No. 1 in Modern Energy

Wind Energy in Hungary

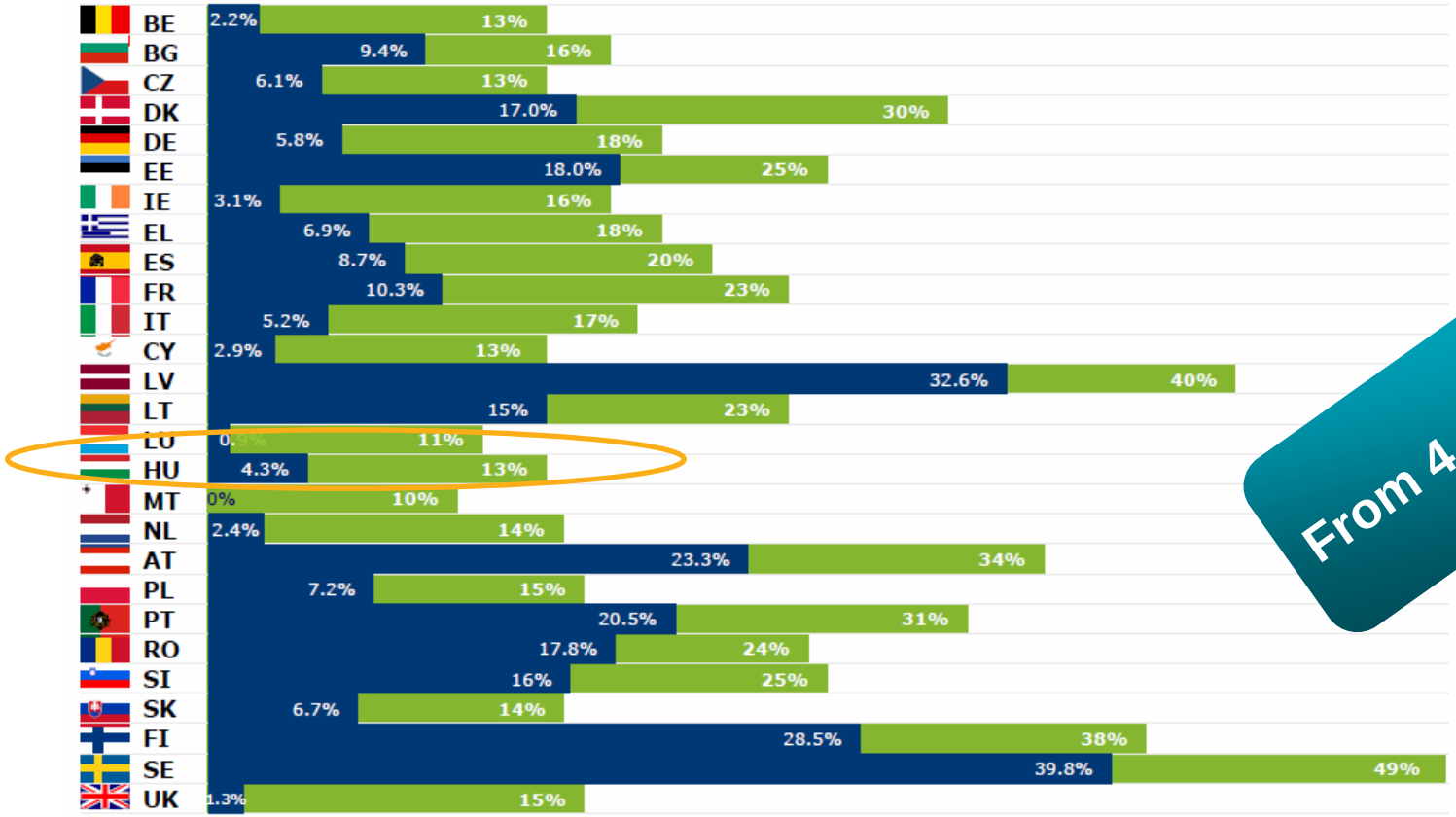
- Potential, Benefits and Barriers

Director Jannik Termansen, Vestas Wind Systems A/S

Vestas

HUNGARY

Reaching the EU RES target by 2020 may be demanding



From 4,3% to 13%

Source: EU Commission 2009

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%

Link to the Fraunhofer model

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

Fraunhofer ISI
TU WIEN Technische Universität Wien / Vienna University of Technology
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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

