Solarizing India’s Irrigation: Can PM-KUSUM live up to its promise?

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**PM-KUSUM: The targets**

**Component-wise revised solar capacity and financial support is given below:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Revised target</th>
<th>Solar capacity (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10,000 MW</td>
<td>10.0</td>
</tr>
<tr>
<td>B</td>
<td>20 lakh Pumps</td>
<td>9.6</td>
</tr>
<tr>
<td>C</td>
<td>15 lakh Pumps</td>
<td>11.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>30.8</strong></td>
</tr>
</tbody>
</table>

**Year-wise revised target under the three components are as given below:**

<table>
<thead>
<tr>
<th>Year</th>
<th>Component-A (Commissioning target in MW)</th>
<th>Component-B (Sanction target in Nos.)</th>
<th>Component-C (Sanction target in Nos.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Individual pump solarization</td>
<td>Feeder level solarization</td>
<td></td>
</tr>
<tr>
<td>2019-20</td>
<td>0</td>
<td>1,50,000</td>
<td>82,000</td>
</tr>
<tr>
<td>2020-21</td>
<td>500</td>
<td>5,50,000</td>
<td>1,18,000</td>
</tr>
<tr>
<td>2021-22</td>
<td>4,500</td>
<td>6,00,000</td>
<td>2,00,000</td>
</tr>
<tr>
<td>2022-23</td>
<td>5,000</td>
<td>7,00,000</td>
<td>3,50,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10,000</strong></td>
<td><strong>20,00,000</strong></td>
<td><strong>7,50,000</strong></td>
</tr>
</tbody>
</table>

Source: MNRE
The progress so far

Component A
9 : States have made some progress
5 : Reached the tender stage
1 : Have issued LoA

Component B
7 lakh : Pumps tendered so far

Component C
10 : States have made some progress
5 : Reached the tender stage
1 : Have issued work orders

Source: Publicly available information; SERC's filings, etc.
Deep-dive

Component A
Component A: On-ground views and challenges (1/2)

- State-level coordination
  - Most States have discoms as the implementation agency. Punjab and Rajasthan are exceptions.
  - Inter-departmental coordination could be a cause of concern.
    - Pilots in Karnataka are delayed by up to 2 years – delay in approvals for land diversion and construction of evacuation infrastructure.

- Discoms’ perspective
  - **Money matters**: Generally interested, if there’s commercial viability.
  - **Long-term view**: Need integration with long-term planning.
    - Maharashtra included feeder solarisation in its solar policy.
    - States with excess contracted capacity are reluctant.
  - **RPOs are not doing the magic**
    - Many states are already fulfilling, looking at other pipeline.
    - Difficulty in registering farmers’ for RECs (AP and KN).
Component A: On-ground views and challenges (2/2)

• Commercial viability
  – Most SERCs determining tariffs (LCOEs) inline with large-scale projects
    • Limited economies of scale, cost of dedicated evacuation bay, etc. are not particularly considered
    • In MSKvy, a ceiling tariff ₹3.1 fetched limited bids. Only 1,800/7,000 MW received bids

• Financing
  – Farmers’ finding it challenging to source equity:
    • In Rajasthan, banks not accepting farm land as collateral
    • Karnataka worked around the issue by allowing SPVs by farmer and the developer

• Component A vs C?
  – One may sabotage the other

<table>
<thead>
<tr>
<th>States</th>
<th>Notified ceiling tariff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rajasthan</td>
<td>₹ 3.14</td>
</tr>
<tr>
<td>Telangana</td>
<td>₹ 3.13</td>
</tr>
<tr>
<td>Punjab</td>
<td>₹ 2.75</td>
</tr>
<tr>
<td>Odisha</td>
<td>₹ 3.08</td>
</tr>
<tr>
<td>Haryana</td>
<td>₹ 3.11</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>₹ 3.09</td>
</tr>
</tbody>
</table>
Deep-dive Component C
Component C: On-ground views and challenges (1/3)

• **The experience so far:**
  – States, which piloted solarisation of individual pumps, are not (bullish about) scaling-up
    • Karnataka – Surya Raitha scheme
    • Andhra Pradesh – Grid-connected BLDC project
    • Gujarat – SKY scheme

• **State-level coordination**
  – SNAs are the implementation agencies in many states, leading to coordination issues
    • Discom’s operational concerns are not adequately addressed
    • Leading to multiple petitions and rejoinders in SERCs. e.g. Tamil Nadu, Punjab

• **Discoms’ perspective**
  – Feeder solarisation is emerging as their favourite
Component C: On-ground views and challenges (2/3)

• **Commercial viability**
  - Lack of farmers’ interest in States with free and reliable power
    - Tamil Nadu: Zero farmer investment. SNA to own the asset. Incentive for farmer to conserve water.
    - Karnataka: At ₹1/unit tariff, farmers opted to sell water. Discoms unable to recover loan in stipulated period
  - High infrastructure upgrade cost to discoms
    - Discoms with limited feeder segregation are not in a position to take-up additional loans (e.g. Chhattisgarh)
    - Gujarat: Retrofitting with ‘Smart Energy Management’ devices

• **Regulatory issues**
  - SERCs recognize the importance of ensuring a remunerative FiT to the farmers, but lack of a standardised approach to arrive at the Feed-in-Tariff
    - Punjab calculated LCOE of ₹1.2 for farmer, then revised it to ₹2.6
    - Rajasthan fixed it ₹3.44 on the merit of supporting farmers
Component C: On-ground views and challenges (3/3)

- **Operational experience**
  - **Metering and billing**: logistics and trust issues
    - All pilot states experimented farmer groups.
    - Karnataka: Cooperatives are dysfunctional. Farmers are not paid yet.
    - Andhra Pradesh: 3 persons involved in meter reading (discom, cooperative, farmer). Not a scalable model.
  
  - **Free-riding**: non-participating farmers
    - Karnataka could not solve the problem. Unauthorised connections were rampant.
    - Gujarat using watchdog device.
    - Andhra Pradesh implemented only after 100% farmers agreed. Delayed the project for 2 years.

  - **Technology**:
    - Some states are struggling to meet the must-run status for 11 kV lines. Prone to tripping.
    - Network connectivity: Karnataka’s experimented with a mini-SCADA system fell through.

  - **Securing land**: a challenge
    - In MSKVY, both the discom and developers found it difficult to get land near substations at viable price.
What can be done?

• Get real
  – Make it demand-driven
    • May not meet the target as per current timeline
  – Engage discoms
    • Create a forum for regular engagement and feedback
  – Understand ‘incentives’
    • For all parties involved: farmers, discoms, developers
  – Iterate
    • Continue making regular improvements

• Look beyond targets
  – Who is getting the support? Are pumps adequately sized?
  – Is the asset getting utilised? Is the irrigation access improving? Is the water getting conserved?
Thank you
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