Gauteng Climate Innovation Center (CIC)

A Business Plan for the financing and implementation of a CIC in Gauteng, South Africa.

Prepared by infoDev in partnership with The Innovation Hub in Gauteng Province
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EXECUTIVE SUMMARY

This document presents the business plan for a Climate Innovation Center (CIC) in Gauteng province, South Africa, jointly developed by The Innovation Hub and the World Bank’s infoDev Climate Technology Program. The CIC will provide a mix of financing, technical assistance and general business advisory services to help South African industry – targeting entrepreneurs and small and medium enterprises (SMEs) – develop cutting-edge technologies and business models which address climate change mitigation and adaptation.

The CIC seeks to directly support South Africa’s economic policy objectives of a higher value, inclusive green economy. The CIC has a projected five-year operational budget of approximately ZAR 170 mm (USD 21.2 mm) and seeks to enhance efforts to deliver job creation, new companies, support development of innovative technologies, reduced CO₂ emissions and enhanced climate resiliency.

INTRODUCTION

The global transition to low-carbon growth holds tremendous economic opportunities for South Africa. The country has strong technical and industrial capability, world-class renewable resources, political commitment to a green economy, and potential to act as a hub for the continent.

These factors make it possible for South Africa to take a profitable leadership role in the global clean technology revolution through the domestic development and deployment of innovative technologies and business models addressing climate change. To unlock this potential, the CIC design leverages the experiences of The Innovation Hub and infoDev’s global Climate Technology Program.

- The Innovation Hub was established by the Gauteng Department of Economic Development (DED). It is Africa’s first internationally accredited Science and Technology Park and the country’s leading knowledge-intensive business cluster. It is a regional center of innovation where high-tech entrepreneurs, businesses, academics, researchers and venture capitalists can network and prosper.

- infoDev’s Climate Technology Program (CTP) helps countries innovate and benefit from locally appropriate climate change solutions. The CTP designs and implements national CICs which provide a tailored suite of services to help the private sector develop clean technologies for domestic and export markets. The CTP also delivers cutting edge knowledge creation, international networking and collaboration, global financing, and business competitions.
DEVELOPMENT OF A CIC FOR SOUTH AFRICA

South Africa faces a number of pressing socio-economic and development challenges towards effective achievement of the United Nations Millennium Development Goals. These are compounded by the challenge of effectively addressing climate change mitigation and adaptation in the wake of a global economic crisis. A key learning point from this post-crisis analysis is that South Africa must invest heavily in (i) transitioning to a ‘green economy’, (ii) creating ‘green jobs’, and (iii) preparing a new industrial development trajectory of sustainable low-carbon economic growth. These will be characterized by enhanced quality of life for all citizens, as well as a minimal need for punitive environmental taxes and penalties.

Notably, the CIC is viewed as one of the pillars for Gauteng to achieve the Province’s objectives of job creation, industrial development, technological innovation and improved environmental performance and shift to a ‘Green Economy’. The overall strategic goal of the Gauteng Green Economy Strategy is sustainable growth and sustainable job creation. The CIC will provide financing and other services to help South Africa pro-actively – and profitably – develop, transfer and deploy advanced climate smart technologies that meet local needs.

The design of the Gauteng CIC is based on the model developed by infoDev’s Climate Technology Program. It was tailored to the South African context in a six month process including: extensive outreach; wide sector mapping; a major conference workshop to gather public, private and academic stakeholders; and in-depth provincial and national government consultation.

The CIC team has determined the following key principles for an effective CIC in South Africa:

- **Inclusive growth for benefits to all citizens:** The CIC services will explicitly target the needs of traditionally disadvantaged groups, including youth, women, and the poor. The CIC will promote better understanding of these communities as specific consumer markets, entrepreneurs, and/or other sources of innovation.

- **Focus on commercialization for transformative effect:** While a number of projects in South Africa scale-up known climate solutions, the CIC will fill the key niche to uncover, foster and commercialize novel technologies and business models. This will help transform the response to climate change.

- **Key role linking other relevant activities:** The CIC will serve as a node, or nexus, to link many of the ongoing or planned activities devoted to drive climate technology innovation in South Africa.
Act as conduit to international markets and collaboration: The climate technology revolution is a global phenomenon. The CIC will provide the venue and network to connect South Africa to private, government and multilateral efforts worldwide.

CIC DESIGN: ACTIVITIES AND BUDGET
The Gauteng CIC will be a non-profit entity incorporated in South Africa. With utmost consideration for sustainability and autonomy, the CIC can be organized as a separate legal entity or housed within an existing organizational structure. The CIC’s activities will be comprised of five main categories:

ADDRESSING THE FINANCING GAP
The CIC will offer four types of financing services which relate to the specific entrepreneur and technology needs at the different stages of commercialization. These include: (i) proof-of-concept grants that target early stage technical innovation; (ii) inclusivity grants which are reserved for businesses that benefit disadvantaged populations; (iii) direct placements that replicate venture capital screening methodology; and (iv) investment syndication to broker more advanced companies with the identified national and international funding sources.

BUSINESS ADVISORY AND INFORMATION SERVICES
This suite of CIC services will directly provide SMEs and other innovators with the skills and information to scale-up their business and/or commercialize their models. The services being offered will include: (i) business planning, (ii) financial planning, (iii) technical expertise, (iv) university and research partnerships for technology commercialization, and (v) market information. Focus will be given on providing greater objective insight into South Africa’s underserved markets, to encourage greater business activity in these sectors.

ADVOCACY FOR EFFECTIVE INNOVATION POLICY
On behalf of climate SMEs, the CIC will work with the Government of South Africa (GSA) to promote favorable regulatory frameworks enabling climate technology and business model innovation in South Africa. These activities will draw directly from experiences of CIC-supported SMEs and international best practice to create targeted analytical pieces that examine the regulatory barriers to innovation and propose realistic, effective solutions. In particular, the CIC will focus on greater participation of the social economy in the growth of green industries.
FACILITIES FOR ENTREPRENEURS AND SMES

The CIC will provide facilities needed by South African innovators, including incubator space and related utilities for entrepreneurs and SMEs. The resulting cluster of like-minded companies will spur collaboration and cross-fertilization of ideas. The CIC may also provide access to technical facilities at universities and other institutions for researchers to create prototypes of innovative climate technologies.

INTERNATIONAL MARKET LINKAGES

The CIC will provide the conduit for South African green industry to engage with the global clean technology sector and enabling organizations. Owing to its strong financial and technological infrastructure, South Africa is an ideal channel for knowledge exchange and collaborative ventures. It is also an ideal showcase for the capability and entrepreneurial potential of the continent as a whole. For these reasons, the CIC in South Africa is well-positioned to benefit from global as well as local activities. In this regard, the CIC will pro-actively engage high-level programs to maximize the impact of the grassroots and community innovation created by the technologists, entrepreneurs, and companies that it hosts.

The five-year budget for the CIC is projected to be ZAR 170 mm (USD 21.2 mm). This covers staff, facilities, financing, international linkages and all services. The CIC will require 20 staff including its head, investment officers, case managers, business and financial planners, technical experts, policy fellows and administrative support.

RESULTS OF THE SOUTH AFRICAN CIC

The CIC will bring a wide range of environmental, economic and social benefits. It will launch innovative clean technology enterprises which build domestic industry, increase climate resiliency, reduce carbon emissions, connect to international markets, and create jobs for all South Africans. Due to its focus on inclusive growth for the historically disadvantaged – including the youth, rural and urban poor, and women – these results will also be measured by the impacts it has in these communities.
1.0 Global Climate Innovation Challenge

1.1 Innovation at the Global and National Levels

New technologies are essential to reduce the long-term cost of climate change and achieve green growth. All countries – developing, middle income, and industrialized – want to build their capacity to innovate to (i) ensure energy security and increased energy access, (ii) address climate change mitigation and adaptation and (iii) create competitive domestic industries in clean tech for job creation and other benefits.

Barriers to innovation in climate sectors become increasingly more pronounced at decreasing levels of industrialization. They often include gaps in appropriate financing, challenges with technology absorption, lagging technical and business capabilities, entrepreneurial and human capacity constraints and uncertain regulatory environments. Often, there is also a need to expand the capacity of public and private sector bodies supporting locally appropriate innovation.

Figure 1 shows the challenges and gaps faced in supporting technical and business model innovations that address the particular needs of developing and middle income countries. The essential missing piece relates to the capacity to drive innovation within the countries that best understand their own markets, needs and conditions.

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**Figure 1 - Gap in Innovation for Developing and Middle Income Countries**

- **Needed Climate Technology Innovation for Developing and Middle Income Countries**
- **Existing Programs:** Carbon finance, CIF/CTF, GEF, IFI lending
- **Low-income IFI programs**
- **Local and some multinational private sector**
- **Commercial debt and public equity markets**
- **Multinational technology manufacturers**
- **Private technology innovators**
- **VC and other early stage private finance**
- **Government and other innovation programs (e.g., US SBIR)**
- **Government and academic basic R&D**
- **Some basic research in MICs results from developed countries can be shared at this level**
- **Some limited private sector**
- **Niche sustainable investors**

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1.2 INCUBATORS, ACCELERATORS AND INNOVATION CENTERS

infoDev has a successful history of supporting innovation in developing countries by facilitating a global network of business incubators. The incubators aggregate financing and shared services for innovative companies, helping them overcome market barriers that are particularly high in developing countries. Experience has shown that these centers dramatically increase the survival rate of new enterprises, with over 75% being operational after 3 years of exiting the incubator (Figure 2).

As a policy tool, incubators are a highly effective form of public spending, resulting in lower long-term employment costs when compared with infrastructure projects. Incubation experience also has shown that for every USD 1 of government subsidy, a Return on Investment (ROI) of USD 30 in tax revenue can be generated in the long-term through corporate and income taxes from the spun out companies. For these reasons, incubating early-stage businesses is important for economic growth and job creation.

1.3 GAPS IN EXISTING INITIATIVES AND INSTITUTIONS

infoDev commissioned a report by Bloomberg New Energy Finance that surveyed and analyzed hundreds of government, private and PPP initiatives that support climate and clean energy innovation. These included centers of excellence, seed funds, technology accelerators, business incubators, advisory centers and other programs.

The 550 organizations were filtered according to their level of commitment to climate innovation, with a minimum of 25% of activity. Further analysis was conducted on the nature of their work, focusing on business incubation, research and development, networking, capacity building, enterprise advice and financial assistance.

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1 Annex 1 has more information on infoDev and The Innovation Hub, its partner for the South Africa CIC.
2 Grant Thorton Report on Incubation: Source: EDA
3 NBIA (National Business Incubation Association) data
At this stage, 67 relevant organizations were reevaluated to yield only 25 which committed at least 50% of activity to climate innovation (Figure 3). This relatively small group cannot sufficiently capitalize on the immense market opportunities and address the gravity of climate challenges, especially considering that only 18 can be considered 75%-100% committed to climate technology.

Furthermore, the report found gaps in the existing institutions which prevented them from addressing the broad range of barriers associated with climate innovation (Figure 4). Some focus only on financing or business advisory while others concentrated efforts solely on technical development – few advocate policy reform or standards. Only a few institutions address most of the barriers, including China’s Baoding New & High Tech Industrial Development Zone, China, The UK’s Carbon Trust and Brazil’s CIETEC at the University of Sao Paulo. Majority of centers are located in either developed or highly industrialized developing countries – none on the shortlist were located in Africa.

Figure 4 - Institutions that facilitate climate technology innovation
The Bloomberg report also categorizes the major gaps in existing institutions according to five core areas⁵:

- **Technology**: Proving the technology and competing at cost with the market equivalent(s)
- **Company**: Building a pipeline of workforce capacity and sustainable ventures
- **Finance**: Ensuring access to flexible risk capital and funders with diverse risk appetites
- **Market**: Creating new and expanding existing local and global demand, thereby generating market pull which feeds into further development
- **Policy**: Informing, linking and transforming innovative policy mechanisms

Progressive journeys for each core area are required to bridge this innovation gap (Figure 5). The “valley of death” phenomenon is strongest in the early growth stage between discovery and market entry, which is denoted by the dotted black lines. It is crucial to facilitate coordination across all five journeys, building up both supply push and demand pull for climate technology innovation.

