

Cross-border Cooperations in European Energy Policy: Challenges in the Case of Intermittent RES-E



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with Albert Hoffrichter and Alexander Weber.*

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1.1) Current situation and research questions

Current situation

- Member states are trying to achieve the European (and national) RES-targets. This leads to a strong increase in renewable generation capacity in some states (e.g. Germany).
- Critics refer to a “low cost efficiency of national solutions” and call for cross-border cooperations on the development of new RES-E capacities.
- The European Commission has been promoting cross-border cooperations for several years:
 - Cooperation Mechanisms in the RES-Directive (Directive 2009/28/EC)
 - Guidelines on State aid for environmental protection and energy 2014-2020

Research questions

- Which effects can cross-border cooperations have?
- How can these effects be assessed from a national point of view?



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1.2) Methodological approach and system of objectives

Conceptual (respectively abstract) and qualitative analysis

Theories

- New Institutional Economics
- Welfare Economics, Industrial Organization

System of objectives

- Cost efficiency
 - Consumer perspective
 - Welfare perspective
- Decarbonisation
- In principle, many other objectives possible (e.g. additional environmental objectives, security of supply etc.)



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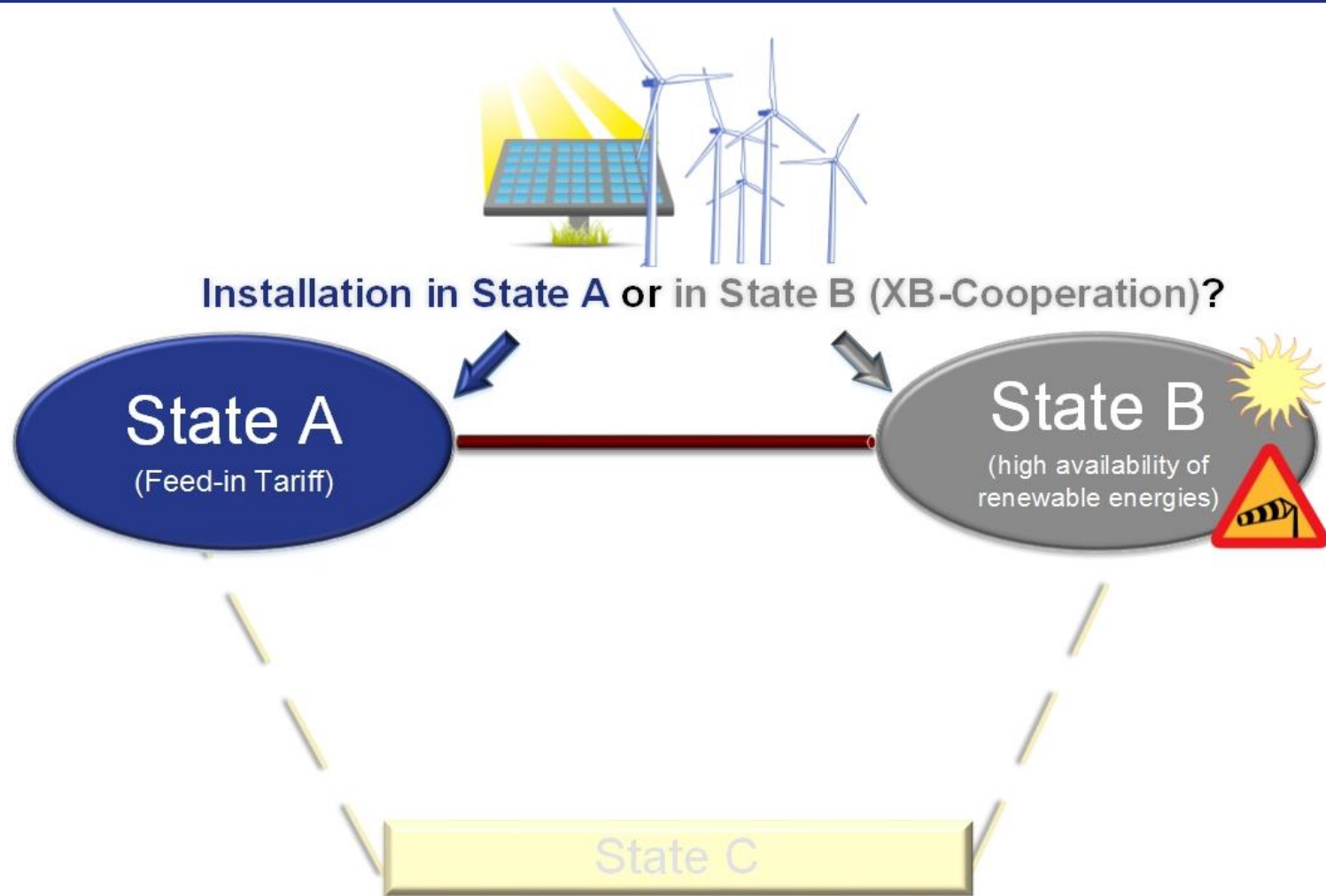
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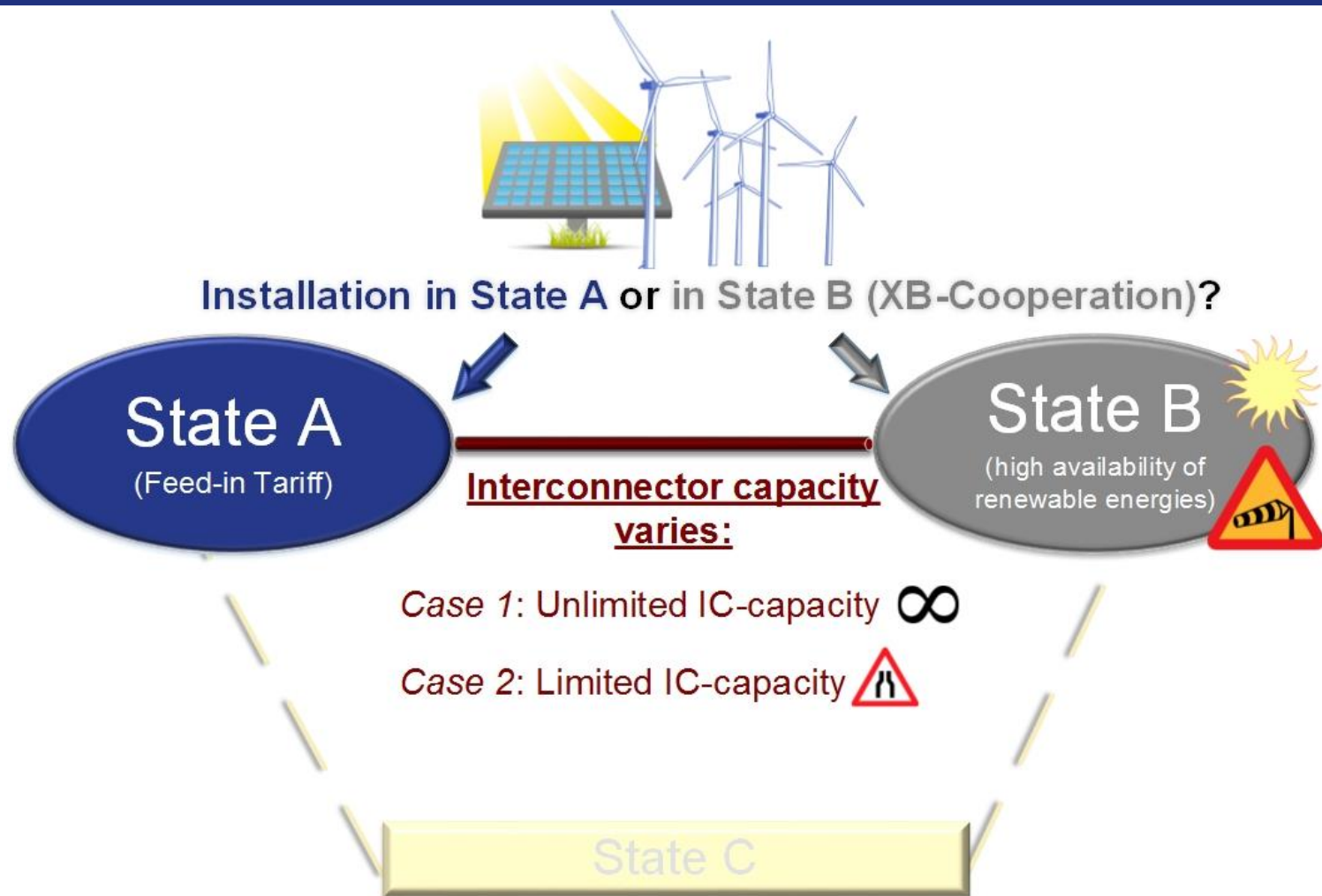
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2.1) Model and assumptions



2.1) Model and assumptions



Effects in this analysis: Comparison between the (respective) situation with a XB-cooperation [installation in state B] and a situation in which all new RES-E are domestically installed [in state A].