Link to the Fraunhofer results

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

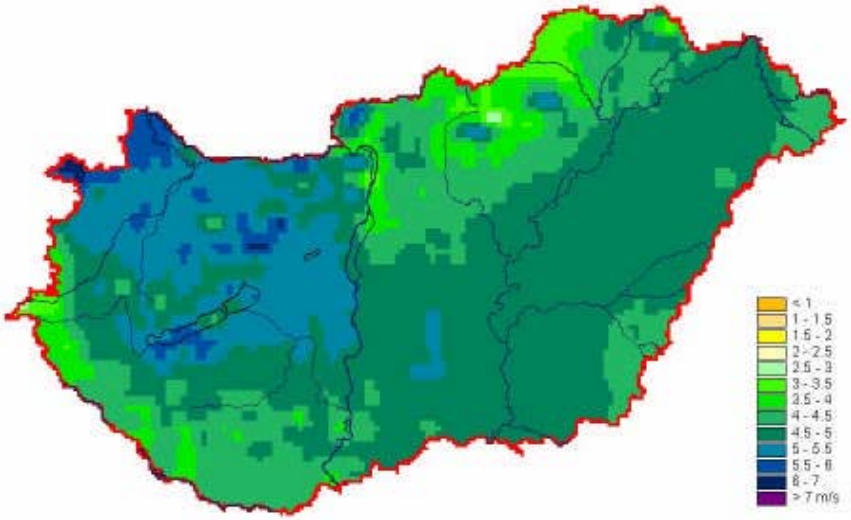
We believe that Wind Energy represents a key technology option for Hungarian power generation in reaching the EU RES target of 13% by 2020

Because Wind Energy is…

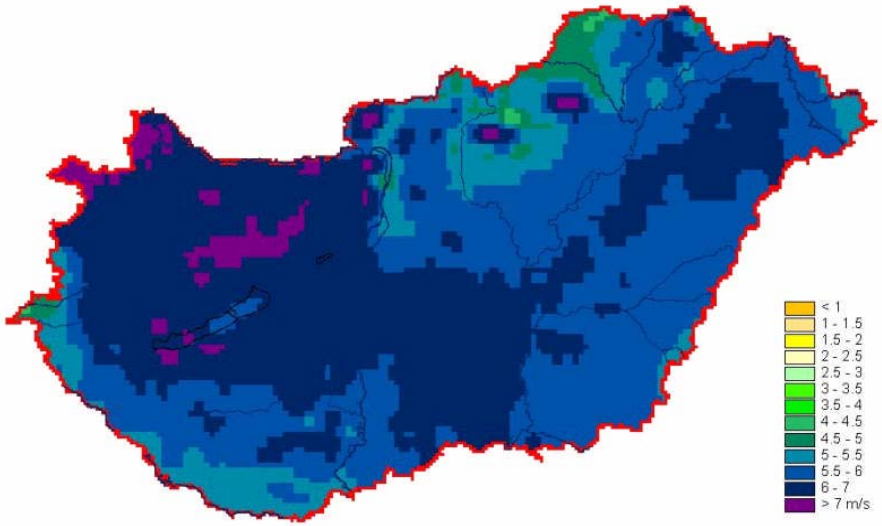
- Competitive
- Predictable
- Independent
- Fast
- Clean

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

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Exploiting Hungarian wind potential brings local Hungarian benefits

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The 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 CO_2 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

Link to the Fraunhofer results

=

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

Sources: Fraunhofer Institute 2009, Future pathways for renewable electricity in EU.
Daniel L. Kammen & Ditlev Engel 2009, Green Jobs and Clean Energy Economy.

