

Techno-economic analysis and business cases

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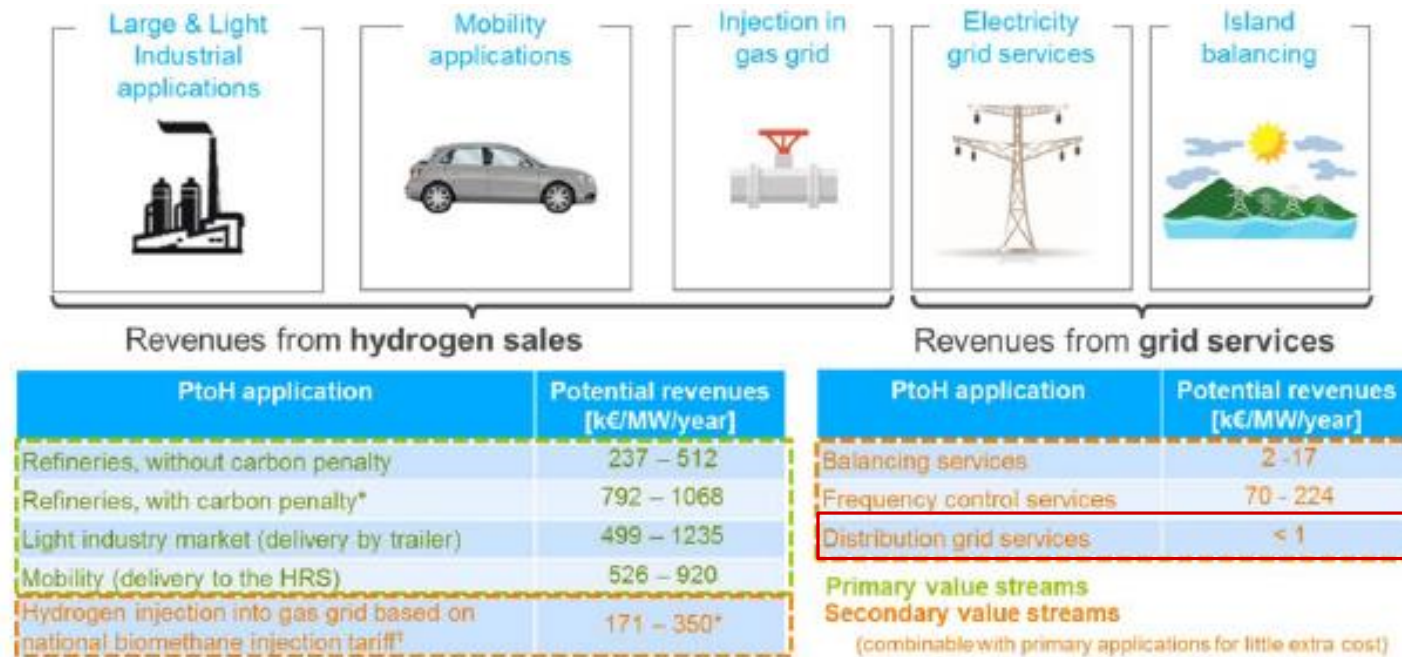
State Secretariat for Education,
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Economic impact of grid services



- In today's situation, providing grid services cannot be the only reason for installing a WE.



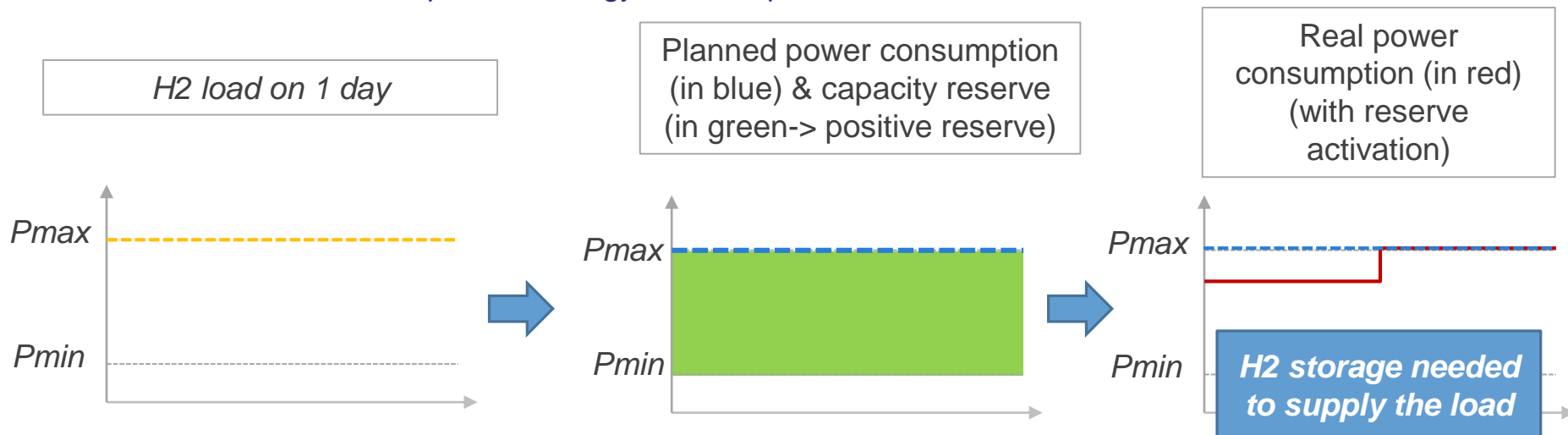
As of today, grid services can only be a secondary revenue stream for WE