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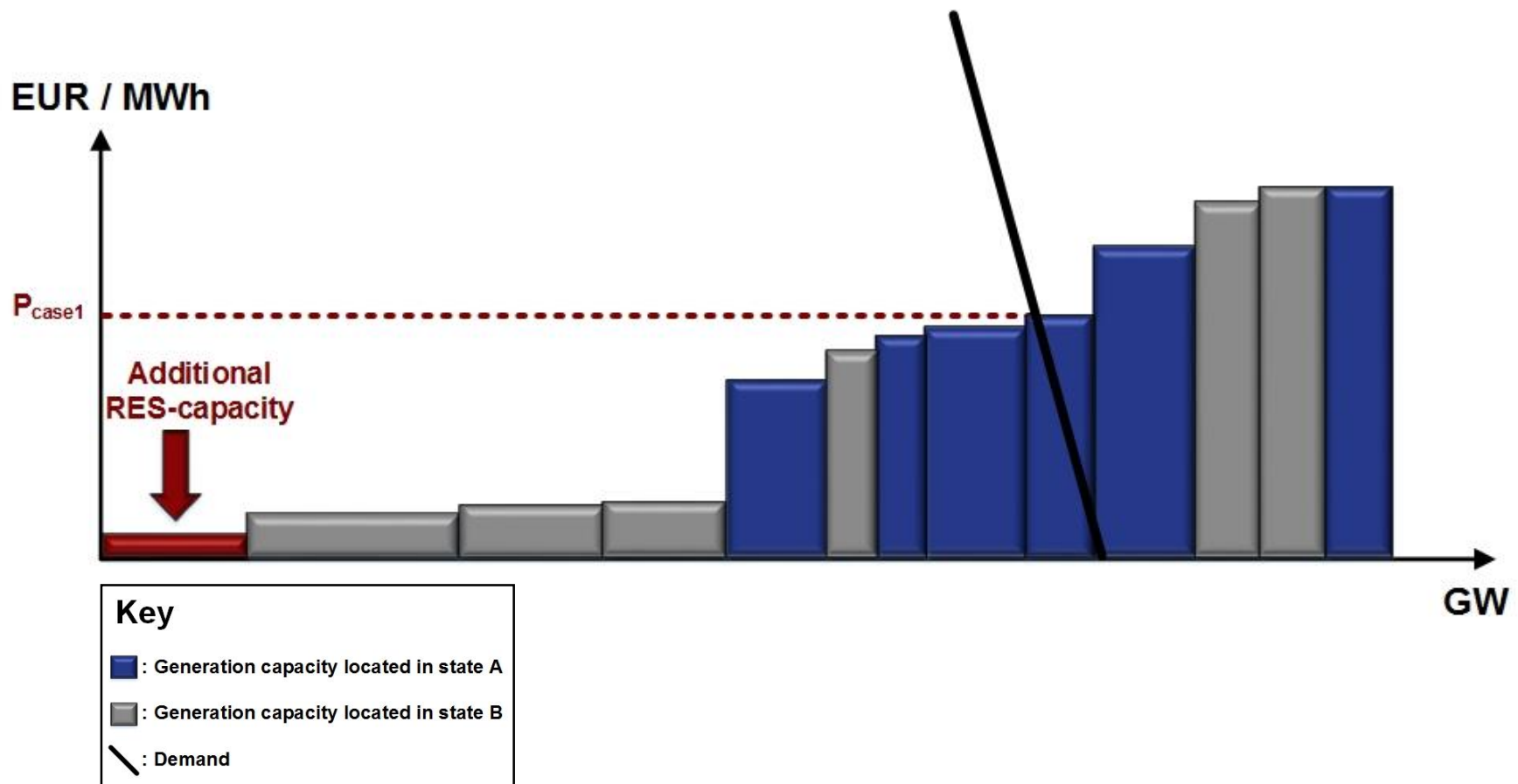
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2.2.1) Effects on dispatch [Case 1: Unlimited transmission capacity]

Effects of a XB-cooperation (in case 1) on the dispatch (in state A and B)...

(...under the assumptions of our simplified model...) None.



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[Case 1: Unlimited transmission capacity]

XB-RES-cooperations can have the following effects on production costs (from a system perspective):

- Different (usually: higher) availability of renewable energies at the new location of the plants
(This effect [usually] decreases production costs and is often the main motivation for XB-cooperations.)
- Changes in the *temporal* availability of renewable energies in the respective region
(This effect can increase [spatial concentration of RES] or decrease [long distances between renewable energy plants] the production costs.)

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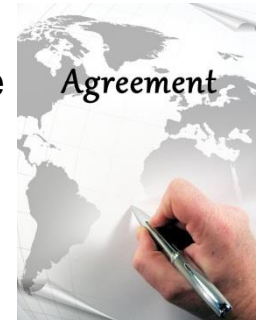
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[Case 1: Unlimited transmission capacity]

Negotiations on sharing the benefits of cooperation

- If the XB-cooperation leads to lower production costs, these benefits can be shared between the cooperating states by entering into a XB-agreement.
- The transaction costs that arise because of such an agreement increase with the intensity and duration of the bi- (or multi-)lateral negotiations.