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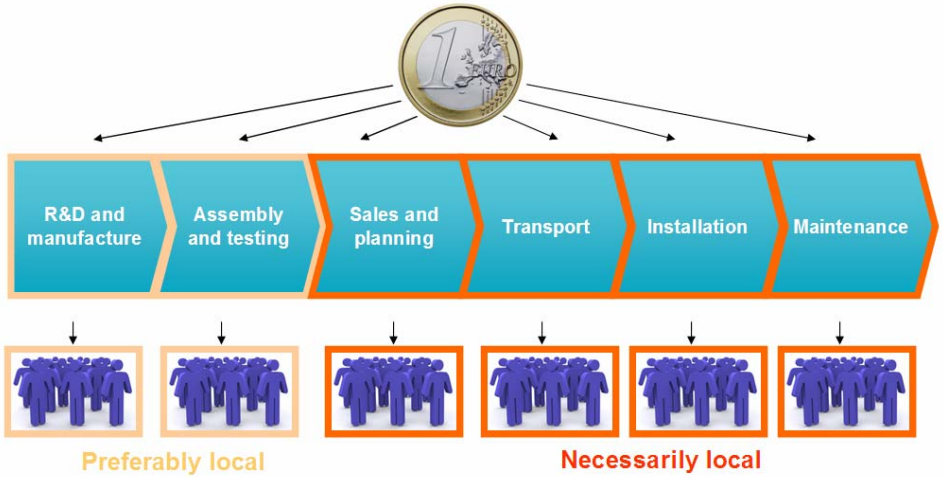
Wind energy brings local green jobs

*Industry	Wind	Coal	Gas	Nuclear
Jobs/MWa	2.79	1.01	0.95	2.18-2.34

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

Sources: McKinsey 2008. Includes construction and O&M labor, MWa is megawatt average, adjusted to normalize capacity factors. Other figures: EWEA as well as Daniel L. Kammen & Ditlev Engel 2009, Green Jobs and Clean Energy Economy.

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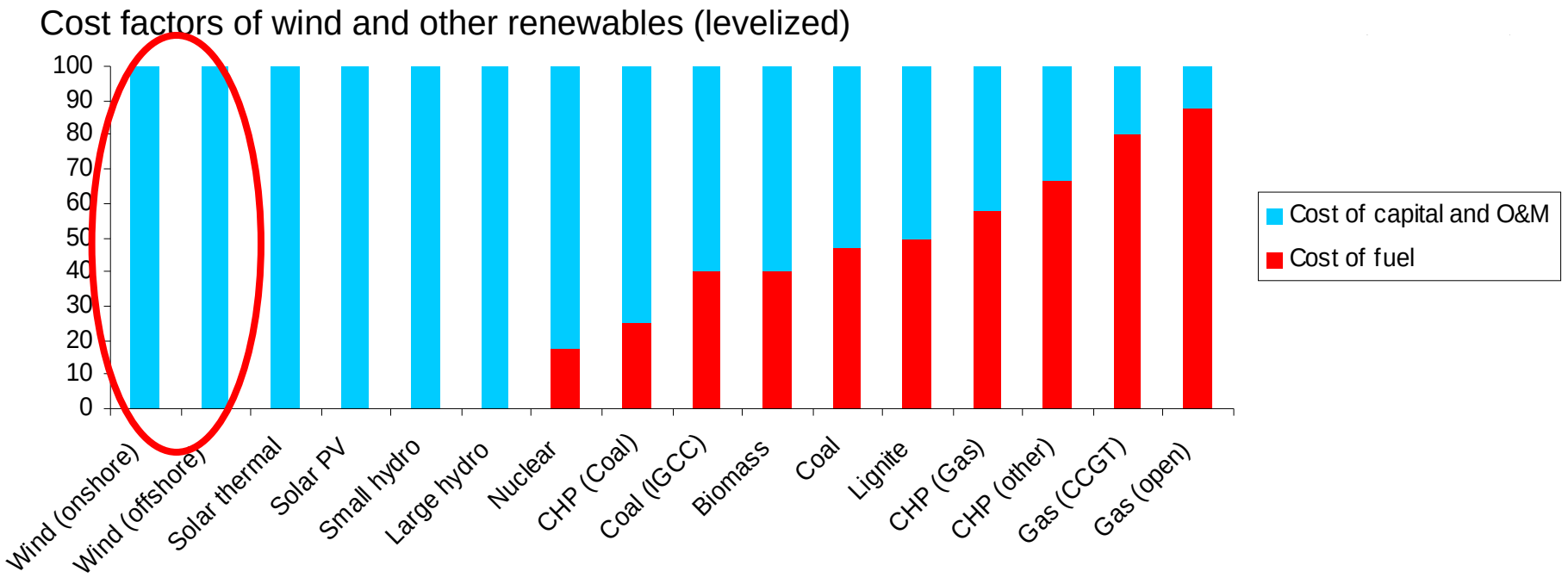
Wind energy brings more local green jobs per national energy budget…



