

The impact of national policies on the cost of onshore wind across the PENTA region

Lessons-learnt for policy

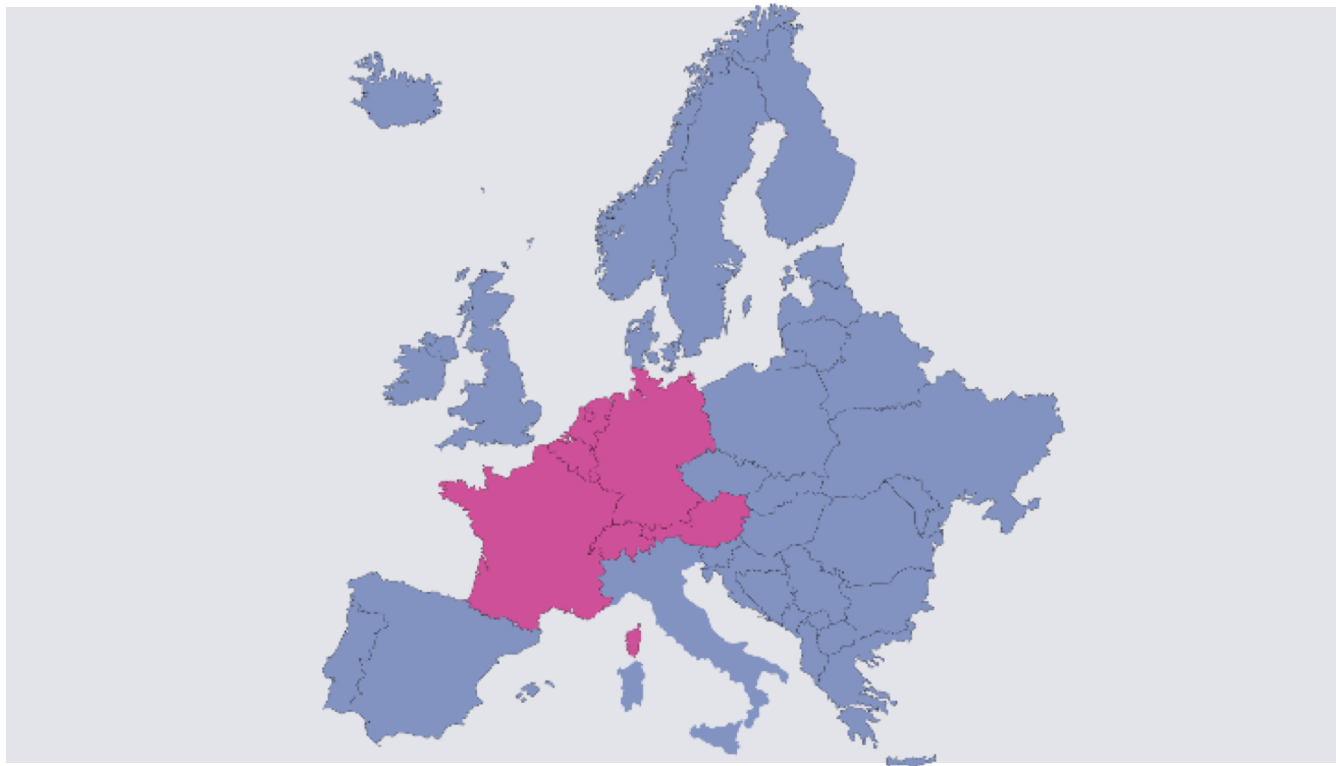
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VIENNA, 22 NOVEMBER 2018



The cost of deploying renewables depends on resource conditions and the national regulatory environment

