Promotion of PV in Germany:
Feed-in tariffs, self-consumption and direct selling
— Review and forecast —

Photovoltaics conference
Koordinierungsstelle Erneuerbare Energien e.V.

Paris, 3 July 2012

Thorsten Müller
Stiftung Umweltenergierecht
www.stiftung-umweltenergierecht.de
Content

- Short description: Stiftung Umweltenergierecht
  (Foundation for Environmental Energy Law)
- Development of PV in Germany
- The different approaches to promote PV in Germany:
  - Feed-in tariffs
  - Self-consumption
  - Direct selling
- Latest decisions on changing the EEG (Renewable Energy Sources Act)
- Open questions related to the further development of PV (in Germany)

www.stiftung-umweltenergierecht.de
Foundation for Environmental Energy Law

- Non-profit organisation established on 1\textsuperscript{st} March 2011; area of legal research: renewable energies, reduction of energy consumption and climate change mitigation
- 46 founding donors, 26 endowments
- Transformation of energy supply was not only the reason, but also the purpose for establishing the foundation
- Central question of research: “How is the legal framework to be changed so as to achieve the objectives related to energy and climate change mitigation policies?“
- Development of new regulatory approaches and laws
- Donations and endowments are very welcome and essential for building up our foundation!

www.stiftung-umweltenergierecht.de
DEVELOPMENT OF PV IN GERMANY

www.stiftung-umweltenergierecht.de
Entwicklung der PV in Deutschland

- 1.1.1991: StrEG (Electricity-Feeding-Act)
- 1.8.2004: Amendment of the EEG
- 2009: Amendment of the EEG
- 1.7.2010: Changes to the EEG related to PV 2010
- 1.4.2012: Changes to the EEG related to PV 2012
- 1.9.1999: "100,000 roofs programme"
- 1.4.2000: Entry into force of the EEG (Renewable Energy Sources Act)
- 1.1.2004: Cost-covering tariffs for PV
- 1.1.2009: "flexible degression"
- 1.1.2009: Support of self-consumption
- 1.7.2010: Introduction of separate steps of degression

Kumulierte installierte Leistung in kW
Vergütung in ct/kWh

www.stiftung-umweltenergierecht.de
FEED-IN TARIFFS, SELF-CONSUMPTION AND DIRECT SELLING
Feed-in tariffs

- Entitlement of installation operators: priority purchase, transmission, distribution of and fixed payment for electricity (§§ 8, 16, 32, 33 EEG)
- Investment security achieved by EEG support scheme is main aspect when financing RE-installations from banks
- Challenge: adjusting the level of EEG-remuneration to decreasing PV modul prices
- Previous reactions by lawmaker:
  - Repeated adjustments of feed-in tariffs
  - New regulatory design for degression
  - Reduction of eligible sites for PV installations
Development of the degression in the EEG

- Originally defined degression (Reduction in tariffs for electricity from new commissioned installations): 5 per cent per annum
- Introduction of a „flexible degression“ which depends on annually installed capacity (1 January 2009)
  - At last: increase of percentage of degression up to 24 % when more than 3.500 MW/a are installed
  - Minor degression when less than 2.500 MW/a are installed
    → Problem: year-end rally
- Degression was split up into two steps in the year 2010:
  → Problem: half-year-rally and year-end rally
- Effect reduced because of the global supply of PV moduls
Self-consumption support

- Self-consumption of electricity produced by PV was always allowed
- As electricity supply costs were lower than feed-in tariffs for PV, self-consumption economically not interesting
- Since 1st January 2009: additional support is paid
  → Artificial creation of grid parity
- Regulation was always controversially discussed:
  - Higher macro economic costs
  - No support of storage
  - Loss of profit for State, municipalities and grid system operators
  - No incentives for a grid and system compatible approach
  - Fundamental problem: Does an optimisation of self-consumption make any sense in energy terms?

www.stiftung-umweltenergierecht.de
Direct selling of PV electricity

- Until 2012 possible, but economically a niche product
- Since 2012: New market premium enables direct selling
- Market premium consists of
  - a financial compensation: difference between market revenues and the not used feed-in tariff payment and
  - the management premium to compensate additional effort
- Criticism:
  - Although the actual market premium design creates investment security, ...
  - ... there is no effect on the supply of PV electricity
  - Additional costs for the EEG surcharge of 500 Mio. € in 2012
  - Basic problem: PV electricity cannot be produced as needed
- Spain: no (more) market premium for PV electricity
LATEST DECISIONS ON CHANGING THE EEG

www.stiftung-umweltenergierecht.de
Amendments of the EEG related to PV in 2012 (I)

Key issues of the legal Act adopted last week:
• New remuneration conditions due to
  – reduction and restructuring of tariffs:

