Finance for Energy Access
Pre-Read for Public-Private Roundtable

Sixth Clean Energy Ministerial
27 May 2015, 3:00pm
Mérida, Yucatán, Mexico
OUTLINE

1 Overview
2 Current Landscape
3 Energy Access Finance Needs and Challenges
4 Policy Levers for Energy Access
5 Potential Finance Mechanisms
6 Examples of Finance Mechanisms in Use
**OVERVIEW**

**Finance for Energy Access: CEM Roundtable 4:** The objective of the roundtable is to bring together practitioners, financiers, and policymakers to collectively identify the most promising strategies to leverage established and emerging financing mechanisms with the overarching goal to unlock sustainable private capital for the small-scale, distributed energy access solutions that are central to achieving universal energy access targets.

**Presentation:** Provides background information on the distributed energy access supply chain with a focus on the financing needs and challenges for the small and medium enterprises (SMEs) in the sector. The presentation identifies a range of financial mechanisms for the energy access sector including current examples of innovative models and description of enabling policies. These materials are intended to support the Roundtable discussion on energy access financing on: improved delivery of existing funding sources, promising innovative financing mechanisms, and transformational strategies to unlock sustainable private investment for energy access.

"Donors, governments, and businesses need to become more strategic about how the public and private sectors collaborate in financing pro-poor energy access."

Source: Information in this presentation has been drawn from recent published literature, global organizations, and a report under development by the National Renewable Energy Laboratory (NREL), in collaboration with the International Institute for Environmental Development (IIED) and other organizations.
**What IS Energy Access?**

**By 2030, 2.7 billion people will still be without clean cooking facilities and 1 billion will be without access to electricity.**

**What:** electricity, clean cooking systems and mechanical power.

**Who:** the unserved. Could be absolutely poor, poor or not poor. Both urban and rural areas.

**Why:** water, health, education, income generation, empowerment of women, and sustainable development.

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**Economy**

- Researchers estimated that Africa misses out on 2–4% a year in GDP growth due to power shortages.

**Income**

- Up to 40% of African household income is spent on fuels for heating, lighting and cooking.

**Health**

- Four million deaths per year are attributed to inhalation of indoor smoke

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**Overview**

Sustainable Energy SE4ALL, Access Committee report and Infographic World Bank 2014
The Electricity Access Challenge

- Electricity access is a crucial component of every advanced economy.
  - Access to affordable, reliable electricity is critical to meet development goals:
    - Jobs
    - Agriculture
    - Health
    - Education
    - Sanitation
    - Gender equality
    - Quality of life
  - Individual productivity, future earning potential and country GDP improve with energy access

- SE4ALL has targeted universal energy access by 2030
  - Energy incentives must increase by $45 billion per year until 2020 to reach universal electrification
  - Comprehensive policy measures, financial incentives, phasing out of fossil fuel subsidies, and carbon pricing are essential steps to universal access

*For the purposes of this roundtable, the term energy access refers to electricity only

1.2 billion people have zero access to electricity; additionally, 800 million have unreliable grid power to meet basic energy needs.

80% of people without electricity live in rural areas, mostly in Asia and Sub-Saharan Africa.

The current rate of electrification is almost completely offset by population growth; without further investments an estimated 1.0 billion people will still lack electricity in 2030.

Source: Global Tracking Framework, Sustainable Energy for All, 2013.

Source: Energy For All, World Energy Outlook, EIA, October 2011.
PATHWAYS FOR CLEAN ENERGY ACCESS

Household Lighting Devices
Solar lanterns and small solar kits

- May have charging capabilities for cell phones and other small devices

Household Energy Systems
Powering a single home

- Fairly low cost
- Easy installation
- No central grid connection
- Powers small loads and DC-based appliances
- AC appliances can be supported using a DC to AC power converter

Source: <http://www.cleanenergyministerial.org/Blog/pathways-for-energy-access-39363>
Mini-Grids
Powering a community

- Easier installation than AC mini-grids
- Limited distribution range
- Limits central grid interconnection
- Powers small loads and DC-based appliances
- AC appliances can be supported using a DC to AC power converter

DC-Based

AC-Based

- More complex installation
- Longer distribution range
- More suitable for central grid interconnection
- Powers larger AC-based loads and appliances
- Generators may be used to increase power availability
- Can be used to provide power equivalent to a reliable central grid

Central Grid Connection
Connecting communities to the central power grid

- A reliable central grid provides sufficient power for homes, businesses, industry and other services
- Central grid connections may not be technically or financially feasible for all rural and developing areas

Source: <http://www.cleanenergymisterial.org/Blog/pathways-for-energy-access-39363>
The World Bank and IEA have developed a new framework for SE4ALL to define levels of energy access that takes into account both the **quality of energy supply** as well as the **energy services** that the energy can support.