Sources: NEA & IEA 2005, World Bank 2009

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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 →

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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

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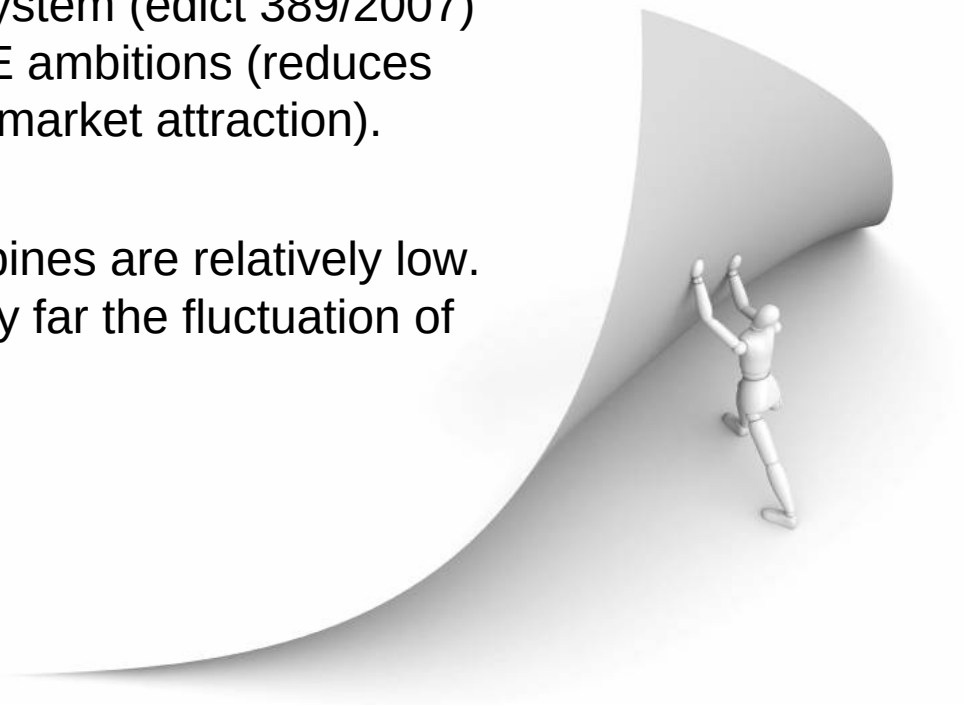
Recommendation #2

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

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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.

"The Danish Wind Case"

