ineligible) | Total # of Applications Deemed Eligible to Enter the Competition | Semi-Finalists Selected (# with female team leader) | Teams that Finished Accelerator (# with female team leader) |
|--------------|-----------------------------------|--|--|---|---|
|              |                                   |  |  |   |   |

|                     |     |           |     |                       |                     |
|---------------------|-----|-----------|-----|-----------------------|---------------------|
| <b>Target</b>       |     |           |     | <b>No target set</b>  | <b>No target se</b> |
| 2014                | 183 | 81 (44%)  | 102 | 30 (3, i.e. 10%)      | 24                  |
| 2015                | 160 | 51 (32%)  | 109 | 20 (0)                | 17                  |
| 2016                | 191 | 82 (43%)  | 109 | 20 (1, i.e. .5%)      | 17                  |
| 2017                | 232 | 113 (49%) | 119 | 20 (4, i.e. 20%)      | 19                  |
| Total               | 766 | 327 (43%) | 439 | <b>90 (8, i.e.9%)</b> | <b>77</b>           |
| Annual Average: 191 |     |           |     |                       |                     |

### Pakistan: Launched September 2013, Closed June 2018

| Annual Cycle        | Total # of Applications Initiated | Attrition of Applications (due to non-completion or deemed ineligible) | Total # of Applications Deemed Eligible to Enter the Competition | Semi-Finalists Selected (# with female team leader) | Teams that Finished Accelerator (# with female team leader) |
|---------------------|-----------------------------------|--|--|---|---|
| <b>Target</b>       |                                   |  | <b>100 entrants per year (10% women)</b>                         | <b>No target set</b>                                | <b>No target set</b>  |
| 2014                | 81                                | 33%  | 54   | 28 (2, i.e. 7 %)                                    | 19 (0%)   |
| 2015                | 451                               | 61.5%  | 174  | 55 (12, i.e. 22%)                                   | 27 (7, i.e. 26%)  |
| 2016                | 592                               | 47%  | 314  | 82 (23, i.e. 28%)                                   | 33 (11, i.e. 33%)   |
| 2017                | 511                               | 46%  | 275  | 84 (25, i.e. 30%)                                   | 26 (10, i.e. 38%)   |
| Total               | 1635                              | 47%  | 818  | <b>249 (62, i.e.25%)</b>                            | <b>105 (38, i.e.36%)</b>                                    |
| Annual Average: 408 |                                   |  |  |   |   |

### South Africa: Launched October 2013, Closed September 2018

| Annual Cycle  | Total # of Applications Initiated | Attrition of Applications (due to non-completion or deemed ineligible) | Total # of Applications Deemed Eligible to Enter the Competition | Semi-Finalists selected (# with female team leader) | Teams that Finished Accelerator (# with female team leader) |
|---------------|-----------------------------------|--|--|---|---|
| <b>Target</b> |                                   |  | <b>100 – 300 entrants per year (10% women)</b>                   | <b>40 – 50 per year then set at 20-25</b>           | <b>10-15 per year</b>                                       |

|                     |            |            |            |                 |                  |
|---------------------|------------|------------|------------|-----------------|------------------|
| 2014                | 68         | 34%        | 45         | 23 (1)          | 8 (0%)           |
| 2015                | 120        | 50%        | 60         | 28 (4)          | 10 (2, i.e. 20%) |
| 2016                | 221 (52)   | 60%        | 88 (18)    | 26 (5)          | 9 (5, i.e. 56%)  |
| 2017                | 198 (51)   | 59%        | 81 (30)    | 25 (8)          | 11 (4, i.e. 36%) |
| <b>Total</b>        | <b>607</b> | <b>51%</b> | <b>274</b> | <b>102 (19)</b> | <b>38 (11)</b>   |
| Annual Average: 152 |            |            |            |                 |                  |

