



# **RES-H Policy Project: Result Highlights**

**A Working Document prepared as part of the IEE project  
"Policy development for improving RES-H/C penetration in  
European Member States  
(RES-H Policy)"**

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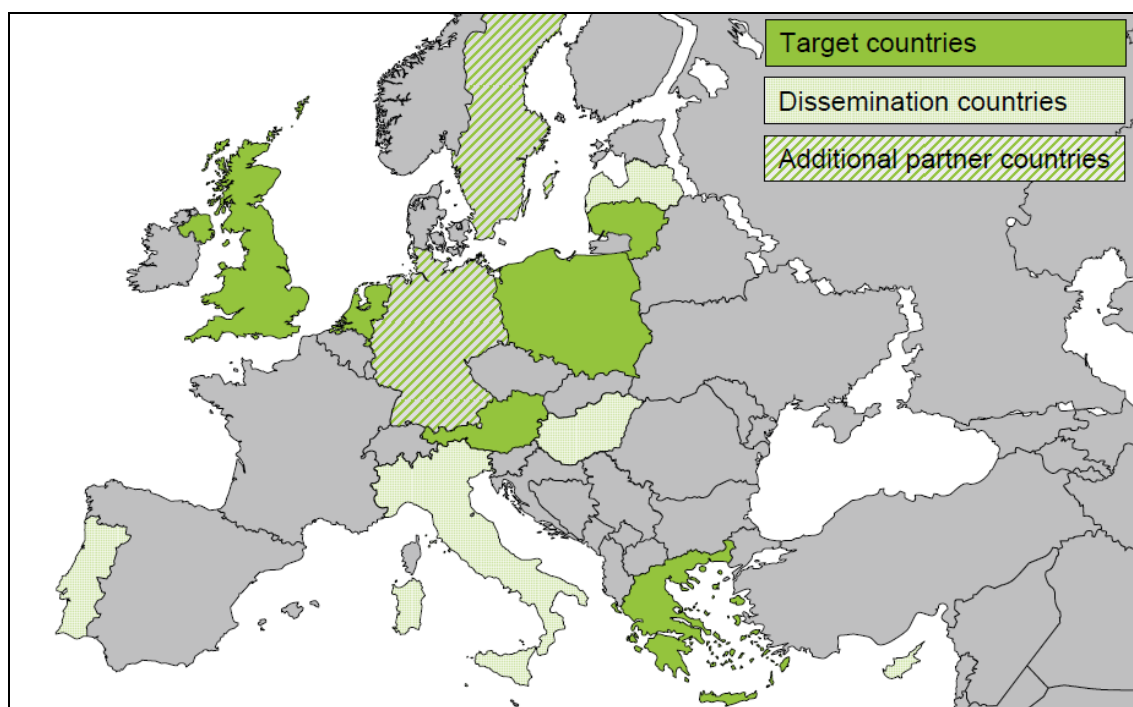
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## 1 Objectives of the project

The project "Policy development for improving RES-H/C penetration in European Member States (RES-H Policy)" aims at assisting Member State governments in preparing for the implementation of the Renewables Directive 2009/28/EC as far as aspects related to renewable heating and cooling (RES-H/C) are concerned. Selected Member States are supported in setting up national sector specific 2020/2030 RES-H/C targets. Moreover for each of the target countries the project analyses a basket of different policy options to support RES-H/C. Based on a qualitative as well as quantitative assessment the project develops tailor made policy options and recommendations as to how to best design a support framework for increased RES-H/C penetration in national heating and cooling markets.

On the European level the projects assesses options for coordinating and harmonising national policy approaches. This results in common design criteria for a general EU framework for RES-H/C policies and an overview of costs and benefits of different harmonised strategies.

The target countries/regions of the project comprise Austria, Greece, Lithuania, The Netherlands, Poland and UK – countries that represent a variety in regard of the framework conditions for RES-H/C. In addition dissemination activities have been carried out in Cyprus, Hungary, Italy, Latvia and Portugal.