It is important to note that each target country will have achieved a different level of progress along the five journeys. For example, in the least developed countries, the most urgent need might be for an entrepreneurship incubator. This is because of the need to build up enterprises and whole industries from scratch, as well as the contribution of SMEs in job creation for these countries. However, countries that already have relevant industries and/or an entrepreneurial ecosystem might simply need to leverage the work of existing players while focusing its own resources on strengthening the innovation ecosystem.

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⁵ Adapted by infoDev: Carbon Trust
1.4 CLIMATE INNOVATION CENTERS

To complement multilateral, national and local solutions are being structured around the climate technology sector, infoDev’s Climate Technology Program is rolling out Climate Innovation Centers (CICs) in a number of countries in Africa, South East Asia and the Caribbean. CICs support innovation by offering a full suite of financing and capacity building services to technologists, entrepreneurs, and SMEs that address challenges to starting and scaling their climate technology ventures (Figure 6). In addition to incubating promising start-ups, CICs bridge local funding gaps by providing dedicated proof-of-concept and seed funds to entrepreneurs.

In parallel to investments, CICs also provide business advisory and training services, market intelligence products, access to product testing facilities, and government engagement on policy. In this way, a center acts as a national focal point, coordinating efforts in promoting the growth of locally relevant climate sectors. CICs also provide a platform to create international business-to-business linkages, enhance knowledge sharing, facilitate trade, and achieve national green growth objectives.

The table below differentiates CIC focus by country size and level of development:

<table>
<thead>
<tr>
<th>Country attributes</th>
<th>Large/medium population countries</th>
<th>Low population countries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High GDP</td>
<td>Medium/Low GDP</td>
</tr>
<tr>
<td>Scale of Center</td>
<td>National</td>
<td>National</td>
</tr>
<tr>
<td>Scope of Center</td>
<td>Main technology thrust</td>
<td>Technologies for basic energy needs; mitigation; adaptation</td>
</tr>
<tr>
<td>Innovation process</td>
<td>Full range (technology research, development, modification and deployment)</td>
<td>Emphasis on deployment process and strategies</td>
</tr>
<tr>
<td>Need for international resources (finance, human)</td>
<td>Selective</td>
<td>High</td>
</tr>
</tbody>
</table>
Each CIC is specifically tailored to the host country’s market needs, opportunities and challenges. infoDev develops a business plan via detailed analysis and an extensive in-country, multi-stakeholder engagement process. Stakeholders participate in workshops, focus groups, surveys and interviews to explore the key barriers to climate technology commercialization and assist in the development and design of appropriate solutions. This gaps-needs analysis forms the basis for the national CIC business model.

**COMPLEMENTARITY WITH ONGOING AND FUTURE PROGRAMS**

Each CIC leverages the expertise of local R&D, academia, entrepreneurs, NGOs, private sectors and host government ministries such as water and energy, environment, commerce, finance and science and technology. This ensures that existing initiatives are complemented and coordinated without duplication. It also fosters a local sense of ownership, which will increase the success of the CIC’s implementation and operations.

infoDev is coordinating efforts at the global level, including existing and future programs designed to support climate technology development and deployment. These include ongoing engagement at the UNFCCC, multilaterals such as The World Bank & IFC and bi-lateral organizations including development partners and donors. Because the CICs are part of a larger Climate Technology Program; they will be actively involved the broader mandate to advance climate technology enterprise development beyond the countries that are selected to host centers. This magnifies the impact of the investment in each individual CIC, as shown in Figure 7:

**Figure 7 - Benefits of the CTP and CIC network**
1.5 SMES AS THE UNIT OF SUPPORT
The definition of small and medium enterprises (SMEs) differs from one context to another. In general, organizations and administrations can apply the decision criteria which best suit their purposes. For purposes of this report, infoDev adopts a broad definition which is suited to the holistic approach of the CIC, recognizing that innovation can originate at various points in a value chain (Figure 8). The term SMEs is therefore used to include a range of potential innovators, such as:

- **Entrepreneurs**: groups or individuals who possess the attitudes and motivation required to launch and scale up a successful climate technology venture
- **Researchers**: scientists and academics exploring new technologies related to climate change mitigation and adaptation, or developing new commercial applications for ones that exist
- **Community-based social enterprises**: local initiatives targeted towards monetizing the need for basic services such as waste management, utilities (water, power, cooking fuel) and delivering these in a climate-friendly way
- **Small-scale manufacturers**: supply chain partners with the potential to apply their industrial capabilities to climate technology production
- **Retail distributors**: supply chain partners with the capability to deploy climate technologies across an expansive geographical network
- **Importers and exporters**: firms which currently rely on foreign partners for the sourcing, manufacturing and delivery of climate technology solutions

Using this value chain approach, with the Traditional SME or Social Entrepreneur as the main catalyst, the CIC could leverage the positioning of The Innovation Hub within the South African innovation eco-system to develop other actors in the ecosystem. Adopting this perspective increases the potential linkages and complementarities that can be created through the CIC. It also implies that the CIC’s interactions with other entities, such as government and financiers, should be prioritized according to the benefits accrued to SME stakeholders.

Throughout this business plan, SME profiles will present concrete examples of South African businesses in need of CIC intervention. Expanded versions of these profiles can be found in Annex 5.
SME Profile: An Improved Process for Converting Waste to Energy

Jan Davel, an engineer based in Pretoria, has co-developed a system for converting biomass waste into energy. The OneGreen Dry Brayton Cycle System (Figure 8) will convert existing industrial turbo machines to generate electrical power from this renewable fuel source. This process will also yield a charcoal byproduct that can be used in soil rehabilitation programs for agricultural land.

Davel requires start-up capital for a 100-200 kW pilot plant to demonstrate the application and efficiency of the system, identify technical and operational barriers, and address these using control mechanisms and further development. The funding will make it possible to scale up the technology in less than three years. Davel estimates that the available biomass in South Africa's five metropolitan areas can generate up to 170 MWh of electricity.

To unlock this innovative and commercial potential, the CIC could directly finance the project or facilitate investment from other sources. Also, Davel could benefit from business advisory services and market intelligence provided by the CIC. Through the OneGreen system, Davel has the opportunity to create jobs, provide access to power and mitigate harmful emissions in South Africa.
1.6 THE GLOBAL CIC NETWORK

The solutions to climate change – and related clean technology revolution – will undeniably be driven at the global level. International collaboration on research, technology transfer, tapping export markets and component imports are all necessary parts of the evolving and emerging response to climate change. The global CIC network exemplifies South to South technology transfer and knowledge sharing.

Therefore, the ability to create international linkages in support of national climate technology industries is a key component of the CIC’s value proposition. The portfolio of activities for each CIC host country will include not only local and regional programs, but also global participation and showcasing. To this end, the following capabilities will be built into the design of all CICs:

These high-level activities will maximize the impact of the grassroots and community innovation created by the technologists, entrepreneurs, and companies within each CIC. The worldwide CIC network is designed to enable:

- **Knowledge Platforms:** The Network will maintain a series of actively managed knowledge platforms and databases on the latest, key developments in these areas, growing a repository of information on technologies, market information, competitive landscapes and sector trends.

- **International B2B Forums:** The Network will provide the conduits and efficient stakeholder marketplaces to allow clean energy and climate companies to realize their potential on a global basis.

- **Technology Transfer and Collaboration:** The Network will facilitate the process of technology and skills transfer between Centers by coordinating researchers, national governments, finance, manufacturers, distributors and consumer representatives.

- **Demand aggregation:** The Network will provide a basis by which the consumer groups, working with manufacturers can aggregate demand across countries and across regions that have similar markets.
• Thought Leadership and Sharing Best Practice: The Network will actively gather and package pioneering lessons on bottom-up clean energy and climate innovation, providing a forum to gather and drive global expertise on this subject and disseminate results widely.

• Competitive Global Funding / Financing: The Network will provide a conduit by which aspiring companies from different countries can compete for funding in a way that ensures efficient allocation and minimizes due diligence costs.

Figure 10 illustrates a hypothetical scenario wherein four SMEs across the globe leverage the CIC network to spur value creation and innovation:

**Figure 10 - Illustrative example of global collaboration mechanisms**

Company: WinAfrique
Country: Kenya
Product: Hybrid RE for telecom towers

Company: ElectroCell
Country: Brazil
Product: Fuel cells & batteries

Company: Craftskilz
Country: Kenya
Product: Off-grid wind turbines

Company: InnovLite
Country: India
Product: LED lighting

WinAfrique needs assistance in accessing regional markets for exporting
ElectroCell needs to locate manufacturing facilities in China
Craftskilz needs to source low-cost LEDs to develop ‘turn-key’ solutions
InnovLite needs access to technologies & capabilities to lower costs of components

SME Profile: Clean Diesel Fuel from Plastics, Household or Industrial Wastes

Helga Dietrich has worked in waste conversion since 1993. As sole owner and investor of Imvemvane Logistics, she is marketing Catalytic Depolymerization Process (CPD) technology as a method of converting waste to quality diesel fuel. She currently has 12 customers in the pipeline.

Conversion of organic material to diesel occurs naturally over 300 million years, a process which CPD replicates in as little as three minutes. This CO2-neutral technology can process all plastics, municipal solid waste, sewer sludge, agricultural waste, and other materials into diesel, distilled water, and fertilizer. CPD technology has a superior energy efficiency rating and is highly profitable, even without subsidies.

The CIC’s business and financial planning services would help Dietrich scale up Imvemvane Logistics within and beyond South Africa. Additionally, she could benefit from international linkages with export customers, investors and fellow entrepreneurs through the global CIC network.
2.0 Climate Technology Market Landscape: South Africa

2.1 The Green Growth Opportunity: Key Trends and Factors

An HSBC report estimates that the low-carbon energy sector of the broader climate economy will triple to USD 2.2 trillion by 2020. Increasing pressures on the environment and natural resources offer employment and trade benefits for those countries that can take a lead in the climate economy, which includes mitigation, adaptation, and climate finance.

The following factors and trends in South Africa underscore its potential to be a climate technology leader, as well as the value that a CIC would bring to the country.

- **Regional leadership:** South Africa’s political, economic and infrastructural achievements have positioned it at the leading edge of development on the continent, validated by its 2010 entry into the BRICS organization of leading emerging economies.

- **Technical and financial sophistication:** South Africa leads the continent in ICT development and application. Its financial services sector, backed by a sound regulatory and legal framework, compares favorably with those of industrialized countries.

Accelerating Technology Absorption in South Africa

Technology absorption is the application of existing technologies, processes, and products proved and tested in a new environment in which the processes have not yet been tested and the markets and commercial applications are not fully known.

In 2011, the World Bank published a study entitled *Fostering Technology Absorption in Enterprises in Southern Africa*, which utilized case studies and surveys in Mauritius, Lesotho, Namibia and South Africa to highlight the role of technology absorption in increasing economic diversification and competitiveness. Researchers identified the following opportunities for public policy support that would enhance technology absorption: knowledge from trade and foreign direct investment, skills enhancement, university research collaboration and firm-sponsored R&D.

Middle and low income countries can borrow from and improve on existing technology and industrial ideas, instead of having to generate new knowledge through trial and error. Prioritizing technology absorption, with support from both public private sectors, can therefore be a source of national competitive advantage and accelerate “catch up growth”. As the region’s most developed economy, South Africa can benefit greatly from building its capabilities in this area.

- **Pressing need for employment:** Data from the International Labor Organization (ILO) shows that interplay between the rate of job creation, population growth

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6 HSBC Global Research. Sizing the Climate Economy, September 2010.
and shifting demographics has kept South Africa’s unemployment rate above 20% for about a decade. This is particularly alarming among South African youth aged 15-24, where unemployment is the third highest in the world at 48.2%.

- **Technical skills gap:** In addition to creating more jobs, South Africa must ensure that its citizens have the necessary knowledge and abilities. The availability and sustainability of an appropriately skilled workforce is a challenge to South Africa’s progress in several economic sectors, including technology. The skills gap causes other problems such as wage inflation, which can further impair the country’s competitiveness.

- **Dual economy:** Notwithstanding significant achievements by South Africans, the legacy of apartheid continues to manifest in obvious socioeconomic inequalities. South Africa’s Gini-coefficient increased from 0.64 to 0.67 in the years between 1995 and 2008, and ranks among the world’s highest.