Pentalateral Energy Forum region

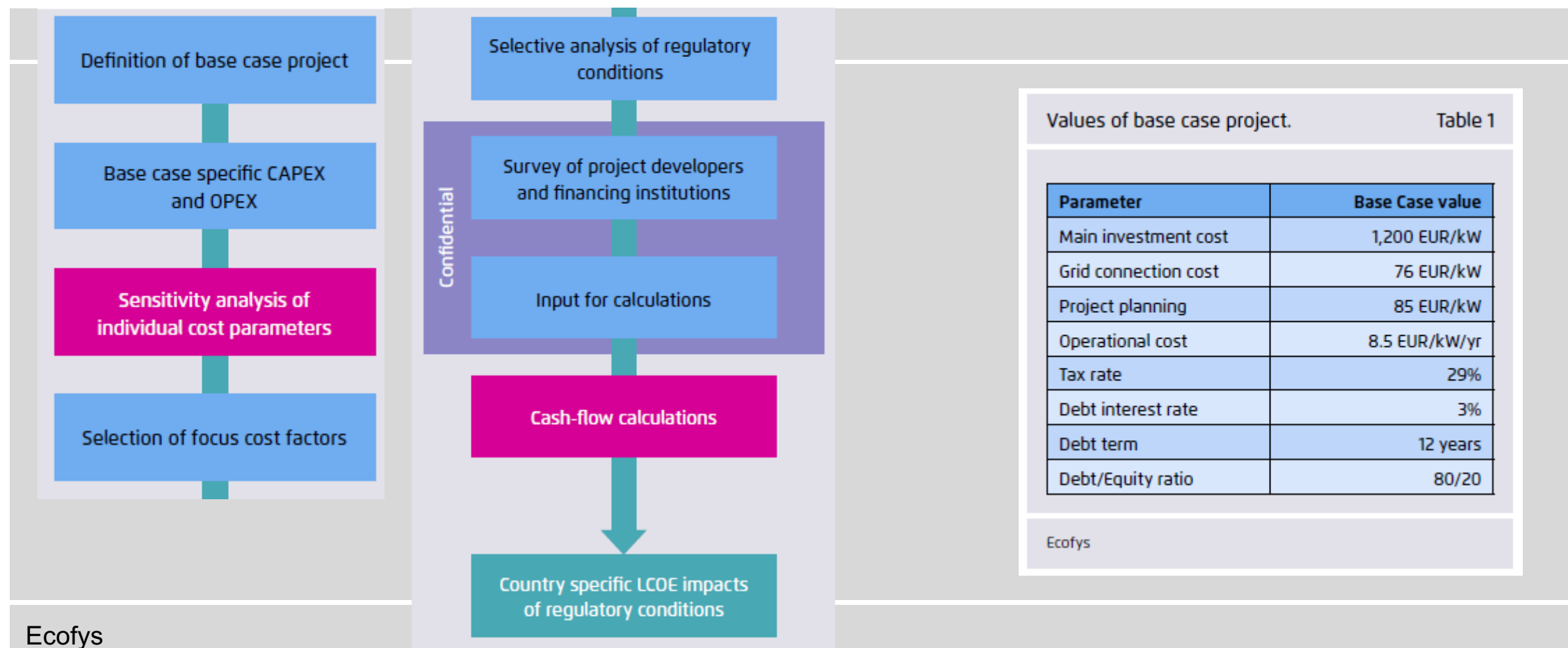


Study overview

- Evaluation of cost impacts for onshore wind projects resulting from countries' regulatory environment
- Case study Pentalateral Energy Forum (Austria, Belgium, France, Germany, Luxembourg, the Netherlands and Switzerland)
- Assessment is based on empirical data gathered through a stakeholder survey
- Aim is to understand the regulatory factors that impact divergence in renewable energy project costs from one country to the next
- Study performed by Ecofys and eclareon

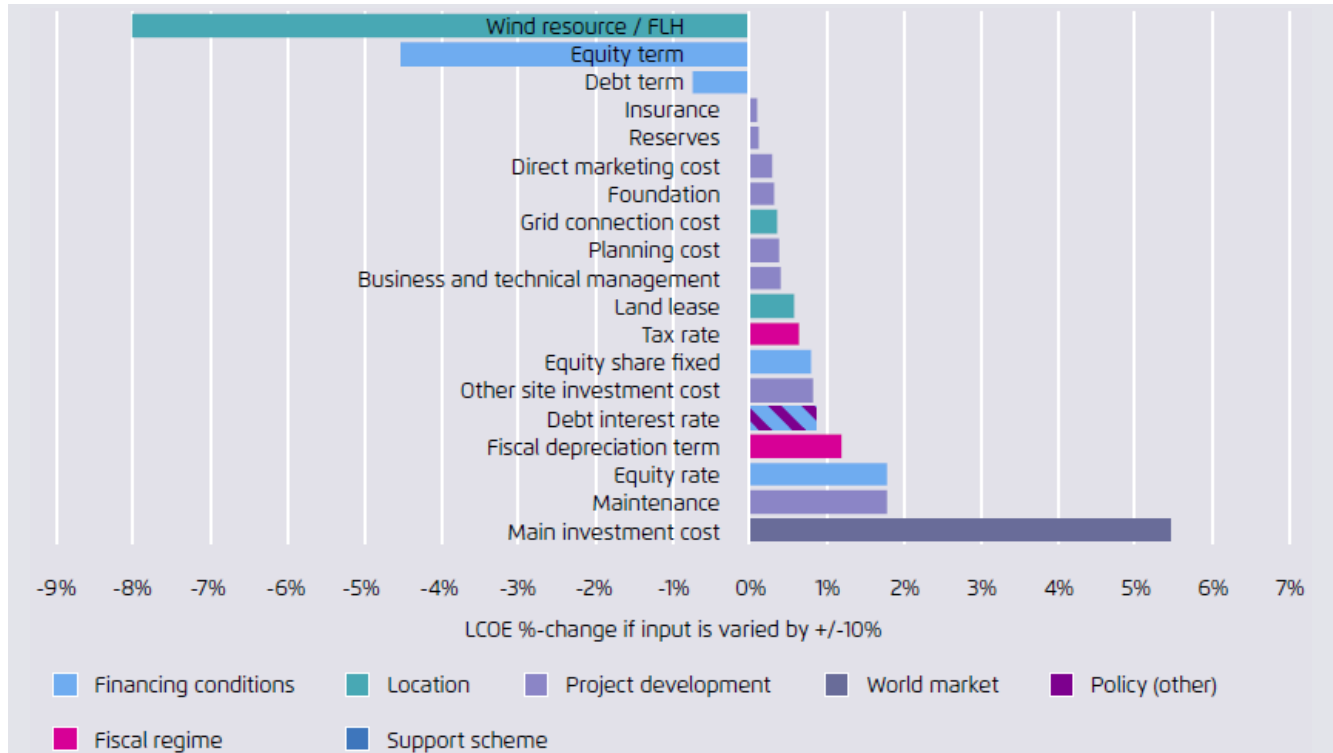


Applied methodology



Identifying the most relevant parameters affecting the LCOE of onshore wind projects

Correlation of input parameters with LCOE when applying a sensitivity analysis of +/-10%