Project website: [www.res-h-policy.eu](http://www.res-h-policy.eu)

## 2 RES-H/C targets

Possible ranges of RES-H targets for 2020 and 2030 were investigated and compared to the sector specific indicative targets reported by Member States in their National Renewable Energy Action Plans (NREAPs). The target ranges were derived through different research elements comprising

- existing national scenarios for RES-H (literature review)
- a scenario based top-down approach using the Green-X model<sup>1</sup>
- a bottom up approach based on a disaggregated data compilation of the building stock and parameters such as thermal renovation rates, the existing national technology split, maximum technology specific diffusion rates, resource availability especially for biomass

The proposed target ranges were subject to national stakeholder consultation processes (consultations, workshops) and revised accordingly.

Exemplary results:

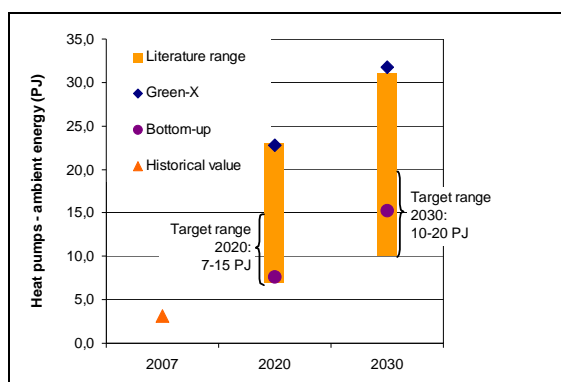


Figure 1: Comparison of literature, top-down and bottom-up analysis and deriving first suggestion for target ranges, heat pumps, Austria

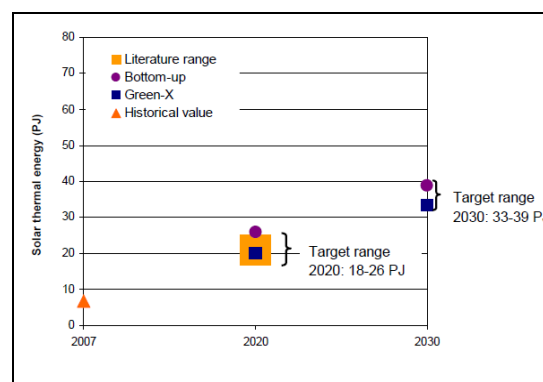


Figure 2: Comparison of literature, top-down and bottom-up analysis and deriving first suggestion for target ranges, solar thermal, Greece

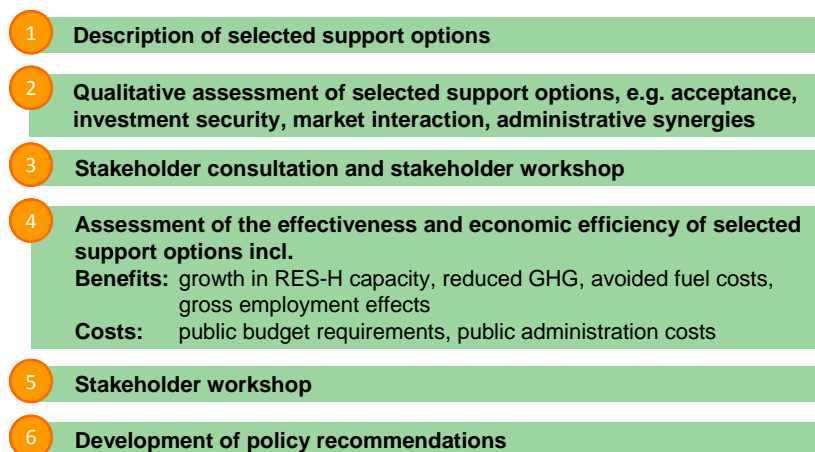
## 3 RES-H/C policies

### 3.1 Assessed policies

For each of the target countries a range different policy sets to support the market penetration of RES-H/C has been analysed. In a first step each of the selected instrument options has been qualitatively assessed against a variety of different qualitative

<sup>1</sup> Resch, G.; Panzer, C.; Ragwitz, M.; Faber, T.; Huber, C.; Rathmann, M.; Reece, G.; Held, A.; Haas, R.; 2009; "20% RES by 2020 – Scenarios on future European policies for RES-Electricity"; Report of the European research project futures-e

criteria (see section 3.2). This analysis has then been subject to a stakeholder consultation. Based on this the selection of support options has been narrowed down to two policy sets per target country. In a second step those two policy sets were subject to a profound quantitative assessment (see section 3.3). The following figure shows the different assessment steps.



