Water and Energy for Food (WE4F) Grand Challenge for Development

Afghanistan Landscape Mapping

February 2020
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Executive Summary
The most promising Afghan businesses in the WE4F nexus are offering innovations in food storage or harnessing Afghanistan’s solar energy resource.

**Nexus opportunities in Afghanistan**

**Enterprises**
- **Focus**
  - 12 of the 13 enterprises are involved in the solar energy sector, which offers the highest commercially sustainable returns, among the six nexus themes, in the market.
  - Agricultural produce spoilage creates a unique **market opportunity for storage solutions**, including dehydration and cold storage.

- **Opportunities**
  - High income countries in the region, particularly in the Gulf, have limited capacity to grow fresh produce – with improved storage capacity, Afghanistan could help fill this gap and increase income.
  - Strong involvement of the international community in Afghanistan’s development can help spread best practices and new technology.

- **Challenges**
  - Low average incomes depress potential profitability, particularly in selling to rural areas and farmers.
  - Much of the business environment is **geared towards donor-funded projects** which has dampened innovation and forward planning.

**Financing**
- **Resources**
  - Credit is generally tight in Afghanistan with collateral requirements of 100-200% for loans and high interest rates.
  - Equity and debt capital **investment is not well understood** by the business community.
  - **Capital markets are not developed**, but many development-focused financiers are eager to deploy capital and cite difficulty in sourcing deals as a barrier.
  - **Short-term thinking dampens businesses’ investment in capital goods.**
  - **Current uncertainty has a dampening effect on both domestic and foreign investment in the country.**

**Technical assistance**
- **Needs**
  - Years of engagement by the donor community has created an abundance of highly qualified local providers of technical expertise with experience in a variety of nexus relevant areas.
  - Most enterprises declared that they had not received technical assistance in the past, although **identified a great need for assistance in scaling their businesses**.
  - The most prevalent needs were **general business advisory, marketing, investment advisory, and technical advisory on solar technology.**
  - **Most technical assistance providers identified had highly relevant experience for the nexus.**
  - The exercise of thinking about business expansion over the next 5 years was novel and often difficult for many of the enterprises identified due to the typical business strategy of responding to RFPs from donors, highlighting the particular need for general business advisory in Afghanistan.
Project
The assessment drew on outreach from 31 enterprises, 9 investors, 17 service providers, and 7 donor-funded projects.

This assessment on Afghanistan was done in parallel with a regional assessment for the rapid rollout of the Asia Regional Innovation Hub to serve South and South East Asia.

- The Asia Regional Innovation Hub will serve to rapidly scale up innovative enterprises focused on food, energy, and/or water through brokering financing and facilitating technical assistance.
- Water and Energy for Food (WE4F) is focused on growing enterprises in a variety of developing countries to encourage the reduction of water and/or energy (or renewables substitution) in food production with a particular focus on the base of the pyramid.

Outreach began with identifying and contacting banks and other investors, donor-funded projects in the country, and technical assistance providers.

- These groups served as great sources for potential WE4F enterprises.
- Relatively informal business arrangements (including the emphasis on personal relationships) and high levels of interconnectedness in the private sector, particularly centered on Kabul, made this approach effective for quickly connecting with most market participants.
- Significant time was needed to answer questions related to the project, the Innovation Hub, the goals, the nexus, and to establish and grow trust with enterprises.

- Reached out to thirty-one enterprises sourced from: investors, TA providers, and donor-funded projects. Outreach ranged from single phone conversations or emails to multiple communications in person and via email and telephone with promising enterprises.
  - Generally the project and concepts had to be explained a few times and enterprises needed time to consider the ideas presented. Establishment of trust was also key. Only after this, could work proceed.

- Reached out to nine banks and other investors that are active in Afghanistan to gauge interest in financing as well as information on clients (enterprises to reach out to).
  - Reached out to seven other donor-funded projects focused on agriculture in Afghanistan.