- **Expanding SME sector:** According to the Department of Trade and Industry (DTI), the percentage of companies that were registered as small and medium enterprises increased from 49% to 61% between 2004 and 2007 (Figure 11). The number of SMEs grew by 60% during the same three-year period, driving the 30% growth for overall industry. The same study cites that SMEs contribute 39% of employment and about 50% of GDP. Furthermore, the Global Entrepreneurship Monitor has observed an increase in Total early-stage Entrepreneurial Activity in South Africa from 5.1 to 8.9 between 2005 and 2010.

Other developments specific to climate change and the green economy highlight opportunities for intervention that the CIC model is highly suited to address:

- **Energy divide:** In 2009, only 55% of South Africa’s rural households gained access to electricity services compared to 88% of those in urban areas. Of the remaining 3.4 mm households, approximately half are targeted to be supplied with

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10 Measured as the percentage of the population aged 18-16 who are either a nascent entrepreneur or an owner-manager of a new business. (GEM Consortium)
electricity by 2014. The other half is comprised of informal dwellings which are unstable and not cost-effective to electrify.\textsuperscript{11}

- **Rising electricity prices**: According to the Department of Energy’s latest Integrated Resource Plan, regular price increases of up to 25% are needed until 2015 to fund electricity generation projects. Rates are expected to more than double over the next two years alone.

**Greening the South African Energy Sector**

Energy comprises about 15% of South Africa’s GDP and is a key driver of the country’s economy. The Government of South Africa (GSA), in particular, has set a target of 10,000GWh of energy to be produced from renewable energy sources by 2013. South Africa has access to various renewable energy sources, such as solar, wind, biomass, and natural gas.

It remains to be seen the role that South African companies, researchers and innovators will play in developing, manufacturing, installing and operating the massive new infrastructure investments required to reach these goals.

- **Carbon emissions**: From 2000 to 2007, per capita CO\textsubscript{2} emissions in South Africa were consistently between 8.5 and 9.5 times higher than in Sub-Saharan Africa. This is driven partly by its dependence on coal, the most emissions-intensive energy resource. This is accompanied by a fairly consistent rise in the level of total emissions from South Africa over the same period (Figure 12).

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Figure12}
\caption{CO\textsubscript{2} emissions, 2000-2007}
\end{figure}

- **Water scarcity**: Based on current projections, South Africa will exceed the limits of economically viable land-based water resources by 2050 if conservation

\textsuperscript{11} OECD/IEA Comparative Study on Rural Electrification Policies in Emerging Economies, 2010
measures are not taken.\textsuperscript{12} The country’s water supply is chronically stressed by economic expansion, population growth and accelerating evaporation due to global warming.

- **Vulnerability to climate change**: Studies have shown that South African agricultural and coastal areas will be adversely affected by increasing global temperatures and changing rainfall patterns. Infrastructural, economic and human losses from more destructive natural disasters may also be observed. Other assessments show that by 2100, changes in temperature and precipitation could cause strong southward expansion of the malarial transmission zone into South Africa.\textsuperscript{13}

- **Strong government support**: At the Johannesburg Green Economy Summit in May 2010, six government ministers (economic development, trade and industry, public works, science and technology, mineral resources, and water and environmental affairs) explained how their departments would stimulate green growth in South Africa. The green economy was identified as a key “jobs driver” in South Africa’s November 2010 New Growth Path (NGP). In addition, the state-owned Industrial Development Corporation (IDC) has pledged to invest about R23 billion over the next five years into the Green Economy space, to be supplemented by additional allocations from the national budget.

Government, academia, industry, and the international community have all demonstrated a significant interest in leveraging South Africa’s strengths to realize its potential to address climate issues. It is of paramount importance, therefore, to create strategic alignment among these different groups’ priorities and capabilities.

**2.2 THE GREEN ECONOMY IN GOVERNMENT POLICY**

Global climate change policy has advanced rapidly over the past five years, with many countries having adopted greenhouse gas (GHG) emission and renewable energy targets, implemented policy measures such as energy efficiency, technology and vehicle performance standards, and provided financial signals such as carbon prices and incentives to encourage private investment in clean energy. Climate technology has been a consistent theme in South Africa’s economic growth strategies, examples of which include the following:

**NEW GROWTH PATH**

Job creation is at the heart of the New Growth Path Strategy. The policy document sets out critical markers for employment creation and growth and identifies where viable changes in the structure and character of production can generate a more inclusive and greener economy over the medium to long term. It is further acknowledged that

\textsuperscript{12} National Climate Change Response White Paper, 2011

\textsuperscript{13} IPCC, Climate Change 2007: Impacts, Adaptation and Vulnerability
technological innovation will open up the opportunity for substantial employment creation. The New Growth Path targets 300,000 additional direct jobs by 2020 to green the economy, with 80,000 in manufacturing and the rest in construction, operations and maintenance of new environmentally friendly infrastructure. The potential for job creation rises to well over 400,000 by 2030. Additional jobs will be created by expanding the existing public employment schemes to protect the environment, as well as in production of bio-fuels.

THE NATIONAL CLIMATE CHANGE RESPONSE POLICY
On 12 October 2011, the South African Cabinet approved the National Climate Change Response (NCCR) Policy, which sets out South Africa’s climate change response strategy to achieve the desired reduction in Green House Gas (GHG) emissions. The NCCR Policy objective is structured around the following strategic priorities: risk reduction and management; mitigation actions with significant outcomes; sectoral responses; policy and regulatory alignment; informed decision making and planning; integrated planning; technology research, development and innovation; facilitated behavior change; behavior change through choice; and resource mobilization. Furthermore, NCCR Policy aims to limit jobs contraction to those areas of the economy where excessive carbon intensity is unsustainable, whilst promoting and expanding the green economy sectors.

LONG-TERM MITIGATION STRATEGY
In 2008, in the context of South Africa’s moral and legal obligation to make a fair contribution to the global mitigation effort under the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol, Cabinet fully considered the Long Term Mitigation Scenario study which outlined various options for dealing with the country’s climate change challenges. The LTMS process informed South Africa’s national position that emissions should peak in the period from 2020 to 2025, remain stable for around a decade, and decline thereafter in absolute terms. The President confirmed this strategic policy direction at the 2009 National Climate Summit and further detailed this as a South African undertaking in the context of all legal obligations under the UNFCCC and its Kyoto Protocol. At the international UNFCCC Climate Change Conference in 2009, i.e. COP-15 in Copenhagen, the President announced a target to reduce emissions growth 34% below business-as-usual levels by 2020 and 42% by 2025, subject to the availability of finance, technology, and capacity-building support from the developed world.

Other notable South African policy achievements include the Industrial Policy Action Plan 2 (IPAP-2), Integrated Resource Plan 2010, Medium-Term Strategic Framework (and associated Outcomes), and the Green Economy Summit 2009. A number of these policy documents were catalyzed by the climate change resolution adopted by the
governing party at the 2007 ANC National Conference at Polokwane.\textsuperscript{14} The resolution states a strong intention to mitigate GHG emissions and adopt a low-carbon growth path. It further acknowledges the role of South Africa as a high-emission country, the impact of climate change on the poor, and the ANC’s past and continuing commitment to a sustainable future. It affirms that the organization will continue to play a leadership position on environmental issues internationally. Furthermore, the resolution resolves to set GHG mitigation targets for the country in the future, and to diversify the energy mix away from its current coal focus with a strong emphasis on renewable energy, particularly wind and solar.

Setting a price on carbon emissions, ambitious renewable energy targets and a mandatory energy efficiency program comprise the main pillars of the path to achieve GHG reductions in the resolution. It speaks to the context of the employment creation imperative, and seeks to mobilize all stakeholders to respond to the climate change challenge. The fast-tracking of appropriate institutional mechanisms to support mitigation is directly identified, including the establishment of a renewable energy feed-in tariff (which has now been abandoned in favor of the renewable energy procurement process).

Significant public finance is geared to supporting climate change through the procurement of sustainable technologies by Government as well as developing catalytic projects and programs. The development finance system in South Africa is critical to integrating development with climate change. Development finance institutions, such as the Development Bank of Southern Africa (DBSA), IDC, Land Bank and Khula Enterprises can incubate climate-resilient development. This is particularly true for climate-proofing infrastructure and industrial processes; designing and testing new financing instruments; localizing and rolling out sustainable technologies; and unlocking new economic opportunities through enterprise development and job creation. These institutions serve an important role in building technical capacity and knowledge platforms to mobilize action at regional, provincial and local levels.

\textbf{2.3 CIC-SPECIFIC GOVERNMENT SUPPORT}

To demonstrate South Africa’s progressive actions on climate change, the national government has competitively selected the CIC as one of the Top 10 projects to showcase at COP-17 in Durban. The shortlisting of projects was undertaken by an inter-ministerial task team of various cabinet ministers and senior advisory and officials representing various departments and agencies, including the Department of Environmental Affairs and the Department of Economic Development. This distinction

\textsuperscript{14} Tyler, Aligning South African Energy and Climate Change Mitigation Policy, Energy Research Centre - University of Cape Town, December 2009.
emphasizes the CIC’s alignment with strategic priorities and green growth objectives at a national level.

Furthermore, the CIC is included as a key initiative in the new Green Economy Accord, which was signed in Cape Town on November 17, 2011. The development of the Accord involved twelve cabinet ministers, business sector representatives, green energy associations, three labor federations, and various community constituencies. These stakeholders have committed to build a greener economy in South Africa and create 300,000 new jobs by 2020 across a range of clean climate industries. Through this process of greening the economy, the parties will also cooperate to ensure better living conditions for South Africa’s poor citizens. This principle of inclusive growth is one of the underlying principles of the CIC, which will focus its several of its activities on historically disadvantaged populations.

2.4 LOCATING THE CIC IN GAUTENG PROVINCE

Several of South Africa’s strengths and challenges are amplified in Gauteng, home to 20% of the population, the financial capital (Johannesburg) and the seat of government (Pretoria). Gauteng’s GDP is 34% of South Africa’s total, and 59% higher on a per capita basis. Gauteng is ranked 14th among 90 OECD metro-regions in terms of contribution to national economy.

ECONOMIC GROWTH AND BUSINESS INNOVATION

Gauteng is also an engine of growth for South Africa. From 1995 to 2008, the Gauteng economy grew at an annual average rate of 3.6%, with growth exceeding 6% in certain years. For every additional 1% share of population in the province, 1.6% is added to its contribution to national growth, which implies higher productivity than in other parts of the country.

Not surprisingly, the province hosts more than 40% of South Africa’s small, medium, and micro enterprises, as well as key players in the realms of environment and innovation. It is an ideal hub for innovation due to its significant contributions to national R&D expenditure and patent generation. The Gauteng Provincial Government and municipalities have developed programs of financial and non-financial support for SMEs, but further assistance is needed to address barriers to entry.

Gauteng benefits from a diverse economy. In 2008, 70.3% of total gross value added (GVA) was derived from services, followed by manufacturing, electricity and gas, and construction (27.1%), and the primary sector (2.6%). Manufacturing has emerged as a clear opportunity for boosting employment and exports, since it is connected upstream to suppliers in other sectors with potential for greater multiplier effects. The Gauteng

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city-region could also become a green technology export centre for the South African Development Community (SADC) region.

**POPULATION GROWTH AND ENVIRONMENTAL PRESSURES**

The Gauteng population increased by 3.2 million residents between 1995 and 2009 at more than four times the national growth rate. Rapid urbanization has reinforced the spatial segregation instituted under apartheid. Meanwhile, population growth has been concentrated in a few locations and has resulted in strong spatial polarization, urban sprawl and tracts of under-utilized land between main urban centers. This pattern of development not only reinforces existing inequalities but generates high economic and environmental costs.

Gauteng contributes a third of South Africa’s greenhouse gas emissions and power demand. To address this, Gauteng presented a detailed Green Economy Strategy as early as January 2010. This document recognizes that decoupling economic growth from environmental impact and natural resource consumption can result in new job growth, while improving environmental quality of life. This could yield further market opportunities in waste management, particularly with respect to recycling and landfill energy generation, as well as distributed and concentrated solar power generation.

Environmental challenges in Gauteng are undermining economic growth, reducing its attractiveness to firms and human capital. Air quality, constrained waste management facilities and water quality pose health risks and entail associated costs and inefficiencies. Meanwhile, rising population density, industrial activity (particularly in the metals and mining sector), and increasing emissions from coal-fired energy generation and transport are further exacerbating environmental degradation. However, the convergence of economic and sustainable development policies for regional development create opportunities for green growth. Gauteng can play a significant role in helping South Africa to reap the benefits of active engagement in global collaborative efforts.
**SME Profile: Solar Water Heaters made by Africans for Africans**

All Solar Water Heaters that are currently marketed in South Africa and the continent are made from copper piping and mostly imported. The units are susceptible to theft because copper is highly valued as a commodity. Also, mending these units requires costly skills and tools.