The following table shows an overview of the main characteristics of the respective policy sets:

	Policy set 1	Policy set 2
<b>AT</b>	Technology specific investment subsidies in the range of 10-35% of investment costs	Use obligation for RES-H or DH for new buildings and for existing buildings that are subject to major renovation: 2011/2015/2020/2025/2030: 7%/15%/20%/25%/30% of final energy demand for heating (space heating + hot water) Non compliance: Penalty 20 EUR/m <sup>2</sup> floor space
<b>Upper AT</b>	Technology specific investment subsidies in the range of 20-40% of investment costs	Use obligation for RES-H or DH for new buildings and for existing buildings that are subject to major renovation 2011: 50% 2015-2030: 100% of final energy demand for heating (space heating + hot water) Non compliance: Penalty 65 EUR/m <sup>2</sup> floor space)
<b>GR</b>	Technology specific tax incentives equivalent to 10-30% of investment costs	Use obligation for new buildings and for existing buildings that are subject to major renovation: 2011-2013: 60% of domestic hot water demand 2014-2030: 50% of final energy demand for heating (space heating + hot water) Non compliance: Penalty 50 EUR/m <sup>2</sup> floor space
<b>LT</b>	Technology specific investment subsidies in the range of 20-45% of investment costs	Technology specific tax incentives equivalent to 15-21% of investment costs
<b>NL</b>	Technology specific investment subsidies in the range of 10-40% of investment costs	Use obligation for new buildings and for existing buildings that are subject to major renovation combined with investment subsidies for all buildings. Required shares of renewable in case of obligation increasing from 10% in 2011 to 30% in 2020 and 2030 Non compliance: Penalty 55 EUR/m <sup>2</sup> floor space Investment subsidies in the range of 10-30% of the investment

	Policy set 1	Policy set 2
<b>PL</b>	Technology specific investment subsidies in the range of 20-45% of investment costs	Use obligation for new buildings and for existing buildings that are subject to major renovation: 20% of final energy demand for heating (space heating + hot water) Non compliance: Penalty 60 EUR/m <sup>2</sup> floor space
<b>UK</b>	Renewable Heat Incentive (RHI) with technology specific support level of 2,0-17,5 pence per kWh RES-H	RHI combined with a modified supplier obligation (CERT)

### 3.2 Qualitative assessment criteria

Policy support instruments can be assessed against quantitative and qualitative criteria. Future RES-H/C penetration rates, policy costs, economic benefits in terms of avoided fuel costs or employment can be quantified through economic modelling, while factors like the political acceptance, the agreement with important principles (e.g. the polluter pays principle) or the effect on long-term structural changes can only – in the latter case at least partly – be assessed via qualitative criteria. Qualitative assessment is based on system knowledge, experience and judgment. The following qualitative criteria were used:

<b>Cost efficiency and transaction costs</b>	Target achievement
	Establish stable and reliable investment conditions
	Capability to support specific RES-H/C technologies
	Long-term perspective contributing to dynamic efficiency
	Avoiding over-incentivising (contributing to static efficiency)
	Transaction cost (contributing to static efficiency), especially public administration costs
	The ability to exploit administrative and organisational synergies at the interface to other related instruments (eg energy taxes)
	Incentive for efficient system operation (contributing to static efficiency)
<b>Acceptance</b>	Policy sector (public authorities, policy makers)
	Building owners (small scale investors) and tenants
	RES-H/C system operators (large scale investors)
	RES trade associations
	Fuel suppliers and associations (conventional fuel)
	Media
	Experience from other countries
	Communication
<b>Market interaction</b>	Level of market conformity
	Impact on competition
	Impact on market stability
<b>Other</b>	Provision for the "polluter-pays principle"
	The consideration of local characteristics
	Distribution of costs and social justness
	Contra-productive secondary effects
	The ability to avoid lock-in effects

### 3.3 Economic assessment

The economic assessment was mainly based on two models:

- INVERT<sup>2</sup> is a dynamic bottom-up model for simulating space heating and hot water demand in buildings (domestic and non-domestic) and for evaluating the effects of different support schemes and energy price settings on the energy carrier mix, CO<sub>2</sub> reduction and policy costs.
- The RES-H/C diffusion in industrial processes and corresponding parameters were determined by a model provided by ECN.

An important aspect in modelling the penetrations of renewable technologies is the future development of energy prices. Two energy price scenarios (low/high price scenario) were used, based on PRIMES data.

