Solar manufacturing in India:
A perspective
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Solar Manufacturing: Landscape

### Module Manufacturing Capacity
- Estimated at ~2000 MW

### Cell Manufacturing Capacity
- Estimated at ~850 MW

#### Table of Player Capacity (MW)

<table>
<thead>
<tr>
<th>Player</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Delhi NCR</strong></td>
<td>345W</td>
</tr>
<tr>
<td><strong>West Bengal</strong></td>
<td>60W 210W</td>
</tr>
<tr>
<td><strong>Gujarat</strong></td>
<td>40W 90W</td>
</tr>
<tr>
<td><strong>Maharashtra</strong></td>
<td>180W</td>
</tr>
<tr>
<td><strong>Karnataka</strong></td>
<td>90W 320W</td>
</tr>
<tr>
<td><strong>Andhra Pradesh</strong></td>
<td>70W 760W</td>
</tr>
</tbody>
</table>

#### Module Manufacturing

- **Moser Baer**: 185W 250W
- **IndoSolar**: 160W -
- **Waree**: - 250W
- **Euro Multivision**: 40W -

#### Cell Manufacturing

- **Tata BP Solar**: 84W 125W
- **Solar Semiconductor**: 60W 195W
- **XL Energy**: - 192W
- **Titan Energy**: - 100W
- **Surana**: - 50W
- **Photon Energy**: - 50W

#### Other Players
- **Others**: 145W 243W

Note: Only the larger players are shown in the tables. Numbers rounded-off as appropriate. Map and locations are indicative and not to scale.

Source: Company websites, Company Annual Reports, Company profiles and presentations
Manufacturing landscape: The Skew

Indian Solar Manufacturing Landscape

Polysilicon → Ingots → Wafers → Cell → Module

- 850 MW
- 2000 MW

No player in India

Around 50 players

Module Manufacturing Players Size-wise split

- 35 players
- 7 players
- 6 players

Experience (years)

- 38% 5+
- 62% less than 5

Market Focus

- 75% Export oriented
- 25% Others

- 70~75% of the value not captured
- Competitive pricing?
- Quality Subcomponents
- Fragmented operations
- ~33 of 48 module manufacturers are <50 MW
- 6 out of 10 have ~5 yrs of operation experience
- Market focus
- ~75% capacity in EOU/SEZ
- Low capacity utilization.
First solar has the highest market share in the module market~22%

5 out of 10 suppliers are Chinese

Vikram solar is the only Indian manufacturer to feature in the top 10

~18% market is catered by the domestic manufacturers.

Source: India Solar Map, Bridge to India, September 2013
Case Study 1: South Africa Renewable Energy Independent Power Producer Procurement Programme (REIPPP)

- **Structured**, multiple bid submission windows accommodating multiple projects totalling 6925 MW

- **Bid process** based on
  - **Price/tariff** (evaluation score weighting of 70%)
  - **Economic Development commitment** (30%)

- **Economic Development commitments** include
  - **Local content**
  - **South African ownership, incl. local communities**
  - **Job creation**
  - **Socio economic development in local communities**

- **20 yr** PPA with Eskom, terms non-negotiable, consultations during design phase

- **Small Project Programme**: <5 MW, 200 MW total

### Phase | Size | Particulars
--- | --- | ---
Window 1 (1415 MW) | 28 projects, capex $5.75bn | ▶ 18 PV projects (631 MW)  
▶ 8 Wind projects (634 MW)  
▶ 2 CSP projects (150 MW)  

Window 2 (1044 MW) | 19 projects, capex $3.5 bn | ▶ 9 PV projects (417 MW)  
▶ 7 Wind projects (562 MW)  
▶ 1 CSP project (50 MW)  
▶ 2 Small Hydro (14.3 MW)  

Window 3 (1165 MW) | Bid submission date Oct 2013 |
Visible, consistent and effective government support crucial

Results of bid windows 1 & 2: Published Dept of Energy

<table>
<thead>
<tr>
<th></th>
<th>W1 Avg bid price $/kWh</th>
<th>W2 Avg bid price $/kWh</th>
<th>W1 Local Content %</th>
<th>W2 Local content %</th>
<th>W1 Jobs indicated construction</th>
<th>W1 Jobs indicated operations (MW)</th>
<th>W2 Jobs indicated construction</th>
<th>W2 Jobs indicated operations (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photo-voltaics</td>
<td>$0.34</td>
<td>$0.20</td>
<td>28.5%</td>
<td>47.5%</td>
<td>10.386 (632 MW)</td>
<td>221 (632 MW)</td>
<td>4.557 (417 MW)</td>
<td>194 (417 MW)</td>
</tr>
<tr>
<td>CSP</td>
<td>$0.33</td>
<td>$0.31</td>
<td>21.0%</td>
<td>36.5%</td>
<td>1.165 (150 MW)</td>
<td>70 (150 MW)</td>
<td>662 (50 MW)</td>
<td>50 (50 MW)</td>
</tr>
<tr>
<td>Wind</td>
<td>$0.14</td>
<td>$0.11</td>
<td>21.7%</td>
<td>36.7%</td>
<td>1.869 (634 MW)</td>
<td>128 (634 MW)</td>
<td>1.579 (562 MW)</td>
<td>65 (562 MW)</td>
</tr>
<tr>
<td>Small Hydro</td>
<td>-</td>
<td>$0.12</td>
<td>-</td>
<td>66.7%</td>
<td>-</td>
<td>-</td>
<td>261 (14 MW)</td>
<td>7 (14 MW)</td>
</tr>
</tbody>
</table>

Source: Respective websites, Secondary sources
Case Study 2 Virginia Clean Energy Manufacturing Incentive Grant (CEMIG) Program /Solar Photovoltaic Manufacturing Incentive Grant (SMIG) Program (till 2013)

What

- Grant given to manufacturers of solar photovoltaic panels in Virginia. Program expanded in 2013 to include other renewable energy manufacturers as well.

SMIG

- Years 1 and 2 - $0.75/watt
- Years 3 and 4 - $0.50/watt
- Years 5 and 6 - $0.25/watt

Maximum of $4.5 million / year

- CEMIG is based on the expected ROI of business and is decided on a case-to-case basis, subject to maximum of $9mn per entity.

How much

Eligibility

- Capital investment of more than $50 million in Virginia on or after July 1, 2011
- Creation of 200 or more new full-time jobs on or after July 1, 2011

Source: Respective websites, Secondary sources
Solar Manufacturing: The Perspective

Manufacturing policy
- Consistent & end goal focused policy
- SIPS
- Complimentary fiscal /Tax incentives
- Differential custom and excise duties on components than fully assembled; Denmark & Germany

Procurement cycle
- Time bound & reliable flag posts
- Lower tariff Vs domestic manufacturing
- Evaluation criterion
- Complimentary financial/ fiscal incentives
- Soft loans for projects with x% local content; Denmark & Germany
- AD benefits only on locally manufactured cell/module
- Favorable allocation: Canada, US, Brazil

Reviving existing units
- The positive NFE requirement at EOU/SEZ units
- Manufacturing hubs
- Upstream & downstream end to end-systems
- Sub components & ancillaries

R&D, HR
- R&D on Efficiency improvements;
- ‘Hyphen’ manufacturing to localize content; Auto sector
- Prioritize manpower training to reduce costs
Thank You

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