Doug Cunningham started developing a local alternative product in early 2009 and started Jabulani Holdings (Pty) Ltd in 2010. His system is 100% constructed from easily sourced African materials. It is also made to endure the harsh African climate and simple to construct, install and repair.

Jabulani requires ZAR 12.5 million (USD 1.57 million) to set up and fund 1 year of working capital for 4 solar water heater factories. These will be established in poor areas of South Africa, providing jobs and skills development where it is urgently needed. The CIC can provide investment facilitation and business advisory services to help Cunningham achieve his goals of local innovation, affordable clean energy and job creation.
3.0 Analytical Approach: South Africa

Over a six-month period, infoDev engaged South African stakeholders to assess the feasibility of establishing a locally owned and operated CIC in Gauteng (Figure 13). This section focuses on the sector mapping and stakeholder workshop, as well as a separate report that outlines why economic growth must be inclusive of all South African citizens. These activities informed the design and implementation of the CIC in reference to ongoing climate technology initiatives.

3.1 Sector Mapping

The project team has undertaken a broad sector mapping (Annex 4) of such efforts and those in related fields where the CIC will work. These findings will inform the design of the South African CIC model, with the knowledge that the CIC need not operate in specific areas if sufficient support already exists in the local context.

The table below lists in alphabetical order the 20 various organizations that were profiled in the sector mapping report. It is important to reiterate that this grouping was intended to provide an overview of major players, rather than a collectively exhaustive roster. Overall, the findings suggest that the CIC in South Africa could be most effective by focusing its activities on four key needs: financing, business advisory (includes technical training and access to information), policy advocacy, and access to facilities.

<table>
<thead>
<tr>
<th>Sector Mapping List</th>
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<tbody>
<tr>
<td>Aurik Maxum Business Incubator (managed by The Innovation Hub)</td>
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<tr>
<td>Business Partners Limited National Cleaner Production Center (NCPC)</td>
</tr>
<tr>
<td>Climate Technology Initiative – Private Financing Advisory Network (CTI-PFAN) Raizcorp</td>
</tr>
<tr>
<td>Commercial banking and SME finance sector (in aggregate) Renewable Energy Market Transformation Project (REMT)</td>
</tr>
<tr>
<td>Development Bank of South Africa (DBSA) Small Enterprise Development Agency (SEDA)</td>
</tr>
<tr>
<td>Enablis South African Bureau of Standards (SABS)</td>
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<tr>
<td>Energy Development Corporation (EDC) South African Renewables Initiative (SARI)</td>
</tr>
<tr>
<td>Gauteng Enterprise Propeller (GEP) South Africa’s National Energy Research Institute (SANERI)</td>
</tr>
<tr>
<td>International Development Corporation (IDC) Technology Innovation Agency (TIA)</td>
</tr>
<tr>
<td>Khula Direct The Southern African Business and Technology Incubation Association (SABITA)</td>
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</table>
There was strong overall consensus across the wide array of public, private and multilateral stakeholders that a CIC in South Africa would help the country to take a pro-active approach to addressing local climate issues, create jobs and economic development, and achieve the country’s green growth objectives.

KEY FINDINGS: FINANCING

- Funds accessible to SMES and/or climate-oriented projects have grown significantly in recent years, following government recognition of the green economy as a key contributor to South Africa’s New Growth Path and IPAP-2.
- Climate-related SMEs are competing with other sectors for funding that is generally targeted towards all SMEs (e.g. commercial bank loans, microfinance, etc.) This puts them at a disadvantage due to relatively longer development times and higher startup costs that characterize the industry.
- Alternatively, specific “green” funds do exist, in which case an SME is often required to demonstrate proven technology or comply with prohibitive collateral requirements. These funds, moreover, tend to broadly categorize green initiatives; few mandate that entrepreneurs focus on specific sectors, and those that do are focused in energy (examples include the IDC).
- Some commercial banks are active in financing climate sector projects, although these tend to be on a larger commercial scale to satisfy their risk profiles.
- The mix of financing options available is tilted in favor of grants (non-repayable or conditionally repayable) and loans. This presents an opportunity to enhance the contribution of viability-minded risk capital, which aligns both financiers’ and entrepreneurs’ incentives towards maximizing the value of the business.

KEY FINDINGS: BUSINESS ADVISORY AND ACCESS TO INFORMATION

- Most financing organizations that provide training and other forms of non-monetary support only extend these to SMEs who are also their funding recipients.
- South African universities offer dedicated courses of study in climate-related courses and undertake academic research in the field. Stellenbosch University, as an example, houses the Centre for Renewable and Sustainable Energy Studies.
- Organizations doing climate research do not equally or exhaustively cover the subsectors of climate change, i.e. adaptation and mitigation. Most are industry-centric (energy, manufacturing, chemicals, etc.) with climate change as a secondary focus area.
KEY FINDINGS: POLICY ADVOCACY

- The South African government has embraced both SMEs and the green economy as growth engines for the country, from the national level down to the provincial and municipal governments.
- In addition to launching independent efforts, many government bodies have partnerships with academia and the international donor community, composed mainly of bilateral and multilateral organizations.
- Consolidation has begun to occur as a response to the rapid proliferation of such initiatives, more so with public entities involved in financing.
- Job creation remains the leading criterion for prioritizing government resources. Fewer programs are mandated to primarily focus on building an innovation pipeline and connecting this supply with market demand.
- Relatively few public-private partnerships have been documented, shaping the perception that government and the private sector operate in separate silos. Not surprisingly, policy development is one of the areas where this distinction is sharpest. This promulgates a private sector view that green technology is highly politicized industry, which influences some firms’ and financiers’ decision to participate.

KEY FINDINGS: ACCESS TO FACILITIES

- There is little overlap between available business and technical facilities; most existing organizations focus exclusively on either research or incubation activities. A number of laboratories and scientific research centers have been launched that focus on climate change and sustainability; some in a broad sense, but most focusing on a specific area e.g. renewable energy or transportation. The opposite is true regarding business incubation facilities, which tend to be broadly focused on SMEs instead of clustering them according to industry.

GAUTENG CIC: A HOLISTIC SOLUTION TO INNOVATION BARRIERS

In South Africa, SMEs and the green economy are receiving significant attention from both the public and private sectors. There are a number of agencies, offices and programs supporting one or the other in some way. However, the number of those which specifically target the area of overlap (SMEs with a green economy focus) is substantially smaller, even without distinguishing between activities that encourage innovation and those which focus on implementing existing technologies.

The sector mapping reveals a degree of fragmentation and an incomplete integrative alignment mechanism. There is no single entity that is fully equipped to address all five journeys – technology, company, finance, market and policy – although several do cover more than one. This creates the perception of silos which hinder the flow of innovation and green growth. As a result, climate-oriented SMEs are not consistently
equipped to develop their concept and business model, navigate the market and policy environment, and scale up to deliver sustainable economic growth. These differences in capabilities from one SME to another, without the presence of a holistic set of solutions, increase the likelihood of failing at any given stage of the innovation value chain.

GAUTENG CIC: PRACTICAL ASSISTANCE TO EARLY-STAGE CLIMATE SMES

Understandably, the activities, processes and programs on climate change operate on a relatively long term horizon; global agreement on greenhouse gas emissions, for example, is not expected within the next decade. A parallel process is needed wherein entrepreneurial, bottom-up innovation results in lower emissions and greater energy efficiency without sacrificing economic improvement. To this end, the CIC can provide:

- **Assistance to promising pre-revenue climate SMEs that lack an established track record, guarantees or collateral.** Given the existing alternatives, the CIC can connect SMEs with appropriate funding partners by matching their capabilities and objectives. With regard to direct investment, the CIC must complement the available financing base by channeling its own funds towards the unmet demand for early-stage SME risk capital.

- **Commercialization of promising research that is ready to emerge from South African (and nearby) laboratories.** Further opportunities exist to offer entrepreneurial training for SMEs in climate-related sectors to educate them about all aspects of running a successful business venture. The CIC should publish market potential and consumer behavior assessments in under-prioritized fields of climate research to generate interest among potential entrants.

- **Dialogue and interfacing with government policymakers regarding issues faced by CIC-supported firms and industries.** This should be done only to the extent that it fulfills the CIC’s mandate to develop early-stage climate SMEs. In this regard, the CIC can also facilitate collaboration between the public and private sectors, thereby accelerating and encouraging climate technology innovation.

- **The first climate technology SME incubator in South Africa.** The CIC can provide shared office space and services where incubated firms can benefit from knowledge exchange, operational synergies and best practice sharing. It should also enable these firms to access technical laboratories and research facilities in South Africa for design, prototyping, and quality testing. More importantly, the CIC must invest in connecting technical knowledge with market information. This will allow the SMEs to deliver effective and commercially viable solutions.
Creating International Linkages for the South African Climate Technology Industry

A recurring theme throughout the sector mapping was South Africa’s important role as a bridge linking the Sub-Saharan African region with the rest of the world. It is important to frame this connection as a reciprocal exchange where both sides can profit and grow, rather than depict a relationship of dependency.

Because of its leading-edge financial and technological infrastructure, South Africa is an ideal channel for knowledge exchange and collaborative ventures. It is also an ideal showcase for the capability and entrepreneurial potential of the continent. For these reasons, the CIC in South Africa is very well-positioned to benefit from the global activities described in Section 1.6 - The Global CIC Network.

3.2 STAKEHOLDER CONFERENCE

Another major milestone in the engagement process was the one-day workshop hosted by infoDev and The Innovation Hub in Pretoria on 6 October 2011. The aim of the conference was to gather selected stakeholders to help design the CIC, based on the presentation of the CIC concept, an analysis of particular circumstances in South Africa in the climate innovation arena involving SMEs and to seek input from all relevant actors who well understand the climate technology ecosystem and the needs of South Africa.

A total of 83 participants attended the workshop, representing six different sectors: (i) government, (ii) finance, (iii) research and academia, (iv) private sector, (v) bilateral and multilateral organizations, and (vi) civil society. Figure 14 depicts the representation of each sector in the total group.

After several plenary sessions, the participants broke out into four working groups (Figure 15). They were given the option to select which one of four thematic topics aligned most closely with their expertise. These topics were aligned to the four needs identified in the sector mapping report.

Each discussion was moderated by an infoDev-assigned facilitator. With a view to developing a deeper understanding and analysis of how the potential CIC activities could apply to the particular circumstances in the South African clean-tech and
climate smart innovation sector, the conference working groups were instructed to brainstorm, discuss and identify specific gaps and barriers to climate technology and business model innovation in South Africa.

Working group participants were tasked to discuss specific solutions that the CIC can offer to overcome those barriers to innovation and economic development. To a great extent, the outcomes of these sessions validated and expounded upon the research findings in the sector mapping exercise. The workshop outcomes greatly influenced the preparation of this business plan, and are presented in greater detail in Annex 3. Key takeaways and recommendations from each session are summarized below:

WORKING GROUP 1: FINANCING
Financing is most often needed for the earlier stages of business development, when it is not typically available from traditional and established channels. In addition, there is limited and inconsistent awareness among SME entrepreneurs regarding available funds and how to access them. This information asymmetry would be addressed by maintaining a current and comprehensive repository of financing mechanisms and tools, along with a parallel database of projects in need.

South Africa requires a frame of reference for best practices in financing, which entails coordination at the national, regional and global levels. This knowledge would allow for the development of a standard framework for comparing and evaluating climate technology investments. Should the various financiers recognize and adopt such a model, it would create transparency and in turn increase the likelihood of successfully matching entrepreneurs with investors and creditors.

Climate technology’s relatively nascent and continuously evolving nature requires a sustained pipeline of education and support activities. To address the dual economy and promote social inclusion, the financing sector must be sensitive to access requirements of women-owned enterprises and household-level entrepreneurial activities.