#### 3.3.1 Growth in RES-H/C capacities

By incentivising RES-H/C technologies economic support policies (e.g. investment subsidies) change the comparative advantage of renewable technologies against conventional heating systems. Regulatory instruments such as RES-H/C use obligations do also influence the diffusion rate of different technologies.

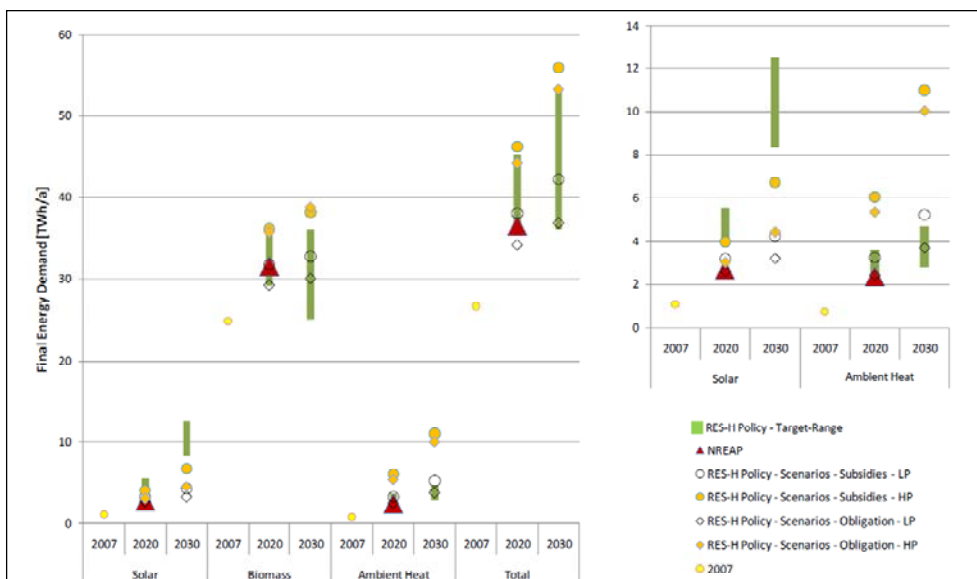


Figure 3: Historical data (2007), NREAP-targets, INVERT-scenario results and target ranges according to literature, bottom-up analysis and stakeholder dialogue for the case of Austria (LP – low energy price scenario; HP – high energy price scenario)

<sup>2</sup> INVERT originally has been developed by Vienna University of Technology/EEG in the frame of the Altener project INVERT (Investing in RES&RUE technologies: models for saving public money). During several projects – this does also apply to the RES-H Policy project – and studies the model has been extended and applied to different regions within Europe.

As an example Figure 3 shows the impact of the two policy sets for the RES-H/C diffusion in the Austrian building sector compared to the target ranges proposed in the previous working step (see section 2) and the indicative technology specific RES-H/C targets stated in the Austrian NREAP. Similar estimations have been done for all target countries.

### 3.3.2 Costs

For all target countries at least one of the assessed policy sets was an economic support instrument fed by the public budgets. For this instrument type the annual public budget requirements are one of the core parameters for assessing overall policy costs. As an example the following figure illustrates the public budget requirements for the support of RES-H/C in the building sector under policy set 1 (subsidies) for Lithuania. Similar estimations have been done for all target countries.

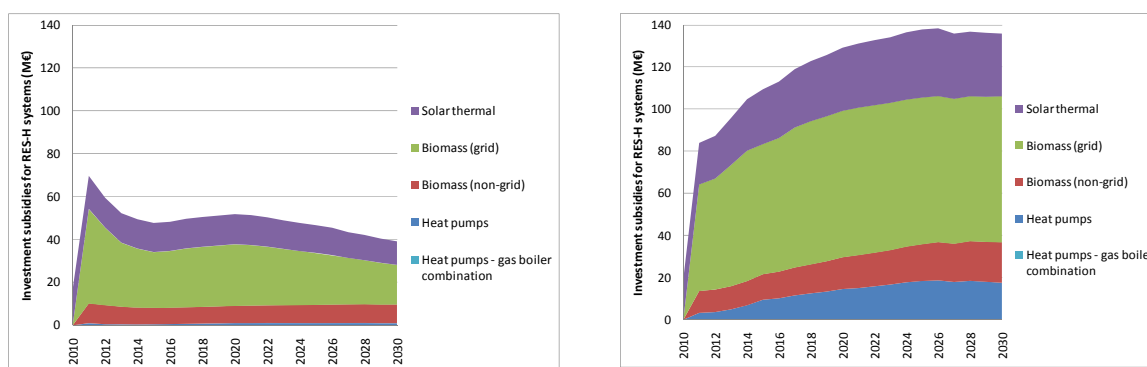


Figure 4: Public budget requirement in the building sector under policy set 1 in Lithuania (left: low energy price scenario, right: high energy price scenario)