<table>
<thead>
<tr>
<th>Installed capacity: buildings</th>
<th>Other installations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 10 kW</td>
<td>Up to 10 MW</td>
</tr>
<tr>
<td>Up to 40 kW</td>
<td>19,5 ct/kWh</td>
</tr>
<tr>
<td>Up to 1 MW</td>
<td>18,5 ct/kWh</td>
</tr>
<tr>
<td>Up to 10 MW</td>
<td>16,5 ct/kWh</td>
</tr>
<tr>
<td>Up to 10 MW</td>
<td>13,5 ct/kWh</td>
</tr>
<tr>
<td>Up to 10 MW</td>
<td>13,5 ct/kWh</td>
</tr>
</tbody>
</table>

– entitlement to tariff payments is limited to 90 % of the amount of electricity produced in installations with a 10 to 1000 kW capacity (“market integration model”)
• Operator can chose between self-consumption and direct selling or the feeding-in at spot market price
• Remuneration is restricted to installations with a maximum capacity of 10 MW

www.stiftung-umweltenergierecht.de
Amendments of the EEG related to PV in 2012 (II)

- New design for degression by monthly reduction steps
  - Basic degression: 1% per month
  - “flexible degression” is maintained (2.8 % up to -0.5 % per month)
- Direct promotion of self-consumption is abolished
  - Self-consumption still profitable due to the tariff reduction
  - But significantly smaller effect as before
- End of financial promotion: Feed-in tariff and market premium payments for PV will no longer be paid once the overall amount of installed capacity in Germany exceeds the cap of 52 GW
FORECAST: WHAT NEXT?
Consequences of further changes

Situation as long as 52 GW cap is not reached …

• Basic system consisting of feed-in tariff, self-consumption and direct selling remain in force
• But: Cost-effectiveness of all market segments?
• But: Developments cannot be forecasted: Uncertainty about the moment when cap will be reached (2015, 2016 or later?)
  – Risk of a “final race for subsidies”

Situation when 52 GW cap is reached …

• New system: only self-consumption and direct selling without support remain possible
• Questionable…
  – if parallel to self-consumption other business models will still be possible and
  – how financing models can be realised without the guarantee of a feed-in tariff

(Keyword: merit-order effect)

www.stiftung-umweltenergierecht.de
Basic issues still to be solved:

• To achieve appropriate legal framework conditions important and basic questions have to be answered:
  – Which share of renewable energies shall be achieved?
  – How fast shall renewable energies develop?
  – How should the mix of renewable energies look like?
  – How will the future electricity markets be designed?
  – How should appropriate concepts for electricity storage be designed? At which timescale should they be transposed?
  – ...

• It is the task of politics, economics and scientists to come up with answers to these questions before the current legal framework will lapse
Future of feed-in tariff payments

- (How) Can installation operators in the framework of a feed-in tariff system be held responsible for the functioning of the whole system?
- (How) Can incentives be created in the framework of a feed-in tariff system, which allow for a regional or overall control over the capacity to be installed?
- (How) Can and should the public enjoy the benefits after a period of twenty years of support?
- ...

www.stiftung-umweltenergierecht.de
Future of self-consumption

• What is the appropriate reference point to optimize the balance between production and consumption: the respective house, the respective point of consumption?
• How can the individual benefits of the installation operators be combined with benefits for the public?
• Which are the prospects of net metering?
• What are the possibilities of decentral storage used directly by the consumer?
• ...

www.stiftung-umweltennergieriecht.de
Future of direct selling

• Which incentives can be created through market price signals for fluctuating electricity with marginal costs of zero?
• How can the individual benefits of the installation operators be combined with benefits for the public?
• How will business models function when the spot market price will tend to zero or even be negative in case of a high share of fluctuating renewable energies?
• ...
Conclusion

• The EEG has caused a highly notable development
• It is an adaptive system whose full potential remains to be developed
• The stop of support also reflects the unanimity and the lack of planning of politics
• The fact that unresolved questions still exist should not be used as an excuse not to create actively the process of transformation
• There are many indications that it is preferable to provide different requirements for the expansion and the operation of PV installations rather than having a level playing field
• Thereby it should be noted that PV and wind are supply-dependent
Stiftung Umweltenergierecht

Thorsten Müller
Vorsitzender des Stiftungsvorstandes
Ludwigstraße 22
97070 Würzburg
Tel.: +49 9 31.79 40 77-0
Fax: +49 9 31.79 40 77-29
E-Mail: mueller@stiftung-umweltenergierecht.de

www.stiftung-umweltenergierecht.de

Unterstützen Sie unsere Arbeit durch Zustiftungen und Spenden für laufende Forschungsaufgaben

Zustiftungen: Konto 46 74 54 69 bei der Sparkasse Mainfranken Würzburg (BLZ: 790 500 00)
Spenden: Konto 46 74 31 83 bei der Sparkasse Mainfranken Würzburg (BLZ: 790 500 00)