Problems of contractibility: Incomplete contracts and opportunistic behavior

- As it is not possible to regulate all contingencies (e.g. changes of the framework conditions or behavior of contractual partners) in the XB-agreement this cooperation contract will be incomplete (to a greater or lesser extent).
- Incomplete contracts provide an opportunity to achieve individual objectives to the detriment of contractual partners (or in this case: adjacent states).
- High risks of opportunistic behavior can lead to high transaction costs as states will...
 - ...monitor their contractual partners in order to detect opportunistic behavior.
 - ...invest large resources to secure themselves against adverse actions of contractual partners.

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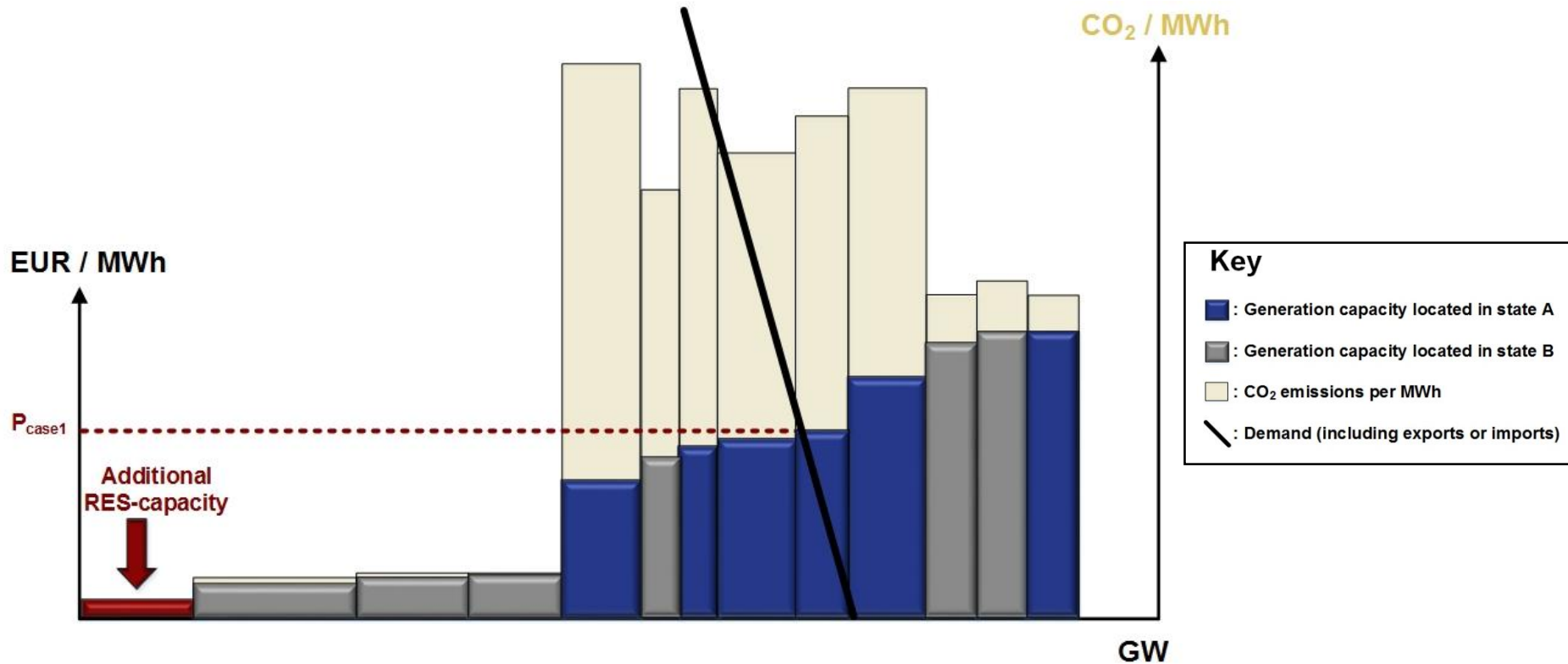
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2.2.3) (Potential) effects on the “decarbonisation” objective [Case 1: Unlimited transmission capacity]

Analogous to part 2.2.1, a XB-cooperation has no effects on the dispatch.
Consequently, it also has no impacts on the CO₂ emissions in state A and B.

(...under the assumptions of our simplified model [e.g. same amount of generated renewable electricity – the installed renewable generation capacity varies in the case of cooperation.])



