Wind Energy in Hungary
- Potential, Benefits and Barriers
Director Jannik Termansen, Vestas Wind Systems A/S
Reaching the EU RES target by 2020 may be demanding.
Fraunhofer ISI: “With business as usual RES policies Hungary will not reach her 13% RES target”

• By retaining current RES support a doubling of current RES deployment can be expected by 2020

• Corresponding to a share of 8.7% RES in gross final energy demand by 2020

• Consequently, facing a huge gap in size of 4.3% of gross final demand, Hungary would fail to fulfill the 2020 RES target of 13%
Fraunhofer ISI: “With strengthened RES policies Hungary can reach her 13% RES target"

• Effective and efficient RES support with strengthened national RES support would allow Hungary to speed up RES deployment significantly

• With strengthened national policies Hungary achieves a 2020 RES deployment corresponding to 13% of gross final energy demand – equal to the agreed Hungarian EU target

Source: Fraunhofer Institute 2009, Future pathways for renewable electricity in EU
We believe that Wind Energy represents a key technology option for Hungarian power generation in reaching the EU RES target of 13% by 2020.

Because Wind Energy is...

- Competitive
- Predictable
- Independent
- Fast
- Clean
And Hungary offers good wind sites

The Hungarian wind map in 50m

The Hungarian wind map in 100m

Source: Technical Faculty of University Szent István, Hungary
Exploiting Hungarian wind potential brings local Hungarian benefits
RES-E avoid fossil fuel imports (economy and energy security)
- with impact on Hungary’s trade balance, contributing to Hungary’s security of supply
- with a potential savings of 570 million € on average per year
- creating less dependence on gas imports and strengthening Hungary’s energy security

RES-E avoid CO₂ emissions and polluted waste (climate and environment)
- for climate protection and avoided expenses for emission allowances
- with a potential savings of over 100 million € on average per year

A Vestas V90 3.0-MW turbine alone is carbon neutral after only seven months of energy production; during its lifetime it saves the atmosphere from 220,000 tons of CO₂

Wind energy brings local green jobs

<table>
<thead>
<tr>
<th>*Industry</th>
<th>Wind</th>
<th>Coal</th>
<th>Gas</th>
<th>Nuclear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobs/MWa</td>
<td>2.79</td>
<td>1.01</td>
<td>0.95</td>
<td>2.18-2.34</td>
</tr>
</tbody>
</table>

Because wind energy deployment is local...

- 65.9 GW installed
- 154,000 jobs created
- 22.3 GW installed
- 80,000 jobs created
- 14.7 GW installed
- 31,500 jobs created
- 3.1 GW installed
- 21,600 jobs created

Wind energy brings more local green jobs per national energy budget...

Cost factors of wind and other renewables (levelized)

Sources: NEA & IEA 2005, World Bank 2009
So, how can Hungary strengthen her policies in order to reap the benefits from Wind Energy and reach the EU RES target by 2020?

Hungary should further increase business case certainty for wind investors.

Four Recommendations →
Recommendation #1

Remove 330 MW cap on wind power

• Evaluate system capacity and necessary grid reinforcements to connect higher shares of wind power.

• Create adequate regional wind maps – and plan for all available wind resources.

Source: Fraunhofer Institute 2009, Future pathways for renewable electricity in EU
Reconsider compulsive forecasting system and imbalance penalties

- Compulsive forecasting and penalty system (edict 389/2007) may do harm to Hungary’s own RES-E ambitions (reduces investors’ incentives and creates less market attraction).

- Load on Hungarian grid from wind turbines are relatively low. Fluctuation of consumption exceeds by far the fluctuation of energy generation by wind turbines.

Source: Fraunhofer Institute 2009, Future pathways for renewable electricity in EU
Recommendation #3

Plan and invest in improved grid infrastructure

- Create adequate regional wind maps – and plan for all available wind resources.

- Assess and plan for necessary grid reinforcements to connect high shares of wind power above 330 MW.

- Maintain Wind Energy’s priority access to grid.

Source: Fraunhofer Institute 2009, Future pathways for renewable electricity in EU
Recommendation #4

Streamline permitting procedures

What is the cost of stronger RES policies for Hungary?