WORKING GROUP 2: BUSINESS ADVISORY / ACCESS TO INFORMATION
SMEs operating in the climate innovation and clean-tech sector in South Africa have a critical need for business advisory services and access to both technical and market information. Information has a catalytic role in the innovation process; when shared, it creates an objective view of the challenges ahead and opens avenues for effective collaboration. Among this working group’s foremost recommendations is the establishment of a one-on-one business coaching and mentoring network, which would facilitate local knowledge exchange. Moreover, projects that are specific to clean technology would greatly benefit from a “one stop” incubator environment. This is a
niche that the CIC is clearly equipped to fill: offering climate-specific business advisory, training and access to information.

The CIC can coordinate with existing institutions to reduce the lead time required to create and deliver these services. Examples of existing initiatives include The Innovation Hub’s Maxum clean technologies incubation program, SABTIA (SA Business and Technology Incubation Association), and other academic and research activities.

To supplement the financing sector improvements mentioned in the first working group, SMEs must be trained on how to evaluate and prioritize funding sources. This would empower entrepreneurs to appropriately customize proposals in response to various financiers’ goals and incentives. Additional support is needed to instill proper budgeting and financial management skills.

To facilitate market entry and growth, new entrepreneurs must be properly educated about compliance with legislative, regulatory and quality standards. Given that the SME is the unit of support, these certification courses should be delivered locally, or in such a way that minimizes the time and cost to the client. In parallel, South Africa needs a reliable supply of qualified assessors that would consistently enforce and evaluate its standards. Building on public and private services such as the National Empowerment Fund and the National Qualifications Framework, it is important to ensure that existing regulations are refined and expanded with the SME in mind.

The CIC can address SMEs’ need for business advisory, training and information in several ways. For example, SMEs can be linked in cooperative organizations to capitalize on tendering opportunities. Also, the CIC can offer targeted communication and activities to youth, gender and other groups with shared needs and interests, including those who have had historically limited participation in climate technology innovation.

This working group also raised certain issues on the CIC mandate should be explicitly defined in relation to business development and information sharing. In particular, participants were concerned about the extent to which the CIC should engage with climate issues at various administrative levels, from the municipal economic transformation strategies flowing from the Industrial Policy Action Plan, Local Economic Development plans and municipal Integrated Development Plans (IDPs) to the regional level, i.e. Southern Africa.

**WORKING GROUP 3: POLICY ADVOCACY**

Policy advocacy services and solutions play an important role in supporting SMEs in the clean-tech and climate innovation sector. This includes three levels of services and
solutions, namely: advising SMEs on governmental issues, advising government itself and promoting increased interaction between both parties.

There exists a range of existing government advisory initiatives and government-supported private sector initiatives and partnerships. However, only a few have a focus that includes green innovation, such as the Technology Innovation Agency (an agency of Department of Science and Technology - DST)’s R&D Tax Incentive Scheme, the National Cleaner Production Centre, the National Business Initiative, and the SMME group within Business Unity South Africa. Fortunately, other like-minded initiatives are beginning to emerge given the governmental perspective and policy thrust around the green economy. The CIC can offer valuable and objective insight on harmonizing these initiatives and advocating for the government to adopt an innovation mindset.

The working group participants envisioned that the CIC’s policy advocacy services must be supported by its other strategic functions in the following ways:

<table>
<thead>
<tr>
<th>Financing</th>
<th>Access to Facilities</th>
<th>Business Advisory / Access to Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Providing access to financing and funding information</td>
<td>• Identifying and scaling up services and solutions providers that could be utilized by SMEs</td>
<td>• Reporting on upcoming market opportunities that need governmental support</td>
</tr>
<tr>
<td>• Leveraging financing opportunities for SMEs</td>
<td>• Providing a physical venue for demonstrating and showcasing innovative solutions to the government.</td>
<td>• Updating SMEs on policy compliance issues</td>
</tr>
<tr>
<td>• Deal brokering and facilitation</td>
<td></td>
<td>• Quantifying the compliance burden and cost of doing business</td>
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The CIC can monitor and coordinate interaction between government and SMEs, with a dual purpose. First, it should help both sides identify and realize opportunities for technology innovation. Second, it should assess and publicize the impact of emerging policy, legislation and regulation on SMEs in the clean-tech sector. By aggregating firm-level issues under the CIC umbrella, SMEs can more easily win government support for their credibility and bankability.

**WORKING GROUP 4: TECHNICAL / OFFICE FACILITIES**

The CIC in South Africa must provide entrepreneurs with adequate office services, in particular information and communications technology, which would allow them to engage professionally with the established private sector and academia. Facilities and equipment should also be available for prototyping, production and quality testing; however, these need not be housed within the CIC if sharing agreements can be reached with other institutions wherein the technical review will not put the SMEs' intellectual property at risk.
It is essential that the products and technologies originating from the CIC meet the requirements of the South African Bureau of Standards (SABS). In addition to technical integrity, CIC innovations must undergo and pass “real world” usability tests.

The CIC’s research facilities should provide access to the following: journal articles on the newest trends and developments in climate-related sectors; market research and analysis reports; access to marketing databases and technical expertise.

3.3 INCLUSIVE GROWTH MINDSET

Despite South Africa’s world-class achievements and capabilities, the majority of its citizenry is comprised of populations that are the most vulnerable to climate change. For many disadvantaged South Africans, ecological issues are a matter of livelihood and survival. Ironically, these stakeholders are also the least likely to enjoy the benefits of the green economy in terms of high-skills jobs or industrialization.

However, disadvantaged populations must be fully included in order for humankind’s transition to sustainable lifestyles to be an achievable goal. They must share the vision of a climate-compatible economy, where profitable growth need not be sacrificed for environmental sustainability. Pervasive change in habits and mindsets must take place through all levels of society in conjunction with technological, political and infrastructural improvements.

Engaging South Africa’s youth

South Africa has an acute youth unemployment problem that requires a multi-pronged strategy to raise employment and support inclusion and social cohesion. According to the Quarterly Labour Force Survey for the third quarter of 2010 published by Statistics South Africa, About 42% of young people under the age of 30 are unemployed, compared to less than 17% of adults over 30. Only 1 in 8 working age adults under 25 have a job, compared with 40% in most emerging economies. Employment of 18-24 year olds has fallen by more than 20% since December 2008.

Considerable evidence suggests that young people are disadvantaged in the labour market. The shortfalls in the education system constrain the prospects of young people, leaving them ill-equipped for the workplace, in many cases without basic competencies. They also lack work experience, which provides critical on-the-job learning and training; contact with the job market; and the potential for networking.

The CIC provides an exciting opportunity to channel the South African youth’s entrepreneurial ability, intellectual curiosity, and interest in technology towards solving the challenges of climate change.

One of the primary challenges to including marginalized communities is lack of data that would conclusively quantify their potential value add to climate innovation. Further empirical research must be conducted to support or refute anecdotal evidence in this
regard. However, this does not undermine the need for inclusive growth in the CIC model design, as illustrated by the following example of gender mainstreaming in the design of the Ethiopia CIC:

**Including Women and Girls in Green Growth: Lessons from Ethiopia CIC**

It is important to recognize gender-based aspects associated with climate change, particularly in countries where women and girls are likely to be affected more adversely than men and boys due to their limited access to resources, their restricted rights and their lack of voice in decision making.

To illustrate: when climatic events such as droughts impact the household income, girls may be required to leave school to bring home additional money; the opportunity cost of education manifests in limited future prospects for earnings and employment. For example, when girls have to walk farther distances from home to fetch water or firewood due to resource depletion, they are at greater risk of gender based violence such as rape or abduction.

Unleashing the potential of women and girls in the fight against climate change results in a win-win situation in terms of using all our resources to find solutions to the environmental problems we face, as well as breaking down gender-based exclusion - a necessary precondition for sustainable, people-centered development. Studies have shown, for example, that in many cases returns to female education in terms of wages and GDP are actually greater than for males, suggesting that women and girls contributions to the workforce are a vast untapped resource in terms of development.\(^{17}\)

Addressing gender, therefore, is integrated throughout the design and implementation of the Ethiopia CIC in order to maximizing its beneficial impact on the country. In South Africa, this rubric is expanded to include other marginalized groups and ensure that the CIC extends equal opportunity to all citizens.

The Gauteng CIC is at infancy compared to other climate-related and SME support initiatives in South Africa. As such, it has the potential to develop and evolve into a uniquely placed and distinctly different institution, compared to its peer institutions. As a nascent initiative, it does not have the challenge of being associated with any previous policy failures. As such, it does not have any institutional baggage and is therefore at liberty to push the boundaries of creativity, ingenuity and innovation in terms of the scope and reach of its impact and services, within its core mandate and objectives.

The CIC will emphasize interconnectedness between climate change, development and social justice.\(^{17}\) Its efforts will take into account the principles of sustainable development which are based on rights, needs and inclusion of marginalized groups. This refers to various segmentation criteria: age, racial, ethnic or religious affiliation, economic standing, profession, gender, physical and mental ability, etc.

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\(^{16}\) World Bank, 2011, “Measuring the economic gain on investing in girls, The girl effect dividend”.

\(^{17}\) Annex 6 contains a report with more detailed information on South Africa’s need for inclusive growth.
The CIC will support technologies and businesses that serve the needs of disadvantaged groups (e.g. youth, women and girls, urban and rural poor). In addition, the CIC should engage and catalyze the great entrepreneurial and innovative capacity found in the disadvantaged groups. This potential remains largely untapped and has not reached the forefront of public awareness; rather, most citizens are treated solely as potential consumers of green technology instead of a source for grassroots innovation. Furthermore, current policy and market forces place a price premium on green innovations, which not all consumers can afford.

The CIC must address these barriers, allowing all segments of society to contribute to – and benefit from – innovative approaches to local climate change challenges. Examples of key success factors are reducing prohibitive fee structures, removing bureaucratic red tape, and increasing diversity in policy making, research and business development. Consequently, inclusive growth will be a mainstream criterion for selecting, designing, and evaluating the specific activities of the CIC.

Given the context and job creation goals of the NGP, the CIC must ensure inclusive growth in two key areas: (i) policy advocacy activities and (ii) financial inclusion and empowerment of the social economy.

POLICY ADVOCACY ACTIVITIES
Together, the green economy and the policies around it represent an emerging thought area that is strongly driven and encouraged by the government. South Africa has taken steps toward making climate protection a long-term constitutional goal and aligning the efforts of multiple agencies.

As a result of these developments, South African economic policy thinking is currently experiencing a paradigm shift. Policy principles and foundations are moving from the current capital-focused, resource-intensive and consumption-driven standard towards a green economy characterized by resource efficiency and conservation. Government thus needs an independent measure against which to test the soundness of policy proposals and interventions.

South Africa faces a number of pressing socio-economic and development challenges towards effective achievement of the United Nations Millennium Development Goals. These are compounded by the challenge of effectively addressing climate change mitigation and adaptation in the wake of a global economic crisis. A key learning point from this post-crisis analysis is that South Africa must invest heavily in (i) transitioning to a ‘green economy’, (ii) creating ‘green jobs’, and (iii) preparing a new industrial development trajectory of sustainable low-carbon economic growth. These will be characterized by enhanced quality of life for all citizens, as well as a minimal need for punitive environmental taxes and penalties.
FINANCIAL INCLUSION AND EMPOWERMENT OF THE SOCIAL ECONOMY

If green investment continues to be based on the current economic paradigm, it will naturally limit and minimize the scale of environmental activism that is needed to have a wide-reaching and long-lasting impact on addressing climate change. In supporting the green economy objectives of the New Growth Path, the CIC must also contribute to the national effort to integrate disadvantaged citizens and unify the dual economy. This includes historically disadvantaged groups as well as new social formations, who can all participate as potential financing beneficiaries or consumers of climate-related technology.

It is important to recognize the role of various actors in the ‘social economy’, i.e. non-governmental organizations, social enterprises, community trusts, cooperatives and grassroots community-based organizations. These can all become key proponents in the design and implementation of effective and sustainable green economy approaches and interventions. Engaging them in collaboration acknowledges the valuable contribution of community-based social actors towards developing effective, holistic, and sustainable green economy interventions.

The signing of the Green Economy Accord in South Africa represents an unprecedented trilateral social compact between government, business and civil society, where civil society comprises both organized labor and grassroots community constituencies. This agreement is an historic example of global best practice, allowing South Africa to serve as a pioneering case study of an inclusive green-growth led economic strategy.