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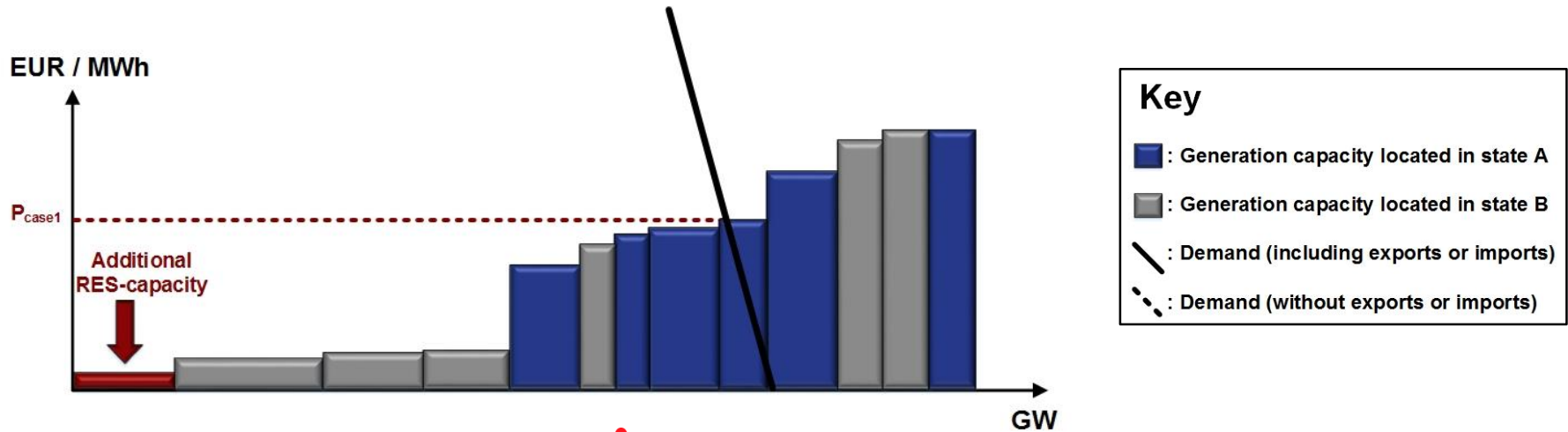
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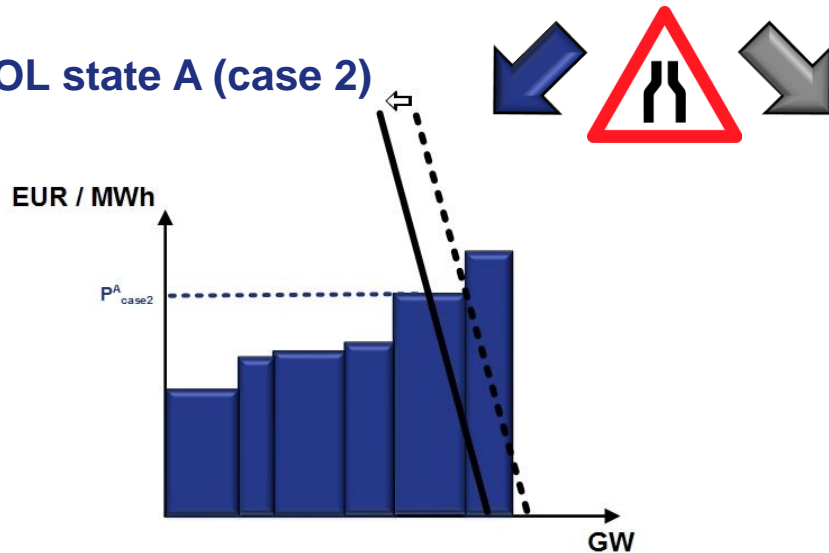
2.3.1) Effects on dispatch

[Case 2: Limited transmission capacity]

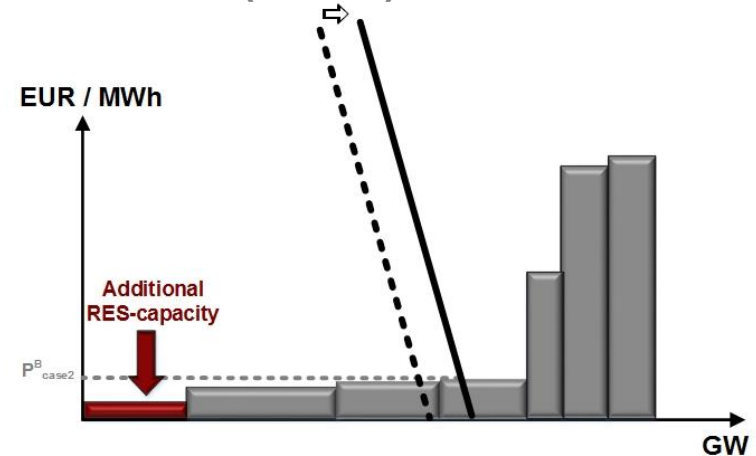
MOL case 1



MOL state A (case 2)



