



20% RES by 2020 ...

A quantitative assessment of policy pathways for meeting the challenge

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This presentation reflects research conducted within the European project:

◀ Shaping an effective and efficient European renewable energy market ... www.reshaping-res-policy.eu



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(2) 20% RES by 2020 ... *what do the NREAPs tell us?*

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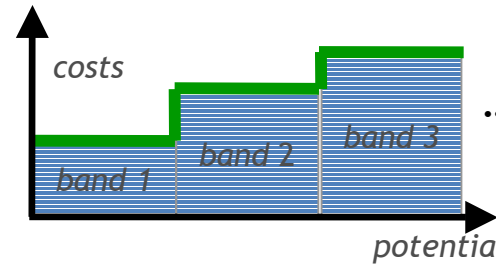
(5) Conclusions

(1) Introduction - Green-X ... a simulation model for energy policy instruments (for RES)

Mid-term (up to 2020)

realisable potentials in year $n+1$

& corresponding costs for RES at country level by RES technology (subdivided into several bands)



The *Green-X* approach:

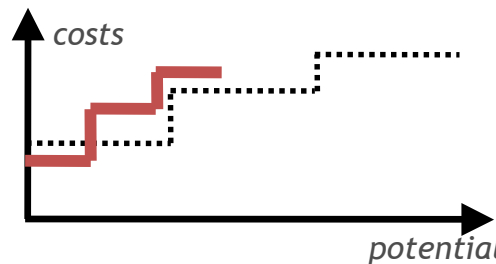
Dynamic cost-resource curves

&

a detailed energy policy representation

Technology diffusion ('S-curve')
(non-economic barriers by technology/country)

Technological change
((global) learning curves by technology)

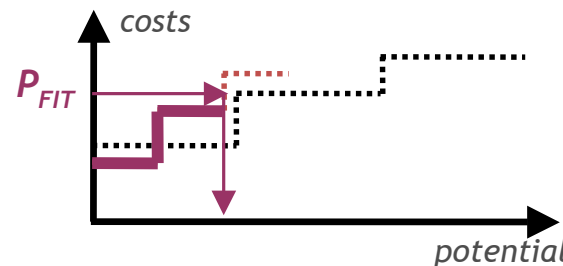


Realisable yearly potentials in year n

Energy policy
(energy prices, RES support)

e.g. Feed-in tariffs,
Investment incentives,
Tendering schemes,
Quotas with tradable green certificates

Deployment in year n
and corresponding costs & benefits



(1) Introduction - evaluation criteria for (RES) support instruments

► Key criteria for the evaluation of support instruments

Support instruments have to be

- **effective** for increasing the deployment of RES &
- **efficient** with respect to minimising the resulting *support costs* over time.

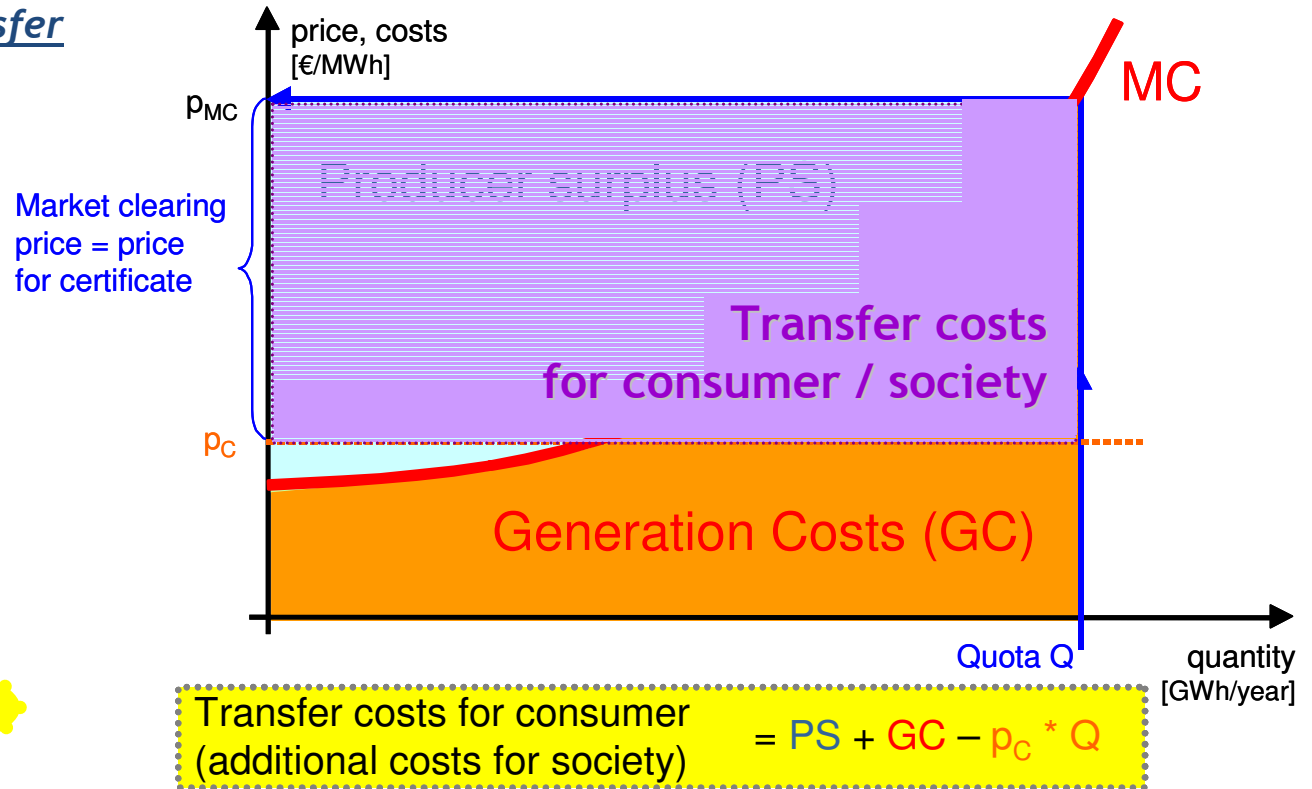
support expenditures or transfer costs for consumer / society