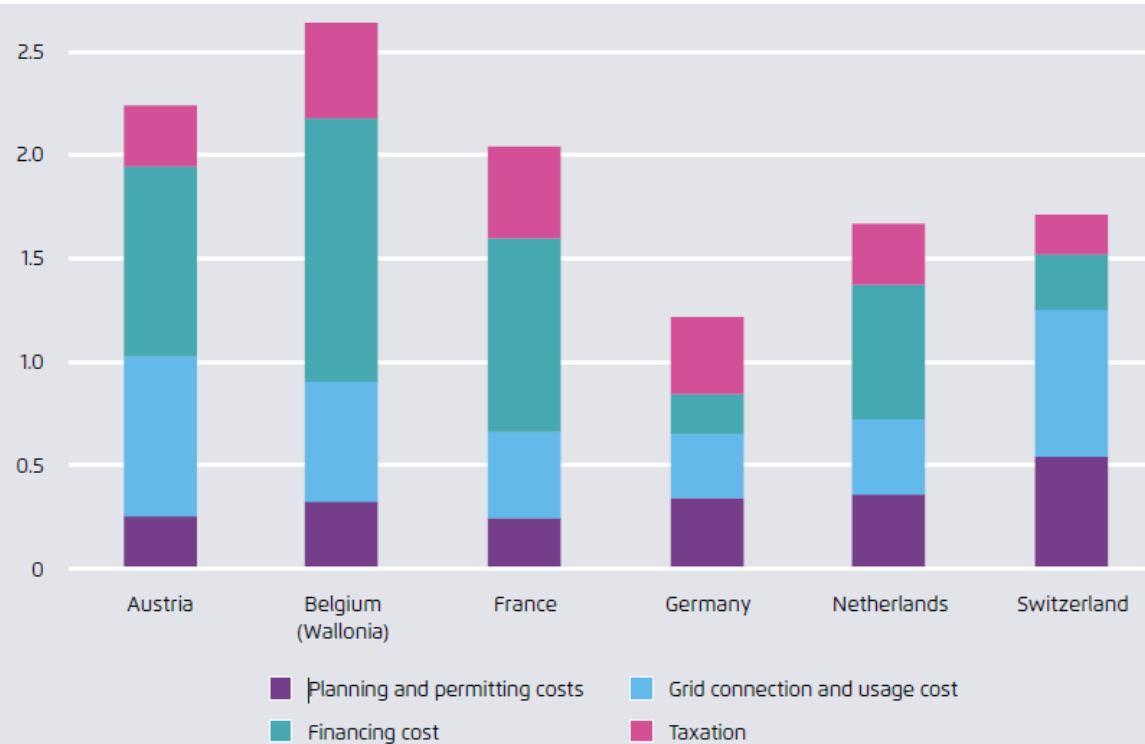


- Resource availability (-8%) and technology cost (5.5%) have strong influence on LCOE
- Other factors can have, combined, also a large effect on LCOE
- Some cost parameters – e.g. planning and permitting – are largely determined by national regulatory conditions
- Regulatory conditions (can) deviate significantly between countries

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Main finding from empirical research: *National policy & regulatory environment can have greater effect on cost of renewables than natural resource availability*

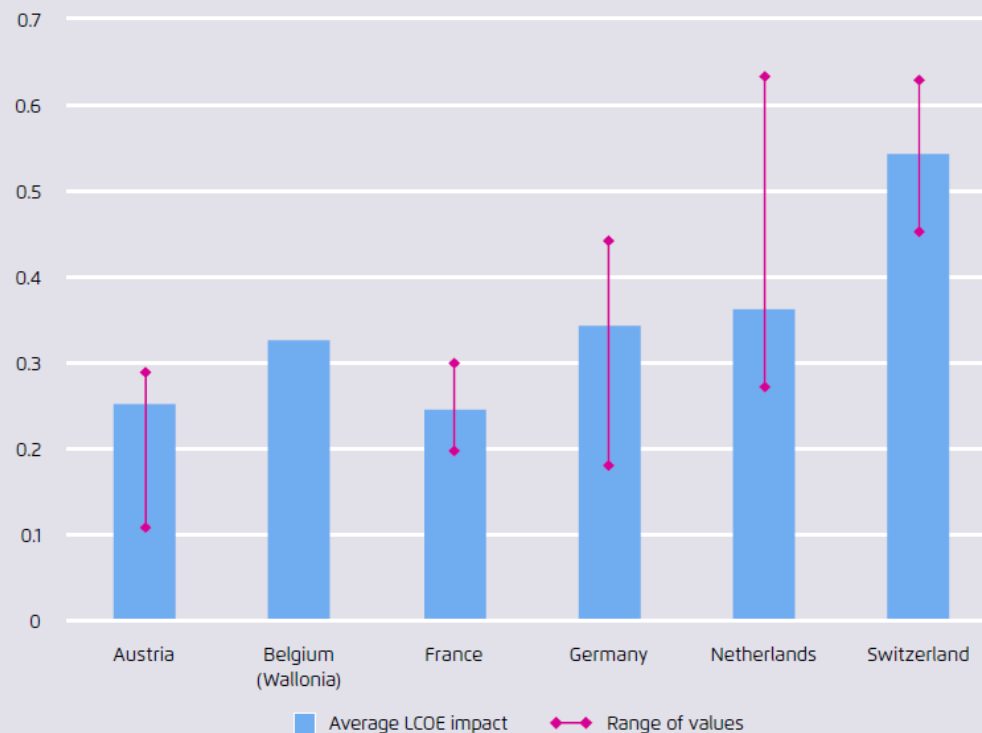
Combined effects of analysed factors on the LCOE in [ct/kWh]



- 10% decrease in full load hours increases the LCOE of reference wind project by 8 EUR/MWh
- The combined effect of the individual policy and regulatory cost components ranges from 12.2 EUR/MWh in Germany to 26.4 EUR/MWh in Belgium

Planning and permitting

Average cost impacts of planning and permitting in [ct/kWh]