What does grid services imply from a business point of view ?

(1/2)



- WE selected to participate in grid services must be able to increase and/or decrease their electrical consumption
- 2 kind of remuneration :
 - Remuneration to reserve capacity → for being ready to perform the service
 - Remuneration to provide energy when requested

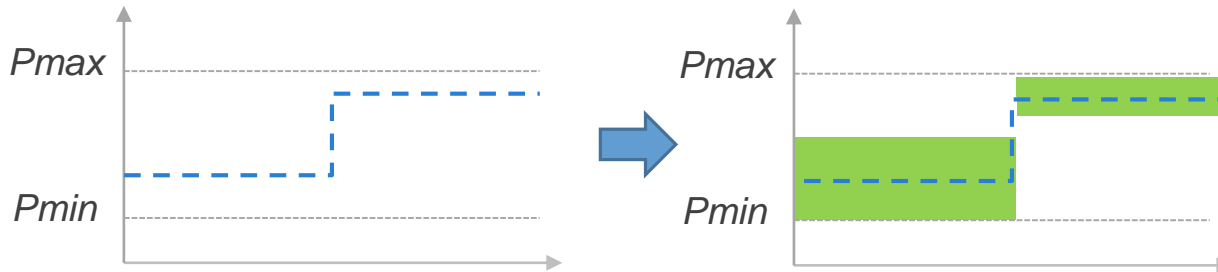


Participation in grid services has an impact on WE operation (load supply for the primary market)

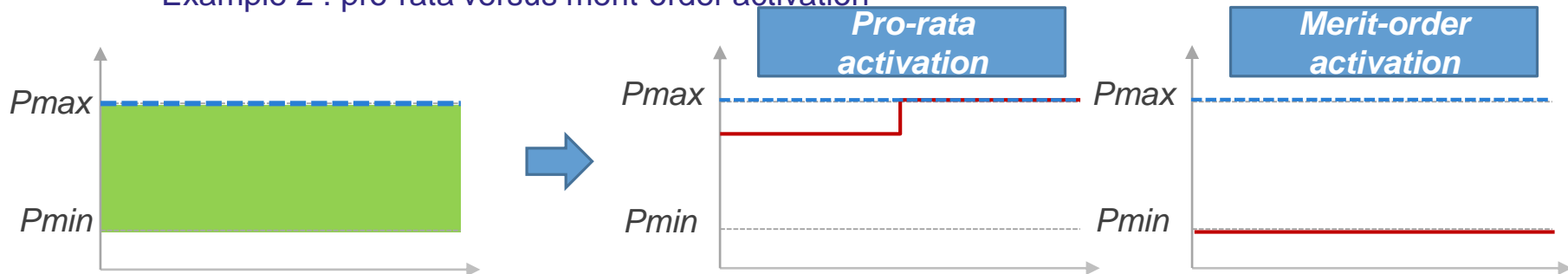
What does grid services imply from a business point of view ? (2/2)



- Precise characteristics differ from one country to another
 - Example 1 : symmetrical product



- Example 2 : pro-rata versus merit-order activation



Precise grid services characteristics must be taken into account in the assessment

Objectives of our work in QualyGridS



- Getting a more detailed understanding of grid services at European level
- Identifying which grid service (taking into account all their characteristics) would best fit with WE operational constraints and would bring the highest economic benefit

Economic assessment

Methodology



- **Dynamic simulation & economic assessment conducted on different business cases**
 - **Economic performance indicator : levelized cost of hydrogen:**

$$LCOH = \frac{\text{Costs over 20 years} - \text{Grid services revenues over 20 years}}{\text{Quantity of hydrogen supplied over 20 years}}$$