(due to the support of RE) ...
 ... consumer → producer
 ... do not consider any indirect costs / benefits or externalities

Increasing the **efficiency** of RES support:

• *Minimise generation costs*

• **Lower producer profits**
 (to sufficient & adequate levels)



p_C ... market price for (conventional) electricity

p_{MC} ... marginal price for RES-E (due to quota obligation)

MC ... marginal generation costs

- (1) Introduction
 - key elements of the new RES directive

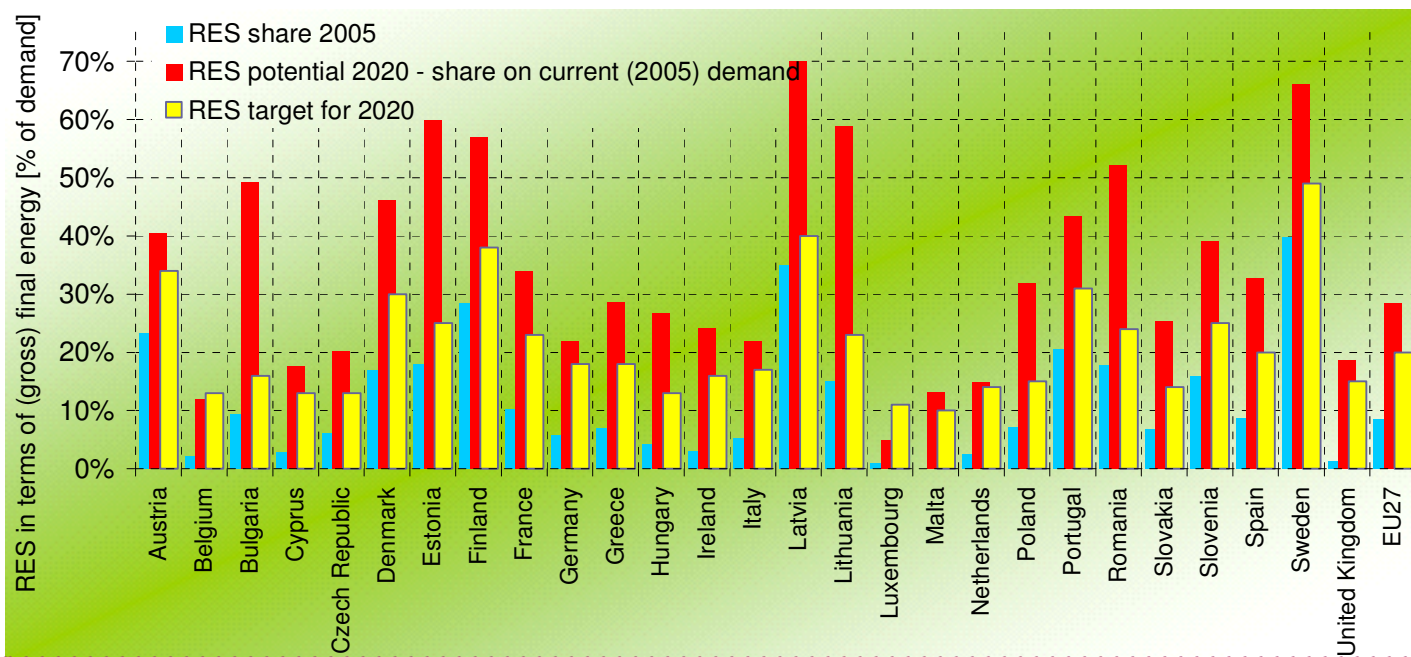
Key elements of the new RES directive (2009/28/EC)

- ▶ National support schemes remain as key driver for the future RE deployment in Europe
 - ▶ Target definition: RE share in gross final energy consumption
 - ▶ Binding national targets for RE (in total*) by 2020
*(*no sector targets except the minimum target (10%) for RE in transport)*
 - ▶ Flexibility with respect to national target achievement
(national compliance but with increased cooperation between Member States)
 - ▶ Measures for an accelerated removal of non-economic RE barriers
(Grid access, accompanying market stimulation measures etc.)

▶ **National Renewable Energy Action Plans** describe the way forward from the Member State's perspective

(1) Introduction
 - key elements of the new RES directive

► **20% RES by 2020 at EU level**
 & the corresponding national RES targets



Achieved RE deployment (2005), realisable RE potential up to 2020 and agreed RE target for 2020 by Member State

Note: Additional potentials do not include biofuel imports from abroad

► Flexibility for national RE target achievement
 → the need for cooperation

► Renewable energy potentials are distributed unevenly across Europe ... this was ignored by the applied RE target calculation procedure

(2) 20% RES by 2020
... *what do the NREAPs tell us?*

► **20% RES by 2020**

What do the NREAPs tell us?

... National Renewable Energy
Action Plans describe the way forward
from the Member State's perspective

(2) 20% RES by 2020
... what do the NREAPs tell us?