- Reached out to seventeen technical assistance providers active in Afghanistan to understand their technical capabilities as well as source information on enterprises for the nexus.
The Water and Energy for Food Grand Challenge has identified six themes for enterprises at the different nexus points:

**Water for food**
- **Theme 1**: Innovations in food production to reduce water use in food production
  - Technology for efficient use of water in food production
  - Sustainable/efficient food production
- **Theme 2**: Efficient use of water resources for food production
  - Irrigation, waste-water, water storage

**Water and energy for food**
- **Theme 3**: Sustainable use of energy and water in agriculture

**Energy for food**
- **Theme 4**: Energy innovations for food processing & logistics
  - Solar mini-grid linked food processing applications
  - Energy efficient logistics for food preservation
  - Storage and warehousing
- **Theme 5**: Food production with efficient energy use
  - Solar cropping

**Food for energy**
- **Theme 6**: Leveraging food waste for energy
  - Biogas production
  - Pellet production
  - Compost from waste
The primary obstacles in identifying relevant enterprises were:
► Finding enterprises with a broad customer base is difficult. Commercial revenues for businesses directly serving farmers are restricted due to low farmer incomes and appetites for investment as well as donor-funded programs targeting farmers.
► Finding enterprises without significant donor funding in their revenue streams is difficult – particularly for water-related (mostly irrigation) companies.
► Although political and security uncertainty are well understood investment deterrents in the country, the current environment, post-election (September 2019) and pre-announcement of the results coupled with the uncertainty around the peace process is a particularly difficult time to attract capital investment.
Market
Afghan commercial innovation is slowed by low income and high donor dependence in many economic sectors

**2018 GDP per capita (USD)**

Source: World Bank

<table>
<thead>
<tr>
<th>Region</th>
<th>GDP per capita (USD)</th>
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</thead>
<tbody>
<tr>
<td>MENA</td>
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<tr>
<td>Afghanistan</td>
<td>521</td>
</tr>
</tbody>
</table>

**Afghanistan has one of the lowest levels of economic output per capita**

- The country is the 9th poorest in the world based on GDP/capita and is the **poorest in Asia** with GDP/capita of $520.90 in 2018.
- Low income levels are particularly acute for farmers, making service and goods provision to this sector difficult for businesses while maintaining profitability.

**Economic growth and donor money**

Source: World Bank

- The ratio of ODA to economy size was over 50% in 2009, at the time the highest in the world. In the years since, that ratio has come down to slightly under 20% with Afghanistan currently the 10th highest recipient of ODA in relation to GDP.
- The economy has maintained its size, despite lower levels of donor assistance in recent years, which may indicate a decoupling of aid and economic growth. Donor aid is, however, still proportionately high.
Food spoilage and high electricity costs, resulting in high food prices, present opportunities for nexus-related enterprises to offer market-based solutions.

**Food production**

- Losses of food throughout production processes, from rot and pests at the farm level to spoilage in the food supply chain due to inadequate storage, result in higher costs for food due to waste and decreased supply.
- Cold storage of fresh produce requires continuous electricity supply and high capital investment and is infrequent and not at scale in Afghanistan. For this reason, much of the fresh produce of the country is exported to neighboring countries for cold storage soon after the harvest and then reimported, at marked-up prices, to meet consumption.
- Better food preservation, either through dehydration (drying) or cold storage would help lower the cost of food, decrease the waste in the supply chain, and provide the country with greater food security. This is especially important for poor consumers who spend a disproportionately high percentage of their income on food.

**Electricity**

- Grid-supplied electricity largely consists of imports from neighboring countries. The electricity is mostly hydro-electric, which is at peak generation during the summer months. However, peak demand in Afghanistan occurs during the winter months and, without adequate storage capacity, the result is higher prices caused by a mismatch between supply and demand.
- The gap is filled by small, off-grid, and mostly diesel-powered backup generation solutions. The diesel fuel required is imported as well as very costly.
- Both create an environment in which electricity supply is costly and unreliable, stifling the potential development of manufacturing or other job-creating industry.