Discount rate (8%)

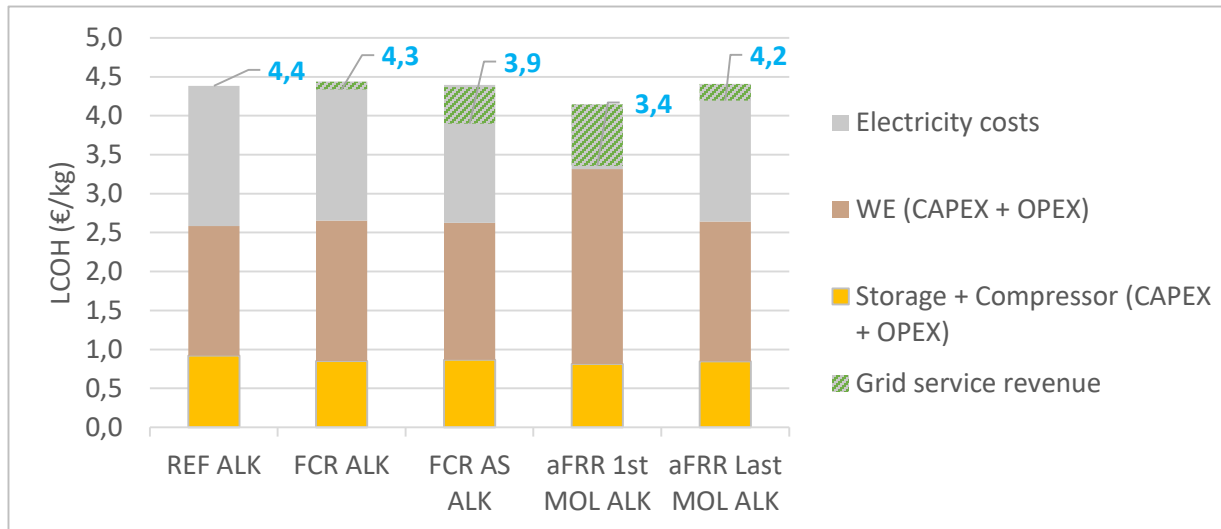
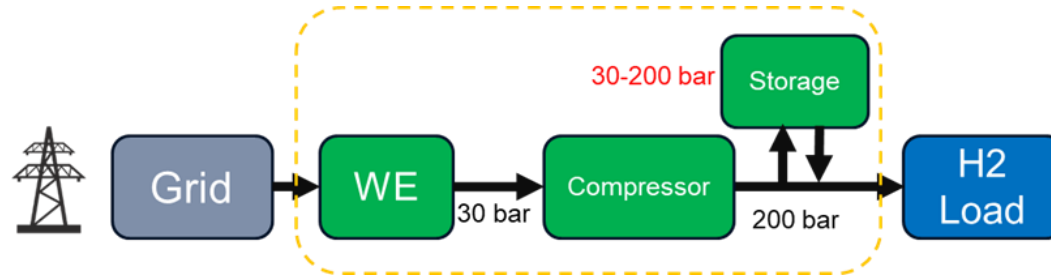
- **Analysis based on historical data** : what would have been the best operating strategy ? Uncertainty on bidding process has not been modelled.
 - ***The results must be considered in this perspective***