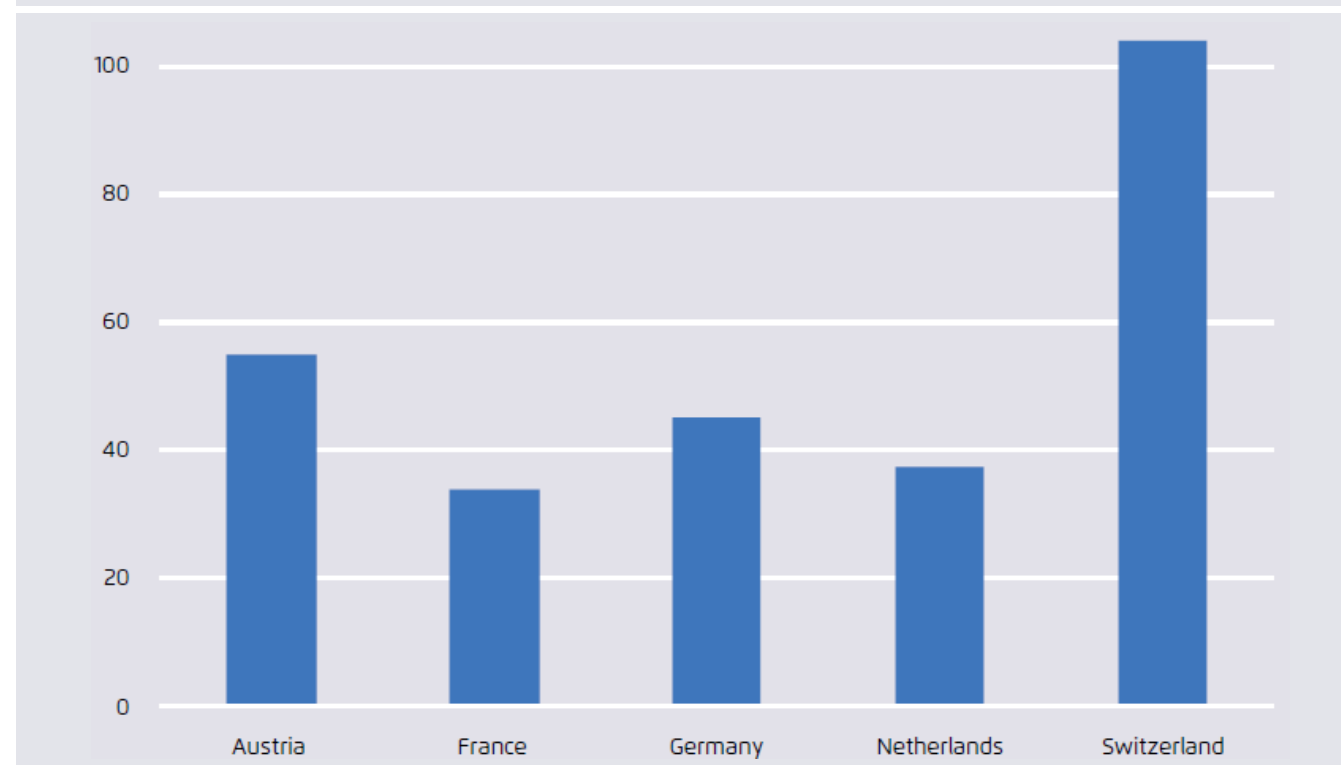


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- Costs borne by project developer related to planning and permitting (preliminary site assessments, securing of land, all types of assessments and permits)
- Not included: costs related to preparing site or planning/implementing construction activities
- LCOE impacts range from 0.25 ct/kWh (France) to 0.54 ct/kWh (Switzerland).
- Planning & permitting costs can deviate significantly from these average costs. Cost ranges large in DE (0.18–0.44 ct/kWh) and NL (0.27–0.63 ct/kWh)
- According to surveyed stakeholders, problems arise from lack of standardisation in permitting requirements & procedures, lacking coordination between different levels of administration, length of procedures, court appeals

Permitting cost

Average share of costs related to permitting in [EUR/kW]

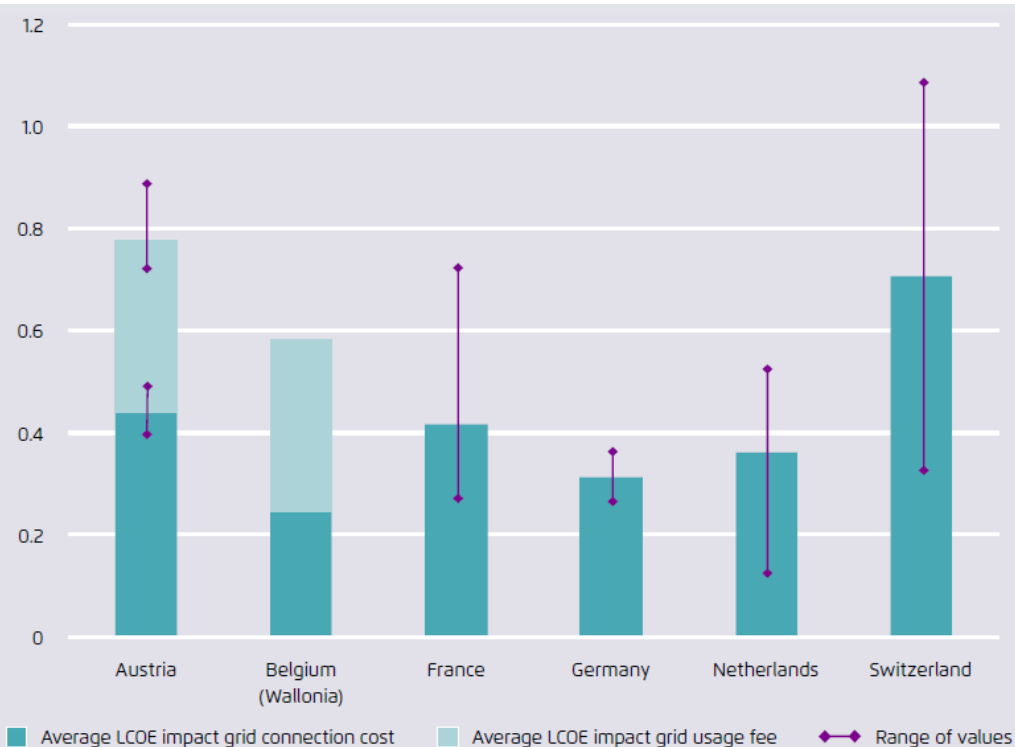


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- Costs determined by type of assessments required (environmental, avifauna, landscape, noise, shadow flickering, interference with radar, military/flight zones, minimum distance to urban areas, natural conservation areas, coast lines) & by the time required for assessment & administrative fees
- Average costs from 34 EUR/kW (FR) to 104 EUR/ kW (CH). Developers from AT and DE stated that provisions for environmental impact assessments are becoming more stringent, requiring assessment periods of multiple years
- Developers reported lack of coordination between different levels of administration as key challenge
- Recommendations: definition of national standards, national cap on permit fees, “one-stop shop”

Grid connection and usage cost

Average costs of grid connection and grid usage in [ct/kWh]

