The promotion of renewable energy supply (RES) in Hungary

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Rational to promote RES

- Reduce local and global pollution
  - First best solution: pollution taxation/pricing, including CO2 pricing
- Increase supply security
  - Gas import dependence
  - Fuel mix diversity
- Industrial development
  - Developing local industry and employment
    - Germany, Spain, Denmark
  - Importing the positive externalities of technological innovation or developing a local champion – choice of support system
  - Developing an exporting EU industry
    - Given that world trends are for RES…China, India?
  - Importance of understanding local comparative advantages

COST EFFICIENCY, GRADUALITY
The beginning in Hungary: 2001

- Major motivation: EU RES policy context
- Hungary agreed to increase the share of its RES electricity generation up to 3.6% of domestic consumption (DC: ~ 40 TWh)
- Baseline in 2001: ~ 0%
- No policy preference for any particular type of RES
- No real understanding of RES potentials / costs
- The proposal of the Regulator: establishing a production support scheme to meet the 3.6% target at least cost — Uniform Feed In Tariff
- Tariff level based on avoided damage estimate
Note: the model of the renewable electric energy feed-in tariff scheme

Costs, prices

MC: marginal cost of renewable electricity generation

Feed in tariff for renewable electricity

Support for 1 kWh renewable electricity

Market price for electricity

kWh renewable electricity

Support for 1 kWh renewable electricity

Renewable electricity generated without price support

Renewable electricity generated due to the renewable price support
Note: efficiency stimulating effect of feed-in schemes

Costs, prices

MC$_1$ marginal cost of renewable electricity before technological development

MC$_2$ marginal cost of renewable electricity after technological development

Feed-in tariff for renewable

Gains of technical development remain at the

All profit increase

Generated electricity before the technical development

Increase of generated electricity due to technical development

kWh renewable

P$_h$
RES support schemes in the EU

Source: Rickerson et al. (2007)
What has the uniform FIT system delivered?

Development of RES-E generation 😊

Dominance of large biomass 😞

Germany and Hungary are the only countries that met the 2010 RES-E target.
Shortcomings

• Promotion of outdated technologies (large biomass with < 30% efficiency)
  ▶ Political debate about its effects on forest quality

• No attention to RES in heat production
  ▶ Heat accounts for 40% of primary energy consumption in Hungary

• Investment into wind is limited by quota set by TSO and Regulator (330 MW)
  ▶ Its allocation was not transparent and market based

• RES support mixed up with CHP support

• Rent seeking spoiled the FIT scheme

  switch to differentiated FIT scheme
## The Hungarian feed-in tariffs in force from January 2009, (huf (¢€))

<table>
<thead>
<tr>
<th>FEED-IN TARIFF</th>
<th>From 1st January 2009 HUF (¢€)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak</td>
</tr>
<tr>
<td>Based on resolution of Hungarian Energy Office (HEO) if it was adopted or the application was received before 01. 01. 2008, [except hydro power station units (PSU) &gt;5 MW]</td>
<td>Solar, Wind</td>
</tr>
<tr>
<td>Based on resolution of HEO adopted after 01. 01. 2008, (except hydro PSU &gt;5 MW, other PSU &gt; 50 MW)</td>
<td>Other than Solar and Wind</td>
</tr>
<tr>
<td>Produced from renewable energy sources</td>
<td>Solar</td>
</tr>
<tr>
<td>Produced by PSU of 20 MW or less (except Solar)</td>
<td>31.13 (11.1)</td>
</tr>
<tr>
<td>Produced by PSU of &gt;20 MW - max. 50 MW (except Wind from 30th Nov. 2008, Solar)</td>
<td>24.90 (8.9)</td>
</tr>
<tr>
<td>Produced by Wind PSU of &gt;20 MW - max. 50 MW from 30th Nov. 2008</td>
<td>31.13 (11.1)</td>
</tr>
<tr>
<td>Produced by PSU comprising used equipment</td>
<td>19.36 (6.9)</td>
</tr>
<tr>
<td>Produced by hydro PSU &gt; 5 MW, other PSU &gt;50 MW</td>
<td>19.36 (6.9)</td>
</tr>
</tbody>
</table>
The operation and settlement regime of the Hungarian obligatory FI balance circle

Feed-in tariff set by statutory order, obligatory taking over period and amount of yearly fed RES-E set by HEO resolution.

Based on principles in the ministerial decree the allocation process is set in the business code (fluctuation obligatory taking over at fluctuating price, like German and Austrian examples).
Average RES Electricity Prices in ERRA Countries in 2008 by Technology

- AVERAGE
- SOLAR
- WIND
- HYDRO <10MW
- HYDRO <1MW
- HYDRO >10MW
- Biomass
- Biogas
- Other
Why do investors like the FIT?

- **Average feed-in tariff**
- **Estimated wholesale price**
- **Unit price subsidy**
How to get out of the FIT scheme?

- Hungarian answer: RES producers get the support until the original investment is paid back
- Application of the Net Present Value method
- FI tariff is set by the Government
- Regulator estimates NPV assuming the (escalated) tariff and a „justified” return on investment
- Production quantity eligible for support is defined in the license for each of the renewable producers
- After production quota is exhausted, producer is on the market
The NPV method

*Net Present Value (NPV) method*

\[
NPV = -I_0 + \sum_{i=1}^{n} \frac{CF_i}{DF_i}
\]

where:

- \( I_0 \) is the value of the initial investments
- \( CF_i \) is the cash-flow of the year \( \text{“}i\text{”} \)
- \( DF_i \) is the discounting factor in year \( \text{“}i\text{”} \)

\[
DF_i = (1 + r)^t
\]

Investments return if \( NPV \geq 0 \)
Estimated pay back periods for typical investments in Hungary

*Estimated returns in Hungary (2008)*

- Rubber trimming power plants
- Cogeneration (not RES)
- Sewage-treatment gas power plant
- Biogas PP without gas deposit
- Geothermal power plants
- Biomass power plants
- Biogas PP with gas deposit

Payback periods:
- 3 years
- 4 years
- 7 years
- 8 years
- 9 years
- 10 years
- 11-12 years
- 14 years
- 15 years

*Years*
Additional support mechanisms: the example of Hungary
The way forward

• National Renewable Action Plan: 14.6% of final energy consumption is to be produced on renewable basis by 2020
  ‣ Biomass and geothermal in renewable heating
  ‣ Small green-field biomass and wind in electricity

• Alternatives to the present FIT regime under discussion
  ‣ Feed in bonus
  ‣ Green certificate trading

• Major simplification of the licensing regime is needed