- Five Tier Framework to discern levels of energy access and services
- Electricity supply access
  - Evaluated by criteria emphasizing reliability, adequacy and accessibility.
  - Tier is independent of how the power is delivered
- Tiers correspond with ability to use energy services and appliances
- Number of households at each tier can be used as a metric for overall progress towards universal energy access within a country or region.

<table>
<thead>
<tr>
<th></th>
<th>Tier 0</th>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Tier 3</th>
<th>Tier 4</th>
<th>Tier 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Available Power (W)</td>
<td>None</td>
<td>&gt;1 W</td>
<td>&gt;20 W</td>
<td>&gt;200 W</td>
<td>&gt;2,000 W</td>
<td>&gt;2,000 W</td>
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<tr>
<td>Consumption (kWh/year)</td>
<td>&lt; 3</td>
<td>3 - 66</td>
<td>67 - 321</td>
<td>322 - 1,319</td>
<td>1,319 - 2,121</td>
<td>&gt; 2,123</td>
</tr>
<tr>
<td>Duration of Supply</td>
<td>None</td>
<td>&gt; 4 hrs</td>
<td>&gt; 4 hrs</td>
<td>&gt; 8 hrs</td>
<td>&gt; 16 hrs</td>
<td>&gt; 22 hrs</td>
</tr>
<tr>
<td>Evening Supply</td>
<td>n/a</td>
<td>&gt; 2 hrs</td>
<td>&gt; 2 hrs</td>
<td>&gt; 2 hrs</td>
<td>4 hrs</td>
<td>4 hrs</td>
</tr>
<tr>
<td>Quality</td>
<td>n/a</td>
<td>low</td>
<td>low</td>
<td>Adequate</td>
<td>Adequate</td>
<td>Adequate</td>
</tr>
<tr>
<td>Typical Applications (Cumulative)</td>
<td>None</td>
<td>Radio, lighting</td>
<td>General Lighting, fans, TV, and task oriented food preparation</td>
<td>Air cooling, food processing, and task oriented food preparation</td>
<td>Refrigeration, Air water heating, conditioning pumps, expanded heating and full food preparation</td>
<td></td>
</tr>
</tbody>
</table>
1. Overview
2. Current Landscape
3. Energy Access Finance Needs and Challenges
4. Policy Levers for Energy Access
5. Potential Finance Mechanisms
6. Examples of Finance Mechanisms in Use
Current Focus on Grid Extension Financing

Grid Extension
- Current financing efforts focus heavily on grid-extension, while financing for off-grid solutions falls short.
- Long-term goal in many countries will be universal grid access, but development can take decades and require enormous capital.
- Will not reach everyone by 2030
- Cost to build and maintain grid increases and ROI decreases with rural populations.

Decentralized energy (off-grid and mini-grids)
- Quicker pathway to energy access
- Benefits to providing basic energy services prior to full access
- Relies heavily on small and medium enterprises (SMEs) that can foster local, sustainable economic development
# Distributed Energy Service Options

<table>
<thead>
<tr>
<th>Market segment</th>
<th>Service offering</th>
<th>Energy asset/source</th>
<th>Financing method</th>
<th>Additional services</th>
<th>Payment collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household</td>
<td>Tier 2: &lt;200 Wh/d</td>
<td>Device</td>
<td>Pay-per-use</td>
<td>Appliance add-on</td>
<td>Manual</td>
</tr>
<tr>
<td></td>
<td>“Two lights and a charger”</td>
<td>Task lamp/“plus”</td>
<td>User buys right to X amount of energy for Y of time, with no further commitment Revenue can be unpredictable</td>
<td>Requires users to comply with certain appliance standards</td>
<td>Local staff recoups cash from customers</td>
</tr>
<tr>
<td></td>
<td>“Basic households needs”</td>
<td>Solar kit</td>
<td>Rental/pure lease</td>
<td>Provides optional appliances to users</td>
<td>Scratch-card</td>
</tr>
<tr>
<td></td>
<td>Tier 3: &lt;800 Wh/d</td>
<td>Home system</td>
<td>User has access to X time, Y energy or X time + Y energy</td>
<td>Out-right cash sales</td>
<td>Vendor sells scratch-card containing code to activate access or top up usage credit</td>
</tr>
<tr>
<td></td>
<td>“Small productive power”</td>
<td>Solar home system</td>
<td>User pays regular fee (weekly/monthly...)</td>
<td>Form part of and therefore financed through pay-per-use, rental or rent-to-own package</td>
<td>Mobile money</td>
</tr>
<tr>
<td></td>
<td>Tier 4: &lt;1,600 Wh/d</td>
<td>Village system</td>
<td>Rent-to-own/lease finance</td>
<td></td>
<td>Virtual payment and system activate/top up of usage credit</td>
</tr>
<tr>
<td></td>
<td>“Large productive power”</td>
<td>Mini/micro grid¹</td>
<td>User has access to X time, Y energy or X time + Y energy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Can be powered using a range of energy sources, including solar, wind, hydro, biomass and diesel, including in combination