### Turkey: Launched October 2013, Closing December 2018

| Annual Cycle        | Total # of Applications Initiated | Attrition of applications (due to non-completion or deemed ineligible) | Total # of applications deemed eligible to enter the Competition | Semi-finalists selected (# with female team leader) | Teams that Finished Accelerator (# with female team leader) |
|---------------------|-----------------------------------|--|--|---|---|
| <b>Target</b>       |                                   |  | <b>100 entrants per year (10% women)</b>                         | <b>No target set</b>                                | <b>No target set</b>  |
| 2014                | 217                               | 56%  | 96   | 27 (17, i.e. 18%)                                   | 25 (8, i.e. 32%)  |
| 2015                | 199                               | 56%  | 88   | 28 (21, i.e. 24%)                                   | 25 (5, i.e. 20%)  |
| 2016                | 210                               | 54%  | 97   | 27 (17, i.e. 18%)                                   | 17 (3, i.e. 18%)  |
| 2017                | 149                               | 36%  | 96   | 32 (19, i.e. 20%)                                   | 28 (7, i.e. 25%)  |
| <b>Total</b>        | <b>775</b>                        | <b>50.5%</b>   | <b>376</b>   | <b>114</b>  | <b>95 (23, i.e. 24%)</b>                                    |
| Annual Average: 193 |                                   |  |  |   |   |

### Thailand: Launched March 2016, Closing June 2019

| Annual Cycle  | Total # of Applications Initiated | Attrition of applications (due to non-completion or deemed ineligible) | Total # of applications deemed eligible to enter the Competition | Semi-finalists selected (# with female team leader) | Teams that finished Accelerator (# with female team leader) |
|---------------|-----------------------------------|--|--|---|---|
| <b>Target</b> |                                   |  | <b>100 entrants per year (30% women)</b>                         |   |   |
| 2016          | 33 (4)                            | 0%   | 33 (4, i.e. 12%)   | 21 (4, i.e. 19%)                                    | 11 (3, 27%)   |

|                    |           |    |                          |                          |                         |
|--------------------|-----------|----|--------------------------|--------------------------|-------------------------|
| 2017               | 44 (10)   | 0% | 44 (10, i.e. 23%)        | 25 (6, i.e.24%)          | 11 (3, 27%)             |
| <b>Total</b>       | <b>77</b> |    | <b>77 (14, i.e. 18%)</b> | <b>46 (10, i.e. 22%)</b> | <b>22 (6, i.e. 27%)</b> |
| Annual Average: 39 |           |    |                          |                          |                         |

**Morocco: Launched August 2016, Closing September 2019 (extension is under discussion)**

| Annual Cycle        | Total # of Applications Initiated | Attrition of applications (due to non-completion or deemed ineligible) | Total # of applications deemed eligible to enter the Competition | Semi-finalists selected (# with female team leader) | Teams that finished Accelerator (# with female team leader) |
|---------------------|-----------------------------------|--|--|---|---|
| <b>Target</b>       |                                   |  | 100 entrants per year (10-15% women)                             |   |   |
| 2016                | 201 (23%)                         | N/A  | N/A  | 30  | 30  |
| 2017                | 218 (17.9%)                       | 4%   | 209  | 30 (6)  | 30 (6)  |
| <b>Total</b>        | <b>419</b>                        |  |  | <b>60</b>   | <b>60</b>   |
| Annual Average: 209 |                                   |  |  |   |   |

Note: GCIP Ukraine was still in Project Preparation Phase at the time of this evaluation

**Annex VII – Startups’ Projected GHG Emission Reduction, Job Creation, Revenue Potential**

**ARMENIA**

| Company and Its Innovation   | Environmental Benefit of its Innovation   | Annual GHG Emission Savings Projected by 2020 | Predicted Increase in Revenue by 2020 | Projected Jobs Created by 2020 |
|--|---|---|---------------------------------------|--------------------------------|
| YSU BIOFUEL TEAM<br>Biohydrogen produced from biomass to be used as fuel | Biohydrogen is a 100% ecologically-clean fuel with no CO2 emissions at all  | 0   | N/A                                   | 30                             |
| BITLIS-MEN<br>Water flow measurement system                              | Using the system in pumping stations decreases their energy consumption, thereby reducing energy demand from thermal power plants, reducing CO2 emissions | 0   | N/A                                   | 1                              |



