



Techno-economic analysis of hydrogen production and supply for heavy-duty road transport

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RISE Research Institutes of Sweden (PP10)

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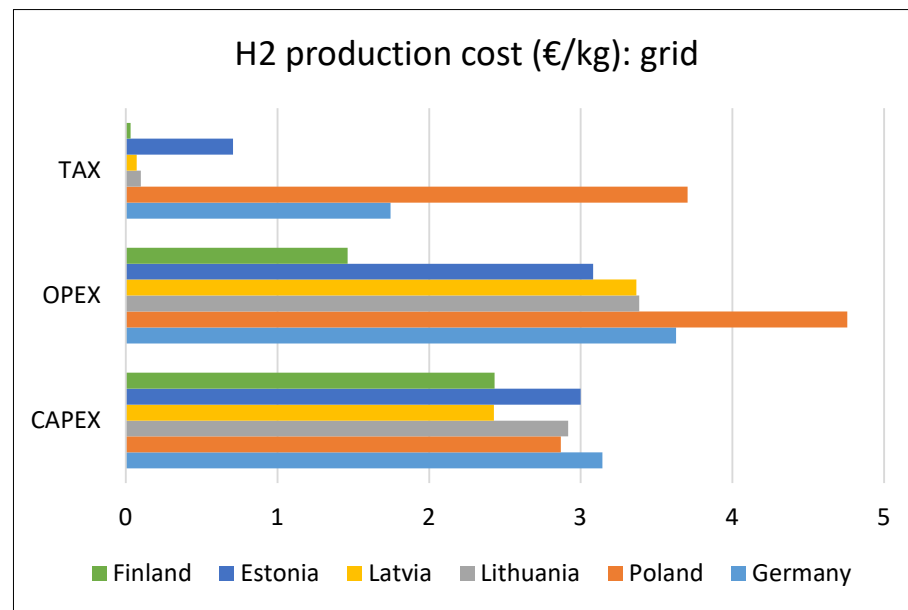
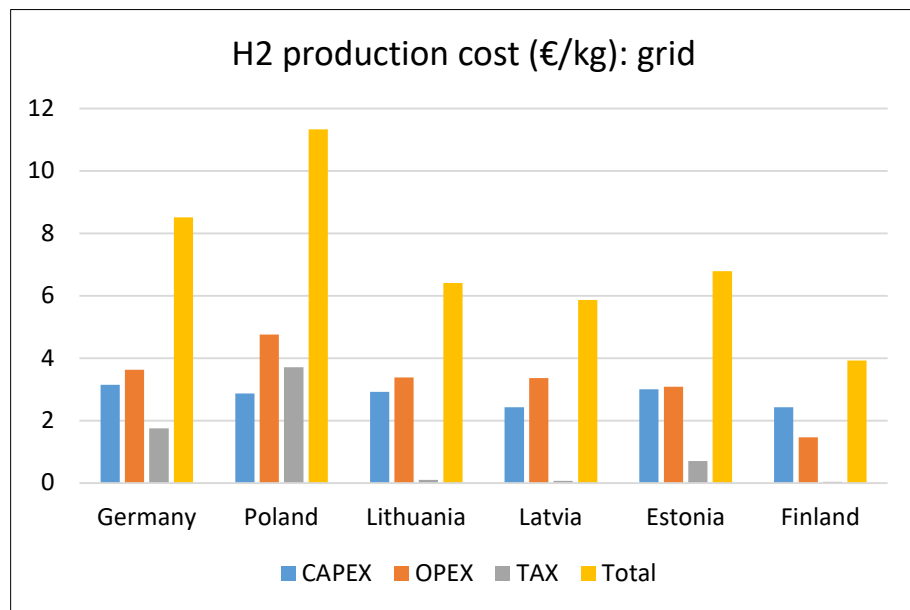
Techno-economic analysis of hydrogen production and supply for heavy-duty road transport