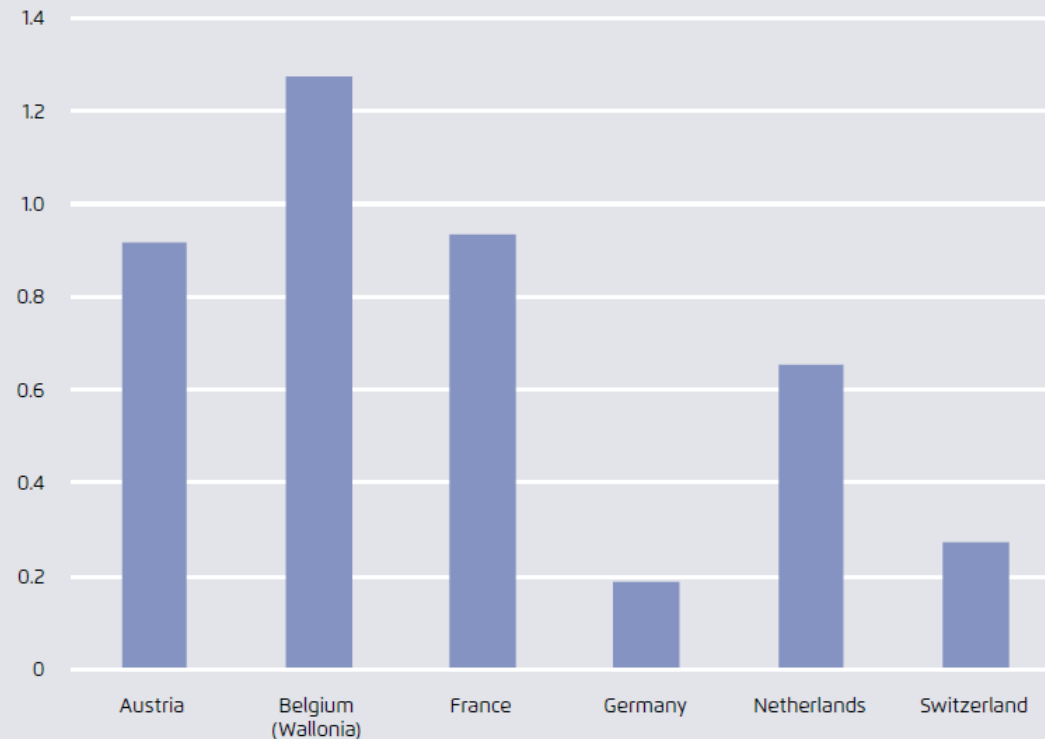


- Costs related to grid connection of the plant, if applicable, grid reinforcement and usage
- Connection cost depend on connection regime, “shallow” or “deep”. Some countries chose hybrid “shallow-deep” approaches, where generators pay parts of reinforcement costs
- 0.24 ct/kWh (BE) to 0.71 ct/kWh (CH). Incl. grid usage costs, generators in AT face highest average costs of 0.82 ct/kWh. Generators in DE, with “shallow” grid connection and no grid usage fees, have lowest costs of 0.31 ct/kWh
- Project-specific costs depend on size, distance to connection point and voltage level. Reinforcement cost vary according to location
- Project developers mentioned lack of transparency in connection costs and lacking coordination of grid planning & spatial planning

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Financing conditions

Average costs of financing (measured as difference between typical national financing case and “theoretic financing case”*) in [ct/kWh]



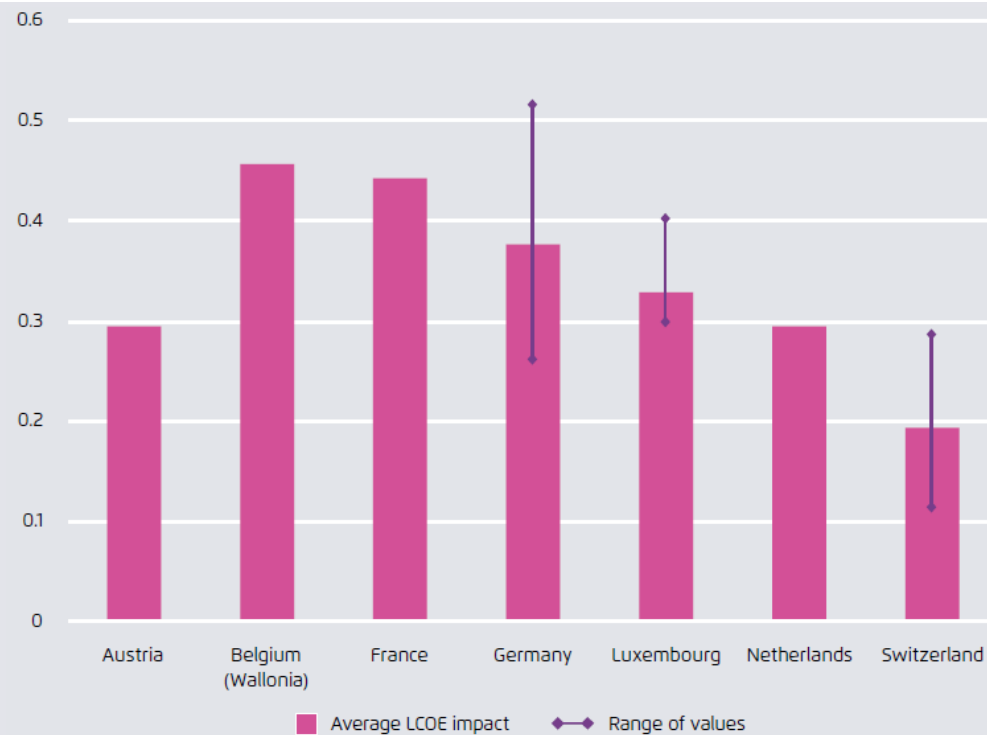
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* The “theoretic financing case” provides very favourable conditions with a debt interest rate of 2%, debt term of 17 years and a debt/equity ratio of 85/15.

- Interest rates on debt, debt/equity ratios & debt terms determined by markets and can only be influenced indirectly by regulatory conditions
- However, they are important indication of perceived regulatory risks (support scheme design, potential of non-realization or changes in project configuration and operation, potential of retro-active changes in support schemes)
- Large degree of variation, ranging from 0.19 ct/kWh (DE) to 1.28 ct/kWh (BE)

Corporate taxation

Average costs of taxation in [ct/kWh]