|   |   |          |       |     |
|---|---|----------|-------|-----|
| SOLVAR SYSTEMS<br>Novel solar photovoltaic modules for energy generation  | Reduces CO2 emissions by over 30 tons per year (estimated)  | 30 tCO2e | 4900% | 10  |
| ECOTECHNOLOGY LLC<br>Biodegradable water absorbent material (Aquasource) for agriculture and decorative plants  | Application in rooting neighborhood of each plant reduces irrigation needs by 50-60%, increasing crop productivity up to 40-60% and improving soil structure  | N/A      | 3471% | 25  |
| BLACK SOLAR<br>A new anti-reflection layer formation technology for solar photovoltaic products utilizing a proprietary 1-step plasma etching process | This critically differentiated manufacturing process produces low-cost, high-efficiency solar modules for the large solar photovoltaic market   | N/A      | N/A   | N/A |
| N/ANO HI<br>Nanotechnology and nanoproducts of 2D atomic materials (nano-structures, nanosheets, nanopowder)  | Significantly increase the efficiency of the solar photovoltaic panels by using flexible graphene solar cells (replacing conventional ones by replacing ITO electrodes with flexible and transparent graphene ones) | 0        | N/A   | N/A |
| TECHNOLOG<br>New heat exchange technology for individual heating systems based on new rule of liquids mass - heat transfer                            | This new approach to water heating systems in all domains has 25% gas savings   | 0.25     | N/A   | N/A |
| AM-ESKA<br>Used tires are recycled: turned into diesel fuel, carbon black, and still cord   | Makes the environment cleaner by recycling one of the most dangerous types of waste (old, used tires) as well as producing high quality diesel fuel   | N/A      | 36%   | N/A |

## **INDIA**

| <b>Company and Its Innovation</b> | <b>Environmental Benefit of its Innovation</b> | <b>Annual GHG Emission Savings</b> | <b>Predicted Increase in Revenue by 2020</b> | <b>Projected Jobs Created by 2020</b> |
|-----------------------------------|--|------------------------------------|--|---------------------------------------|
|-----------------------------------|--|------------------------------------|--|---------------------------------------|

|  |  | Projected by 2020 |         |      |
|--|--|-------------------|---------|------|
| NISHANT BIOENERGY PVT LTD<br>Biomass fuel pellet manufacturing plant (350-400kgs/hr) and pellet-fueled cook stoves and burners | We are going to propagate decentralized biomass fuel manufacturing from local biomass and employ local people. Each franchisee will be buying local biomass worth Rs 50 Lakh/year. With 20 franchisees, total purchase would be more than Rs 10 Crores per year. This money will help local economy around the pellet factories. Biomass is rural thing thus most benefit will go to poorest in the area. Our solution replaces fossil fuels with locally-made sustainable low cost fuel thus end consumers using our stoves/burners will also benefit. User saves around 35%-40% in fuel cost while shifting from fossil fuel to our pellet stoves/burners. | 26000 tCO2e       | 900%    | 240  |
| AARSHADHAATU GREEN N/AN/AOTECHNOLOGIES INDIA PVT LTD<br>Nano copper-based, anti-corrosive and anti-fouling coatings            | Energy Calculations  | N/A               | #DIV/0! | 40   |
| AGNISUMUKH ENERGY SOLUTIONS PVT. LTD<br>Gas-fueled radiant heat applications   | > 10 million metric tons CO2 emissions reduction   | 30000 tCO2e       | 24900%  | 5000 |
| ATOMBERG TECHNOLOGIES<br>Energy efficient ceiling fan  | Number of ceiling fans in India: 246 million with 10-hour average running time on 300 days: 2782 units saved per year, which should be enough to provide electricity access to 200 million families  | 0                 | 900%    | 500  |