**Water resources**

- In an already arid country, most provinces have experienced drought conditions due to lower than average rainfall in the past several years.
- Water scarcity is exacerbated by farmers’ use of flood irrigation methods in food production. The primary reasons for this method’s use are: tradition, a lack of willingness or ability to invest in more modern irrigation methods, and a feeling expressed by many that water is ‘free’ and therefore a lack of interest in its conservation. (Water is typically sourced from rivers or the ground, and thus farmers typically do not pay for the marginal costs of water usage).
- Farmers’ lack of willingness to invest and the prevalence of donor aid to agriculture has curbed the growth of commercial enterprises to water scarcity in the agriculture sector.

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1. World Bank, Islamic Republic of Afghanistan Agricultural Sector Review
2. World Bank, Afghanistan: Renewable Energy Development Issues and Options
High levels of solar photovoltaic potential make solar power a commercially-attractive energy source

Excellent solar resources throughout the country and the high cost and intermittent nature of imported electricity result in increased potential profit margins for solar-powered solutions

- Enterprises in the solar industry interviewed function as importers and distributors of either solar PV panel systems or generators and distributors of solar electricity, or both.
- PV panels are typically purchased on a secondary market (often used equipment from Europe or the United States) and are refitted for use in Afghanistan.
- Enterprises in this area focus on selling, installation, and maintenance, rather than solar PV manufacturing.

Droughts and ground water pumping have led to water scarcity in many parts of the country in recent years

- Commercial solutions to water scarcity were not found in this study.
- Many farmers view water as free and have neither the finances nor the inclination to invest in reduction. Many farmers are also provided with drip-irrigation and other water reduction systems through donor funded aid programs.
- Food processing companies interviewed expressed a desire to reduce water, but declared it as a low priority for investment.
Conflict and political instability perceived generally throughout the country restrain investment in Afghanistan:

The top five food producing provinces\(^1\) are all located in the north of the country, which is less exposed to conflict:

► Of the top ten food producing provinces, the majority are located outside of insurgency control and therefore are potentially more attractive for capital investment.
► Balkh province, a relatively safe and prosperous province also has a rail link to Uzbekistan from its capital at Mazar-e-Sharif.
► Fresh and processed food account for 59% of Afghan exports by value and 20% of imports; however the country is, overall, a net food importer due to its trade imbalance. It exported $2.4 billion of fresh and processed food from 2012-2016 and imported $8.4 billion.\(^2\)

Political and security uncertainty are major deterrents to investment in Afghanistan: many investors noted that they are waiting on the results of the recent election as well as the peace negotiations before considering investing:

► Although there is a potential for conflict throughout the country, the perceived risk of investing in Afghanistan dampens investment, even for provinces which are relatively conflict free.

1. CountrySTAT data, 2012, based on tons of barley, maize, rice, and wheat produced
2. International Trade Center, Afghanistan agricultural data
Cold storage offers the clearest approach to capture profit margins in the nexus; cheap(er) and more reliable solar power makes cold storage economically viable

- 12 of the enterprises are involved in solar power
- Afghanistan averages 300 days of sunshine per year
- 6 mentioned cold storage explicitly as part of their growth plans

- Due to very low average income among farmers, commercially successful businesses in this sector focus on B2B sales
- Manufacturing is nascent in Afghanistan and most enterprises focus on sales, installation, and maintenance

- 7 of the enterprises identified had at least one woman in a leadership position

- Aggregated capital needs for pipeline enterprises are $34.7 MM
- Majority of enterprises looking for grant funding
- Demand for debt capital is under 20%, only requested by 2 enterprises

- Enterprises Identified: 13
- Female leadership
- Solar power focus
- B2B strategy
- Distributor role
- $34.7 MM
Enterprises identified a need for working capital to finance inventory for installation or growth capital to finance capital equipment

Most relevant companies in the nexus are involved in solar power generation
► Afghanistan’s 300+ days of sunshine and high-cost, and unreliable electricity make this power source profitable for food processing and production.
► Food storage (dehydration and cold chains) powered by solar energy can reduce costs to consumers and decrease spoilage in the supply chain.