Source: Bardouille and Muench, June 2014, DESCOs: A commercial solution to the energy access challenge.
**Recent Investments in Distributed Energy Access**

**OMC Power**, a small-scale power company in **rural India**, secured major funding from Singapore-based renewable energy fund Energy Investment Tech.¹

**d.Light** solar lighting and power products raised **$11 million** in Series C financing; now impacting over 2 million customers with lighting products and sold more than 125k solar home power units.²

**M-KOPA Solar** raised **$20 million** to fund the expansion of their customer base from 50,000 homes to one million homes by 2018 fronted by the Commercial Bank of Africa (CBA).³

**Simpa**, a solar-as-a-service company in rural India, completed a **$4 million** debt financing round from Overseas Private Investment Corporation (OPIC) and GDF Suez.⁴

**BBOXX**, a pay-as-you-go remote battery enabled finance solution, earned **$1.8 million** in financing from Khosla Impact.⁵

**Angaza**, a Pay-As-You-Go platform, secured USAID funding from Development Innovations Ventures (DIV) to fund research in **rural Tanzania**.⁶

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Scaling Up Private Sector Energy Services

- Private sector, particularly small and medium enterprises (SMEs), provide more flexibility and innovation.
- Local distribution and support channels needed to serve market and local needs.
- Scale up of successful models can take years and require a variety of financing.
- Distinct financing challenges at each stage of development.

Solar-powered lighting (SPL) products have varying needs with their value chain:

- **Bottleneck at the national distributors and resellers**
- **Distributors face a finance double burden:**
  - Upstream (ordering from suppliers)
  - Downstream (affordable products for end-users)

Changing capital requirements make it financially difficult to get products from manufacturers to consumers.

**Capital requirements per value chain step**

1 Capital requirements satisfied or to be satisfied by equity or debt (actual financing demand should be lower than capital requirements)

Sources: Niwa, Lighting Africa, Dalberg Analysis, csimarket.com; A.T. Kearney analysis

**Finance Challenges**

- Need capital for R&D and to pass along good terms to logistics and distributors
- Distributors and retailers need to finance upstream and downstream
- Huge working capital needs because of long transport and distribution times
- About 50 percent of consumers need to finance their off-grid product

**Total capital requirements**

- Today: 287 million
- SPL: 3,908 million
- SHS: 7,600 million

**Changing capital requirements make it financially difficult to get products from manufacturers to consumers.**
## Finance Needs by Stage of Development: Mini-Grid Example

<table>
<thead>
<tr>
<th></th>
<th>Grants</th>
<th>Equity</th>
<th>Debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sources</td>
<td>Subsidies / TA</td>
<td>Seed / Start-up</td>
<td>Growth / Expansion</td>
</tr>
<tr>
<td></td>
<td>Governments</td>
<td>Friends &amp; Family</td>
<td>Impact funds</td>
</tr>
<tr>
<td></td>
<td>Foundations</td>
<td>Angel investors</td>
<td>Venture cap funds</td>
</tr>
<tr>
<td></td>
<td>Donors / DFIs</td>
<td>Impact funds</td>
<td>PE funds</td>
</tr>
<tr>
<td>Risk appetite</td>
<td>++++</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>Amount</td>
<td>$30k – 10m</td>
<td>$100k – 1m</td>
<td>$1 – 5m</td>
</tr>
<tr>
<td>Expected tenure</td>
<td>N/A</td>
<td>3 – 7 years</td>
<td>3 – 5 years</td>
</tr>
</tbody>
</table>

Profitability (and Risk) vs. Scale

- Need for different types of finance at different stages of company growth, with profitability dependent on growth.

- Funding gap can exist between venture capital and debt where risk tolerance and capital size requirements are mismatched (i.e., much capital is needed, however risk is still high). Thus this financing stage is not appealing to either venture capital investors or lenders.