|  |  |  |       |     |
|--|--|--|-------|-----|
| RHINO MACHINES PVT LTD<br>Energy efficient sand plant (Ecoflex)  | CO2 emission reduction is cumulative and will keep on increasing.<br>Working environment and competitiveness also improves   | 14400 tCO2e                                      | 150%  | 50  |
| RHINO MACHINES PVT LTD<br>Multiflex - energy efficient moulding machine  | CO2 emission reduction is cumulative and will keep on increasing.<br>Working environment and competitiveness also improves   | 14700 tCO2e                                      | 400%  | 100 |
| BRISIL TECHNOLOGIES PRIVATE LIMITED<br>(EARLIER KNOWN AS BRIDGEDOTS TECHSERVICES PRIVATE LIMITED)<br>Highly dispersible silica, activated carbon | Reduces total energy required for silica production by over 15%, saving around 600kg of CO2 for every ton of silica produced. The silica produced from our technology will reduce the GHG emissions from vehicles by 7% due to fuel consumption improvements. Every ton of silica will eventually reduce 125,000kg of CO2 emissions from vehicles through fuel savings. As we are expecting to produce around 8000 tons of silica in 2020, it is expected to result in saving 942000 tons of CO2 emissions | 4500 tCO2e/ (direct) + 937500 tCO2e (indirect)   | 5900% | 50  |
| INFICOLD INDIA PVT LTD<br>Power backup integrated bulk milk cooler and integrated cold storage   | Reduction of CO2 emissions   | > 10 million metric tons CO2 emissions reduction | 3900% | 100 |
| GIBSS<br>Geothermal cooling system   | 22 million metric tons CO2 emissions reduction by 2022   | 2 million tCO2e                                  | 400%  | 200 |
| OORJA ENERGY ENGG SERVICES HYD PVT LTD<br>Radiant panels, parabolic trough, compound parabolic collector   | Reduction of over 1 million tCO2e in next 5 years  | 400000 tCO2e                                     | 1150% | 45  |

|   |  |                    |       |    |
|---|--|--------------------|-------|----|
| PROMETHEAN ENERGY<br>ChillerMate/CompMate | 100 million metric tons CO2<br>emissions reduction | 1 million<br>tCO2e | 6150% | 20 |
|---|--|--------------------|-------|----|

## PAKISTAN

| <b>Company and Its Innovation</b>   | <b>Environmental Benefit of its Innovation</b>   | <b>Annual GHG Emission Savings Projected by 2020</b> | <b>Predicted Increase in Revenue by 2020</b> | <b>Projected Jobs Created by 2020</b> |
|---|--|--|--|---------------------------------------|
| HEMPCO<br>Energy efficient construction material using hemp as insulation material                                | Reduces building heating and cooling costs by 70%, thereby reducing carbon emissions (100 tCO <sub>2</sub> e)                      | 500 tCO <sub>2</sub> e                               | 400%   | 100 +                                 |
| GREEN TEAM<br>Converts municipal solid waste into briquettes used to heat boilers, thereby replacing coal burning | Replaces coal with municipal solid waste which reduces carbon emission and results in cleaner cities (40 tCO <sub>2</sub> e)       | 250 tCO <sub>2</sub> e                               | 400%   | 50                                    |
| SAVCON<br>An energy efficient geyser, consuming 70% less energy   | Reduces methane consumption in winter and will help in overcoming seasonal gas shortages of companies (80 tCO <sub>2</sub> e)      | 150 tCO <sub>2</sub> e                               | 67%  | 20                                    |
| PROJECT ROSHNI<br>Intelligent device that collects energy consumption details                                     | Energy efficiency on multiple levels and reduced carbon emissions (100 tCO <sub>2</sub> e)   | 250 tCO <sub>2</sub> e                               | 100%   | 35                                    |
| TAWAN/AI<br>Agricultural dry bio-waste gasifier using pelletized dry crop waste                                   | Reduced consumption of diesel and higher utilization of agriculture waste (30 tCO <sub>2</sub> e)                                  | 300 tCO <sub>2</sub> e                               | 500%   | 30                                    |
| BITSYM<br>Water tank disinfectant device  | Contributes to controlling water-borne diseases (e.g. cholera), thereby saving lives of thousands of people (5 tCO <sub>2</sub> e) | 25 tCO <sub>2</sub> e                                | 100%   | 100                                   |
| ZAHEEN MACHINES<br>Intelligent device for gas burning water heaters   | Reduces methane consumption in winter and will help in overcoming seasonal gas shortages of companies (60 tCO <sub>2</sub> e)      | 150 tCO <sub>2</sub> e                               | 100%   | 100                                   |