As a national flagship initiative and anchor project in the Green Economy Accord, the CIC must prioritize the integration of the social economy into the design of its activities. This effectively positions the CIC well a strategic vehicle for delivering bottom-up green growth.
4.0 Gauteng Climate Innovation Center Model and Activities

The variety and sophistication of existing activities and stakeholders in South Africa suggest that the CIC should provide a holistic set of solutions to ensure that climate technology innovation is diversified across industries and stages of innovation, reaching all socioeconomic groups. In this regard, the CIC becomes an engine for the green economy to build bottom-up growth.

The CIC focuses on scaling up early stage climate technology businesses, regardless of whether they operate in climate change mitigation or adaptation. The vision for the South African CIC is to be the top-of-mind focal point for climate technology innovation for local SMEs. This will facilitate a case-by-case approach to matching each business opportunity with financing and services provided by the CIC or linking to existing support networks offered by related agencies. The CIC will fill market gaps with needed products and services, acting as a facilitator or broker to link entrepreneurs with other activities and counterbalance the formation of silos.

By beginning their innovation journey at the CIC, entrepreneurs can be assured that their capabilities and resources will be fully supported with the most appropriate financing and services. Investors and funders’ transaction and relationship building costs are reduced due to the network effects of channeling their pipelines through the CIC. Furthermore, government can easily inform their policies and programs with up-to-date industry activity.

In this way, the CIC can in part function as a node or forum to effectively connect the climate change initiatives and SME activities in the country. Given South Africa’s position of leadership in the Sub-Saharan Africa region, some spillover effect can be expected as neighboring countries seek to replicate or benefit from CIC-incubated business models. As this happens, the CIC can facilitate economic alliances with other African countries that are too small to support their own climate technology markets. Moreover, the CIC in South Africa will be an ideal gateway to channel international platforms, resources and best practices into the region, while showcasing locally-grown innovation on the global stage.

The CIC must provide a range of independent services of national value which reinforces its position as a valuable national resource. These activities, tailored to simultaneously fuel the social economy and the green economy, have the ultimate objective of mainstreaming these two concepts into a unified and thriving South Africa. With this in mind, infoDev and local stakeholders have designed the CIC model to respond to the needs identified in the preceding section.
Figure 16 illustrates how the CIC activity list is targeted to the valley of death, strengthening and integrating activities of the government and the private sector which otherwise fail to overlap. The CIC will play an essential role as the conduit by which South African companies, researchers and other innovators can usefully connect to efforts in other countries and at the global level. The four pillars of the CIC will each consist of a portfolio of supporting activities:

4.1 TECHNOLOGY PRIORITIZATION

An online survey conducted among multi-sector stakeholders suggested the following technology priorities for the Gauteng CIC: solar water heaters (locally known as “geysers”), solar PV, energy efficiency for buildings and industry, bio-fuels and biomass.

The level of importance ascribed to these technologies reinforces that South Africa’s needs revolve around renewable energy, energy efficiency, and inclusive access to climate technologies.
4.2 FINANCE
The CIC will provide climate technology SMEs with access to highly flexible, stage-appropriate risk capital ranging from ZAR 100,000-7.2 mm (USD 12,500-900,000). The number of grants and investments indicated in this section are annual averages and may be higher or lower in each year depending on local supply. Investment will be accessible at all stages of innovation; however, resources will be concentrated in the early growth stage through grant, seed and scale-up financing. For more advanced firms, the CIC can act as an investment facilitator when necessary.

The main directive for CIC financing will be to seed new ideas and improve their market feasibility. However, the CIC must also strike a balance between social inclusion, policy alignment, environmental impact and economic benefit. The set of criteria that will determine CIC investment decisions will include:

- Level of innovativeness according to the baseline in the target user group
- Alignment with country’s technology priorities and green economy localization
- Management experience
- Competitive advantage
- Market & growth potential
- Uniqueness of business model
- Quantifiable environmental benefits
- Impact on gender and social inclusion

PROOF-OF-CONCEPT GRANTS
These constitute funding for researchers, entrepreneurs and/or new ventures within existing organizations, to assist the development and adaption of technologies for local markets. Funding is used for product design, demonstration and field testing to prove market viability. The CIC will support approximately 8 grants per year for its first five years of operation, with a target average size of ZAR 400,000 (USD 50,000) and a maximum size of ZAR 1 mm (USD 125,000).

INCLUSIVITY GRANTS
The CIC will surpass the status quo of only supporting traditional small and medium enterprises by considering all stakeholders who stand to benefit from the commercialization of climate innovation activities. This also implies transcending beyond traditional social responsibility initiatives to programs which are more sustainable in the longer term, such as public-private-community partnerships for enterprise development support and innovation. This leads to the realization of a true empowerment effect, as opposed to perpetuating beneficiaries’ dependency relationship on donors.
Criteria for social inclusiveness will be mainstreamed into all of the CIC’s activities; marginalized groups will have access to all types of financing offered at the center. As an added measure to counteract their historic underrepresentation in South Africa’s economy, 12 grants of ZAR 100,000 (USD 12,500) will be set aside exclusively for SMEs owned and managed by women, youth, urban and rural poor, disabled, and other critical constituencies.

A review group will be established for screening and evaluating inclusivity grantees, which will include representatives from selected community-based organizations, municipality service delivery staff, and other representatives who are more directly involved with the day-to-day support of marginalized communities. This group will be able to assess the effectiveness of CIC services and make recommendations to better deliver on the inclusive growth agenda.

**DIRECT INVESTMENTS**

For all businesses beyond the proof-of-concept phase, financing will be provided on commercial venture capital terms. Investment term-sheets will be developed by the CIC’s fund manager, who will be incentivized to fund promising early-stage companies that fit a higher risk profile than traditional financing allows. The CIC’s initial annual budget for direct investments is ZAR 7.2 mm (USD 900,000), to be allocated among three deals each year.

**INVESTMENT FACILITATION**

For companies with funding requirements greater than ZAR 8 mm (USD 1 mm), the CIC can function as a broker and connect the entrepreneur to local and international sources of investment. The center will maintain a database of available finance and advise SMEs on approaching investors until an independent and mutually beneficial relationship has formed between the two parties.

This capability is greatly enhanced by the CIC’s global network and expertise. Through the CIC, South African entrepreneurs will gain access to finance and R&D investment in the broader Climate Technology Program within infoDev.

**4.3 BUSINESS ADVISORY AND ACCESS TO INFORMATION**

The CIC will build innovative capacity through business training, technical advice and mentorship. This will equip local citizens with the necessary skills to generate and sustain an innovation pipeline.

To address the need for identifying and unlocking business opportunities, the CIC will ensure that various players in the innovation value chain – entrepreneurs, researchers, community-based social enterprises, etc. – can access information on markets and technologies. This service offering will encompass academic research and
commercially-minded studies on global climate technology sector developments. The knowledge will be sourced from international databases and original analysis to ensure timeliness, reliability and objectivity. As much as possible, information will be publicly available in order to maximize its reach and impact.

First priority for these services will be given to SMEs that are selected for CIC funding. Second are the target communities for inclusive growth and localization. Any remaining capacity at the CIC will then be offered to established firms, organizations and individuals as a revenue stream that will augment the CIC’s operating budget.

BUSINESS PLANNING

The CIC will provide basic business planning advice for interested companies. A full set of services will be offered, including business plan development, professional presentation skills, marketing strategy, human resource management, and basic operations. An inclusivity specialist will also be available to consult with SMEs who aim to engage underserved populations as consumers or employees. This person will be the key focal point in the CIC for perspectives on gender, poverty, youth and other priority groups.

Depending on the market readiness of each company, the CIC will also offer advisory services regarding the international business environment. Because countries with common climate concerns are also potential markets for South African innovation, there is value in adopting a worldwide perspective on the journey from conceptualization to commercialization.

Again, this presents an opportunity to access the depth and breadth of infoDev’s knowledge in propelling economic growth through technology application in SMEs. The CIC will benefit from B2B forums and other international events hosted by the Climate Technology Program, connecting South African entrepreneurs with opportunities to collaborate with other countries.

FINANCIAL PLANNING

As part of investment due-diligence, individuals eligible for CIC financing will be offered financial planning services to ensure their companies are investment-ready. SMEs will be equipped with skills in budgeting, bookkeeping and financial projections. Joint training can be developed with the private sector for certain aspects, such as SME banking.

TECHNICAL EXPERTS

The CIC will retain a group of technical experts in five key climate sectors. Referral services will also be available to connect entrepreneurs with local expertise. Opportunities to engage international knowledge exchange platforms also exist, such as partnerships with the World Bank Institute. Part of their services will include skills
training to encourage the development of a green workforce. This ensures a pipeline of talent that can support the growth created by the center’s incubated SMEs.

COMMERCIALIZATION AND TECHNOLOGY TRANSFER
To bridge the gap between technology push and demand pull, the CIC will partner with South African universities and researchers to promote the commercialization of intellectual property. This can be achieved by working with existing Technology Transfer offices or establishing similar programs as needed. International organizations such as the Intellectual Property Commission may also be brought in through global network linkages.

Special focus will be given to applying business models to community problems such as waste management, water use, electrification, and cooking fuels. This represents an important venue for grassroots outreach to disseminate climate and entrepreneurship knowledge to communities and the informal economy. Such an initiative will allow the CIC to have constant interaction with South Africa’s second economy, expanding the reach of its main location.

MARKET INFORMATION
The CIC will educate South African companies and stakeholders on the global definitions of mitigation and adaptation set by the United Nations Framework Convention on Climate Change (UNFCCC). This advocacy should also tie into the draft paper on climate response by the National Department of Environment Affairs (DEA).

To facilitate the creation of an open and efficient climate innovation marketplace, the CIC will provide a voluntary disclosure service where social economy initiatives can register and promote their activities. The database could be made available online via the CIC website, at the physical location of the CIC, and through other community-based public service offices.

Other national and provincial agencies, as well as private sector actors looking to collaborate with and support worthy social economy in the climate innovation and green economy sectors could draw on such a database either free of charge or through a nominal fee, based on their ability to pay. This database would serve as a valuable resource for identifying and pursuing economic alliances among the various value chain actors.

In addition to linking SMEs with existing local and global data sources, the CIC will allocate ZAR 1.2 mm (USD 150,000) to fund the publication of two market assessments per year. These original reports will identify upcoming needs and trends for climate technology innovation, prioritizing the South African context and addressing the need for reliable, comprehensive information at all strata of the economy.
By undertaking pro-active research on existing and emerging climate innovation initiatives in the social economy, the CIC can make much-needed progress towards filling in information gaps in the lower socioeconomic strata of South Africa. Monitoring initiatives that promote green economy and climate innovation support among the disadvantaged will create a better understanding of what works and what does not in the local context. To provide a holistic perspective, these initiatives should include new entrants, dormant entities and entities which cease to exist.

In tandem with these efforts to fill in local and national information gaps, the CIC in South Africa will actively participate in knowledge exchange with those in other countries, as well as other platforms in the Climate Technology Program. At the global level, learning from individual CICs can be aggregated to draw important inferences and analyze the impact of the program as a whole. Furthermore, best practices can be documented and disseminated to the various countries.

4.4 POLICY ADVOCACY

POLICY RESEARCH AND ANALYSIS
The policy advocacy unit will be overseen by a CIC policy fellow and an analyst, whose primary responsibility will be the production of two analytical pieces per year using actual SME experiences to inform specific climate innovation policy. Two relevant pieces are the Green Economy Accord, a social contract outlining key areas for investment that will facilitate South Africa’s transition to a low carbon economy, and the Localization Accord, which mandates increased support for locally-grown enterprises. These reports will focus on global best practice on policy and regulation on topics related to climate, energy, private sector and innovation. Specific issues of interest include grassroots innovation, tariff and quota systems, technical training and education, intellectual property regulations, and government procurement.

The main objective of the policy research is to identify hurdles or gaps to innovation in current national policies. As an industry focal point, the CIC has an opportunity to ensure that its opinions have a concrete influence on the regulatory framework. To this end, the CIC will engage international partners to establish guidelines and benchmarks on policies and investment in research and development to assist in setting national R&D standards and priorities. The Climate Technology Program can support this by stewarding relationships within the World Bank Group and other multilateral organizations, such as UNFCCC. This will ensure that South Africa’s policies are in line with world-class standards, in addition to meeting the country’s own needs.

The CIC will further differentiate itself from generic green economy think tanks by incorporating the perspective of inclusive growth throughout its research studies. The social economy enjoys strong policy support in South Africa’s New Growth Path, and it is
likely that any efforts to ensure greater levels of support for emerging enterprises would be well-advised and favorably regarded. The CIC can serve this purpose in the climate technology sector and become a thought leader on how to integrate support for emerging enterprises within the broader green economy mindset and the national economic growth trajectory.