► 20% RES by 2020

... **What do the NREAPs tell us?**

The NREAPs submitted are of different quality and completeness.

Several provided a comprehensive & complete RES roadmap

Others have drawn a nice picture that does not match with reality

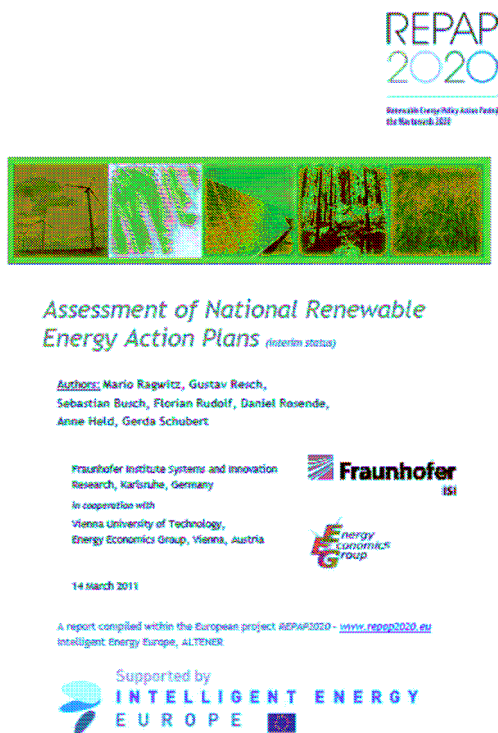
Few delivered a minimalistic and incomplete plan

Substantial optimisation potential exists for all five assessment categories.

Strongest deficits for administrative procedures & spatial planning ...

... followed by **support measures for RES heating & cooling**. The highest optimisation potentials exist in these two areas.

But even support for RES electricity on average shows room for improvement in many EU member states.



Source: "Assessment of the NREAPs"
(interim status)
(Ragwitz & Resch (2011))
- REPAP2020 report) (www.repap2020.eu)

(2) 20% RES by 2020
 ... what do the NREAPs tell us?

► 20% RES by 2020

... **What do the NREAPs tell us?**

Comparison of scenarios

EU27

	NREAP		
	2005	2010	2020
<i>RES at the aggregated level</i>	RES consumption in relative terms [% - share in corresponding (sectoral) demand]		
RES electricity	15.3%	19.4%	34.0%
RES heating and cooling	9.9%	12.5%	21.4%
RES transport fuels	1.3%	4.8%	10.2%
Total (domestic) RES share	8.5%	11.5%	20.6%

According to the NREAPs, member states plan to **over-achieve the overall 20% RES target by 0.6%**. Whether or not the proposed actions will be ambitious enough to achieve these targets remains to be seen. ...

(2) 20% RES by 2020
 ... what do the NREAPs tell us?

► 20% RES by 2020 ... **What do the NREAPs tell us?**

Whether or not the proposed actions will be ambitious enough to achieve these targets remains to be seen. ...

... a first quantitative comparison with our own scenario work ...

Comparison of scenarios

EU27

	NREAP			Green-X		
	2005	2010	2020	2020	2020	2020
				BAU	BAU barriers mitigated*	SNP ^o
<i>RES at the aggregated level</i>	RES consumption in relative terms [% - share in corresponding (sectoral) demand]					
RES electricity	15.3%	19.4%	34.0%	25.6%	28.9%	36.6%
RES heating and cooling	9.9%	12.5%	21.4%	11.8%	13.4%	18.9%
RES transport fuels	1.3%	4.8%	10.2%	7.8%	8.0%	7.4%
Total (domestic) RES share	8.5%	11.5%	20.6%	14.1%	15.6%	19.8%

◀ Green-X BAU scenarios draw a more pessimistic view
 - the open question remains: Are proposed new measures sufficient to trigger the required deployment?

◀ **Strengthened national support (SNP)** show more ambition for RES-electricity, while the NREAPs indicate a higher deployment of RES-heat

(2) 20% RES by 2020
 ... what do the NREAPs tell us?

► 20% RES by 2020

... What do the NREAPs tell us?

... a first quantitative comparison with our own scenario work ...

◀ Technology insights

Comparison of scenarios	NREAP			Green-X		
	2005	2010	2020	2020	2020	2020
EU27				BAU	BAU barriers mitigated*	SNP°
RES-electricity	Gross electricity generation [GWh]					
Biomass	67,185	114,302	231,907	187,474	237,712	263,576
Concentrated solar power	0	1,153	19,963	6,600	25,101	25,948
Geothermal	5,477	5,977	10,893	10,931	12,511	12,593
Hydropower	336,704	340,759	363,534	375,636	377,371	374,248
Offshore wind	1,921	8,513	133,316	19,629	19,502	190,863
Onshore wind	66,534	154,695	343,690	272,675	279,431	392,852
Solar photovoltaic	1,470	20,141	83,375	89,699	132,435	79,009
Tidal, wave and ocean energy	535	501	5,992	5,622	7,667	10,124
Total	468,955	647,481	1,205,382	968,265	1,091,731	1,349,213
RES-heating and cooling	Heating and cooling from RES [ktoe]					
Biomass	52,873	61,647	89,979	64,895	70,879	92,965
Geothermal	413	663	2,550	1,353	1,551	1,582
Renewable energy from heat pumps	616	4,017	12,133	1,323	1,563	6,455
Solar thermal	690	1,448	6,278	1,426	3,926	8,576
Total	54,695	67,858	111,582	68,996	77,919	109,578
RES-transport fuels	Transport fuels from RES [ktoe]					
First generation biofuels	2,857	9,411	19,059	13,642	13,642	12,642
Second generation biofuels	77	527	2,498	2,028	2,379	2,941
Biofuel import / export	171	3,868	7,376	14,718	14,865	12,835
Total biofuels (incl. Import/export)	3,104	13,807	28,933	30,388	30,886	28,418

(2) 20% RES by 2020
... what do the NREAPs tell us?