LCOH result



- One of the studied business case

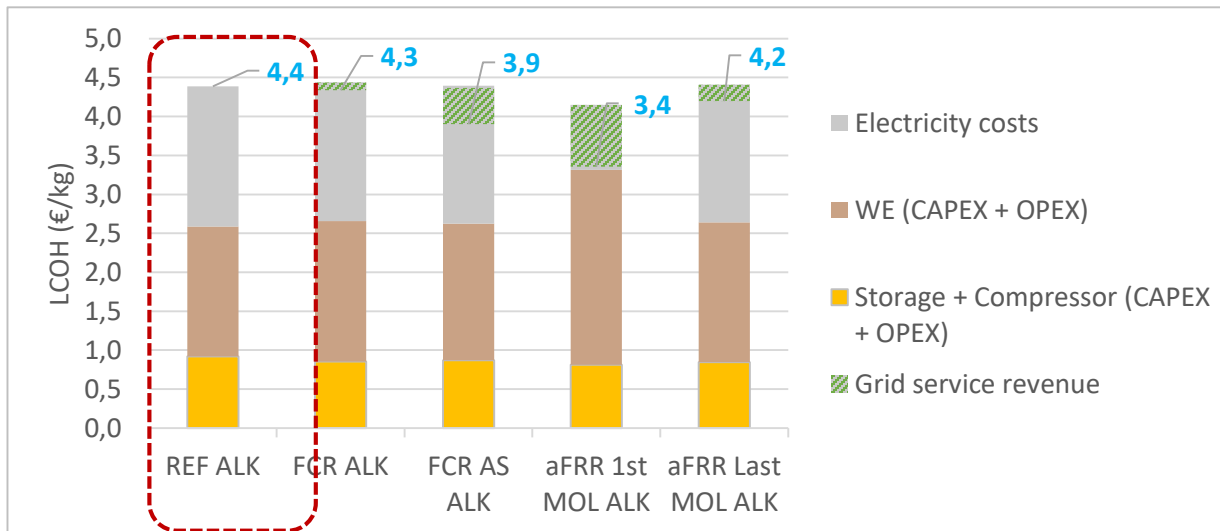
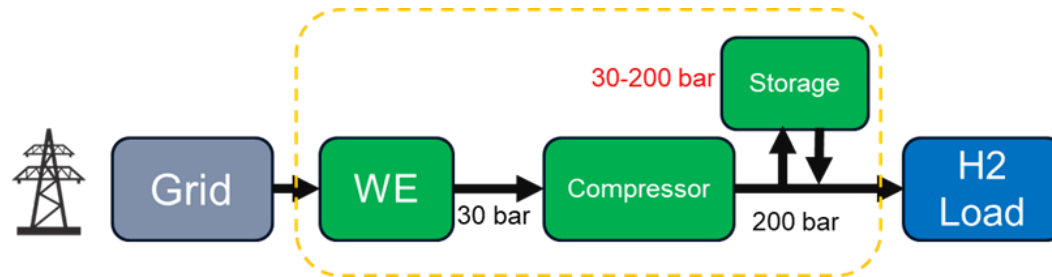
Germany, 2017, FCR & aFRR



LCOH result



Germany, 2017, FCR & aFRR

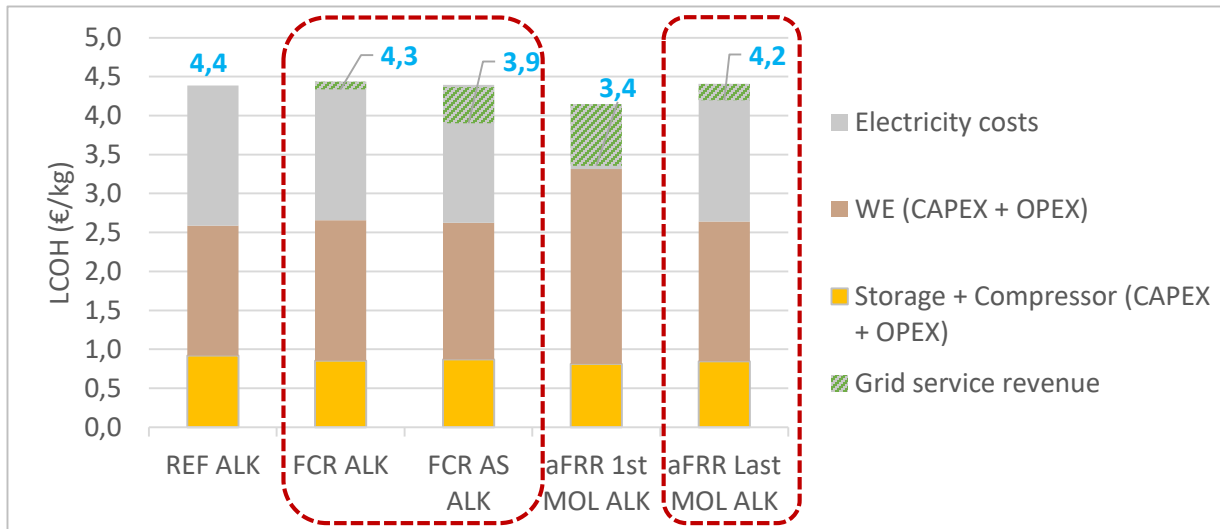
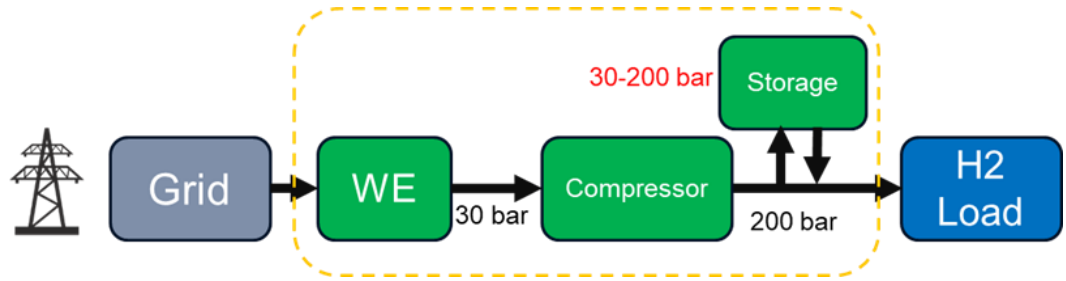