### 3.3.3 Avoided fuel costs

The use of renewables for heating or cooling purposes substitute conventional energy carriers (e.g. gas, oil, coal) thus usually leading to lower fuel costs. As an example the following figure shows the avoided fuel costs in the building sector under policy set 1 (subsidies) for Lithuania. The blue area reflects the total fuel costs that occur under the policy set. The red area illustrates the total fuel costs that would have occurred in the case that all RES-H would have been produced by a fossil fuel mix (based on the mix of fossil fuels in the year 2007). The difference of the total fuel costs in the pure fossil reference scenario and in the scenario presented above represent the net avoided fuel costs (green line). Similar estimations have been done for all target countries.

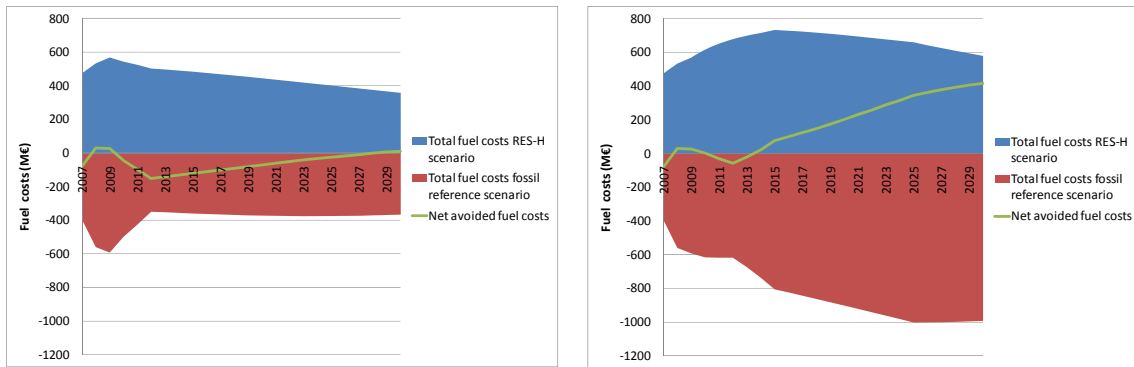


Figure 5: Avoided fuel costs in the building sector under policy set 1 in Lithuania (left: low energy price scenario, right: high energy price scenario)

### 3.3.4 Reduction of GHG emissions

The use of renewables for heating or cooling purposes reduces GHG emissions since in many cases fossil fuels are replaced. As an example the following figure shows the reduction of GHG emissions in the building sector under policy set 1 in Lithuania. For the calculation of this indicator it was assumed that in the fossil reference scenario all RES-H systems would be replaced by a fossil heating system mix.

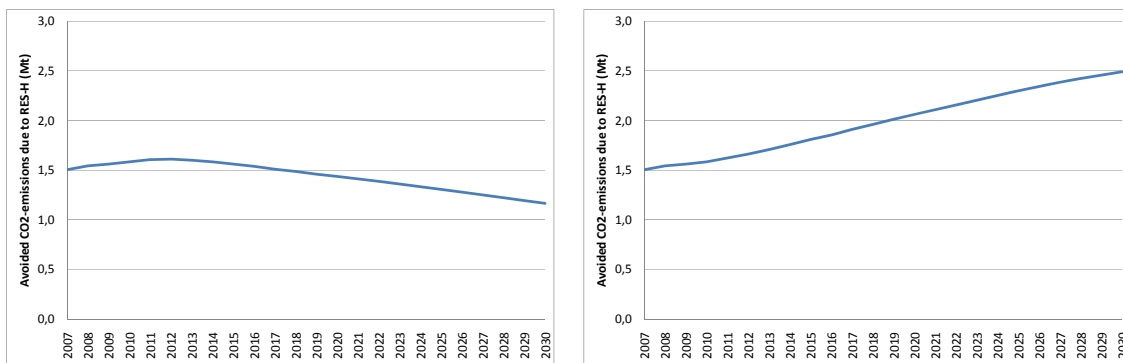


Figure 6: Reduced GHG emissions in the building sector under policy set 1 in Lithuania (left: low energy price scenario, right: high energy price scenario)