► 20% RES by 2020 ... **What do the NREAPs tell us?**
... *a first quantitative comparison with our own scenario work ...*

◀ Important remark: NREAPs reflect a world where energy efficiency deserves key attention ...

◀... *whereas Green-X scenarios are based on PRIMES modeling (reference (2010) & baseline case (2009)).*

◀ *Both PRIMES cases represent no „high energy efficiency“ scenario ... - i.e. the reference case is characterised by a **8% higher gross final consumption***

◀ *Specifically the demand for heat is higher (11%)*

... *Further planned activities:
Implementation of proposed new measures and demand trends
in Green-X scenario work*

(3) Strengthened national RES support

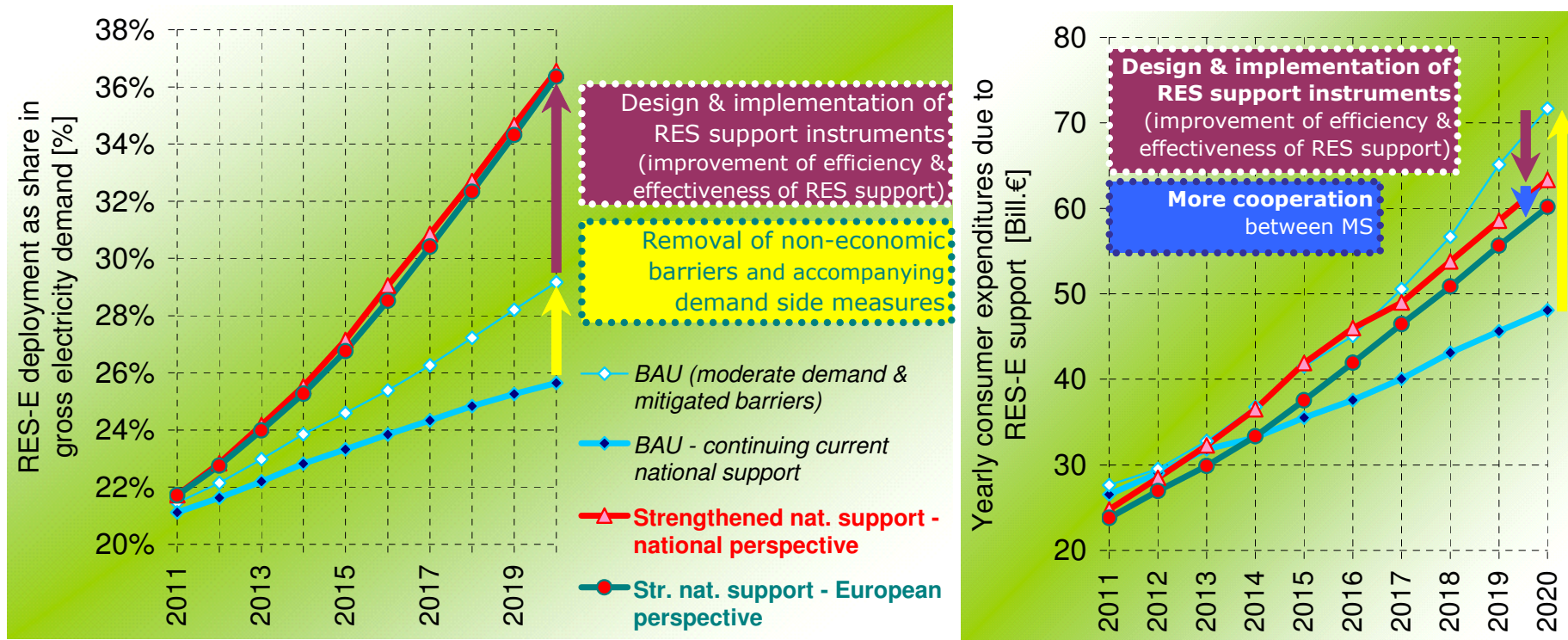
▶ *Strengthened national RES support*

From BAU to strengthened national RES support
... a “bumpy ride”?