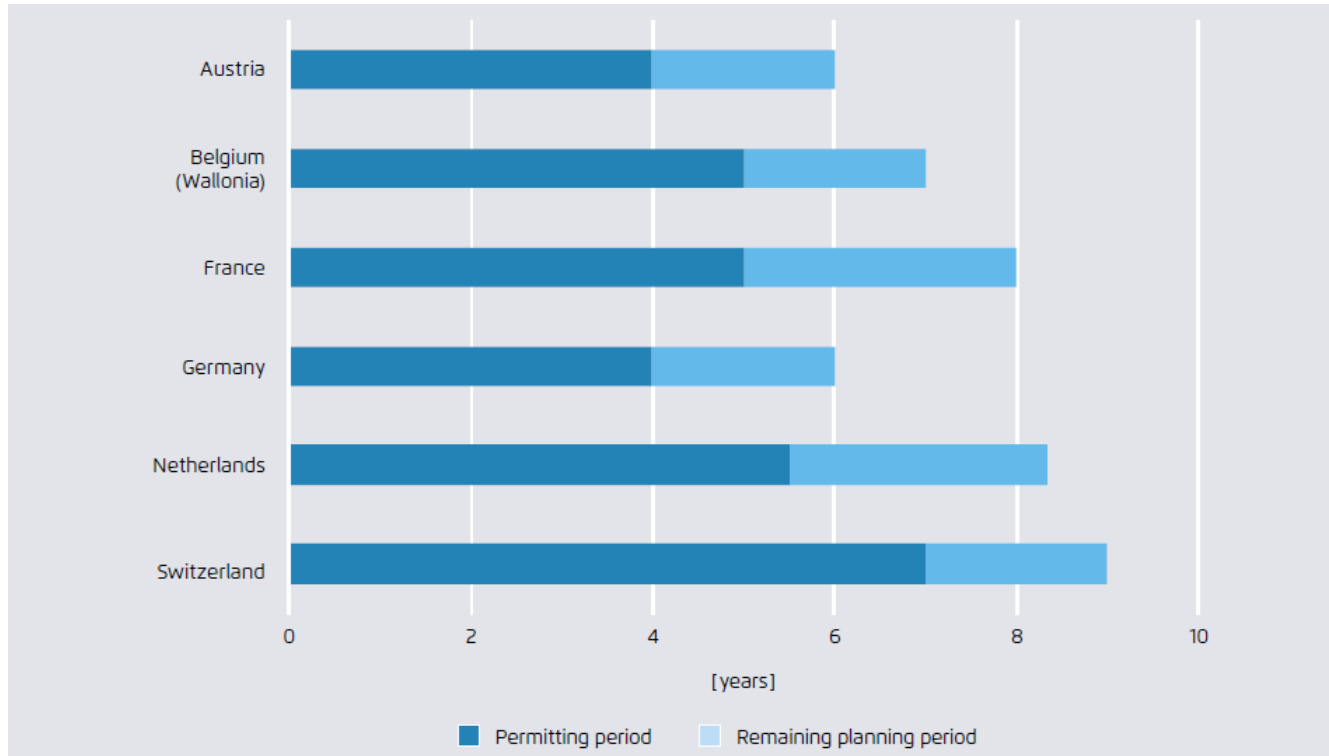


- Taxes purely determined by legislation, reflecting broader political priorities
- LCOE impacts of corporate taxation are smaller in absolute terms compared to the other observed parameters
- The difference observed between countries is smaller, ranging from 0.19 ct/kWh (CH) to 0.46 ct/kWh (BE)

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Further regulation-induced differences: Project realisation periods

Average duration of planning and permitting period



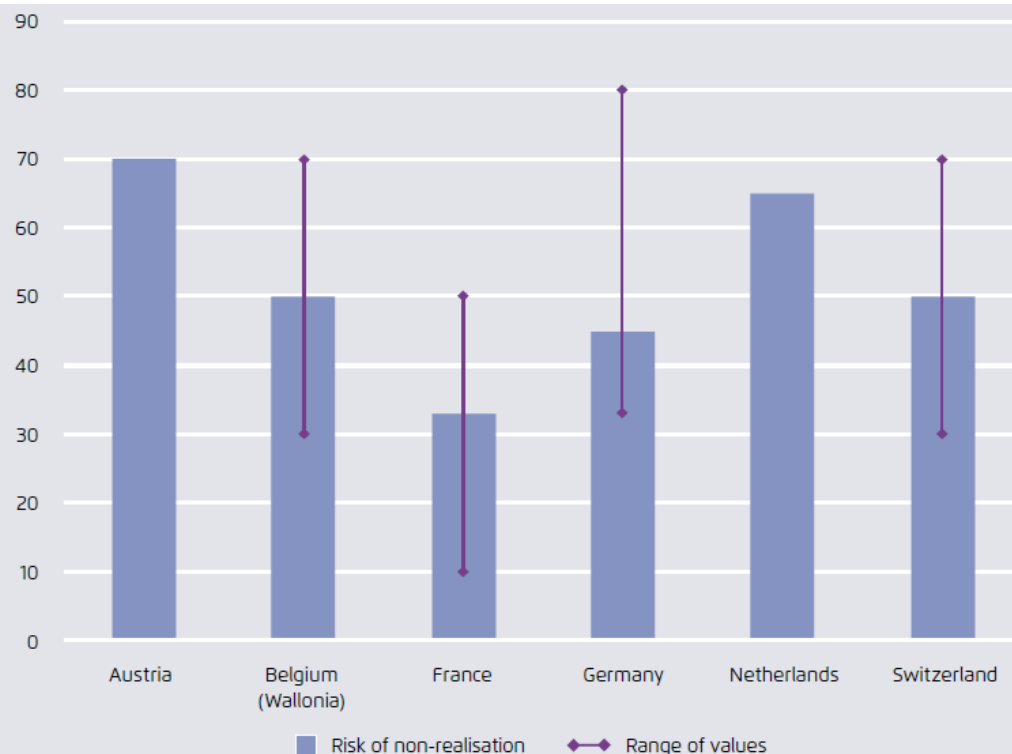
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Permitting period equals time from planning start till permitting is finalised

- From start of project planning to start of wind power plant operation
- Provides an indication of the complexity of the processes involved
- Legal appeals were the most important reason for project delays in all analysed countries
- E.g. in France more than 80% of onshore wind projects are appealed. In 80% of these cases, project developers prevail in the legal proceedings

Further regulation-induced differences: Risk of non-realisation

Average risk of non-realisation at the beginning of the planning stage



- Reported risk of non-realisation differs substantially between countries, ranging from 33% in France to 70% in Austria
- Largest intra-country variation in non-realisation was reported by German developers, with rates from 33% to 80%
- Key factors include specific location, strategy in project planning, technical configuration of the project and support by local stakeholders
- Risk of non-realization not to be directly compared between countries: What are main reasons for abortion? At which stage and after how many years of planning?
- In AT and NL project cancellations usually at early pre-permitting phase, in BE and CH even after permit granting

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Together, the national policy and regulatory environment can have a greater effect on the cost of renewables than natural resource availability

Average LCOE impacts for all parameters in [ct/kWh]

