E-CONTROL

WORKING FOR YOU – WHEREVER YOU NEED ENERGY.
Country Case Study: Establishing Feed-In Tariffs In Austria

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September 14th, 14:00 - 15:30

INOGATE-ERRA Training Course: Renewable Energy Regulation
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2. The Austrian Feed-In Tariff and Investment Grant System

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1. Development of RES-E Support in Austria
Renewables: Austria is top-4 of EU-27

% RES 2005: A: 23,5% EU: 8,5%
% RES 2020: A: 34% EU: 20%

[Quellen: RL 2009/28/EU, Energie-Control GmbH]
Renewable electricity: Austria with highest RES-E % in Europe

2007: Austria 65.5 %, EU 16.2 %
Electricity production and consumption
Austrian public grid (1990 – 2008)
RES-E Support: Implementation in Austria (1/2)

- Until 2002: RES-E – support facilitated by 9 provinces
  - Little growth in RES-E
- 2002:
  - Certificate System for small hydropower plants (<10 MW)
  - Green Electricity Act
    - Feed-In Tariffs for 13 years for wind, biomass, PV,…
  - Strong increase in RES-E
    ⇒ Very costly
RES-E Support: Implementation in Austria (2/2)

- **2006: Amendment of Green Electricity Act**
  - Feed-In Tariffs (mostly) reduced
  - 10+2 years
  - yearly limitation of 17 mill € additional support
    - Less increase in RES-E
    - Criticised

- **2008: small amendment**
  - Raw material subsidy: high prices (corn,...) additional 4 Cent/kWh for biogas, liquid biomass

- **2008/09: New Amendment of Green Electricity Act**
  - 13/15 years (for technologies not dependent/depending on resources)
  - yearly limitation: 21 mill € additional support
  - Cost cap for industrial users
    - ???
2. The Austrian Feed-In Tariff and Investment Grant System
Establishing Feed-In Tariffs and Investment Grants in Austria (1/3)

Some Austrian support scheme specialities

- Fixed feed-in tariff paid for each kWh produced, but politics moves towards investment grants (small hydro, black liquor, small PV)
- A licensed, private Green Electricity Company (=GEC) acts as central clearinghouse for energy and financials
- No state budget involved. Law states that all costs are paid by electricity consumers via retailers and grid tariffs (lump sum)
Shortcomings of Austrian feed-in tariffs:

• Risk of falling either
  – short (no investment if the economic support is not enough or if everybody awaits the next legal amendment)
  – or too long (too much and too expensive)

• No exposure to market signals or entrepreneurial risk

• No incentives for optimal generation portfolio, to minimize balancing energy

• 13-year-long cost burden without change
Establishing Feed-In Tariffs and Investment Grants in Austria (3/3)

The Austrian law designs a feed-in cost methodology according to various criteria:

- Cost basis
- Economic efficiency criteria
- Equity criteria
- Development towards market price
- Minimum energy efficiency for biomass/biogas
- ... and many other
Austrian Support-System for RES-E
Feed-in-tariffs and investment grants

- **Small Hydro Power** < 10 MW
  - New Small Hydro Power Plant from law amendment: Investment Grant 10%-30%
  - Similar Middle Hydro Power up to 20 MW (Investment Grant up to 10%)
  - As well as black liquor (Investment Grant up to 30%)

- **"Other" Green Electricity**
  - Wind Power, Biomass, Biogas et al
  - PV up to 5 kW up to law amendment sponsored by Kli.En

- **Feed-in-tariff**

- **System Operator**

- **Balancing Group**

- **Green Electricity Company (licensed)**

- **Electricity Trader**

- **End Consumer**

- **Settlement price for aliquote Small Hydro Power**

- **Further charging of Settlement price**

- **Limitation for energy intensive plants (0,5% NPV)**

- **Flow of "other" green electricity**

- **Flow of small hydro power el.**

- **Cash flow**

- **Cash flow End Consumer - Electricity Trader**

- **Law amendment July 2008**
Financial Support
GEC → Plant Operators

Small Hydro Power < 10 MW

New Small Hydro Power Plant from law amendment: Investment Grant 10%-30%
Similar Middle Hydro Power up to 20 MW (Investment Grant up to 10%)
As well as black liquor (Investment Grant up to 30%)
PV up to 5 kW up to law amendment sponsored by Kli.En

“Other“ Green Electricity
Wind Power, Biomass, Biogas et al

Feed-in-tariff

Settlement price for aliquote Small Hydro Power
Settlement price for aliquote “Other“ Green Electricity