(3) Strengthened national RES support

Results: Towards an effective and efficient RES target fulfillment

- from BAU to strengthened national support *w/o intensified cooperation*



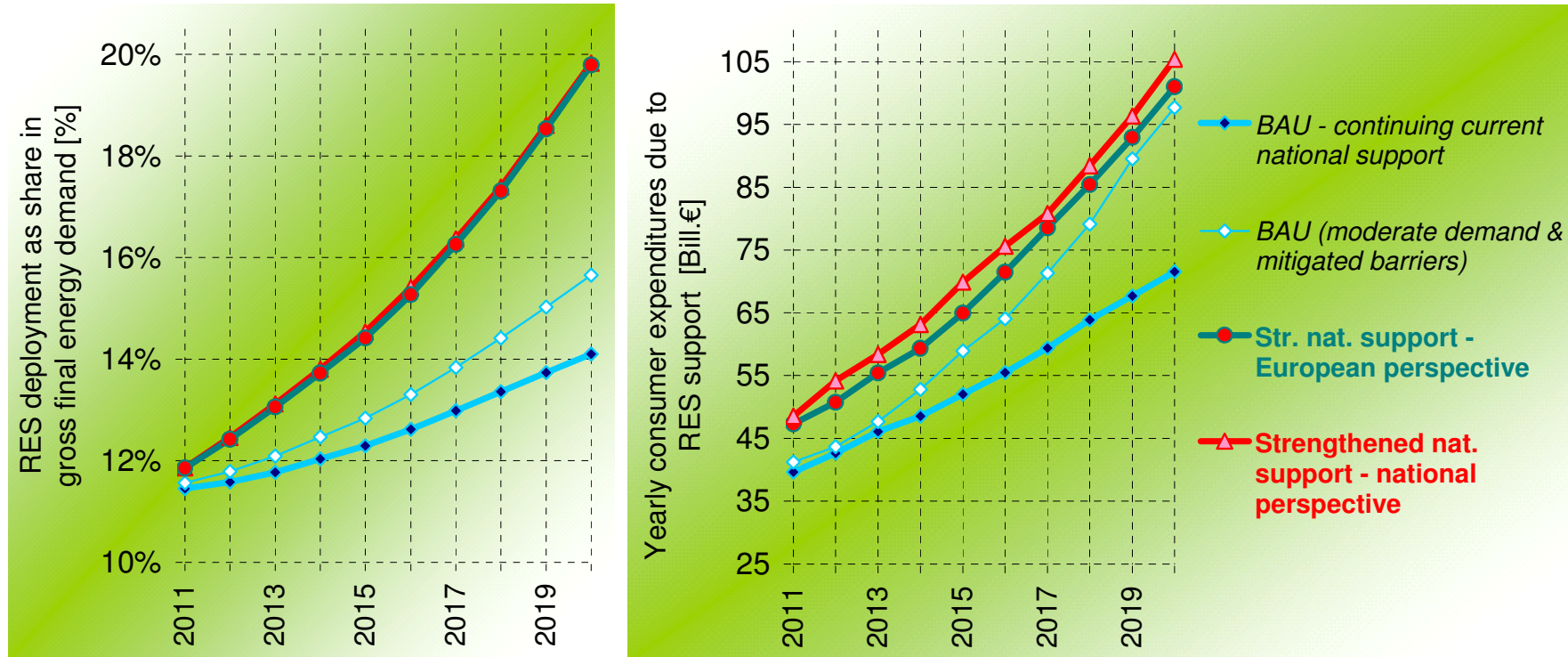
Comparison of RES-E deployment & corresponding *consumer expenditures due to support for new RES-E* (installed 2011 to 2020) in the EU-27 for all selected cases - i.e.

BAU and strengthened national support without (national perspective) or with intensified cooperation (European perspective) between member states