There is significant appetite for initiatives of this nature at present in South Africa, as part of ongoing attempts to diversify the institutional composition and demographics of the economy. This is amplified through various recent policy reforms and initiatives aimed at innovatively supporting the social economy to a greater degree and more effectively than was the case in the past and up to the present. These include:

- Rethinking the strategy and dispensation governing cooperatives, including through the dedicated Strategy on Cooperatives and the Companies Act under the custodianship and stewardship of the Department of Trade and Industry; and
- Amendments to the Intellectual Property Rights Amendments Bill, with a specific focus on legally entrenching the beneficiation and royalties to communities who are the rightful owners of commercialized indigenous knowledge and intellectual property, under the custodianship and stewardship of the Department of Trade and Industry.

GOVERNMENT OUTREACH AND ENGAGEMENT

For government activities to effectively create a well-regulated enabling environment for the green economy, an equally robust level of non-governmental support is required. Any measures for green economy support must be based on targeted in-country activities and familiarity of local circumstances, contexts, challenges and opportunities. In this way, democratic reform can strike a balance between top-down authority and bottom-up societal transformation. Moreover, it empowers the state to regulate appropriately, while simultaneously giving citizens more ways to shape policy.

The CIC will work with the Government of South Africa (GSA) to promote favorable policy, technology partnerships and linkages to global markets by leveraging networks through infoDev’s Climate Technology Program. There are several opportunities for the CIC to undertake practical and valuable policy advocacy, such as:

- Participating in multi-stakeholder consultation and negotiation around the green economy at a national level. The CIC can act as an objective advisor in such sessions, given its holistic perspective on government, business, labor and civil society.
- Helping to establish and support solutions aimed at green economy innovation. This includes addressing government’s research needs and performing
monitoring, evaluation, and impact assessment to track program implementation.

- Apprising government of challenges to climate innovation in the green economy, including informing government of challenges at inception phase in the design of intervention and support programs, so that implementation has the potential of being more impactful and effective.
- Providing independent governmental advocacy through lobbying and evidence-based research case studies.

The need for such activities is likely to increase over time, in line with the heightened focus on the green economy and related strategies, legislative and regulatory measures. In the present context of an emerging green economy trajectory, sustained outreach of this nature can provide systematic support to emerging policy initiatives. The CIC will work positively to provide objective support to governmental and public policy decision makers, as well as those charged with responsibility for oversight of public policy performance evaluation.

4.5 ACCESS TO FACILITIES
Access to modern equipment and facilities will facilitate technological design, development and demonstration for South African entrepreneurs and researchers. At varying degrees of subsidization, the CIC incubator will offer access to office space and technical laboratories where SMEs can benefit from cost sharing and cross-pollination of ideas. To fully leverage the CIC’s global potential, these facilities will also serve as venues for technology co-development and multinational business ventures. To fulfill its commitment to inclusive growth, the CIC may also explore satellite labs and other means of delivering this service to its beneficiaries who cannot relocate or travel.

TECHNICAL FACILITIES
Supported businesses at the CIC should be able to rapidly move from design, prototyping, testing and manufacturing using technologies such as CAD and 3D modeling. Technical facilities will first be outsourced to existing laboratories, preferably at universities and public sector institutions, unless there is a demonstrated need to provide them in-house.

Entrepreneurs can consult with an expert to assess their equipment needs and match them with university or government laboratories. Quality assurance and testing will be conducted in partnership with the South African Bureau of Standards.
Academic and related facilities for nationally-mandated research and development are best accessed by way of SANEDI, a relatively new institution. The Renewable Energy Centre of Research and Development (RECORD), in particular, will be a useful partner for the CIC and its entrepreneurs. RECORD includes testing facilities for wind, photovoltaic, concentrated solar power, and sustainable housing. For South African technologies which are more mature in terms of statutory mechanisms, such as Solar Water Heating, the CIC will prioritize facilities that can accelerate mass scale-up as opposed to exploratory testing.

OFFICE FACILITIES
In South Africa, incubators have been established to support the development of start-up companies in different sectors. There are independent and privately funded incubators in addition to those that are supported by provincial and local governments. The main sponsor of incubators is the national government, through the Department of Trade and Industry’s Seda Technology Programme (Stp). Currently, Stp supports 31 incubators and plans to increase this number to as many as 250.

The Maxum incubator at The Innovation Hub is an initiative supported by the Gauteng Provincial Government. Start-ups graduating from Maxum’s incubation programmes have shown a 72% success rate, which is comparable with international standards.

In the first five years, the CIC incubator space will consist of eight offices, each housing up to four people. SMEs will be clustered according to their climate technology sector and encouraged to collaborate freely with one another. Common space will also be shared with the CIC management staff, to encourage constant interaction and support.

4.6 GENERAL MANAGEMENT AND PROGRAM SUPPORT
CIC-WIDE RESOURCES AND ACTIVITIES
The CIC will have its own executive head, who will oversee the core staff: a procurement specialist, financial manager, marketing and communications officer, and two administrative assistants. This team will take responsibility for shared services, facilities, and CIC network activities:

- Physical infrastructure and equipment: meeting rooms and other common areas, copiers, scanners, telephones
- Services: telecommunications, travel, custodial, IT, security, access to databases

18 The National Energy Act of 2008 introduced SANEDI, which combines the state-owned SANERI and NEEA. The possibility remains to add a renewable energy finance and consulting service to this entity.
External outreach: CIC website, impact monitoring and documentation, promotional materials, global CIC network participation

Official CIC events: seminar series, policy roundtables, business plan competitions, networking receptions.

GLOBAL CIC NETWORK PARTICIPATION

Section 1.6 outlined the various opportunities for country CICs to increase their impact by engaging each other and participating actively in the global Climate Technology Program.

Given its relative sophistication and leadership potential in the global climate technology revolution, South Africa can be a pro-active force in creating and maximizing the beneficial impact of the entire CIC network. The center in South Africa can serve as the venue for international events such as SME showcases, trade conferences and business plan competitions. Moreover, it can be a point of convergence for local and regional research, documenting the growth of the African climate technology industry with evidence-driven analytical work.

Figure 17 illustrates how in-country CIC programs are strongly rooted at a local level to create a foundation of relevant and inclusive home-grown solutions. In order to maximize the potential for green growth, these South African businesses must be incubated with the global clean technology sector as a frame of reference. As represented by the overlapping areas in the graphic, the activities of the overall Climate Technology Program are an important platform for aligning the CIC’s performance with globally competitive standards. This linkage creates a mutually reinforcing cycle, empowering South Africa to lead proactively in clean technology.
The CIC’s programs and services will undeniably affect beneficiaries and surrounding communities. Each programmatic pillar of the CIC will be responsible for rigorous monitoring and evaluation of both direct and spill-over effects.

Proper M&E will be achieved through:

- Internal databases and data collection
- Publication of annual reports
- Focus groups and stakeholder follow-up
- Surveys and other quantitative measurements where possible.

The M&E framework will be developed to reflect the unique activities and priorities of the South African CIC, and at the same time allow for consistency, aggregation and comparability with a global CIC Results Framework.
Stakeholder Feedback: Online Survey

From January 9-18, 2012, infoDev and The Innovation Hub ran an online survey to validate the proposed Gauteng CIC model and activities. The team collected 81 responses from across the climate innovation ecosystem, 90% of which were based in Gauteng province.

91% of respondents agreed that there is a need for a CIC in South Africa. This support was consistently expressed across the eight stakeholder sectors, most notably: 100% of donors, government, research and forums; 95% of industry representatives; and 89% of entrepreneurs. Majority indicated strong agreement, while 7% were neutral on the concept. This suggests a potentially higher approval rating given more CIC awareness and outreach.

Stakeholders identified priority technologies and value chain stages for the CIC. Solar water heaters, solar PV and energy efficiency (buildings) received the highest average importance ratings, followed by biofuels, water supply, and energy efficiency (industry). Respondents identified market entry, proof of concept and applied research as the weakest value chain stages, which corresponds to the CIC’s focus areas. CIC financing (up to ZAR 8 million) also aligns with key funding gaps.

Responses suggested how the various CIC activities should be prioritized for implementation. The following services are perceived as the most essential: proof of concept grants, seed funding, pre-investment advisory and mentoring, linkages to existing companies and facilities, and alignment to global best practice through research and collaboration.
5.0 OPERATIONAL PLAN

5.1 GOVERNANCE

It is envisioned that the CIC will be a non-profit entity, incorporated in South Africa. Using the guiding principles of sustainability and autonomy, the CIC can be designed as a separate legal entity or housed within an existing organizational structure.

Given the prominence of Gauteng province and its support of technological innovation, The Innovation Hub will be a major stakeholder in the CIC. Opportunities exist for the CIC to be governed through The Innovation Hub or its holding company, BlueIQ. The major options are i) to ring-fence the CIC within TIH as a unit directly governed by the TIH board; or ii) to compose a separate CIC board that would be comprised of representatives from government, academy, large business, SMEs, labor, donors/funders, and infoDev’s Climate Technology Program.

In the immediate term\(^1\), the first option will be exercised as a pilot structure (Figure 19) while the CIC is initially established. This will be reviewed within the CIC’s first five years of operation to determine when a transition to the second option should be implemented.

\(^1\) As a follow-up document to the full business plan, a detailed implementation update for Year 1 is currently being prepared by infoDev, The Innovation Hub and the World Bank Pretoria office.
### 5.2 STAFFING PLAN

For its first five years of operation, the CIC will be staffed by the equivalent of 20 full-time employees. The table below outlines their roles and headcounts:

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
<th>Years 1-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Manager</td>
<td>Oversees a major program component and supports technologists, entrepreneurs and enterprises in accessing advisory service funds and providers</td>
<td>![4] (4.50)</td>
</tr>
<tr>
<td>Investment Officer</td>
<td>Oversees financial products of center, vets and conducts due diligence on investments</td>
<td>![1] (1.50)</td>
</tr>
<tr>
<td>Business Planner</td>
<td>Provides non-financial advisory support to entrepreneurs</td>
<td>![1] (1.00)</td>
</tr>
<tr>
<td>Financial Planner</td>
<td>Provides SMEs with advisory support on financial management</td>
<td>![1] (1.00)</td>
</tr>
<tr>
<td>Technical Expert</td>
<td>Supports functions relating to a required technical, engineering or design expertise</td>
<td>![3] (3.00)</td>
</tr>
<tr>
<td>Inclusivity Expert</td>
<td>Consults with entrepreneurs to maximize their businesses’ impact on targeted populations such as women, youth, poor, disabled, etc.</td>
<td>![1] (1.00)</td>
</tr>
<tr>
<td>Research Analyst</td>
<td>Tasked with conducting research for center’s market information programs</td>
<td>![1] (1.00)</td>
</tr>
<tr>
<td>Fellows</td>
<td>Experts and thought leaders affiliated or on assignment with center tasked with preparing reports, articles and policy advocacy</td>
<td>![1] (1.00)</td>
</tr>
<tr>
<td>Executive Head / Chief Officer</td>
<td>Manager of center who reports to a board and oversee investments, enterprise development, budgets and fundraising for center</td>
<td>![1] (1.00)</td>
</tr>
<tr>
<td>Procurement Specialist</td>
<td>Oversees operational aspects of center including projects related to capacity building, analytical products and partnership development</td>
<td>![1] (1.00)</td>
</tr>
<tr>
<td>Financial Manager</td>
<td>Responsible for CIC budgeting and financial management</td>
<td>![1] (1.00)</td>
</tr>
<tr>
<td>Marketing / Comm. Officer</td>
<td>Coordinate branding, marketing, communications and outreach for center</td>
<td>![1] (1.00)</td>
</tr>
<tr>
<td>Support Staff</td>
<td>Includes administrative staff, HR, IT</td>
<td>![2] (2.00)</td>
</tr>
</tbody>
</table>
The staff will be distributed among the CIC’s functions according to Figure 19. Total staffing costs, inclusive of compensation and non-monetary benefits, are projected at ZAR 11.3 mm (USD 1.4 mm) per year.

5.3 BUDGET
The total investment for the CIC’s first five years of operation is ZAR 170 mm (USD 21.2 mm). This includes the full implementation, launch and scale-up of the CIC to include the activities listed in Section 4. More details of the budget are found in Annex 7.