System Operator

Balancing Group

End Consumer

Electricity Trader

Further charging of Settlement price

Limitation for energy intensive plants (0,5% NPV)

Law amendment July 2008
Development of Average Feed-In Tariffs
The Problem of Volatile Raw Material Cost

[August 2010 | Source: Energie-Control GmbH, Öko-BGV, OeMAG]
## Investment Grants for small and medium hydro

<table>
<thead>
<tr>
<th>Size of the plant</th>
<th>Support Cap</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Investment Grant</strong></td>
</tr>
<tr>
<td>Small Hydro max. capacity of 500 kW</td>
<td>Max. 30 %</td>
</tr>
<tr>
<td></td>
<td>Max. 1,500 Euro/kW</td>
</tr>
<tr>
<td>Small Hydro max. capacity of 2 MW</td>
<td>Max. 20 %</td>
</tr>
<tr>
<td></td>
<td>Max. 1,000 Euro/kW</td>
</tr>
<tr>
<td>Small Hydro max. capacity of 10 MW</td>
<td>Max. 10 %</td>
</tr>
<tr>
<td></td>
<td>Max. 400 Euro/kW</td>
</tr>
<tr>
<td>Medium Hydro</td>
<td>Max. 10 %</td>
</tr>
<tr>
<td></td>
<td>Max. 400 Euro/kW</td>
</tr>
<tr>
<td></td>
<td>Max. 6 Mio. Euro</td>
</tr>
</tbody>
</table>
Consumers Pay for Support (1/2)
Traders → GEC

Small Hydro Power < 10 MW
- New Small Hydro Power Plant from law amendment: Investment Grant 10%-30%
- Similar Middle Hydro Power up to 20 MW (Investment Grant up to 10%)
- As well as black liquor (Investment Grant up to 30%)

“Other” Green Electricity
- Wind Power, Biomass, Biogas et al
- PV up to 5 kW up to law amendment sponsored by Kli.En

Feed-in-tariff
- Settlement price for aliquote Small Hydro Power
- Settlement price for aliquote “Other” Green Electricity
- Green Electricity Fee per metering point

System Operator
- Limitation for energy intensive plants (0.5% NPW)

Electricity Trader
- Further charging of Settlement price
- Law amendment July 2008

End Consumer
- Cash flow end consumer - electricity trader

GEC

Flow of “other” green electricity
Flow of small hydro power el.
Price Billed for Feed-In (2010)
Decree of Passed-on billing price

Small Hydro: 6,44 Cent/kWh
Other RES-E: 12,42 Cent/kWh

Electricity Market Price
Base Load 2009: (average) 4,718 Cent/kWh

- paid by electricity suppliers to Green Electricity Company
- additional expense (compared to other electricity) passed on to consumers:

0,4 – 0,6 Cent/kWh on average
Consumers Pay for Support (1/2)
Flat Charge per Metering Point: End Consumers → SO → GEC

Small Hydro Power
< 10 MW

New Small Hydro Power Plant from law amendment: Investment Grant 10%-30%
Similar Middle Hydro Power up to 20 MW (Investment Grant up to 10%)
As well as black liquor (Investment Grant up to 30%)

“Other“ Green Electricity
Wind Power, Biomass, Biogas et al

PV up to 5 kW up to law amendment sponsored by Kli.En

Flow of „other“ green electricity
Flow of small hydro power el.

Feed-in-tariff

Green Electricity Company (licensed)

Before amendm.: (Feed-in-tariff)
Settlement price for aliquote Small Hydro Power
Settlement price for aliquote „Other“ Green Electricity

System Operator

Green Electricity Fee per metering point

Balancing Group

Further charging of Settlement price
Limitation for energy intensive plants (0,5% NPW)

Law amendment July 2008

End Consumer

Electricity Trader

Cash flow
Cash flow end consumer - electricity trader
Flat Charge per Metering Point
Finance of Investment Grants

<table>
<thead>
<tr>
<th>Flat metering point charge to end users under section 22a(1) Green Electricity (Amendment) Act 2006</th>
<th>2007-2009 €/year/metering point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid Levels 1-4</td>
<td>15,000</td>
</tr>
<tr>
<td>Grid Level 5</td>
<td>3,300</td>
</tr>
<tr>
<td>Grid Level 6</td>
<td>300</td>
</tr>
<tr>
<td>Grid Level 7</td>
<td>15</td>
</tr>
</tbody>
</table>

[Source: E-Control, Jan. 2007]

- Expanded to 2012
- paid by consumers to system operators and passed on to Green Electricity Company
Austrian Feed-In Tariffs – Conclusions