(3) Strengthened national RES support

Results: Towards an effective and efficient RES target fulfillment

- from BAU to strengthened national support *w/o intensified cooperation*

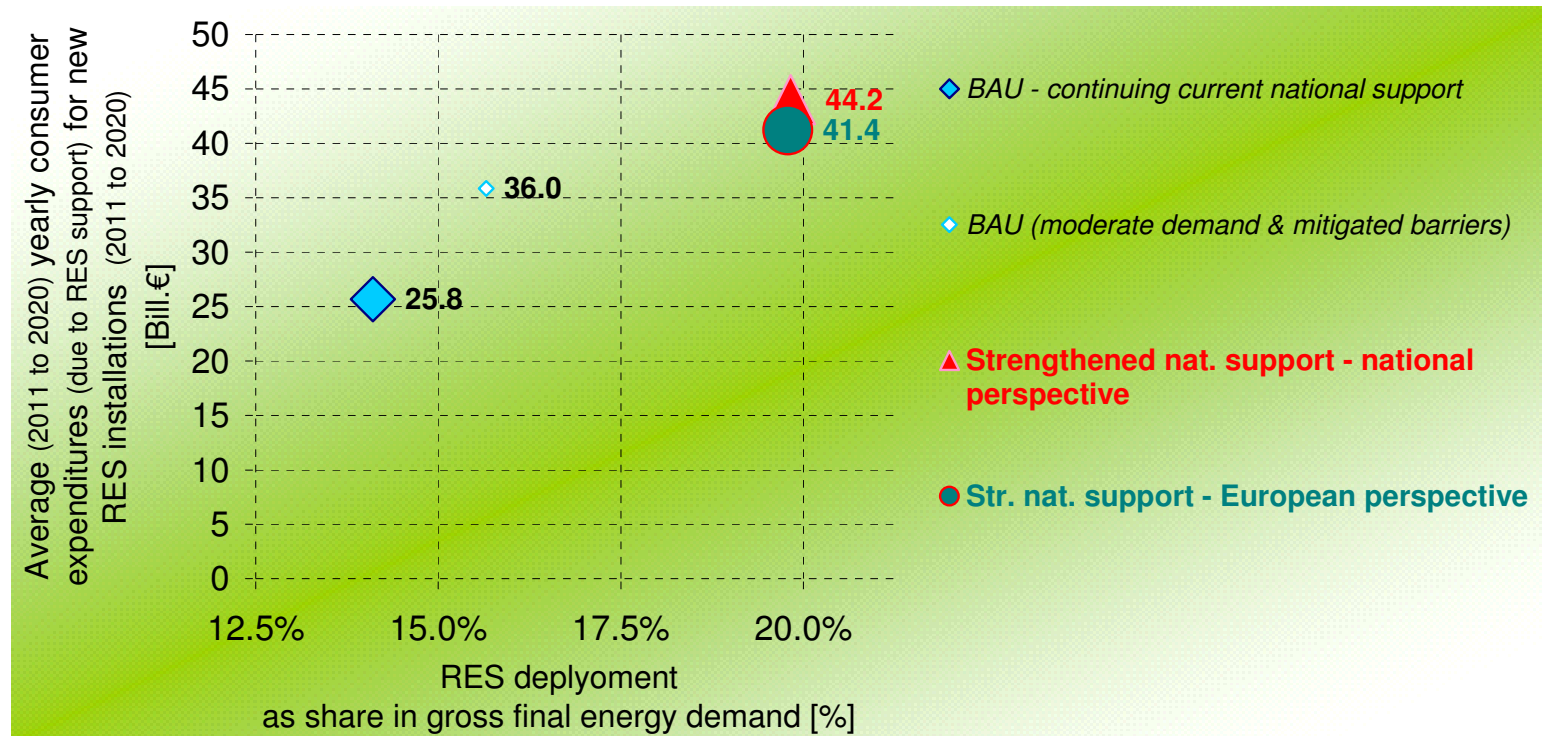


Comparison of total RES deployment & corresponding consumer expenditures due to support for new RES (installed 2011 to 2020) in the EU-27 for all selected cases - i.e. BAU and strengthened national support without (national perspective) or with intensified cooperation (European perspective) between member states

(3) Strengthened national RES support

Results: Towards an effective and efficient RES target fulfillment

- from BAU to strengthened national support *w/o intensified cooperation*



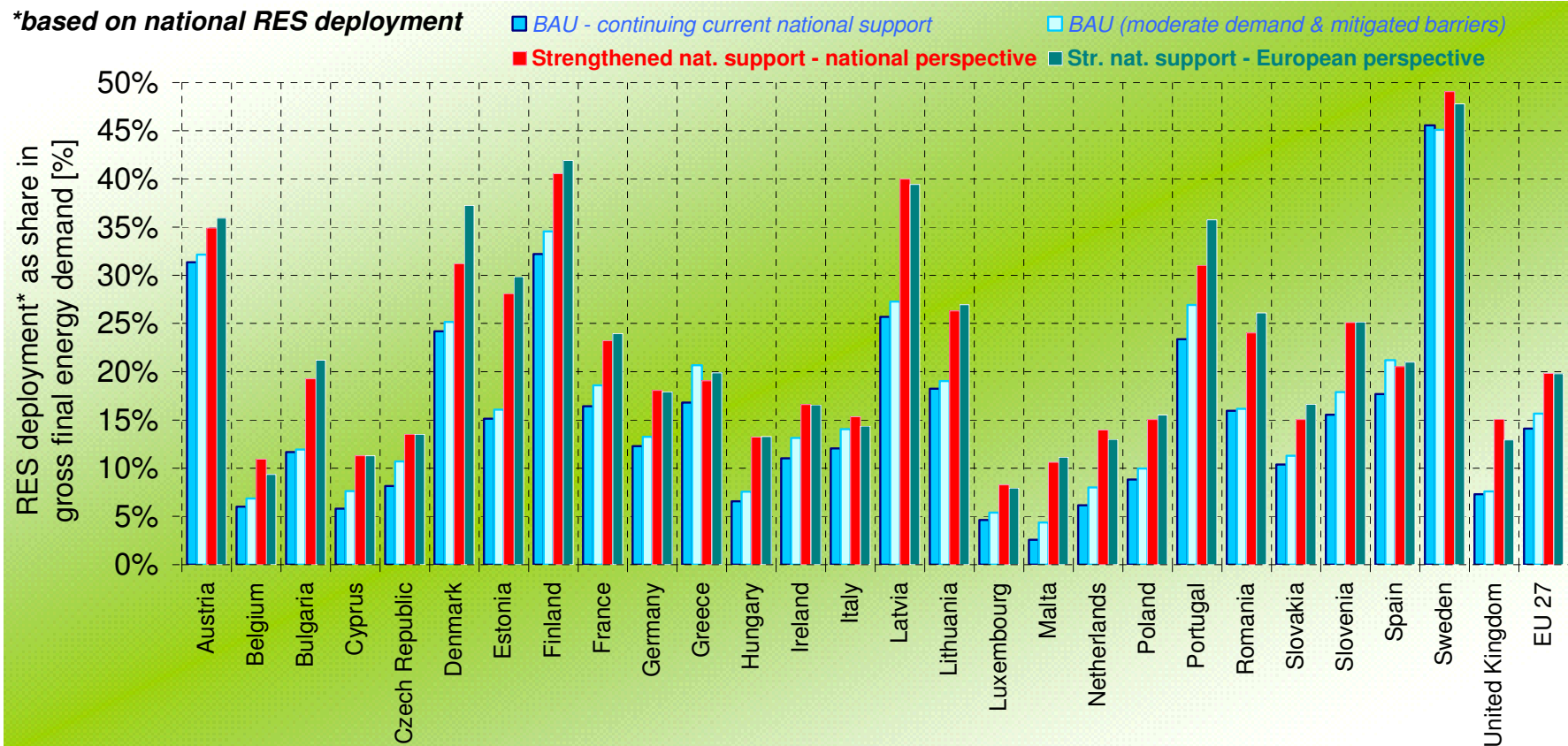
Comparison of of the resulting 2020 RES deployment and the corresponding (yearly average) consumer expenditures due to RES support for new RES (installed 2011 to 2020) in the EU-27 for selected cases - i.e. BAU and strengthened national support without (national perspective) or with intensified cooperation (European perspective) between member states

(3) Strengthened national RES support

Results: Towards an effective and efficient RES target fulfillment

- from BAU to strengthened national support *w/o intensified cooperation*

*based on national RES deployment



Comparison of domestic RES deployment by 2020 (*without subsequent exchange of RES volumes*) for selected cases - i.e. **BAU** and **strengthened national support without (national perspective)** or with intensified cooperation (**European perspective**) between member states

(4) Some “basics” ... harmonisation
as preferable policy option?