|  |   |           |      |    |
|--|---|-----------|------|----|
| DC SOLAR WATER PUMP<br>Solar-powered water pump  | Uses solar power to pump water, thereby increasing agricultural production and incomes in off-grid areas (10 tCO2e) | 150 tCO2e | 900% | 50 |
| BIOFIRE RENEWABLES<br>Biomass fired cooking stoves run by pelletized dry agriculture waste | Encourages use of bio-mass for cooking purposes (0.5 tCO2e)   | 75 tCO2e  | 900% | 25 |
| CHITRAL ENGINEERING WORKS<br>Energy efficiency hydro-electric turbine                      | A more efficient way of generating more electricity i.e. 100 KWH from hydro sources (40 tCO2e)                      | 100 tCO2e | 100% | 50 |

### **South Africa**

| <b>Company and Its Innovation</b>                                 | <b>Environmental Benefit of its Innovation</b>   | <b>Annual GHG Emission Savings Projected by 2020</b> | <b>Predicted Increase in Revenue by 2020</b> | <b>Projected Jobs Created by 2020</b> |
|---|--|--|--|---------------------------------------|
| DUCERE HOLDINGS (PTY) LTD.<br>Miser Hydraulic Hybrid Transmission | By end 2020, we will be reducing CO2 emissions by 2,25m tons per annum for the automotive sector. Our new patents address power utilities, larger transport types and some other energy storage abilities. It is not possible to quantify this now but it will be significant.   | 1200000 tCO2e/yr                                     | 1400%  | 375                                   |
| PASEKA LESOLANG (Entrepreneur)                                    | We intend to save ~346 million liters of water per year {~138 Olympic-sized swimming pools}  | N/A  | 200%   | 150                                   |
| EKASI ENERGY<br>Smokeless stove                                   | We are substituting fuel made from wood waste instead of cutting down indigenous trees. Our objective is twofold. Eliminate smoke through bad combustion technology and use waste products to create compressed biomass fuel. The compression process does use electricity but improves combustion by removing water and making the fuel denser. | 4131 tCO2e/yr  | 547%   | 50                                    |

|   |   |   |       |     |
|---|---|---|-------|-----|
| PEGASUS ENGINEERED GREEN MOBILITY<br>Pegasus multi-fuel technology                                  | By end of year 5, the projected reduction of 10,000 tons CO <sub>2</sub> e  | 3424 tCO <sub>2</sub> e/yr                            | 401%  | 140 |
| ROB SMORFITT<br>(entrepreneur)  | As with GHG emissions, we cannot calculate. However, our equipment halves the time taken to produce a kiloliter of water thereby reducing electrical usage by half.   | N/A   | 4900% | 22  |
| SOLAR TURTLE  | Assuming each Turtle produces 3570kWh per year, that's 3498,6 tCO <sub>2</sub> e saved (Eskom Grid power = 0.98 tCO <sub>2</sub> e / kWh)   | 117945 tCO <sub>2</sub> e/yr                          | 577%  | 9   |
| BAOBERRY  | For each m <sup>2</sup> of vegetation of an awetbox carbon is sequestered at 300g C/m <sup>2</sup> /year which is significant   | Sequestering carbon up to 300g c/m <sup>2</sup> /year | 8%    | 20  |
| DAVE PONS<br>(entrepreneur)<br>Ceiling in a Can – DIY (do-it-yourself) ceiling for low-cost housing | Shack dwellers usually use electric heaters in winter and fans in summer<br>CEILING IN A CAN installation eliminates the use of these. Fan 15KWh Heater 75KWh.<br>Therefore, 90KWh per household and there are over 7 million low cost homes without ceilings in South Africa. About 70% have fans and/or heaters. A heater is on for the night in winter 8 hours and for 120 nights. A fan is on for 180 nights. If only half of the low-cost houses install an insulating CEILING IN A CAN ceiling, then savings will be EM-2.62. 2.5 Million homes save 0.9 tons CO <sub>2</sub> =2.25 million tons CO <sub>2</sub> . Carbon footprint calculator. 0.9 tons CO <sub>2</sub> per household saved each year. | 90000 tCO <sub>2</sub> e/yr                           | 78%   | 9   |