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

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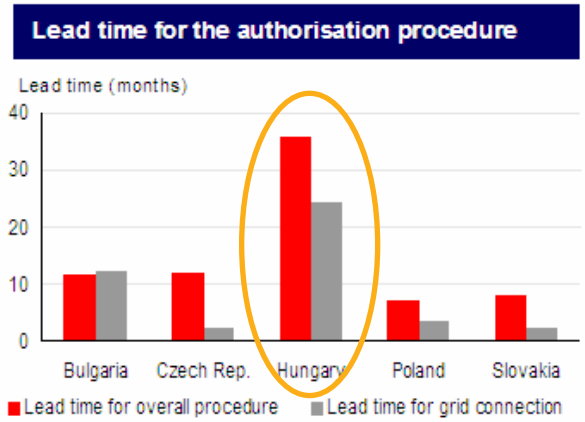
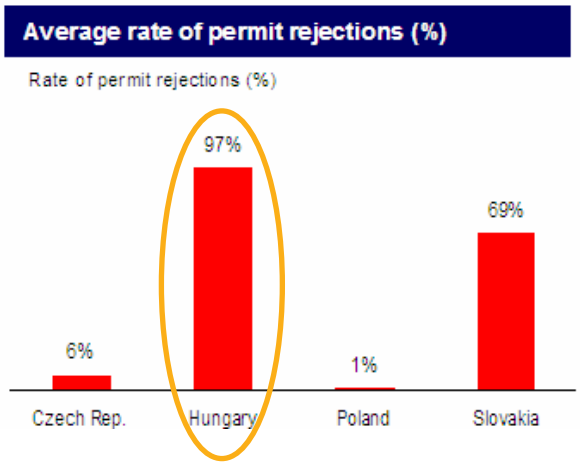
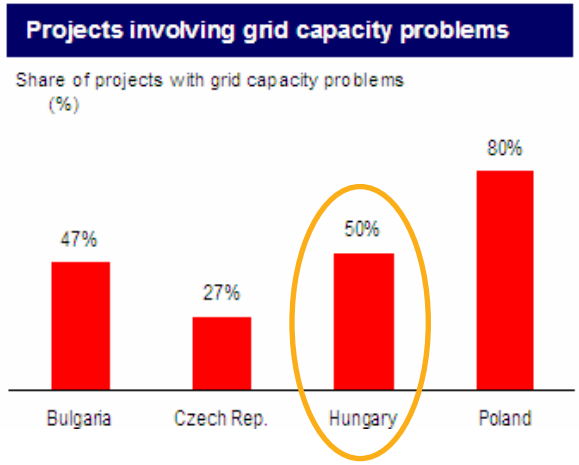
Recommendation #4

Streamline permitting procedures







Source: Freshfields Bruckhaus Deringer Law Firm 2008,
EU 2008, Report on promotion and growth of renewable energy sources

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What is the cost of stronger RES policies for Hungary?

Utilisation of the Hungarian wind potential brings local Hungarian benefits

7 | June 4, 2009

The benefits

Avoided fossil fuel imports
- 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

Avoided CO_2 emissions and polluted waste
- for climate protection and avoided expenses for emission allowances
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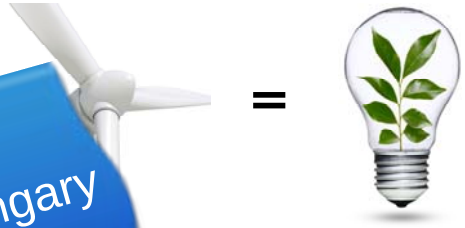

…fer Institute 2009, Future pathways for renewable electricity in EU

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Strengthened RES policies in Hungary

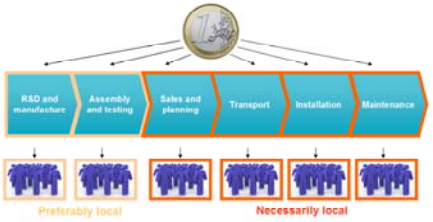
€ 25*

*p.p.; p.a. Ø 2006-2020

Wind energy brings local green job

*Industry	Wind	Coal	Gas	Nuclear
Jobs/MWh	2.79	1.01	0.95	2.18-2.34

Because wind energy deployment is local…



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*Source: McKinsey 2008

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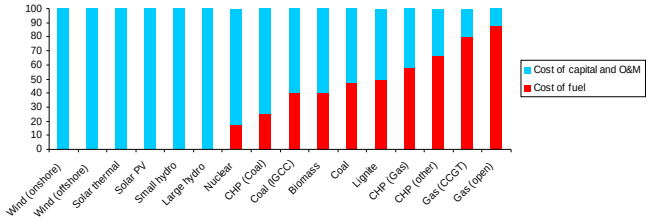
The benefits

…ergy brings more local green jobs per national energy budget…

Cost factors of wind and other renewables (levelized)



10 | June 4, 2009

Sources: NEA & IEA 2005, World Bank 2009

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Fraunhofer's calculations Link

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

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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!