► *Some “basics”*

Cooperation ... Harmonisation
Technology-neutral ... Technology-specific RES
support

*The new RES directive (Directive 2009/28/EC) lays the ground for
the RES policy framework until 2020 ...*

*... However, discussions on the possible harmonisation of RES
support have been prolonged.*

(4) Some “basics” ... harmonisation
as preferable policy option?

▶ Assessment of future RES policy options ... *Quo(ta) vadis, Europe?*

▶ Of highlight, in April 2010 the **Institute of Energy Economics at the University of Cologne (EWI)** published a study titled “**European RES-E Policy Analysis - A model based analysis of RES-E deployment and its impact on the conventional power market**” (Fürsch et. al. 2010), **analysing possible efficiency gains arising from a harmonisation** of national RE support schemes.

▶ We undertook **a comparison to our own assessment**, which has been pursued within the European research project **futures-e** (www.futures-e.org)

... *Background paper*: “**Quo(ta) vadis, Europe? - a comparative assessment of two recent studies on the future development of renewable electricity support in Europe**” (Resch, Ragwitz (2010) - RE-Shaping report)

(4) Some “basics” ... harmonisation as preferable policy option?

▶ Two studies on the future development of RE support in Europe with conflictive findings and recommendations:

EWI

versus

futures-e

▶ ... significant cost savings through a **harmonized uniform quota system (HQS)**. ... A switch from BAU to HQS ends up with **cumulative (generation cost) savings of 174 billion €**, arising from two effects:

▶ **Harmonization gains** through an EU-wide optimized allocation of RES-E deployment.

▶ **Technology-neutral** instead of technology-specific support

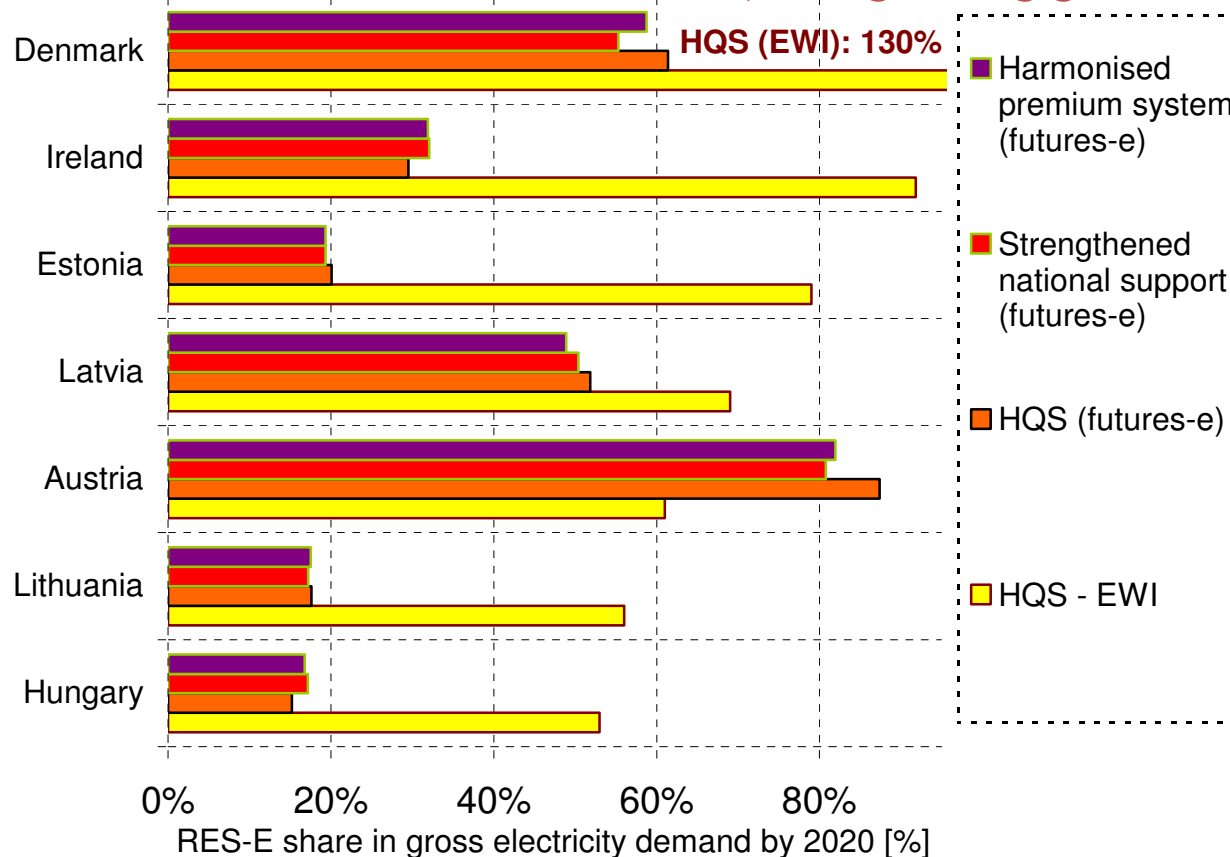
▶ 2020 RES targets can be achieved either by improved (strengthened) national support systems or by a harmonized support system, **as long as support that is offered is technology-specific.**

▶ **(Harmonized) technology-neutral support system fail to trigger immediate deployment and cost reduction of technologies** which are currently still more expensive but which contribution is needed in the mid- to long-term.