### 3.3.5 Public administration costs

Public administration costs cover costs that arise to public authorities or experts who act on behalf of a public authority from the execution of a political measure (e.g. for administering a use obligation or a subsidy scheme). The costs for such an enforcement scheme typically rise with the complexity of an instrument and the degree to which different levels of administration are involved. Public administration costs are an important element in the discussion about policy instruments as

- often an estimation of the expected public administration costs needs to be reported to the policy sector before adopting a regulatory norm for implementing a new instrument,
- public administration costs generally have to be covered by public budgets.

For each of the target countries and policy sets the public administration costs were estimated based on some basic assumptions such as the total number of support cases that has to be dealt with by the executing authority per year (number of funding applications; number of supported installations), management processes to run a support scheme, "efficiency" of programme execution (e.g. number of processed applications per day and staff).

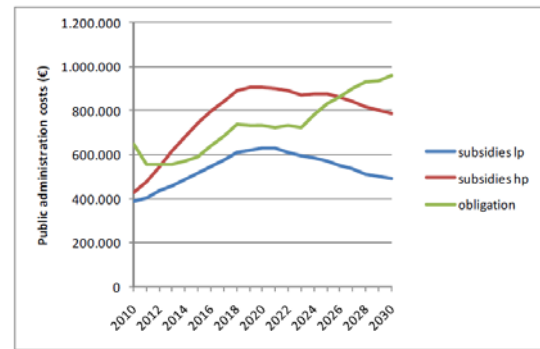


Figure 7: Public administration costs for the two policy sets in Austria (lp: low energy price scenario; hp: high energy price scenario)

### 3.3.6 Employment effects

As one of their main political tasks, governments strive for constant economic growth and high employment. This is why assessing the expansion of RES-H/C in terms of the effect on employment forms an essential part of a quantitative analysis.

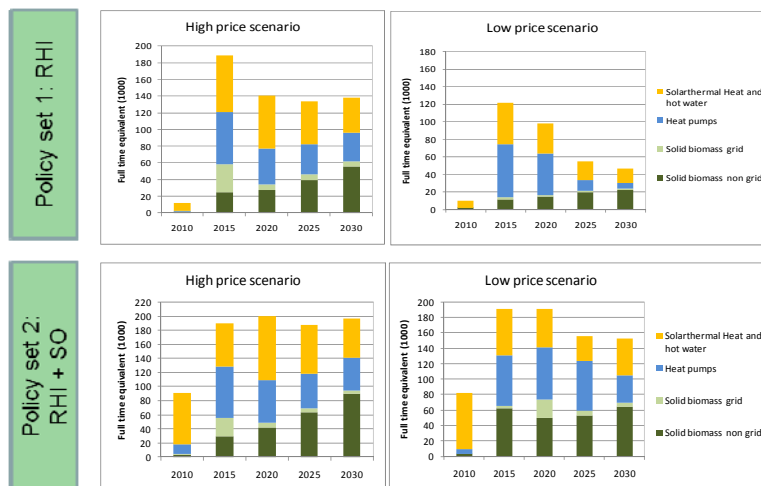


Figure 8: Annual gross employment effect of the two policy sets in the UK

For each of the target countries the gross employment effect (expressed in full time equivalents (fte)) has been estimated for the two RES-H/C diffusion developments linked to the two different policy sets. The estimation was based on data about costs and revenues associated to the policy triggered RES-H deployment. This data came out of the model runs with INVERT (see above) and was multiplied with technology-specific employment coefficients that were taken from the *EmployRES* project.<sup>3</sup>

<sup>3</sup> "Employ RES The impact of renewable energy policy on economic growth and employment in the European Union" carried out by Fraunhofer ISI (DE), Ecofys (NL), Energy Economics Group (AT), Rütter + Partner Socioeconomic Research + Consulting (CH), Lithuanian Energy Institute (LT) and Société Européenne d'Économie (FR).