Source: Bardouille & Muench, How a New Breed Of Distributed Energy Services Companies can Reach 500mm Energy-poor Customers Within a Decade, 2014.
Public Capital Interventions to Catalyze the Technology Cycle

- Public capital investment in energy access is needed for two primary reasons
  - Catalyze business development cycle by overcoming market barriers, as shown in figure.
  - Provide public service by financing and/or derisking projects that are not likely to be (very) profitable

- Scale of need for energy access requires public sector investors to spur private sector investment through smartly designed policies and programs.

Source:
<http://ec.europa.eu/development/body/theme/energy/initiative/docs/EU_EI_fwg_brochure_en.pdf>
# Barriers to Investments in Energy Access

## Top barriers to finance by stakeholder group

<table>
<thead>
<tr>
<th>Top 3 barriers stated by the industry</th>
<th>Top 3 barriers stated by investors</th>
</tr>
</thead>
<tbody>
<tr>
<td>No innovative deal/fund structures</td>
<td>Uncertain legal/policy frameworks</td>
</tr>
<tr>
<td>Insufficient knowledge of investors</td>
<td>Limited track record of industry players</td>
</tr>
<tr>
<td>Subcritical deal sizes</td>
<td>Subcritical deal sizes</td>
</tr>
</tbody>
</table>

- **No innovative deal/fund structures**: 3.6
- **Insufficient knowledge of investors**: 3.5
- **Subcritical deal sizes**: 3.4
- **Uncertain legal/policy frameworks**: 3.7
- **Limited track record of industry players**: 3.6
- **Subcritical deal sizes**: 3.3

- **Manufacturers and distributors**
- **Investors**

*Source: Interviews and surveys with 30 manufacturers and distributors (December 2013) and 13 investors (December 2013 - February 2014), Energypedia, A.T. Kearney*
## Barriers to Investments in Energy Access

| Risks | • Investor anxiety is increased with uncertainty and risk; Political and economic risk are often high in poorer countries, furthermore, government perception of private sector is important. |
| Obstructive Environment | • Non-enabling, weak or even obstructive environments could include tax and subsidies competing fossil fuel industries or lack of clear regulations. |
| Finance Channels | • Large investors need the mechanisms and ability to target small-scale enterprises, local banks, microfinance institutions, and low-income consumers. |
| Capital Availability | • Local businesses face high capital costs via standard routes such as local banks, emerging distribution enterprises need the knowledge and ability to take advantage of opportunities. |
| Low ROI | • Low-income customers living in rural areas have less money to pay for services and are expensive to reach, investments are long term, high risk, and offer low financial return. |
| Security | • Investors prefer reliable customers and investments which have the ability to pay. |
| Investment Size | • Mainstream investors invest many sizes of magnitude larger than low-income markets; small investments have high transaction costs, high interest fees which lead to exclusions for the poor. |
| Business Models | • Proven business models and well-developed plans soothe investors into knowing risks are being mitigated and returns are ensured |
| Impatient Investors | • Under-developed markets require time commitments to build relationships and market demand where none existed before, commercial investors may be impatient. |
| Market Pioneers | • Immature markets lack the builders and pioneers required to overcome barriers and transform the market. |

Overview

Current Landscape

Energy Access Finance Needs and Challenges

Policy Levers for Energy Access

Potential Finance Mechanisms

Examples of Finance Mechanisms in Use
Establishing a foundational policy environment
• Government goals, policies and regulations need to prioritize and enable SMEs and distributed energy options. Stability and transparency are key to attract investment.

Building human capacity
• Government programs can foster business support for SMEs, provide workforce development and increase market understanding for all actors from regulators to investors to end users.

Integrating with development programs
• Government policies on energy access extend far beyond energy. Working across ministries can leverage social development programs on poverty, education, health, and climate.

Catalyzing Finance
• Governments can play a significant role in bringing investors to the market including public-private programs, risk mitigation, and targeted incentives. Policies may need to address finance needs of all players in the sector.
Overview

Current Landscape

Energy Access Finance Needs and Challenges

Policy Levers for Energy Access

Potential Finance Mechanisms

Examples of Finance Mechanisms in Use
### Sources of Financing and the Their Financing Instruments

<table>
<thead>
<tr>
<th>Source</th>
<th>Grants/credits</th>
<th>Concessionary Loans</th>
<th>Market-rate loans</th>
<th>Credit line for on-lending</th>
<th>Partial credit guarantees</th>
<th>Political risk guarantees</th>
<th>Equity</th>
<th>Quasi-equity</th>
<th>Carbon financing</th>
<th>Subsidy/cross-subsidy</th>
<th>Feed-in tariff</th>
<th>Technical assistance</th>
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<tr>
<td>Multilateral development banks</td>
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<td>Export-Import Banks/Guarantee Agencies</td>
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<td>Developing Country Governments</td>
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<td>Rural Energy Agencies/Funds</td>
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<td>International Banks</td>
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<td>Private Investors</td>
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</table>

Investors Along the Industry Lifecycle

Investors and financiers engage at various stages of the business development cycle, depending on when their investment timeframe and risk appetite align with those of a given technology/business model within a certain market (or group of markets).