(4) Some “basics” ... harmonisation as preferable policy option?

► Comparative assessment: EWI versus futures-e
 ... RES-E deployment by 2020 at country level (graph: largest discrepancies)

The EWI-study overestimates the exploitable potential of best resources across Europe (specifically within HQS, but not within BAU) since it does not adequately consider the limiting effect of non-economic barriers (→ neglecting grid constraints).

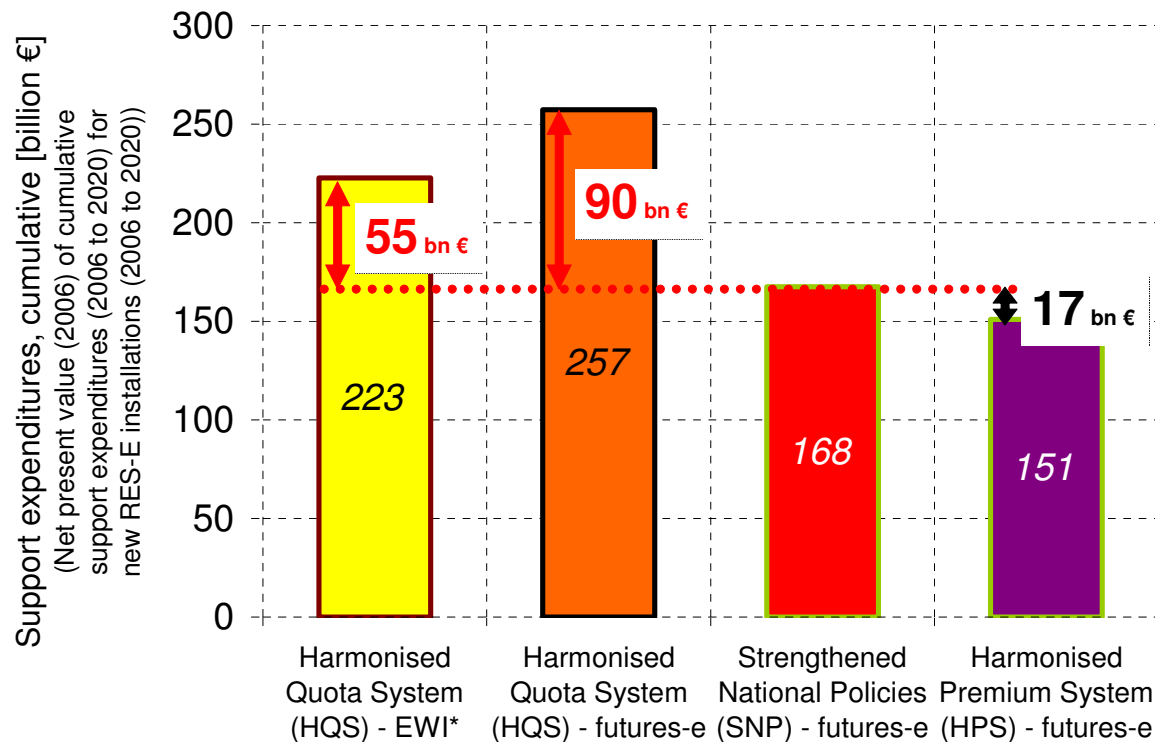


Examples (EWI – HQS):
 ◀ Ireland could increase from currently 9% (2007) to 92 % by 2020
 ◀ Estonia could increase from 1% (2007) to 79% by 2020.

(4) Some “basics” ... harmonisation as preferable policy option?

► Comparative assessment: EWI versus futures-e

Comparison of support expenditures ... we can conclude that a switch to the harmonised quota system based on technology-neutral RE support would result in an increase of support expenditures compared to the adequate reference case of strengthened national RE support (complemented by cooperation mechanisms).



The **cumulative “efficiency losses”** resulting from that simplified harmonisation range from **55 to 90 billion €**, depending on which study (EWI or futures-e) to rely on.

Note: *Estimated based on expressed certificate prices in 2020

Conclusions

- ▶ A harmonization of RES support based on simplistic policy options offering uniform support e.g. via a uniform RES certificate trading cannot be recommended.
- ▶ Thus, considering the possibilities offered by the new RES directive one can conclude that a further strengthening and fine-tuning of national RES support instruments appears preferable, whereby a focus needs to be taken on the removal of currently prevailing non-economic constraints (incl. infrastructural prerequisites → grid expansion) which hinder an accelerated RES diffusion.

Conclusions

- ▶ A stable effective & efficient RES policy based on technology-specific support is a key success criteria
→ „Stop-and-Go(GO)“ policies increase the cost of meeting 20% RES!
- ▶ Ambitious RE support needs to be accomplished by a strong energy efficiency policy
- ▶ The new policy framework requires strong central coordination to assure the required flexibility (for RES target achievement)
 - continuous monitoring of member state's progress
 - transparency & guidance
(e.g. transparency platform, targeted assistance)
 - clear enforcement mechanism (in case of non-compliance)

Thanks for your attention!

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