China’s Distributed Solar PV Ambitions – Policies and Challenges

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Policy & Regulatory Landscape

Since 2013 – Distributed Generation Actively Promoted

Aug 2013: 18 Demo Areas for DG approved
- 2013-2015 implementation period (1823 MW)
- 2013: 793 MW alone
- FIT RMB 0.42 / kWh + local retail electricity tariff based on desulphurization + local subsidy
- Focus industrial & commercial systems
- Self-Generation – Self-Consumption Model

Jan 2014: 81 New Energy Demo Cities + 8 New Energy Demo Industrial Parks approved by NEA
- Spread across 28 Provinces + Municipalities
- 2014-2015 implementation period
- Includes city-level specified targets (e.g. xx m² rooftop-space for solar PV, XX % share of RE power generation capacity, etc.)

Dec 2014: Further 12 Demo Areas for DG approved
- In total 30 Demo areas across 11 provinces and municipalities
- 1/3 of all demo areas in Zhejiang Province alone
- In total 3.55 GW earmarked
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National Feed-in-Tariff Development (07/2008 – 01/2015)

- Early FIT were awarded to natl. demo projects in Inner Mongolia and Shanghai / Chongming Island
- 06/2009 and 09/2010 FIT were the result of a national competitive bidding process
- 2012 through 2015 a fairly stable level of FIT
- **2014 witnessed the introduction of a FIT specifically designed for distributed generation**

Source: NEA
## Policy & Regulatory Landscape

### China’s National Solar PV FIT Status (since 01/2014)

<table>
<thead>
<tr>
<th>Local Solar Resource Benchmark Class</th>
<th>Utility-Scale (Ground-Mounted Solar PV)</th>
<th>Distributed Generation (Industrial and Commercial Rooftop Solar PV)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Feed-In-Tariff (FIT) (RMB/kWh)</td>
<td>Self-Generation and Self-Consumption (RMB/kWh)</td>
</tr>
<tr>
<td>I</td>
<td>0.90</td>
<td>Local Retail Electricity Tariff</td>
</tr>
<tr>
<td>II</td>
<td>0.95</td>
<td>+ 0.42</td>
</tr>
<tr>
<td>III</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

### Possible Future Design
- Introduction of more competitive elements, i.e. developers offer a discount on the FIT
- Clearer distinction btw. utility and distributed generation type of projects
- Level of FIT to be determined by project size
- VAT rebate extended beyond 2015 and possibly integrated
- Urbanization & Green Building Development may lead to the introduction of a specific FIT for BIPV

Note: Local Wholesale Coal-Fire based Tariff Range RMB 0.35-0.45/kWh; Local Retail Electricity Tariff Range RMB 0.5-1/kWh
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<table>
<thead>
<tr>
<th>Case I</th>
<th>Case II</th>
<th>Case III</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% Self-Generation + 100% Self-Consumption</td>
<td>100% Self-Generation + 80% Self-Consumption + 20% Sold to the Grid</td>
<td>100% Self-Generation + 100% Sold to the Grid</td>
</tr>
<tr>
<td><strong>Basic Financials</strong></td>
<td><strong>Basic Financials</strong></td>
<td><strong>Basic Financials</strong></td>
</tr>
<tr>
<td>Local Retail Electricity Tariff (RMB 0.5-1/kWh) + RM 0.42 / kWh</td>
<td>Local Retail Electricity Tariff + RM 0.42 / kWh for self-use + Local wholesale tariff (RMB 0.35-0.45/kWh) for excess power sold to the grid according to % share</td>
<td>Local wholesale tariff (RMB 0.35-0.45/kWh) for excess power sold back to the grid</td>
</tr>
<tr>
<td>FIT Payment 20 years</td>
<td>FIT Payment 20 years</td>
<td>FIT Payment 20 years</td>
</tr>
<tr>
<td><strong>Crucial Issues</strong></td>
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</tr>
<tr>
<td>Metering equipment to measure quantity generated kWh needed Requires reverse power flow precaution equipment by the PV system owner</td>
<td>Single factories/user requires numerous meters to monitor the generation, self-consumption, and sale of excess power</td>
<td>Financially the least profitable model of all, due to low local wholesale tariff offered</td>
</tr>
<tr>
<td>Level of local retail electricity tariff at a given time is determined by the utilities Future adjustment of local retail electricity tariffs are not foreseeable</td>
<td>Forecasting of self-consumption and sale of excess power could be challenging – contractual adjustments of consumption vs. sale could proof challenging</td>
<td>Transformer station needs to invested by the grid company Future upside adjustment of wholesale tariffs will be offered to PV plant owner/operators is unclear</td>
</tr>
<tr>
<td>Load stability important</td>
<td></td>
<td>Only if multiple bldg use the same electrical meter electricity can be sold to multiple bldg’s</td>
</tr>
</tbody>
</table>
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Distributed Solar PV – Critical Issues Hampering Fast Execution of Projects