## Financing Needs for Business Development and Diffusion Vary by Recipient

<table>
<thead>
<tr>
<th>Recipient</th>
<th>Examples of Types of Finance and Investment Needed (non exhaustive)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technology developers</strong></td>
<td>Angel investors, venture capital, seed capital/private equity (high net worth individuals/family offices)</td>
</tr>
<tr>
<td><strong>Manufacturers</strong></td>
<td>Angel investors, venture capital, seed capital/private equity (high net worth individuals/family offices), debt (credit lines and loans from local banks, microfinance), credit enhancements (insurance, export)</td>
</tr>
<tr>
<td><strong>Retailers</strong></td>
<td>Equity, debt (credit lines and loans from local banks, microfinance), corporate finance</td>
</tr>
<tr>
<td><strong>Project developers</strong></td>
<td>Loans (credit lines), seed capital/private equity, corporate finance, credit enhancements (surety bonds, insurance), feed-in tariffs, project finance</td>
</tr>
<tr>
<td><strong>Utilities</strong></td>
<td>Ratemaking/energy sales, corporate finance, investor equity, insurance</td>
</tr>
<tr>
<td><strong>Governments</strong></td>
<td>Ratemaking/Energy sales (for municipal or government owned utilities), taxes, grants from development banks and charitable organizations, carbon funds</td>
</tr>
<tr>
<td><strong>Development capital</strong></td>
<td>Government contributions, foundations</td>
</tr>
<tr>
<td><strong>End-users</strong></td>
<td>Energy savings, personal equity/income, personal loans (local banks, micro finance)</td>
</tr>
</tbody>
</table>
**Types of Capital**

**Equity**
- Corporate investments
- Grants*
- Local SPV financing

**Equity-Debt Crosscutting**
- Social impact and VC Funds
- Capital growth funds
- Convertible grants/results-based financing*
- Crowd funding

**Debt**
- Loans
- Credit enhancements*
- End-user financing
- NGOs/Development finance*
- Financing within value chain
- Green bonds/development impact bonds
- Revolving loan fund*

*Indicates could be considered as a subsidy/soft loan

*Italics* indicate innovative solutions for energy access

**Finance Mechanisms**

Accelerating the Transition to Clean Energy Technologies
**Types of Credit Enhancements and Subsidies**

Credit enhancements and soft lending/subsidies can improve access to capital by lowering risks and increasing returns, respectively.

- **Credit Enhancements (public and private sector)**
  - Partial credit guarantees, including loan loss reserves, loan guarantees, and debt service reserves
  - Surety bonds
  - Insurance (construction, operation, cargo, sovereign risk, currency, weather)
  - Hedging contracts (commodities, exchange rates, interest rates)
  - Export Guarantees

- **Additional Revenue Sources (to suppliers and end-users)**
  - Carbon finance (carbon credits)
  - Grants (e.g., convertible grants, performance-based grants)
  - Fee waivers (e.g., interconnection fees, capacity surcharges)
  - FITs, kWh payments

- **Soft lending**
  - Climate finance and carbon funds
  - Concessional loans, performance-based loans, and hybrid grant-loans
  - Revolving working capital fund with first-loss tranche
CHALLENGES AND BENEFITS OF DIFFERENT TYPES OF CAPITAL

- **Debt**
  - Benefits:
    - Cost of capital is typically less expensive than equity as debt takes losses after equity
  - Challenges
    - Need sufficient cash flow to cover debt payments
    - Lenders look for lower returns over longer tenors, and these market expectations may not be suitable for energy access SMEs’ who are in need of more favorable terms
    - Requires collateral

- **Equity**
  - Benefits
    - Helps complete capital stack and is often needed to access debt (see slide 14)
  - Challenges:
    - Usually has a higher cost of capital compared to debt as equity takes first losses
    - Given the risks, investors may be looking for double-digit returns when only single digits are plausible for energy access
    - Small-scale entrepreneurs may not want too much equity finance early on given loss of ownership stake.