MOL state B (case 2)

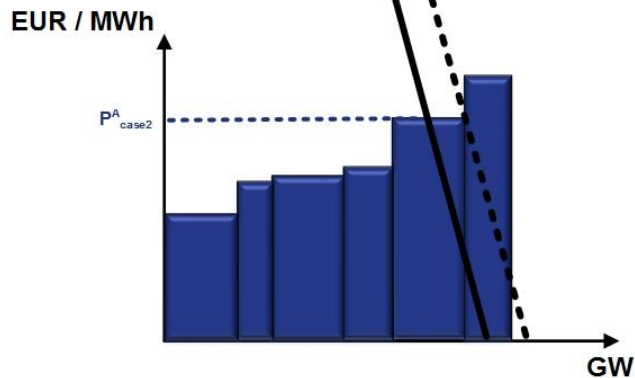


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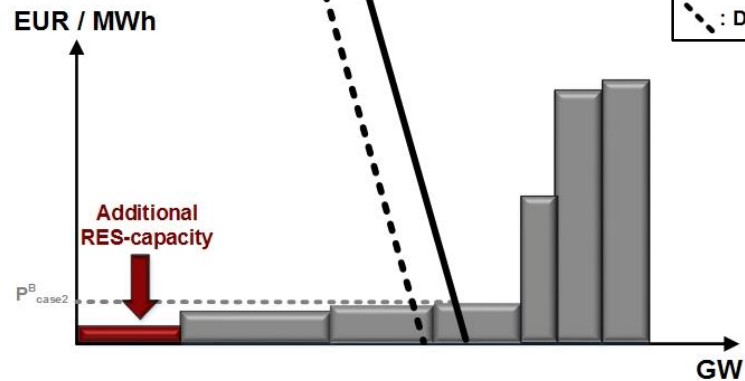
[Case 2: Limited transmission capacity]

XB-cooperation

MOL state A



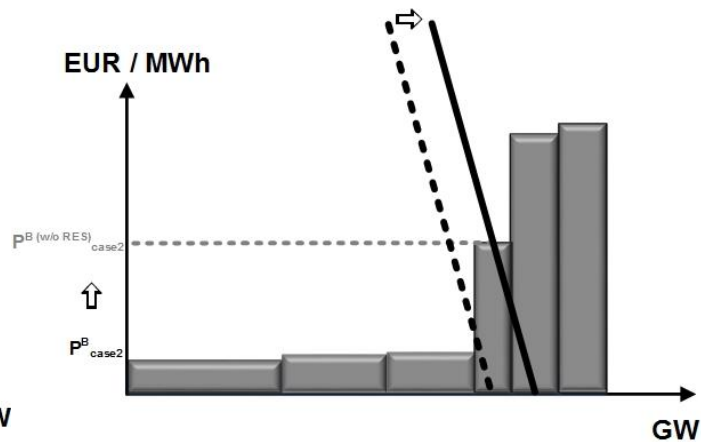
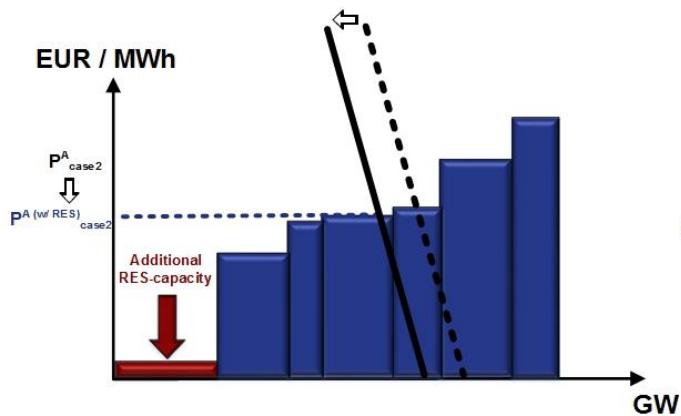
MOL state B



Key

- : Generation capacity located in state A
- : Generation capacity located in state B
- : Demand (including exports or imports)
- - - : Demand (without exports or imports)

No XB-cooperation



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[Case 2: Limited transmission capacity]