Pipeline by nexus

Pipeline by use of funds

Business models dictate the types of capital needed
► Many enterprises focus on importing solar panels and technology and selling, installing, and maintaining the systems, and need working capital to finance inventory.
► Enterprises that are focused on selling solar electricity or in building solar powered cold chain storage require growth capital to finance their purchase of capital equipment.
Inexperience with private finance and donor reliance restricts innovation and growth; a B2B focus on food processors provides the highest potential for commercial returns

**Patterns observed**

**Business development**

- Due to large amounts of donor aid relative to the size of the economy, successful businesses in this sector in Afghanistan are focused on donors as their primary ‘customers’.
- The prevalence of donor funds in the agricultural sector and farmers’ low willingness to pay has led to a lack of commercially viable enterprises serving this segment.

**Financing**

- Most enterprises are averse to debt capital citing collateral requirements of 100-200% and high interest rates of 10-15%.
- Banks mentioned beginning to restrict credit due to an increase in defaults of corporate loans.
- High levels of mistrust for the banking system, the resulting difficulty in allocating capital has tempered Afghan growth.
- Lack of capital was cited by most as a significant drag on potential growth.
- Most enterprises reported not having received any outside financing (debt, equity, grants), but rather grew from founders’ investments and reinvestment of profits.
- A lack of financial understanding is pervasive: there is limited knowledge of different types of capital, and some businesses referred to donor agencies as ‘investors’.
- Irregular/uncertain cash flows also make debt financing difficult for many businesses.
All businesses interviewed would benefit from general business advisory services, especially planning capital projects, as well as education of the market about solar power benefits.

**Patterns observed**

**Technical Assistance**
- The general difficulty in devising growth plans in terms of revenue and customer base expansion exposes a great need for general business advisory services and forward planning for businesses.
- Most enterprises requested technical assistance to help them understand and adopt the latest technologies. There is a lot of desire among Afghan businesses to learn from outside experts.
- One enterprise requested **technical assistance for help with approvals with the Afghan government** and it is likely that more enterprises have this need in this unique regulatory environment.
- Due to the large amount of donor funded development projects, a very large and capable group of local technical assistance providers is available.
- Marketing of technology to end users is key to overcome aversion to adoption.

**General business environment**
- The focus on responding to RFPs from donors has limited business innovation, with many businesses finding **planning/forecasting exercises very difficult**.
- Political and security instability has led to **very short-term thinking** for businesses and made it difficult to sell water or energy saving products where benefits are spread over future time periods.
- Many businesses interviewed cited risk aversion in the market for the lack of uptake of new technology and new methods.
- Many businesses in Afghanistan are **set up in a conglomerate structure** where they pursue multiple business lines at once, likely due to the uncertainty of success in different industries.
- The business environment is highly informal in terms of corporate structure.
Commercial opportunities in the WE4F nexus are in solar power and (solar-powered) food storage; most enterprises have no experience with investors

- **Average ticket size is $2.7 MM, with a range from $150,000 to $9.2 MM and median of $2 MM**
- Very few enterprises interviewed are looking at international expansion even though their products/services are technology-based and usable in a variety of regional markets – and it is likely that those markets might be more attractive due to higher income levels.
- **Most enterprises interviewed have not had experience with outside investors** or debt capital providers, but need both Growth and Working Capital investments to finance expansion plans. Most financing has come from founding investors and retained earnings.
- Most enterprises interviewed have not previously received technical assistance. The most pressing BAS/TA needs observed are for solar technology advisory, marketing, and advisory on investment planning.

### Business focus

- **70%** Of the enterprises are involved with solar electricity generation
- **30%** Of the enterprises are involved with solar powered irrigation pumps
- **62%** Of the enterprises are involved in cold chain storage
Investors & technical assistance providers
Corporate loans are facilitated by donor guarantees and financing available is aligned with investment needs identified; bank regulatory and internal credit requirements restrict credit growth and demand for debt financing.

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Selected recent financial deals show investment interest in Afghan agriculture, particularly in dried fruits (food storage) and spices (high value)

Rikweda Fruit Processing Co.

