The True Costs of Solar PV:
IRENA’s Cost Analysis

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A dynamic market
The energy sector is being transformed.

A virtuous cycle is unlocking the economic, social and environmental benefits of renewables.
Recent cost trends

Rapidly declining solar PV module prices.....

......and installed costs

Source: IRENA Renewable Cost Database, BNEF and Global Data
Solar resources, deployment...

Missed opportunities:

Deployment typically is not where the best resources exist!
Beyond narrow markets
Accelerating PV deployment

The absence of up-to-date cost data is a barrier…

…in response, IRENA is ramping up its work
Renewables are increasingly competitive!

IRENA’s analysis of 9000 utility-scale projects and 200k small-scale solar PV allows us to make conclusions like this:
Solar PV costs:
Current work

1. IRENA Renewable Costing Alliance
   - Works at technical level
   - Pool, confidentially, data
   - Low overheads
   - Entirely voluntary, no fees

2. Accelerating cost reductions in new markets in Africa

3. IRENA’s Solar PV Parity Indicators
Solar PV costs: Current work… continued

1. IRENA Renewable Costing Alliance

2. Accelerating cost reductions in new markets in Africa
   - Joint project with GIZ/BMZ
   - Focus on collecting up-to-date data on current costs for utility-scale, mini-grids and SHS
   - What do “competitive” costs look like in Africa?
   - What are the barriers to achieving these levels in new markets in Africa?
   - How do we get there? What facilitating policies are needed?

3. IRENA’s Solar PV Parity Indicators
Accelerating cost reductions in new markets in Africa

Why Africa?

- 599 million people without access to electricity (IEA)
- Deployment is tiny relative to potential and excellent resources exist
- Off-grid sector is growing rapidly, but what are the costs, why so few systems so far?

Table 4: Global status of off-grid solar home systems markets

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Solar Home Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>2013 (Dec)</td>
<td>About 2 600 000</td>
</tr>
<tr>
<td>India</td>
<td>2012 (March)</td>
<td>861 654</td>
</tr>
<tr>
<td>China</td>
<td>2008</td>
<td>&gt; 400 000</td>
</tr>
<tr>
<td>Kenya</td>
<td>2010</td>
<td>320 000</td>
</tr>
<tr>
<td>Indonesia</td>
<td>2010</td>
<td>264 000</td>
</tr>
<tr>
<td>Nepal</td>
<td>2012</td>
<td>229 000</td>
</tr>
<tr>
<td>South Africa</td>
<td>Est.</td>
<td>150 000</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>2011</td>
<td>132 000</td>
</tr>
<tr>
<td>Morocco</td>
<td>Est.</td>
<td>128 000</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>Est.</td>
<td>113 000</td>
</tr>
<tr>
<td>Mexico</td>
<td>Est.</td>
<td>80 000</td>
</tr>
<tr>
<td>Tanzania</td>
<td>Est.</td>
<td>65 000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>5.1 million</td>
</tr>
</tbody>
</table>

Source: IRENA, 2013

[NB: The information is indicative, data gaps prevent reliable analysis of the number of SHS deployed globally]
Accelerating cost reductions in new markets in Africa

Utility scale solar PV projects in Africa
- Operating or under construction in 8 African countries
- A further 6.5 GW either permitting or financed
- Some projects with competitive cost structures

Source: IRENA Renewable Cost Database and Global Data, 2014
Off-grid PV costs in Africa are still high…..
But there are encouraging opportunities for cost reduction
Accelerating cost reductions in new markets in Africa

For example, off-grid solar home systems in Uganda show large variation in offers and costs

<table>
<thead>
<tr>
<th>Size (kW)</th>
<th>Battery</th>
<th>Cost (USD/kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>2 x 12V/ 100 Ah</td>
<td>1731</td>
</tr>
<tr>
<td>1</td>
<td>2 x 12 V / 150 Ah</td>
<td>2692</td>
</tr>
<tr>
<td>1.5</td>
<td>2 x 12 V / 230 Ah</td>
<td>3269</td>
</tr>
<tr>
<td>3</td>
<td>8 x 6 V / 220 Ah</td>
<td>6154</td>
</tr>
</tbody>
</table>
Accelerating cost reductions in new markets in Africa

Timeline

- Data collection till December 2014
- Analysis and cost reduction identification till Jan 2015
- Drafting of results and handbook Feb-Apr 2015
- Publication June 2015
- Can you help us make the analysis better?
Solar PV costs: Current work... continued

1. IRENA Renewable Costing Alliance

2. Accelerating cost reductions in new markets in Africa

3. IRENA’s Solar PV Parity Indicators
   - Tracks quarterly competitiveness
   - Indicators, not actual costs
   - Target audience are policy makers and thought leaders
   - Start with North America
   - Can lead to more detailed analysis
   - Supports other IRENA activities
IRENA Solar PV Parity Indicators

Methodology

- Simple metrics
- LCOE vs Effective Electricity Rate/Value
- Leads to detailed assumptions & analysis
Residential PV Parity:

- Recent module price reductions make solar PV increasingly competitive
Residential PV Parity: San Francisco

- Nuanced results depending on rate and system cost
Installed cost variation by city

- Consistently wide variation in installed costs
IRENA Solar PV Parity Indicators

IRENA’s PV cost analysis
- Transparent data
- Simple methodology
- Timely and policy relevant information
IRENA’s PV Cost Analysis

Bringing Our Future Forward