|  |   |                           |             |            |
|--|---|---------------------------|-------------|------------|
| <p>ECO-V<br/>GreenTower microgrid</p>  | <p>We aim to replace 1 million electric boilers in Africa over the next 10 years with GreenTower microgrids with an annual GHG reduction of more than 3 million tons by saving the utility grid <math>\hat{\pm}</math>3000 million kwh in energy and more than 1GW in peak demand. Each electric boiler (geyser) replaced represents an annual utility grid energy saving of <math>\hat{\pm}</math>3,240kWh</p> | <p>21000<br/>tCO2e/yr</p> | <p>392%</p> | <p>60</p>  |
| <p>CARBOTECT<br/>Color-based diagnostic aid</p>                                      | <p>N/A</p>  | <p>N/A</p>                | <p>43%</p>  | <p>N/A</p> |
| <p>LIGHTSPERSE<br/>Wireless water meter and associated billing metering software</p> | <p>Climate change patterns affect conventional weather patterns and result in drought and water scarcity in certain areas. Therefore, the management of water as a critical resource, its availability, current use and distribution is critical. This is where our energy efficient, low cost metering technology is effective</p>   | <p>N/A</p>                | <p>400%</p> | <p>65</p>  |



## Turkey

| Company and Its Innovation   | Environmental Benefit of its Innovation  | Annual GHG Emission Savings Projected by 2020 | Predicted Increase in Revenue by 2020 | Projected Jobs Created by 2020   |
|--|--|---|---------------------------------------|--|
| <p>Positive Energy BEAD is an IoT system that helps commercial building managers optimize their energy consumption and operations by adapting the day cycle and occupancy changes of building with the buildings automation system</p> | <p>Commercial buildings count for 2/3 of the total energy consumption by all buildings. Every year 10 billion USD worth of energy is wasted by not knowing HOW we consume energy during the day according to human behavior and daily routine of the building. Another important issue is that human behavior contributes up to 25% of energy waste in buildings. With our BEAD technology engaging the occupants with the building technology will decrease carbon emission by 20% and energy waste by 25%. The impact to climate will be over 5 million tons of GHG emission savings representing financial savings of 2.5 billion USD every year.</p> | <p>500 million tCO2e/yr</p>                   | <p>7400%</p>                          | <p>5 disabled people and 25 engineers by the end of 2020. In addition to that, with our new company policy, we will employ 50% female engineers as of 2018</p> |
| <p>ErikTronik Mühendislik tarla.io is a next generation hardware and software platform for farmers that helps optimize their farm's yield and profit</p>   | <p>We help farmers adapt to climate change and hence give them decision support tools to decrease input usage while increasing their yield. Therefore, we can say 10-%50 reduction in agricultural inputs could be achieved.</p>   | <p>N/A</p>                                    | <p>1900%</p>                          | <p>50</p>  |
| <p>KODECO DESIGN AND ENGINEERING<br/>A 3-wheel vehicle that provides non-stop mobility by solar power.</p>   | <p>In 10 years from 20,000 vehicles: 104369Tons CO2 reduced</p>  | <p>3131 tCO2e/yr</p>                          | <p>3900%</p>                          | <p>15</p>  |