In 2017, the IFC worked with the project sponsor, Rikweda Trading DMCC, to set up a greenfield facility to process 15,000 tons per year of raisins in Kabul. The total project cost was $9 MM of which $6 MM was financed through an equity investment by the sponsor, $2.5 MM a working capital facility from the IFC, and a C-loan of $0.5 MM.

Rumi Spice

In 2018, InFrotier made a $2.5 MM equity investment from its Afghanistan Fund into Rumi Spice, a producer of high quality saffron. The capital investment and InFrontier’s expertise helped the company meet PSP standards in the U.S. market to sell directly to Whole Foods as well as to grow the business and add cumin cultivation.

Agricultural Production

Tanweer has made several investments in agricultural production in and around Jalalabad (olives, watermelons, bananas, oranges, mulberry, strawberry, lemons, limes, grapes, flowers, rose oil, sugar cane, refined sugar, dates, pomegranates, and several types of dried fruits).
Due to significant engagement by the international community, locally-based business advisory service/technical assistance providers are well suited to address market needs identified in the assessment.

<table>
<thead>
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<th>Service</th>
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<td>General business advisory</td>
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<tr>
<td>Marketing</td>
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<td>Investment advisory</td>
<td>Velocity Consulting</td>
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<tr>
<td>Solar technology</td>
<td>AICS, AACS, TADBEER</td>
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<tr>
<td>Sector mapping</td>
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<td>Farmer training</td>
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<td>Food processing advisory</td>
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<td>Facilitation with Afghan government</td>
<td>Velocity Consulting</td>
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Increased financial literacy for enterprises and encouraging innovation through investment structures requiring *skin in the game* would improve capital investment planning.

| Co-investment | To encourage Afghan enterprises in forward business planning, a required co-investment gives them ‘*skin in the game*’ (assumption of greater financial risk) and real buy-in. This can also help the enterprise in thinking about how it plans to grow and to make that decision jointly with the enterprise. |
| Expansion | **Encourage foreign expansion** for Afghan enterprises with easily transferrable technology or technology focused products in order to reach more profitable markets and customers, as well as foster greater regional integration and integration of Afghanistan into existing supply chains. |
| Debt financing | Encourage enterprises with stable cash flows to seek debt capital from banks to fund assets and business expansion. **Make use of Afghan banks’ DCA access to secure lower-cost debt.** This will likely encourage more liquidity and bank lending in the economy. |
| Equity financing | Connect enterprises with regional strategic (equity) investors, which can provide market knowledge, ease entry to new markets, share best practices, and/or provide economies of scale in purchasing. This will likely help Afghanistan to better integrate economically in the region. |
| Concessional capital | First loss equity tranches, partial grant funding, and/or low-interest loans can lower the cost of capital for the enterprise as well as increase the financial returns for other investors, attracting more private capital. |
Afghan solar providers would benefit from training on cutting-edge industry practices, marketing to communicate solar benefits, and involvement in the technical assistance selection process.

<table>
<thead>
<tr>
<th>Technical assistance unit</th>
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| Marketing     | Due to lack of understanding of solar solutions and especially the financial benefits associated with them, targeted marketing campaigns are needed to communicate to Afghan farmers as well as industrial users to understand the **long-term cost benefits and efficacy of solar-powered solutions.** |
| Co-payment    | In order to **ensure better buy-in from the enterprise on the technical assistance provided** (and encourage its effectiveness), it is recommended that the enterprise pay for a percentage of the TA and work closely with the Hub to prioritize types of technical assistance. |
| Technical services | Solar and other technological expertise are needed to improve businesses in these areas; this may require providing expert **training outside of the country** for some enterprises. |
| General business advisory | General business advisory for enterprises to better understand their business, its costs and revenue streams, allocate capital, plan investment, evaluate outside investment. **Advisory on how to scale a business, including thinking about the different ways that revenue can be generated and where the market opportunities lie would be an extremely beneficial exercise for all enterprises.** |