- **Identification of “roof ownership”** requires a longer lead time, hence higher soft costs
- The number of **structurally suitable roofs** available might be considerable less than anticipated, because the majority were built using colored steel, which is less sturdy compared to concrete and thus are subject to significant shorter lifespan
- **Contract risk**, if the bldg owner decides he doesn’t want to pay for the PV electricity anymore and wants to renegotiate or the ownership of the bldg changes
- Will factories still be around in 20 years? If from a macro perspective the **average life span of privately owned companies** is less than 3 years, 60% will go bankrupt in 5 years and 85% will disappear within 10 years?
- To **mobilize local funding** for distributed solar projects proofed to be a major challenge, due to the perceived risk and smaller capacities
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2014 September Distributed PV Policy Announcements – Summary

- Conduct Rooftop Resources, identify priority projects e.g. in Dev Zones
- Design of new / renovated buildings shall incorporate PV applications
- Broaden Scope of “eligible” projects and up to capacity of 20 MW
- Developer can choose support policy previously granted to utility projects
- Local Protection, i.e. local content policies are no longer allowed
- Establishing local financial support schemes encouraged
- Nationwide monitoring and reporting scheme to be established
- Developer and end-user can directly negotiate the tariff
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2014 Sept Distributed PV Policy Announcements – Eligible Project Types

Fish Ponds

Agriculture

Mountain Slopes

Future Solar Highway
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Zhejiang Province Formulates City Level Support Policies for DG

- To date approx. 15 cities across Zhejiang have announced city-level support policies
- April 2014 – Ningbo govt. offers RMB 0.10 / kWh for up to 5 years
- By 2015 Ningbo aims at 370 MW

- 2014: 1 GW DG + 200 MW Utility Quota
- 2014: 270 MW DG, in total 300 MW realized
- 2015: 700 MW DG + 300 MW Utility Quota
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Zhejiang / Jiaxing – A National Model for Local Distributed Solar PV Policy

<table>
<thead>
<tr>
<th>Subsidy mode</th>
<th>Generated power</th>
<th>Generated power</th>
<th>Generated power</th>
<th>Installation capacity</th>
<th>On-grid power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>20yrs</td>
<td>20yrs</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Level of Subsidy RMB</td>
<td>0.42 RMB/kWh</td>
<td>0.3 RMB/kWh</td>
<td>0.1 RMB/kWh</td>
<td>0.457 RMB/kWh</td>
<td>1 RMB/w</td>
</tr>
</tbody>
</table>
Domestic Deployment Trends

2014 Market Development – DG Quote Out-/Underperformer

- DG Quote Outperformer
- DG Quote Underperformer

- No single provinces achieved 100% DG quota
- Only Inner Mongolia managed 80% (40 out of 50 MW)
- Only four provinces achieved higher than 50% of their DG quota
- Share of “roof-top” installations remains insignificant

Source: NEA March 2015
2015/2014 Provincial Targets

- **2015**: 17.8 GW (incl. 1.5 GW poverty projects)
- **2014**: 14 GW (8 GW DG + 6.05 GW Utility)

Source: NEA March 2015
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2015: 17.8 GW Target – Profound Change of Regulatory Landscape

- Former deemed impractical “Hard Target Policy” replaced by “Soft Target Policy”
- The new “flexible and pragmatic approach” makes the target easier to achieve
- Streamlined administrative processes shall shorten project application procedures
- Distributed Generation shall still be prioritized
- Introduction of “competitive bidding process”
- Monthly progress monitoring of projects introduced
- Performance of local govt. will determine the future setting of provincial quotas

Challenges

- Timeline and milestones, mid March, April, June, Sept considered ambitious
- Impact of “market-based” competitive bidding process – on financial attractiveness?
- Relatively high targets set in already grid curtailment stricken provinces?
- Provinces are pressured to perform good, if not quota adjustment, what about quality?
- 1.5 GW of poverty alleviation projects not all companies are interested
- Several provinces lack of attractiveness but shall achieve ambitious targets
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2015 Provincial Project Evaluation Scheme – Hubei

- Individual project capacity below 30 MW & Local governmental entities shall not select more than 3 projects
- Evaluation Criteria (85 Points)
  - Solar Irradiation and Local Site Condition (10 points)
  - Technical Proposal (10 points)
  - Construction Plan (10 points)
  - Grid Connection and Power Consumption Plan (20 points)
  - Preliminary Work (20 points)
  - Previous Construction Experience (5 points)
  - Discount on the FIT (10 points)
- Additional (15 Points)
  - Located in a “New Energy Demonstration City” (2) | Distributed Generation (5) | Continuation of a project under construction (2) | Agro-Project, Poverty Alleviation Project (2) | Local Procurement of Components (2)
China’s 13th Five-Year-Plan (2016-2020)

Driver for PV Development

❖ Macro-Economic Perspective

Energy Supply | Energy Security | Environmental Protection | GHG & Climate Change
China’s Future Urbanization | Green Building Sector Development

❖ Policy Agenda

Power Sector Reform (Utilities & Grid Operators) / Removal of Institutional Barriers
Pricing of Energy and Incentive Policies (Ceiling for Coal Consumption)
Financing (Adjustment of Feed-in-Tariff & Administering of RE Development Fund)

Distributed Generation (Key – Priority)

Grid Planning (Mini/Micro Grid & Integration of Variable Power Generation) & Storage
Domestic Carbon Market
Thank You!

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