	Austria	Belgium (Wallonia)	France	Germany	Netherlands	Switzerland
Planning and permitting (ct/kWh)	0.25	0.33	0.25	0.34	0.36	0.54
Grid connection & usage (ct/kWh)	0.78	0.58	0.42	0.31	0.36	0.71
Financing (ct/kWh)	0.92	1.28	0.94	0.19	0.65	0.27
Taxation (ct/kWh)	0.30	0.46	0.44	0.38	0.30	0.19

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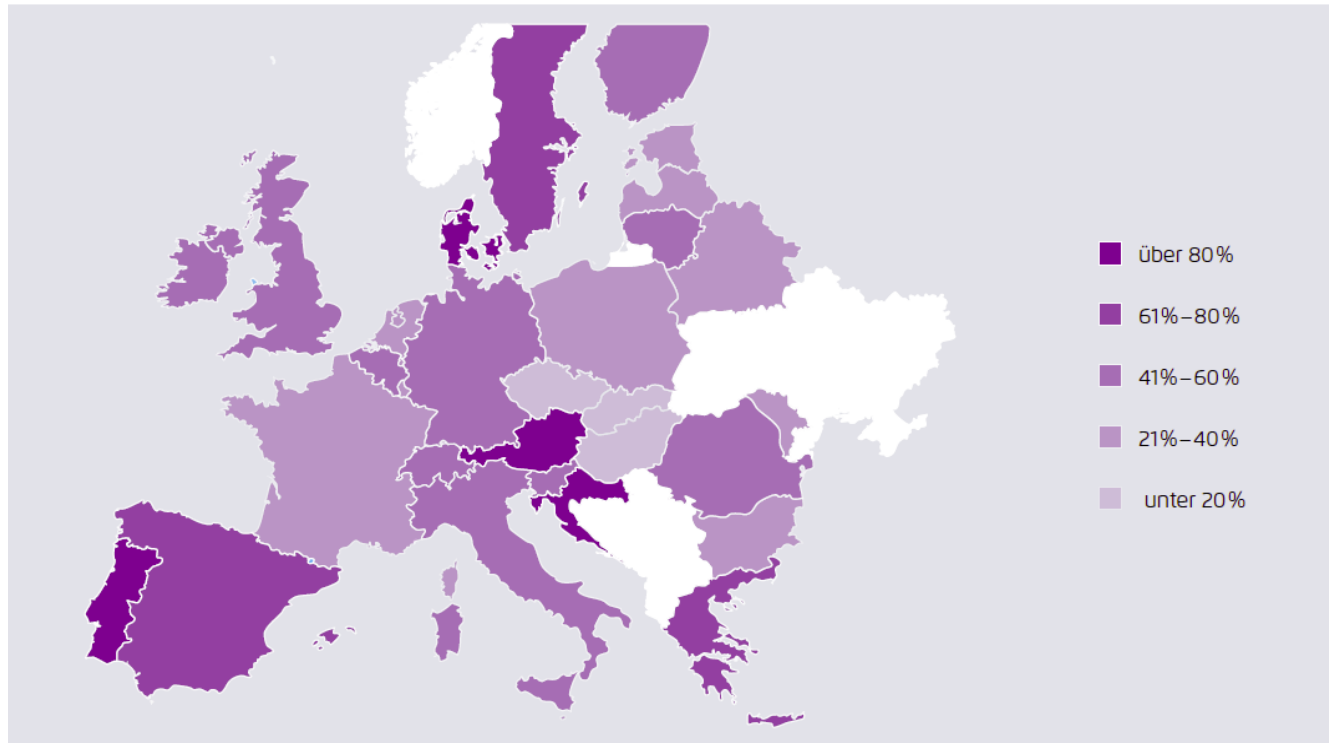
- Significant differences observed for all analysed parameters
- Grid connection & financing costs have largest impact & variation
- Smallest impacts & variations for corporate taxation, ranging from 1.9 €/MWh in CH to 4.6 €/MWh in BE
- Difference in LCOE impact of national policies in PENTA as large as 14 €/MWh
- In competitive cross-border auctions, such differences have a determining effect on the final distribution of RES deployment

Implications for policy design?

Towards a pan-European energy transition?

EU rules push for increased cross-border collaboration, but do not offer a consistent framework to that end

Nicht nur in Deutschland findet eine Energiewende statt: Ganz Europa wird 2030 einen Erneuerbare-Energien-Anteil am Stromverbrauch von mindestens 50 % haben Abbildung 19



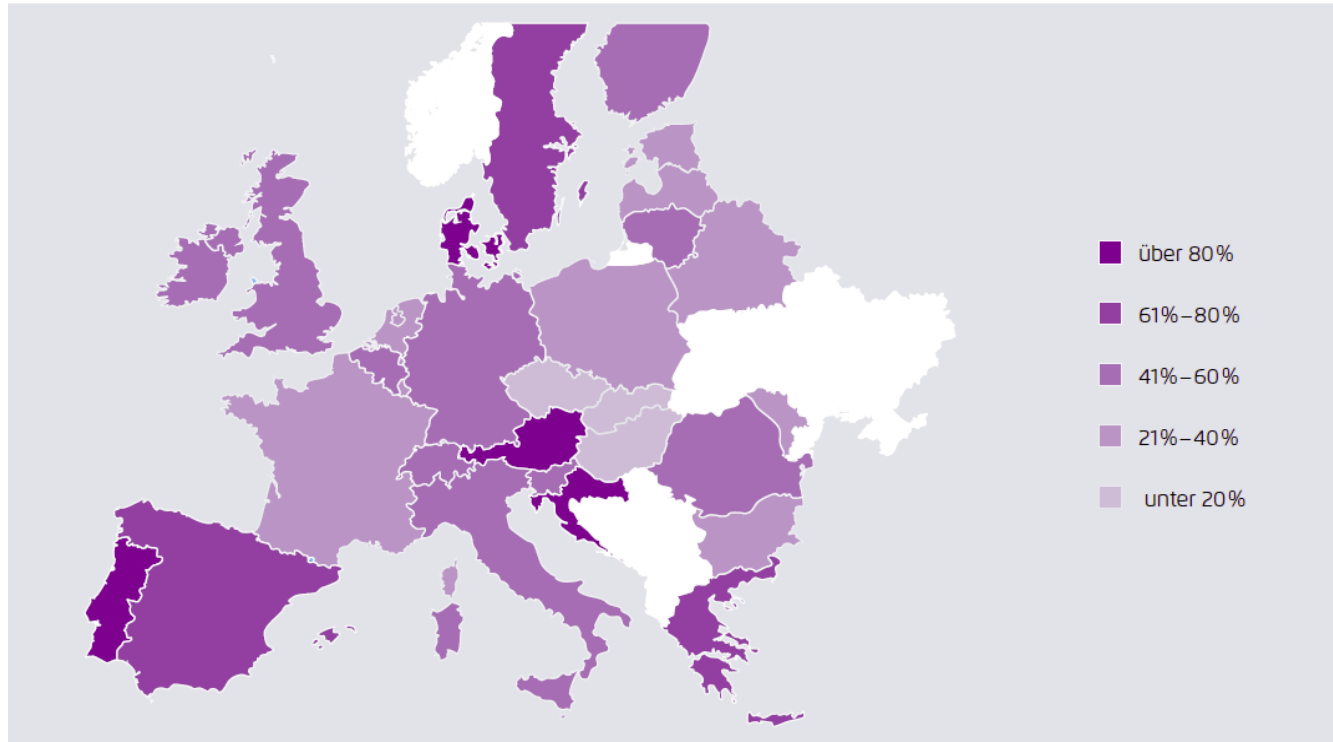
Eigene Darstellung nach E3MLab/IIASA (2017)