The budget translates into an average annual cost of ZAR 34 mm (USD 4.2 mm). The amount will be allocated among the four service categories, inclusive of an equal share of General Management and Program Support (Figure 20).

While donor money will be necessary to seed the CIC over the first five years, it is envisioned that the CEO and management team will seek contributions (both cash and in-kind) from local stakeholders for operations after year five. The objective of donor funding is to act as a catalyst to establish the CIC, generate successes and demonstrate the program is valuable for the government and private sector to fund over the long term.
6.0 Anticipated Risks

Along with expected successes, a range of risks are associated with establishing a pioneering program such as a CIC in South Africa: (i) Operational Risks, (ii) Market Environment Risks and (iii) Implementing Agency Risks. These offer differing degrees of complexity and require various mitigation strategies. The stakeholder outreach process indicated the major risks as well as potential management strategies. However, a key role of the CIC’s advisory committee and management team will be to examine, evaluate and manage risks over time. Included below is an overview of the key risks identified and their associated rating, description and mitigation strategy:

<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Risk Rating</th>
<th>Risk Description</th>
<th>Proposed Mitigation Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CIC Operational Risks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Stakeholder support</td>
<td>L</td>
<td>Stakeholders including beneficiaries, partners, government and private sector that were involved in design process are not supportive of CIC implementation.</td>
<td>Locally based infoDev staff will maintain relationships with key stakeholders throughout implementation period</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Center staff will be trained in partnership development</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Board to include seats for key stakeholders</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>infoDev will ensure that stakeholders’ design is followed</td>
</tr>
<tr>
<td>1.2 Host institution/implementation partners</td>
<td>M</td>
<td>There is a risk that potential host institutions/implementation partners for the CIC do not have the adequate capacity, skills and resources to successfully bid and host the center.</td>
<td>Throughout the design phase, infoDev has assessed the capacity of existing institutions and identified such risks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Grant agreement/s will encourage consortia and partnerships to strengthen bids</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The project implementation team will provide ongoing support and technical assistance throughout the implementation phase.</td>
</tr>
<tr>
<td>1.3 Management team and staff</td>
<td>M</td>
<td>There are risks associated with the unavailability or lack of talent to manage the center</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other risks include the selection of a manager and/or staff who are ineffective at delivering the CIC’s expected results</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Salaries of CIC management have been calculated at competitive market rates to attract required talent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Identification of management and staff will follow WBG procurement guidelines and competitive selection procedures</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Local board will oversee performance of management and staff and set required metrics to monitor management results.</td>
</tr>
</tbody>
</table>
### 1.4 Performance

<table>
<thead>
<tr>
<th>M-H</th>
</tr>
</thead>
</table>
| CIC does not achieve adequate performance results as agreed in the grant agreement  
| Investments do not generate required returns to achieve CIC sustainability objectives |  
| infoDev and the CIC board will monitor the results of the Center to ensure grant agreement milestones are being met. This will be achieved through the establishment of a thorough M&E framework.  
| In coordination with donors, infoDev will retain the flexibility of reallocating budgets based on the performance of specific budget items of the CIC. Grant agreements will be canceled and reissued if milestones in the M&E framework are not achieved.  
| The Center’s first 5 years of funding are not contingent upon returns on investment. Expectations for ROI are long-term and will be monitored regularly to adjust CIC’s future funding requirements. |

### 2. Market Environment Risks

<table>
<thead>
<tr>
<th>2.1 Country</th>
<th>L</th>
</tr>
</thead>
</table>
| Political support for the CIC weakens and/or political opposition to the CIC  
| Introduction of perverse subsidies and/or decrease of conducive policies to support climate technologies |  
| CIC has been designed in coordination with South African government at the provincial and national level  
| Center is not contingent on government funding  
| Government has minority role on CIC board  
| CIC is aligned with South Africa’s Green Economy strategy.  
| CIC investments will not be made based on speculative or short-term policy measures.  
| CIC’s policy advocacy business line will conduct outreach to government decision makers to ensure such risks are fully considered. |

<table>
<thead>
<tr>
<th>2.2 Market demand</th>
<th>L</th>
</tr>
</thead>
</table>
| Poor demand for CIC’s services  
| Lack of quality deal-flow for center’s investments |  
| Assessment of market demand has been incorporated into the design phase by interviewing and analyzing potential CIC beneficiaries  
| Center continually adapts to market gaps and reallocates budgets as necessary  
| Emphasis on customer feedback, quality control and M&E. |

<table>
<thead>
<tr>
<th>2.3 Competition</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overlap with other initiatives.</td>
<td></td>
</tr>
<tr>
<td>Close coordination with existing initiatives and focus on center</td>
<td></td>
</tr>
</tbody>
</table>
### 3. Implementing Agency Risks

#### 3.1 CIC financing/donor support

| L | - Risks that full initial financing for center’s implementation in first 5 years is not secured.  
- Budget outlined in business plan is insufficient to execute current model.  
- Additional risk of financing beyond year 5 not being secured.  
- More than 50% of budget current secured and ongoing discussions with a number of donors & investors.  
- Project still viable at lower levels although not ideal. Various scenarios have been planned and accounted for.  
- Financial sustainability as an explicit aim of the Center post year 5 with a clear focus on revenue generation.  
- Close monitoring by infoDev of financing decisions including flexibility in reallocating program budgets as needed. |

#### 3.2 Capacity & Governance

| L | - Risk that the infoDev’s project implementation team lacks adequate staffing, processes and/or systems sufficient to allow for successful achievement of the results envisaged by the project.  
- As part of project preparation, infoDev will ensure that the staffing arrangements and project management procedures are adequate to implement the CIC.  
- Through review of relevant financial management capacity of the host/implementing partners, necessary training will be provided to equip infoDev’s project implementation team with the required skills to ensure sufficient financial management and procurement capacity of the CIC. |

#### 3.3 Fraud & Corruption

| L | - Grants provided to implementing partners and host institution/s will be mismanaged.  
- Host institution/s and implementing partners will adhere to World Bank Procurement Guidelines. Financial management and technical progress will be routinely supervised during implementation. |
7.0 PROJECTED IMPACT

Based on the analytical models employed in the development of earlier CIC business plans, the following preliminary estimates can be expected from the CIC in South Africa after its first five years:

7.1 JOB CREATION

The CIC will create approximately 2,500 jobs at a cost of ZAR 68,757 per job (USD 8,595). When counting only direct jobs, the cost is ZAR 206,209 which compares favorably to the IDC threshold of ZAR 450,000 for the national jobs fund\(^20\). The criteria that determines job count will be aligned with the standards of the Government of South Africa in evaluating economic development projects in the country. The table below shows that these figures were computed by assuming an average of 4 employees per SME for proof-of-concept grantees, 3 employees for inclusivity grantees, and 10 employees for recipients of direct investment. These companies will generate additional employment between Years 2-5 depending on their anticipated growth rates.

<table>
<thead>
<tr>
<th>Jobs created</th>
<th>Probability</th>
<th>Average Employees</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>POC Grants</td>
<td>4</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>160</td>
</tr>
<tr>
<td>Inclusivity Grants</td>
<td>3</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>180</td>
</tr>
<tr>
<td>Direct Investment (Baseline)</td>
<td>10</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>150</td>
</tr>
<tr>
<td>Do not succeed</td>
<td>25%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Low or no growth (add)</td>
<td>30%</td>
<td>8</td>
<td>7</td>
<td>14</td>
<td>22</td>
<td>29</td>
<td></td>
<td>72</td>
</tr>
<tr>
<td>Medium growth (add)</td>
<td>30%</td>
<td>15</td>
<td>11</td>
<td>25</td>
<td>38</td>
<td>52</td>
<td></td>
<td>126</td>
</tr>
<tr>
<td>High to very high growth (add)</td>
<td>15%</td>
<td>25</td>
<td>14</td>
<td>27</td>
<td>41</td>
<td>54</td>
<td></td>
<td>135</td>
</tr>
<tr>
<td>Totals - Direct jobs created</td>
<td>75</td>
<td>107</td>
<td>141</td>
<td>175</td>
<td>210</td>
<td></td>
<td></td>
<td>823</td>
</tr>
</tbody>
</table>

Indirect\(^{21}\) 1,646
Total 2,469

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\(^{20}\) David McGluwa, regional manager for the IDC in North West Province, quoted in http://www.northwestbusiness.co.za.

\(^{21}\) Assumes a multiplier effect of 2 indirect jobs per direct employee
Using ILO data for labor rate participation in South Africa, 32.5% (802) of these jobs will be taken by women and 63.6% (1,571) will be for youth of both genders aged 20-29.

7.2 SOCIAL AND ENVIRONMENTAL IMPACT

The CIC aims to accelerate the growth of innovative climate technologies in South Africa. The table below highlights the indicative impacts and outcomes of the potential products and services the center would look to support.

Technology impacts have been calculated by aggregating the five-year projected revenues of CIC ventures that have received financing over the center’s first five years of operations. These cumulative revenues have been divided into 3 sectors. This model assumes that 60% of the products/services sold by CIC ventures are energy related, 20% water and 20% agriculture. CO₂ mitigated has been calculated based on energy access figures, including an additional 25% attributed to mitigation benefits from clean water and food access. Levels of innovation have been used to multiply the impact of the technologies on the communities based on the three scenarios of the sophistication of the products/services produced by the CIC.

The base case assumes a low level of innovation and signifies impact if technologies were rolled-out as of today’s standards, prices and complexity. Higher levels of innovation and best case scenarios assume a more radical level of innovation and, as a consequence, higher impact levels. The center will aim to support innovations across this spectrum of risk and sophistication, depending on the market opportunity and deal flow.
### Impacts based on 5 years of funding

#### Technology Impacts

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Worst (1x multiple)</th>
<th>Base (2x multiple)</th>
<th>Best (3x multiple)</th>
<th>Metric</th>
<th>Assumptions</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off-grid kWh produced</td>
<td>170,274,811</td>
<td>340,549,621.54</td>
<td>510,824,432.31</td>
<td>0.33 Cost per kwh</td>
<td>438D Assumes yearly energy production at 50% capacity per day</td>
<td></td>
</tr>
<tr>
<td>MW</td>
<td>38.88</td>
<td>77.75</td>
<td>116.63</td>
<td>3.9 People per household</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off-grid access # households</td>
<td>35,780</td>
<td>71,559.07</td>
<td>107,338.61</td>
<td>4759 Kwh consumption per capita</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off-grid access # of people</td>
<td>139,540</td>
<td>279,080.38</td>
<td>418,620.57</td>
<td>3.9 Water usage per household</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water access kL</td>
<td>14,640,030</td>
<td>29,280,060.05</td>
<td>43,920,090.08</td>
<td>$1.26 Avg water cost per kL</td>
<td>3.9 Water usage per household</td>
<td></td>
</tr>
<tr>
<td>Access # of households</td>
<td>7,571</td>
<td>15,141.01</td>
<td>22,711.52</td>
<td>0.08% Expected deaths from diarrhoea over 5 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access # of people</td>
<td>29,525</td>
<td>59,049.94</td>
<td>88,574.91</td>
<td>495.85 Water usage per person over 5 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreased deaths from diarrhoea</td>
<td>2.42</td>
<td>4.84</td>
<td>7.26</td>
<td>0.08% Expected deaths from diarrhoea over 5 years, as % of current population</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Agriculture</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farms with increased yield</td>
<td>9.948250755</td>
<td>19.89651151</td>
<td>29.84476726</td>
<td>Average farm size 3499.4 acres, 60% yield increases with 8000 INR per acre irrigation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of households with access to cheaper/ better quality food</td>
<td>18,207</td>
<td>36,415</td>
<td>54,622</td>
<td>$1,013 Food expenditure per household</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mitigation/Adaptation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of persons less vulnerable to the effects of climate change</td>
<td>240,074</td>
<td>480,149</td>
<td>720,223</td>
<td>Addition of the above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value of forest assets protected / losses avoided</td>
<td>312,879.96</td>
<td>625,759.93</td>
<td>938,639.89</td>
<td>2.6 Based on acre of forest required to offset carbon by 2.6 tons PER YEAR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO2 Mitigated+</td>
<td>67.82</td>
<td>33.91</td>
<td>22.61</td>
<td>Based on ton of CO2 mitigated per donor contribution</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Based on coal CO2 emissions at 1.47 kg/kWh*