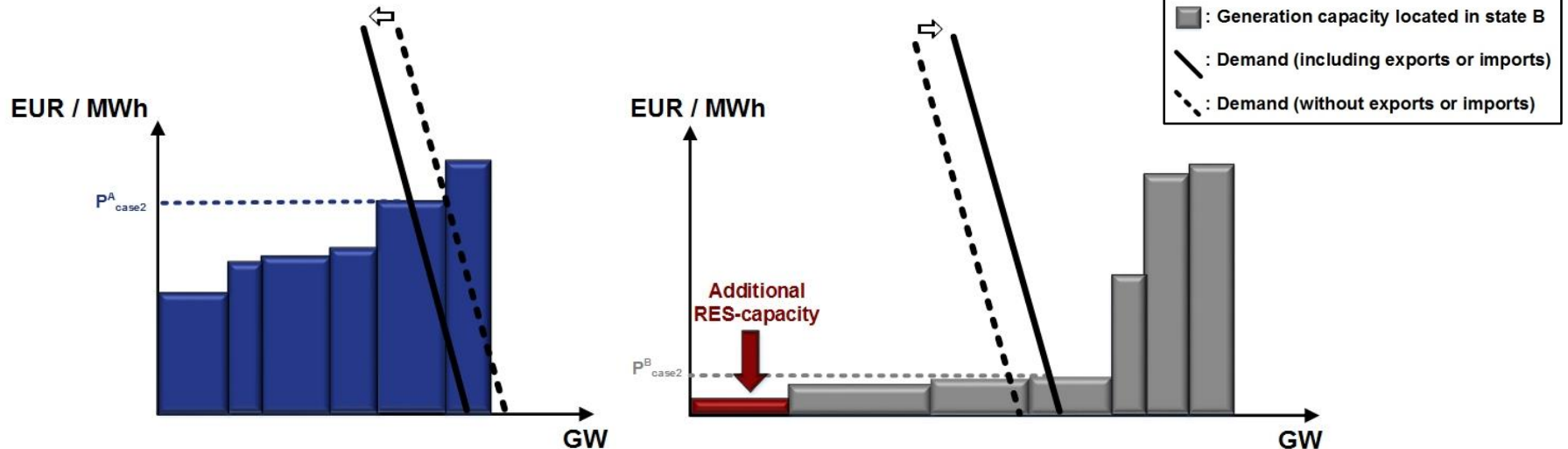
Depending on the location of the new installed RES capacity, different generation capacities become displaced in the (respective national) merit order.

Additional effect of XB-cooperations on production costs:
Comparison between the marginal costs of the capacities that would be displaced in state A and in state B.

Case 2 (with XB-cooperation)

MOL state A

MOL state B



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[Case 2: Limited transmission capacity]

Increasing problems of contractibility: distributional effects and growing uncertainties

- If the interconnector between state A and B is congested, the location of the new intermittent RES capacity has an impact on the dispatch (see slide 20 and 22).
- Thus, XB-cooperations can induce significant distributional effects (e.g. changes in national wholesale prices).
- In case 2, many factors can considerably influence these distributional effects (for example by changing power flows):
 - Changes in the technical system (e.g. [de]commissioning of power plants)
 - Changes in institutional framework (e.g. raise of emission taxes)
 - Further external shocks (e.g. price changes for fossil fuels)
- Because of this high uncertainty, the distributional effects of a XB-cooperation are very difficult to forecast and it is very often too expensive to include all possible outcomes in a bi- or multilateral agreement.
- This increases the incompleteness of XB-cooperation contracts and results in high transaction costs due to intensive and complex negotiations as well as the high probability of renegotiations.

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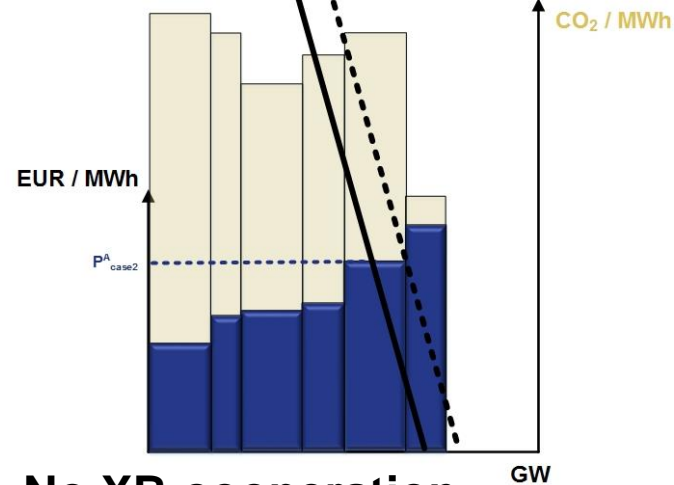
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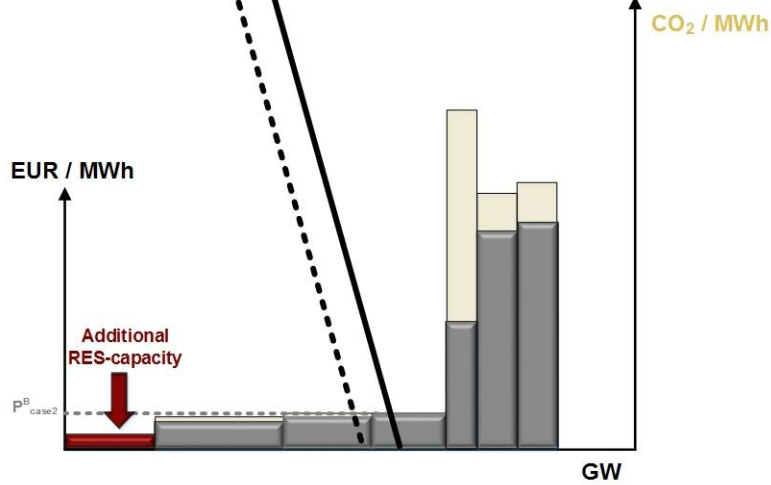
2.3.3) (Potential) effects on the “decarbonisation” objective [Case 2: Limited transmission capacity]