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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:
http://www.vestas.com/en/modern-energy/politicalinitiatives/policy-recommendations.aspx

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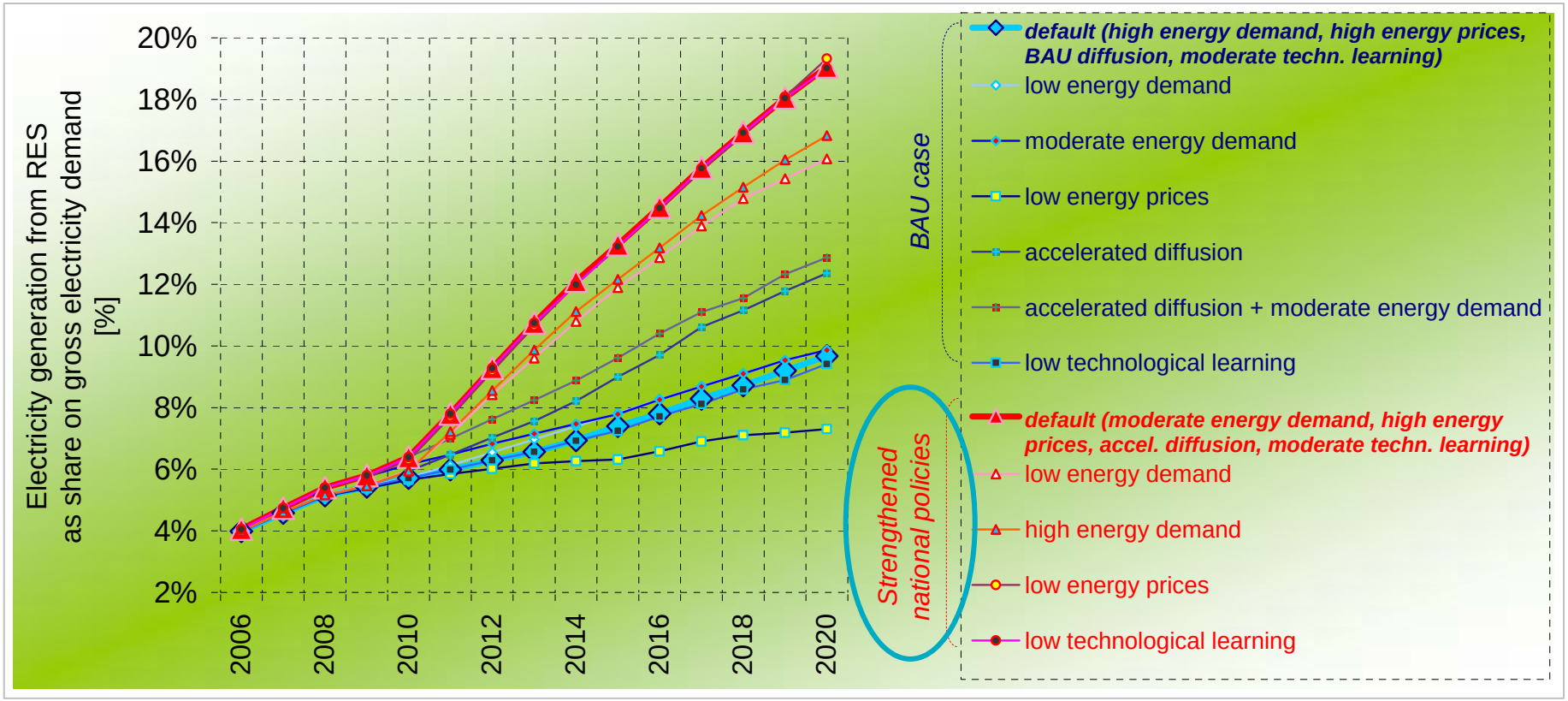
Back-up

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

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Back-up

Costs & benefits of strengthened RES policies (on average 2006-2020, p.a.)