– Feed-in tariffs offer a (too?) high security for investors
– Feed-in tariffs usually do not stimulate cost reduction potentials
– The investors’ expectations are often that all costs are covered by feed in tariffs even with less effective investments (additional subsidy for raw material)
– Feed-in tariffs do not stimulate the dynamics of market instruments (competition, cost awareness, etc)

For these reasons investment grants are increasingly implemented
3. Supported RES-E in Austria: Cost, Role of Regulator
Does the market price matter?
Electricity market price development

[01.07.2010 | Source: Energie-Control GmbH]
Market does not matter?
Green power bought by GEC 2002 - 2009

Changing / decreasing small hydro: market price!

2009: in total 5.147 GWh

[Source: Energie-Control GmbH, OeMAG]
Does Austria spend enough?
Feed-In Tariffs paid out 2003 – 2009 per technology

Source: Energie-Control GmbH, OeMAG}
Is RES-E support cost-efficient climate policy?

Costs per saved ton of CO₂

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>€ / t CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind Power</td>
<td>53 - 64</td>
</tr>
<tr>
<td>Solid Biomass</td>
<td>180</td>
</tr>
<tr>
<td>Biogas</td>
<td>253</td>
</tr>
<tr>
<td>Biomasse liquid</td>
<td>185</td>
</tr>
<tr>
<td>Photovoltaic</td>
<td>249</td>
</tr>
<tr>
<td>CO₂-Sequestration</td>
<td>50</td>
</tr>
<tr>
<td>CO₂-Zertificates (ETS)</td>
<td>8.5 - 29.8</td>
</tr>
</tbody>
</table>

- **Increase because of raw material subsidy**: 1.162 (stock of stations) (2010: about 660 - new stations)
- **Balancing energy**: 3 Cent/kWh

[August 2010 | Source: Energie-Control GmbH]
Does Austria spend too much?
The Consumer Point of View

<table>
<thead>
<tr>
<th>Annual Cost Burden for Electricity Consumers in Euro</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Consumer, Grid Level 7, 3,500 kWh per year</td>
<td>30</td>
</tr>
<tr>
<td>Medium-sized Business Consumer, Grid level 6, 100,000 kWh per year</td>
<td>716</td>
</tr>
<tr>
<td>Industrial Consumer, Grid Level 3, 150 GWh per year</td>
<td>638,812</td>
</tr>
</tbody>
</table>

Additionally: cost of balancing energy by intermittent RES-E

Additionally: cost limitation for energy intensive consumers (passed-on cost of green electricity > 0,5% NPV)
Role of the Regulator

- Each year: Official Report on the development of supported RES-E

- Regulatory support for Ministry of Energy:
  - Each year: decree for feed-in tariffs
  - Each year: decree for Passed-on Billing Price
  - Other topics: ad hoc / on demand
4. Supported RES-E: Outlook
**Austrian Outlook**
Additional RES-E in Austria until 2015

<table>
<thead>
<tr>
<th>Energy source</th>
<th>capacity</th>
<th>production</th>
<th>Restriction: public acceptance?</th>
</tr>
</thead>
<tbody>
<tr>
<td>hydro</td>
<td>700 MW</td>
<td>3.5 TWh</td>
<td>(50% of it without support)</td>
</tr>
<tr>
<td>wind</td>
<td>700 MW</td>
<td>1.5 TWh</td>
<td>(350 windmills)</td>
</tr>
<tr>
<td>solid biomass</td>
<td>1 mio cm</td>
<td>0.5 TWh</td>
<td>(material availability)</td>
</tr>
<tr>
<td>agro energy crops</td>
<td>0,1 - 0,5 mio ha</td>
<td>0,4 – 1,8 TWh</td>
<td>(area availability)</td>
</tr>
</tbody>
</table>

- What is a reasonable role for photovoltaics?
- Austrian total electricity production: 55 TWh
- General restriction: The development of the total energy consumption is of high relevance regarding the future energy supply.
Will RES-E become marketable?
Feed-in tariffs and electricity market price 2003 - 2009

Source: Energie-Control GmbH
EU Status
RES-E account for 62% of new generation capacity installed in the EU in 2009

[Source: European Commission „Renewable Energy Snapshots“, 2010]
Wind: Significant Differences per Country
Wind power installed in Europe 2009

[Source: EWEA 2010]
Wind Outlook
Distribution of full load hours in Europe

Map 3.2  Distribution of full load hours in Europe
(80 m hub height onshore, 120 m hub height offshore)

<table>
<thead>
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