- **Credit enhancements and subsidies**
  - Benefits
    - Credit enhancements lower the cost of capital and may increase the total size of financed project
    - Of subsidies, provides for an additional source of revenue
  - Challenges
    - Can be difficult to qualify for
    - Expense to access and manage may outweigh benefits
    - Subsidies can distort market if not designed to coordinate with SME activities
**Additional Considerations**

- **Start-up capital vs. working capital:**
  - Initial angel, development bank or philanthropic equity may be used for start-up where investors are not seeking market-rate returns.
  - Working capital is needed once a company has a functional business model and is used to cover operational expenses such as maintaining inventory.

- **Local currency vs. foreign currency denominated finance:**
  - Borrowing and repaying in same currency reduces currency risk.

- **Project finance vs. corporate finance:**
  - Risks and collateral are based at the project rather than corporate level.
  - Access to capital may be cheaper at the corporate level but puts corporate assets at risk.
  - For project finance, risks and collateral are assessed at the project level, which may provide some protection to SMEs' corporate level assets.
  - Many energy access projects may be too small to access project finance.
  - Scale of mini-grids may provide best opportunity for project finance, but investor requirements for returns and cash flows make this difficult to access.
  - Given these constraints, raising corporate finance may be more feasible for many SMEs in the near term.

- **Institutional investors:**
  - Include pension funds and insurance funds. Seek low return/low risk, long-term investments. Energy access may be too high risk and yet not provide sufficient returns.
  - Can partner with philanthropic funds to reduce risks to the institutional investor (e.g., a foundation takes the first loss ahead of the institutional investor).

- **Public vs. private capital:**
  - Public funds could be either 1) government funds or 2) bilateral/international development funds.
  - Public funds may come from taxes or ratemaking and have specific stipulations as to how they can be used.
  - Development funds are usually philanthropic in nature and can include concessional finance as well as subsidies (e.g., grants). In the case of concessional finance, public capital might not require market-rate returns.

- **Impacts-oriented (social investors) vs. bottom-line oriented investors:**
  - Similar to public capital, social investors may not seek market-rate returns and may make investment decisions based in part on co-benefits, such as those related to the environment or economy. Impacts-oriented investors can include institutional, angel, and venture capital investors.
OUTLINE

1. Overview
2. Current Landscape
3. Energy Access Finance Needs and Challenges
4. Policy Levers for Energy Access
5. Potential Finance Mechanisms
6. Examples of Finance Mechanisms in Use
## Three Debt Financing Solutions

<table>
<thead>
<tr>
<th>DEBT FINANCE PROVIDER</th>
<th>responsAbility energy access fund (Working Capital)</th>
<th>IntelleGrow (Short term Debt for Capacity Building)</th>
<th>GroFin (Start-up &amp; Growth Finance)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Established</strong></td>
<td>2015</td>
<td>2011</td>
<td>2004</td>
</tr>
<tr>
<td><strong>Type of Funding</strong></td>
<td>Loans for growing energy enterprises.</td>
<td>Venture debt (early-stage, viability-based loans linked to cashflow).</td>
<td>Viability-based loan, linked to cashflow. Risk-adjusted returns.</td>
</tr>
<tr>
<td><strong>Size of Investment</strong></td>
<td>Up to $3 million</td>
<td>$50K to $1.25 million</td>
<td>&gt;$50K to $1.5 million</td>
</tr>
<tr>
<td><strong>Fund Size</strong></td>
<td>Target first close of $30 million with investment from IFC, Lundin Foundation and other social investors.</td>
<td>$10 million from a range of social investors including Omidyar Network and Michael and Susan Dell Foundation.</td>
<td>$400 million under management from a range of social and commercial investors.</td>
</tr>
<tr>
<td><strong>Non-financial Support</strong></td>
<td>Technical assistance services for borrowers.</td>
<td>Nimble structure with decision to lend made within six weeks (rather than months).</td>
<td>Extensive business support pre-, during and post-investment and links to international supply chains and functional expertise.</td>
</tr>
<tr>
<td><strong>Investment time horizon</strong></td>
<td>Six to 24 months revolving fund</td>
<td>12 to 36 months</td>
<td>Three to six years</td>
</tr>
<tr>
<td><strong>TARGET IMPACT</strong></td>
<td>Expected to impact 50 million livelihoods and significantly reduce CO₂ emissions.</td>
<td>$230 million deployed by 2020 improving 10 million livelihoods</td>
<td>$650 million deployed, creating over 75,000 jobs and benefiting more than 1.2 million people.</td>
</tr>
</tbody>
</table>

Shell Foundation took “first loss” position on responsAbility fund to attract IFC and other investors.