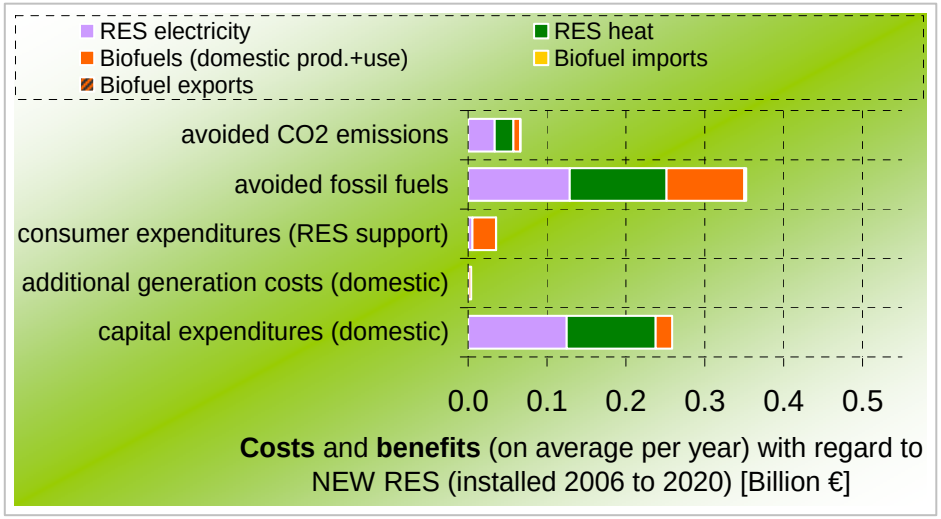
Avoided CO_2 emissions for a better climate

Avoided fossil fuels for the trade balance

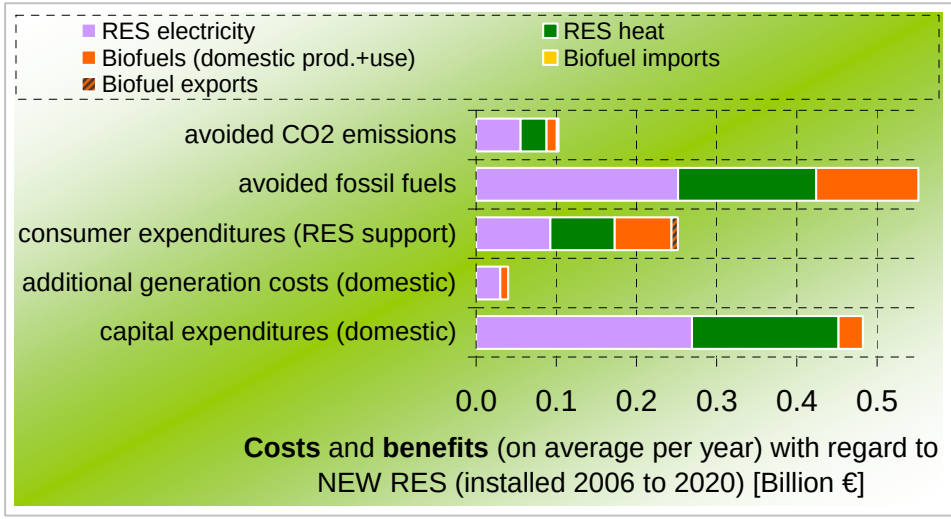
Domestic CAPEX creating future benefits

Higher consumer expenditures - only EUR 25 per capita/year

Business as usual



Strengthened RES policies



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

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Back-up

Overview of needed RES deployment within all energy sectors in the period 2005-2020

Breakdown by RES category		Energy production							
				BAU (Business as usual)			Strengthened national policies		
		[Unit]	2005	2010	2015	2020	2010	2015	2020
RES electricity	RES-E	Mtoe	0.2	0.2	0.3	0.5	0.2	0.5	0.8
RES heat	RES-H	Mtoe	0.7	0.9	1.1	1.2	0.9	1.3	1.6
Biofuels for transport	RES-T	Mtoe	0.0	0.1	0.3	0.3	0.1	0.3	0.5
RES TOTAL	RES	Mtoe	0.9	1.3	1.7	2.0	1.3	2.1	2.9
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 (+/-)		Mtoe				-1.0			0.0
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

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