### 4 Policy harmonisation

In order to reach the targets stated in the Directive 2009/28/EC, the challenge either for national Members States or a harmonised European renewable energy policy is to increase the share of RES-H/C significantly until 2020. In this context, it should be assessed whether a more coordinated or full harmonised policy framework would be able to address the main barriers to an expansion of RES-H/C more effectively and economical efficiently than an uncoordinated policy on Member State's level.

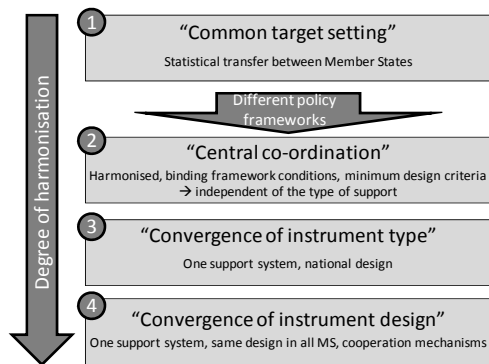


Figure 9: Levels of policy harmonisation

RES-H policy harmonisation already begins with an agreement on common targets for future RES deployment. The next step in the harmonisation process ("central co-ordination") is the postulation of binding framework conditions for all types of RES-H support in terms of technical standards or minimum design criteria for certain policy instruments, whereas the actual specific type of support is chosen by the Member States independently. "Convergence of instrument type" defines one support instrument in all Member States which is designed nationally. If the precise design of a common support instrument is also specified on the European level, the degree of harmonisation is denoted here as "convergence of instrument design".

The INVERT model has been applied to assess the possible costs and benefits of different harmonisation levels for use obligations in the building sector of the target countries. For instance the allocation of RES-H/C generation volumes as well as the distribution of costs and benefits among the target countries have been compared between the *convergence of instrument type* scenario (national design of use obligation) and the *convergence of instrument design* scenario (harmonised use obligation).

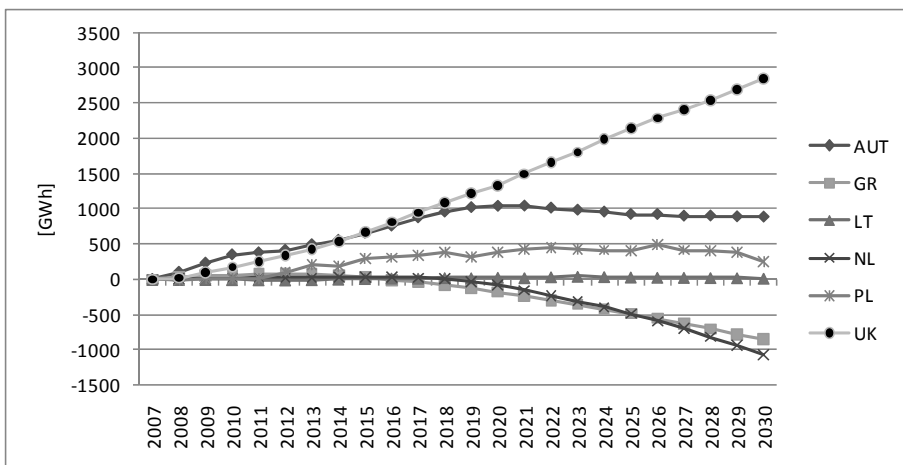


Figure 10: Difference in RES-H energy demand between "convergence of instrument design" scenario and "convergence of instrument type" scenario

## 5 Project consortium

Öko-Institut e.V. ([www.oeko.de](http://www.oeko.de)), Germany (coordinator)

University of Exeter ([www.exeter.ac.uk](http://www.exeter.ac.uk)), United Kingdom

Polish National Energy Conservation Agency ([www.kape.gov.pl](http://www.kape.gov.pl)), Poland

Vienna University of Technology, Institute of Power Systems and Energy Economics,  
Energy Economics Group ([eeg.tuwien.ac.at](http://eeg.tuwien.ac.at)), Austria

Fraunhofer Society for the Advancement of Applied Research ([isi.fraunhofer.de](http://isi.fraunhofer.de)), Germany

Centre for Renewable Energy Sources ([www.cres.gr](http://www.cres.gr)), Greece

Lund University ([www.lunduniversity.lu.se](http://www.lunduniversity.lu.se)), Sweden

Lithuanian Energy Institute ([www.lei.lt](http://www.lei.lt)), Lithuania

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