Source: Graphic from Accelerating Access to Energy: Lessons learned from efforts to build inclusive energy markets in developing countries, Shell Foundation, November 2014
CONCESSIONAL LOANS & GRANTS

Bangladesh

IDCOL Solar Home System (SHS) program

- **IDCOL Model**
  - IDCOL licensed by Bangladesh Bank as non-bank financial institution
  - Most funds flow from multilateral donor agencies to Government of Bangladesh to IDCOL.
  - IDCOL provides grants and low-cost loans for 5-7 years to Partner Organizations (POs)
  - IDCOL sets specifications for SHS equipment.

- **Partner Organizations**
  - Include microfinance institutions, NGOs and private sector entities sell and install SHS to end-users.
  - Use soft loans to extend microcredit to end users
  - Use grants to enhance capacity and reduce system costs

- **Impact:**
  - 47 Partner Organizations involved with IDCOL
  - IDCOL Goal: Started in 2003 with 50,000 SHS goal by 2008.
  - Actual: Over 3 million SHS by 2014 serving more than 12 million people.

Bangladesh Central Bank

- In 2010, the Central Bank introduced a USD 26 million refinancing facility in green energy in Bangladesh from the government’s own budget.
- The fund is being used to incentivize and leverage low cost funding from commercial and state banks.

**Using Natl Bank to Leverage Donor Funds**

**Ethiopia:** Market Development for Renewable Energy and Energy Efficient Products Program (MDRE & EEP)

**MDRE & EEP Model:**
- World Bank providing $40 million to Ethiopia to be disbursed by Development Bank of Ethiopia
- DBE provides concession rate Lines of Credit (LOC) to:
  - Private companies for working capital (in foreign currency) to invest in RE & EE products
  - Requirement to provide 30% project equity and fixed asset collateral limits use.
  - MFIs to provide market rate micro-loans to end users

**Impact:**
- Of initial $20 million in program, $18 million in loans have been approved and nearly $12 million disbursed.
  - 5 MFIs approved at ~USD 2.5 million each
  - 6 SMEs so far approved to import solar lanterns
- MFIs providing short-term loans to households, so only supporting certain technologies – lighting and household biogas
  - Need for longer-term concessional loans from MFIs to access solar home systems

RESULTS-BASED FINANCE

UK Department of International Development (DfID)

- **Results Based Finance (RBF) program for low-carbon energy access**
  - Offers incentive payments, on the basis of results achieved, to businesses which deliver pre-specified outputs within the low-carbon off-grid energy sector
  - Contract signed in advance, but payments made only as sales are achieved and independently verified
  - Operates predominantly in Sub-Saharan Africa and South-Asia with incentives being offered over a 4 year period.
- Funds intended partly for market development.
- Participants must demonstrate long-term financial viability

**Tanzania Impact:**

- Early results from the RBF program in the Lake Zone of Tanzania indicate:
  - 11 new pico-solar product-service options being market-available to rural consumers
  - First half-year sales benefitted nearly 14,000 rural Tanzanians
  - RBF funding has leveraged commercial financing for at least 2 approved companies

### Example Projects

<table>
<thead>
<tr>
<th>Country</th>
<th>RBF Title</th>
<th>Expected total of incentive amounts (£m)</th>
<th>Products to be marked by participating firms and organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin</td>
<td>Lifting up 3 Offgrid PV market segments to the next level</td>
<td>2.4</td>
<td>361k PV lamps, 72k PV lamps with charger, 7,234 pico SHS, 2,550 streetlights, 262 solar pumps</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>Cooking stoves – RBF to extend supply chains into rural areas</td>
<td>1.2</td>
<td>206k clean cookstoves</td>
</tr>
<tr>
<td>Rwanda</td>
<td>Sustainable Market Creation for Solar Lighting</td>
<td>3.4</td>
<td>160k task lights, 192k room lights</td>
</tr>
<tr>
<td>Rwanda</td>
<td>Sustainable Market Creation for Renewable Energy Village Grids</td>
<td>1.891</td>
<td>25 pico-hydro mini grids, 10 micro-hydro mini grids</td>
</tr>
<tr>
<td>Tanzania</td>
<td>Sustainable Market Creation for Renewable Energy Village Grids</td>
<td>1.541</td>
<td>88k pico PV desk lights, 27k pico PV room light kits</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>Output-based PicoPV system development</td>
<td>2.5</td>
<td>255k pico PV systems (mix)</td>
</tr>
<tr>
<td>Vietnam</td>
<td>Creating a Market Driven Biogas Sector</td>
<td>2.75</td>
<td>55,000 biogas digesters</td>
</tr>
</tbody>
</table>