XB-cooperation

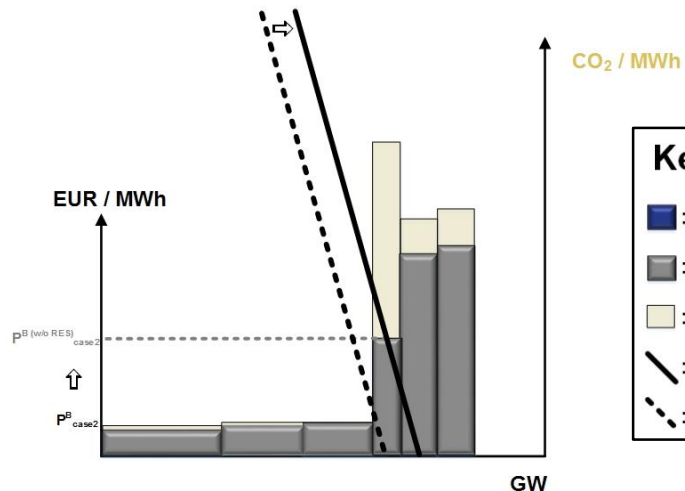
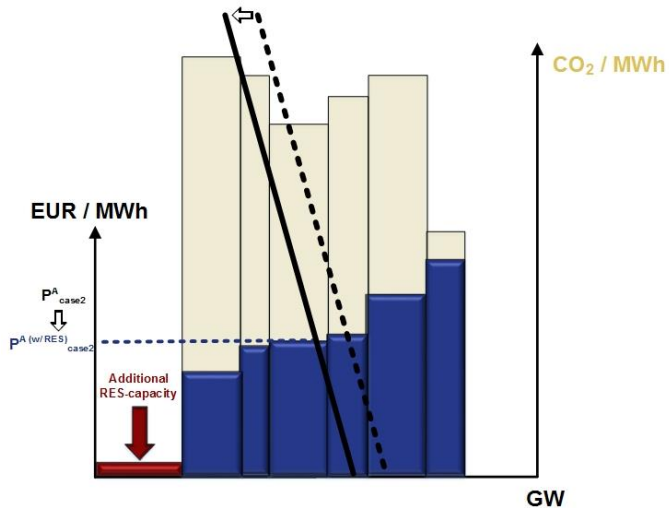
MOL state A



MOL state B



No XB-cooperation



Key

- : Generation capacity located in state A
- : Generation capacity located in state B
- : CO₂ emissions per MWh
- : Demand (including exports or imports)
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- High reductions in production costs are not sufficient to conclude that a XB-cooperation is the best option. It is absolutely necessary to consider the resulting transaction costs.
- The national “regulator” needs a high level of knowledge in order to be able to assess the transaction costs of a XB-cooperation (and other important parameters).
[...and knowledge building can be quite costly.]
- If a XB-cooperation is profitable in the short term, the national “regulator” should aim at realizing it.
- If this is not the case, a XB-cooperation may become profitable in the future depending on:
 - Increasing advantages in production costs? (...depends on the development of the technical system.)
 - Development of transaction costs? (...depends on the “evolution” of the European Union [e.g. establishment of supranational distribution rules], relations to adjacent states [growth of mutual trust or the alignment of national objectives] etc.)

Please note: This analysis takes only effects into consideration that affect the defined system of objectives. Additional (possibly: “higher political”) objectives can be a reason for cooperating with adjacent states and ignoring distributional effects.

Thank you for listening!

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