- EU level: Push to open national support schemes from state aid guidelines does not consider impacts differing regulatory conditions (no level playing field)
- EU 2030 targets will partially be met through EU RES financing mechanism (Art. 27 Governance Regulation)
- Regional or EU-wide tendering to achieve EU target is unlikely to result in desired outcome without better understanding of effects from differences in domestic regulatory conditions
- Country level: Study highlights cost saving potential: Knowing how regulatory conditions impact RES cost key to optimize investment conditions

Towards a pan-European energy transition

Coordinated convergence of national regulatory conditions towards best-practices and informed consideration of regulation-induced LCOE-effects in EU cross-border policies

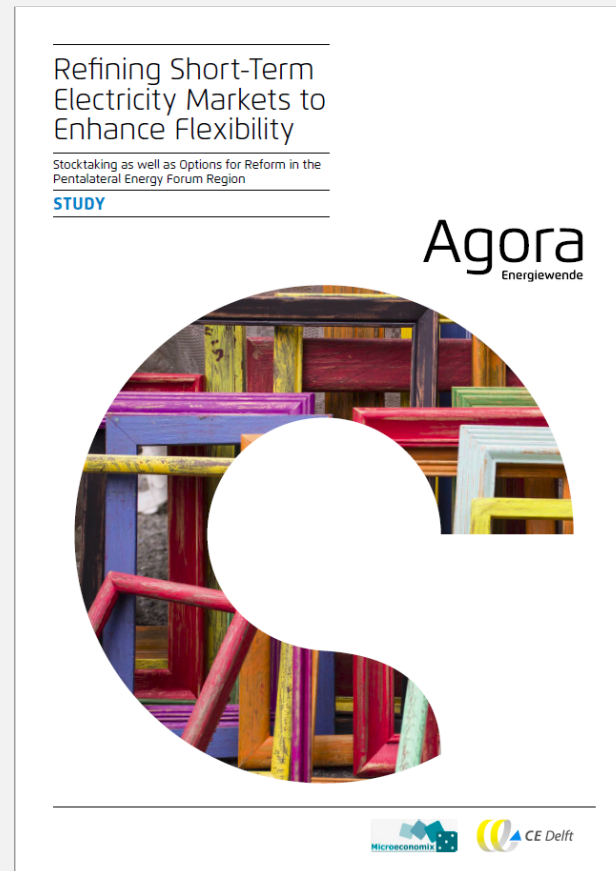
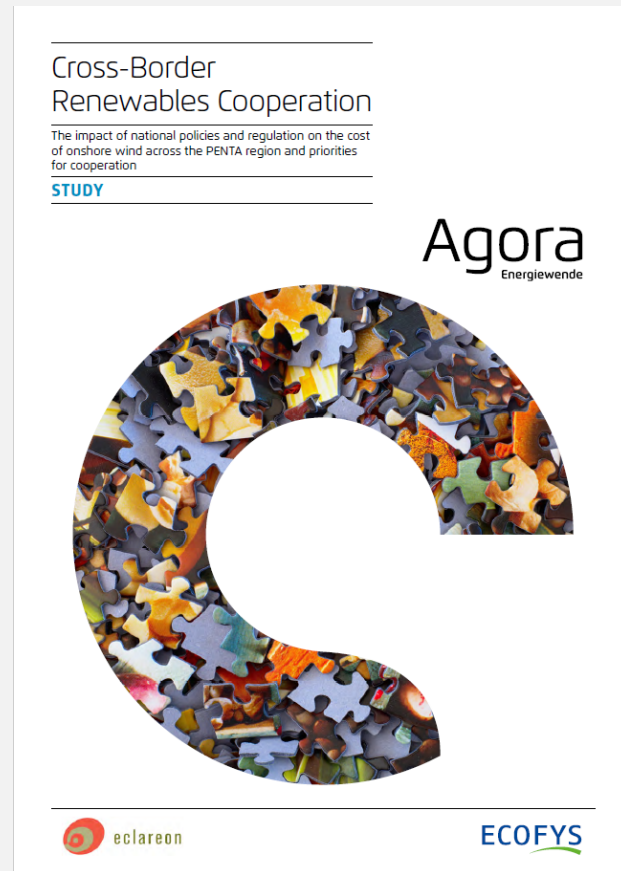
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Eigene Darstellung nach E3MLab/IIASA (2017)

1. Analyse effects of regulatory conditions on RES project costs
2. Assess impact of differences in regulatory conditions on cross-border renewable energy cooperation
3. Agree on a coordinated convergence of select regulatory conditions
4. Design cross-border RES collaboration that reflects differences in regulation
5. Use lessons from regional cooperation to identify best EU-level practices
6. Approach enhanced cross-border renewables collaboration as integral part of better regional cooperation

Relevant studies



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Questions or Comments? Feel free to contact me:
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