First sub-sectors designated for incentives

USAID Financing Programs

USAID’s Development Innovative Financing (DIV)
- Year-round grant competition awards three distinct stages of financing in small increment testing in order to scale-up those with widespread impact and cost-efficiency
- Tiered funding model approach supports discovery, advances what works, and avoids failure

USAID’s Development Credit Authority (DCA)
- USAID backed credit increases access to small loans in developing countries; USAID provides guidance and shares risks with local banks
- With encouraged lending and less risk, private banks are more willing to lend money to local businesses

21% of awards are dedicated Energy projects
- In rural India, Mera Gao Power (MGP), secured stage 2 financing to improve its cost effectiveness of solar power and battery backup microgrids for off-grid villages
- Off-Grid Electric Tanzania provides rural populations with pre-paid electricity via mobile banking in small increments to reduce risk and increase consumer services¹

In 2012, DCA backed credit of $77 million dedicated toward Clean Energy in India, Nigeria, and South Africa
- Kenya Commercial Bank (KCB) provided access to $1 million credit for SMEs in the clean energy sector
- Post-tsunami programs in Indonesia utilized $16 million towards projects including renewable energy and rural electrification²

¹ Source: <http://www.usaid.gov/sites/default/files/documents/15396/DIV%20Factsheet%20Fall%2014%20Final.pdf>
**Examples of Finance Mechanisms**

**Mali**

**Capital Cost Subsidies**

Support for Private-Sector Minigrid Developers

- Agency for the Development of Domestic Energy and Rural Electrification (AMADER) is a rural electrification agency that serves as a “one stop shop.”
  - AMADER regulates the market, selects projects, and provides capital subsidies to mini-grid developers

- Capital cost subsidies for approved developers
  - Technology neutral, based on mini-grid capital costs and operating conditions
  - Fund can accommodate private sector funding, but mostly funded by international donors at present
  - Developers finance remaining project costs through private sector

- AMADER runs two programs for private developers
  - “Top down” method involves competitive bidding by developers on pre-set concessions
  - “Bottom up” method allows developers to submit an unsolicited proposal.
  - Developers prefer the “bottom up” method.
  - Developers set their own tariffs
  - Support for diesel-powered mini-grids to hybridize

Asantys Systems has installed 550 kWp in Solar-Diesel Hybrid Village Power Systems in Mali

**Utilizing Resources and Partners**

- D.light is a for-profit company which designs, manufactures, and distributes solar-powered lights and power products throughout the developing world
  - D.light’s business decisions transformed a student-led design contest into a global powerhouse for access to light and power
  - Company partnerships include:
    - UKAID’s DFID
    - Shell Foundation (SF)
    - USAID
  - Venture Capital Investors include:
    - Omidyar Network
    - DFJ
    - Nexus Venture Partners
    - Acumen Fund
    - Gray Ghost Ventures
    - Garage Technology Ventures
    - The Mahindra Group

Source: Accelerating Access to Energy. Shell Foundation, December 2014

SOCIAL ENTERPRISE DEBT FUND: DEUTSCHE BANK’S ESSENTIAL CAPITAL CONSORTIUM (ECC)

- ECC is an innovative $50 million global venture debt impact fund established by Deutsche Bank’s Global Social Finance to address the lack of high-risk growth debt capital for businesses in impact-oriented sectors such as energy access.

- **Products** offered:
  - **Type of funding**: senior or subordinated debt
  - **Tenor**: 2 – 3 years, up to 5 years
  - **Amount**: between $1 to $5 million USD
  - **Currency**: USD and local currency (swapped to USD using hedging partners)
  - **Rate**: concessionary to market based rates, varying by product and tenor
  - **Collateral**: secured (receivables, inventory, etc) or protected by external guarantees
  - **Product Use**: working capital and other growth

- **20% guarantee against losses** from Swedish Development Agency (SIDA) provides credit enhancement to investors.

- **4% target investor return** with 5 year tenor

Diverse investor group including institutional and corporate investors, HNW individuals, and foundations, including $5.5 million principal investment from Deutsche Bank.

CONCLUSION

Please Consider these Questions Before the Roundtable:

1. Which of the financial mechanisms listed in this presentation hold the most promise for scaling up energy access?

2. Are different mechanisms best suited for various market segments – manufacturers, distributors, project developers, retail service, end users?

3. Which, if any, of the innovative finance mechanisms have transformational potential in the market?