Utilisation of the Hungarian wind potential brings local Hungarian benefits

Avoided fossil fuel imports
- with impact on Hungary’s trade balance, contributing to Hungary’s security of supply
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Avoided CO₂ emissions and polluted waste
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The benefits

Wind energy brings local green jobs

Source: Fraunhofer Institute 2009, Future pathways for renewable electricity in EU

Wind energy brings more local green jobs per national energy budget...

Source: McKinsey 2008

The benefits

Strengthened RES policies in Hungary


*Source: McKinsey 2008

Cost factors of wind and other renewables (levelized)


Because wind energy deployment is local...

Fraunhofer’s calculations

Link
In conclusion

1. With strengthened national RES policies, Hungary possess the possibility to achieve its 2020 RES target solely domestically.

2. Wind power represents a key technology option for Hungarian power generation in reaching the EU RES target of 13% by 2020. Focusing more on Wind Energy will also bring about many other benefits.

3. A removal of non-economic barriers is a precondition for Hungary to assure a successful deployment of RES and Wind Energy in the mid- to long-run.

Vestas has positive expectations for the Hungarian market!
The Hungarian EU National Action Plan is a window of opportunity

The Hungarian National Action Plan to be submitted by 30 June 2010 to EU is:

• Instrumental to planning how to reach 13% of gross energy demand through Renewable Energy by 2020

• Can be an important signal to investors in Wind Energy – a stable, predictable and transparent plan will increase Business Case Certainty

Vestas Policy Recommendations:
Vestas business contacts at your disposal

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Thank you for your attention
Strengthened policies cause RES-E take-off

With effective and efficient RES support a take-off of RES-E can be expected, contributing to Hungary’s overall 13% 2020 target

Source: Fraunhofer Institute 2009, Future pathways for renewable electricity in EU
Costs & benefits of strengthened RES policies (on average 2006-2020, p.a.)

Avoided CO₂ emissions for a better climate
Avoided fossil fuels for the trade balance
Domestic CAPEX creating future benefits
Higher consumer expenditures - only EUR 25 per capita/year

Business as usual

Costs and benefits (on average per year) with regard to NEW RES (installed 2006 to 2020) [Billion €]

- RES electricity
- Biofuels (domestic prod.+use)
- Biofuel imports
- Renewable heat
- Biofuel exports
- Capital expenditures (domestic)
- Additional generation costs (domestic)
- Consumer expenditures (RES support)

Avoided CO₂ emissions
Avoided fossil fuels
Consumer expenditures (RES support)
Additional generation costs (domestic)
Capital expenditures (domestic)

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Source: Fraunhofer Institute 2009, Future pathways for renewable electricity in EU
Overview of needed RES deployment within all energy sectors in the period 2005-2020

<table>
<thead>
<tr>
<th>Breakdown by RES category</th>
<th>Energy production</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td>RES electricity</td>
<td>RES-E Mtoe</td>
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<tr>
<td>RES heat</td>
<td>RES-H Mtoe</td>
</tr>
<tr>
<td>Biofuels for transport</td>
<td>RES-T Mtoe</td>
</tr>
<tr>
<td>RES TOTAL</td>
<td>RES Mtoe</td>
</tr>
</tbody>
</table>

RES share on gross final energy demand % 4.7% 6.0% 7.5% 8.7% 6.3% 9.7% 13.0%
RES surplus / deficit to meet 2020
RES target (+/-)

Breakdown RES heat
- Biomass heat BM Mtoe 0.5 0.7 0.8 1.0 0.7 1.0 1.3
- Geothermal heat GE Mtoe 0.2 0.2 0.2 0.2 0.2 0.2 0.2
- Solar thermal heat and hot water supply SH Mtoe 0.0 0.0 0.0 0.0 0.0 0.0 0.0
- Heat pumps HP Mtoe 0.0 0.0 0.0 0.0 0.0 0.0 0.0

Breakdown biofuels for transport
- Domestic biofuels Mtoe 0.0 0.1 0.3 0.3 0.1 0.4 0.5
- Biofuel imports / exports (+/-) Mtoe n.a. 0.0 0.0 0.0 0.0 -0.1 0.0

Source: Fraunhofer Institute 2009, Future pathways for renewable electricity in EU