➤ Reference case : optimal operating strategy : ~8500 hours a year

LCOH result



Germany, 2017, FCR & aFRR



Interest for offering capacity reserve

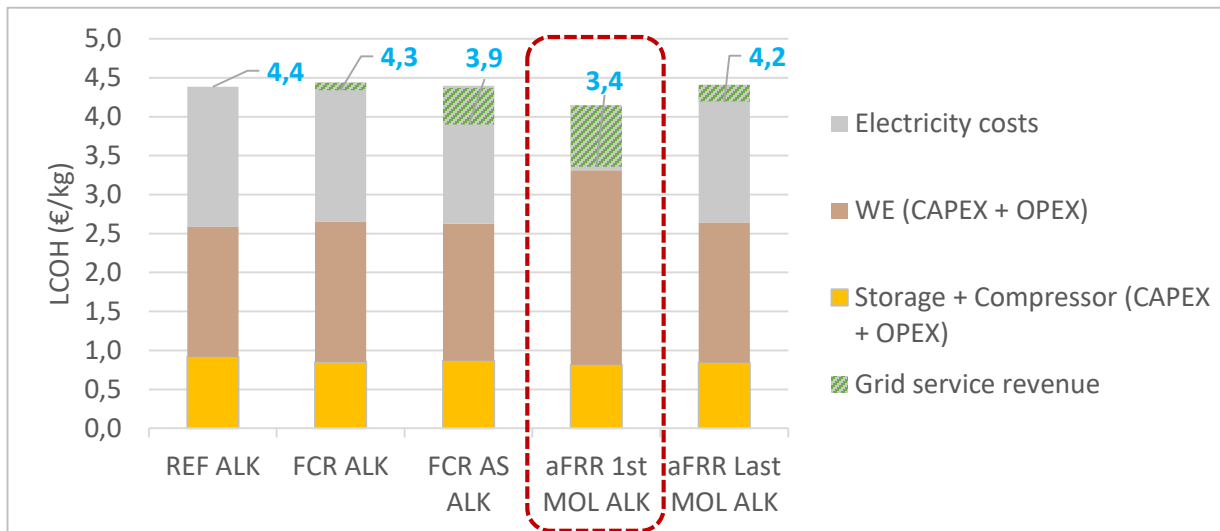
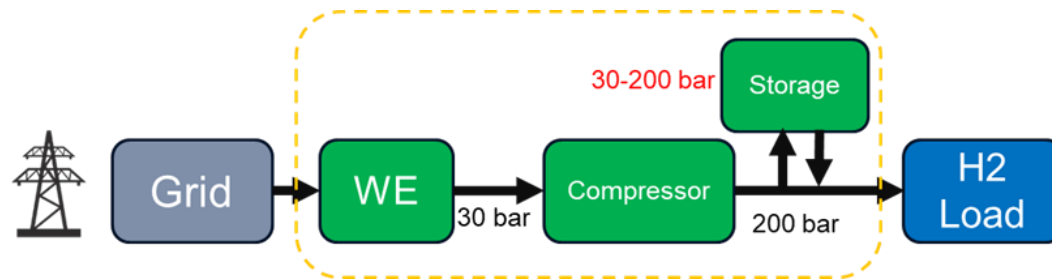
- FCR : symmetrical product hindering the participation
- aFRR “capacity only” : low capacity remuneration

	Average prices Germany 2016/2017
FCR capacity	14,8 €/MW/h
aFRR+ capacity	3,5 €/MW/h
aFRR- capacity	0,9 €/MW/h

LCOH result



Germany, 2017, FCR & aFRR



Interest coming energy activation

- aFRR : interest to access cheap electricity but uncertainty around bidding process

Key conclusions



- Interest for grid services confirmed, but grid services can only be a secondary revenue stream for WE
- Our analysis aimed at giving hydrogen community a better understanding of the impact of grid services on economic performance
- Real-life experimentation required to confirm the exact value that can be captured
- Harmonization is needed -> easier to seize market opportunity

Thank you

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QualyGridS

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