|  |   |  |        |       |
|--|---|--|--------|-------|
| CAPSTUDIO<br>GreenCoat is a new coating material for roof and facades, made of pumice, minerals, organic binder and seed, for sound and heat insulation with hydroponic plants.                              | 0   | 0  | N/A    | 20    |
| ZE YAK ORGANIK SAN/AYI VE TICARET A.Ş.<br>Charcoal produced from olive core/waste  | With the current production capacity of 100 tons per month, a savings of 10.8 million kg CO2 could be made annually.  | 32400 tCO2e/yr                                 | 1289%  | 10    |
| Momentum Araştırma Geliştirme Teknoloji Mühendislik ve Peyzaj Sanayi ve Ticaret Ltd Şirketi<br>Karayel is a smallscale wind turbine solution that can be configured according a client's energy consumption. | We are planning to sell thousands of products globally. As a result of these sales, more than 200 kton CO2 savings are expected.  | 92 tCO2e/yr                                    | 1650%  | 45    |
| RF-SENS<br>Bacteria sensors for water  | Water wastage and contamination will be reduced.  | none   | N/A    | 6     |
| Temiz Yaratici Teknolojiler (TYT)<br>HydroSolar: Floating Solar Photovoltaic Systems   | Floating solar photovoltaic system produces clean energy. It also prevents water evaporation which is one of the main environmental problems of the world. Only 1 MW floating solar photovoltaic plant provides 1,6 TWh/year energy production and 61000m <sup>3</sup> /year water by blocking evaporation. | 56000 tCO2e/yr                                 | N/A    | 10    |
| HyperCFD<br>Day-ahead power production forecasting service for wind farms  | 0   | None   | 49900% | 15-20 |
| ENWAIR ENERGY TECHNOLOGIES CORPORATION<br>Lithium ion battery,   | Lithium ion batteries are used for electric vehicles which are part of the solution portfolio to replacing fossil fuel usage in vehicles. Another issue is to use   | Can not be predicted before battery production | N/A    | 0     |

|  |   |                         |      |                                    |
|--|---|-------------------------|------|------------------------------------|
| silicon anode, li-rich cathode   | batteries in the renewable energy production systems, where discontinuous production of energy in renewable system is a problem.  | plant plan is available |      |                                    |
| BERAY ENGINEERING Engineering Ltd.<br>Marnas is a system, where hydrological forecasts and energy optimization modules work together in order to maximizing the income of the hydropower plants. | 0   | 0                       | 300% | 30                                 |
| UNDA Mühendislik A.Ş.<br>Adaptive Living Facade  | ~12,000 Metric tons CO2 emission reduction per year per building<br>17500 MWh electricity saving per year per building  | 125000 tCO2e/yr         | 200% | 16                                 |
| GökSeHAN Teknoloji<br>RAS Omni-directional low-speed wind turbine  | 0   | 0                       | 78%  | 700                                |
| Fatih Sultan Mehmet Vakif University<br>(A student team startup)<br>Energy Tracker device and Android/IOS Mobile Application   | The project will decrease the misusage of the electricity. It is directly related with CO2 because devices release a lot of CO2. When we control our energy and its usage emission will be decreased 30% electricity misusage and 25.7% emission in CO2. Additionally, it will remove the electricity readers (meter readers) this will automatically save paper and devices. | 27000 tCO2e/yr          | N/A  | 15                                 |
| CUKUROVA GREEN TEAM<br>Phosphorence dye: a nano phosphor pigment (dye) with long-lasting luminescence that can be stimulated by daylight.  | 1 m2 phosphorence dye=1000m3 clean air  | x                       | N/A  | We do not have foresight right now |

|   |  |               |       |    |
|---|--|---------------|-------|----|
| MISAL DESIGN<br>Electric-powered water jet outboard motor                   | Official Emission Standards confirm that dramatically higher pollution is permitted for outboards motor. Even small 5 hp outboards may produce up to 22 times the NO and HC emissions compared to a car. For this reason, electrical outboards have a very important role  | 1300 tCO2e/yr | 0%    | 0  |
| MISAL DESIGN<br>Multiple blade shaftless wind turbine                       | Main aim of our project to have wind turbine in urban concept which has high efficiency and low noise  | 1800 tCO2e/yr | 25%   | 0  |
| DIPLOID<br>BIOTECHNOLOGICAL PRODUCTS<br>Heat insulation material            | Our product is produced using waste and fungal cells. Therefore, the product is recyclable and sustainable. Most of the insulating materials found in the market are petrochemical-based or mineral-based products produced at a temperature of 1200 ° C. Our product can be produced in dark environment with about 10 times less energy than other materials. Since fungal cells are used, carbon emission is minimal at the production stage. The use of wastes and low carbon emissions will facilitate the provision of carbon emission values for countries in climate conferences like Paris. | I do not know | N/A   | 20 |
| HIDROTURBIN TEKNOLOJI<br>ENERJI<br>ARVIDA Micro hydroelectric power systems | na   | na            | 4900% | 20 |