October 1, 2025

Hadi Farabi

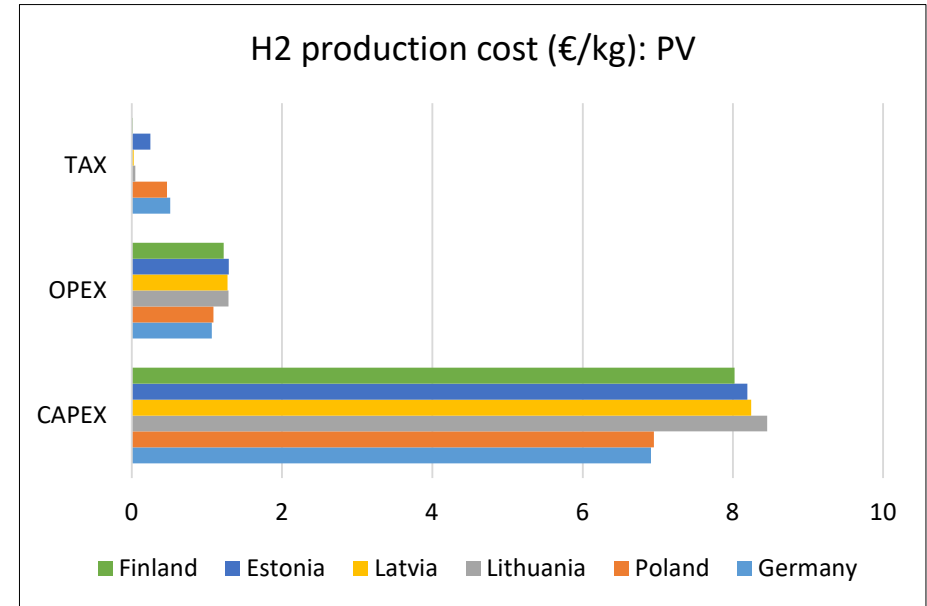
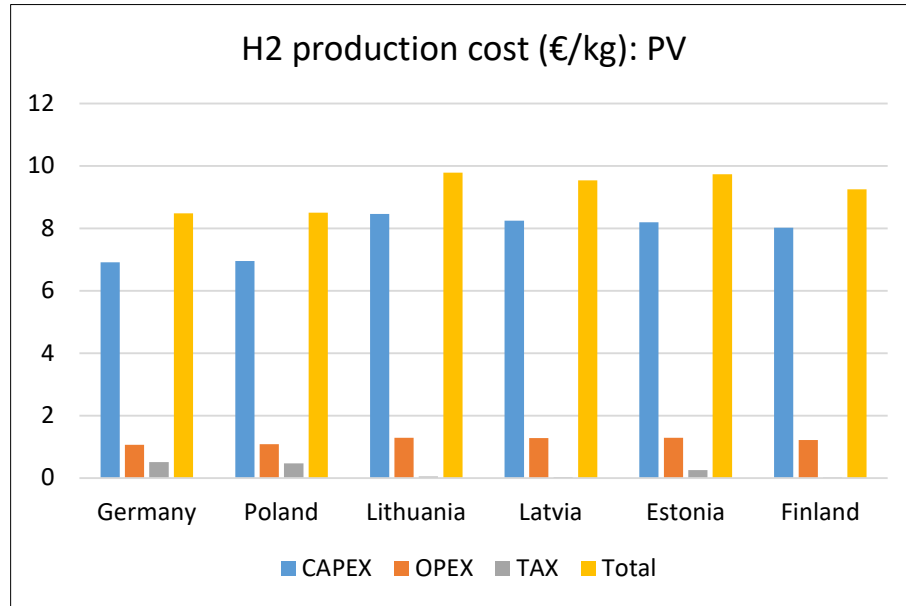
Techno-economic analysis of hydrogen supply

Sample results: grid-connected by country



- Cost can vary between 4-11 €/kgH₂
- Almost equal contribution of CAPEX and OPEX
- Attention to the contribution of taxes

Sample results: PV by country

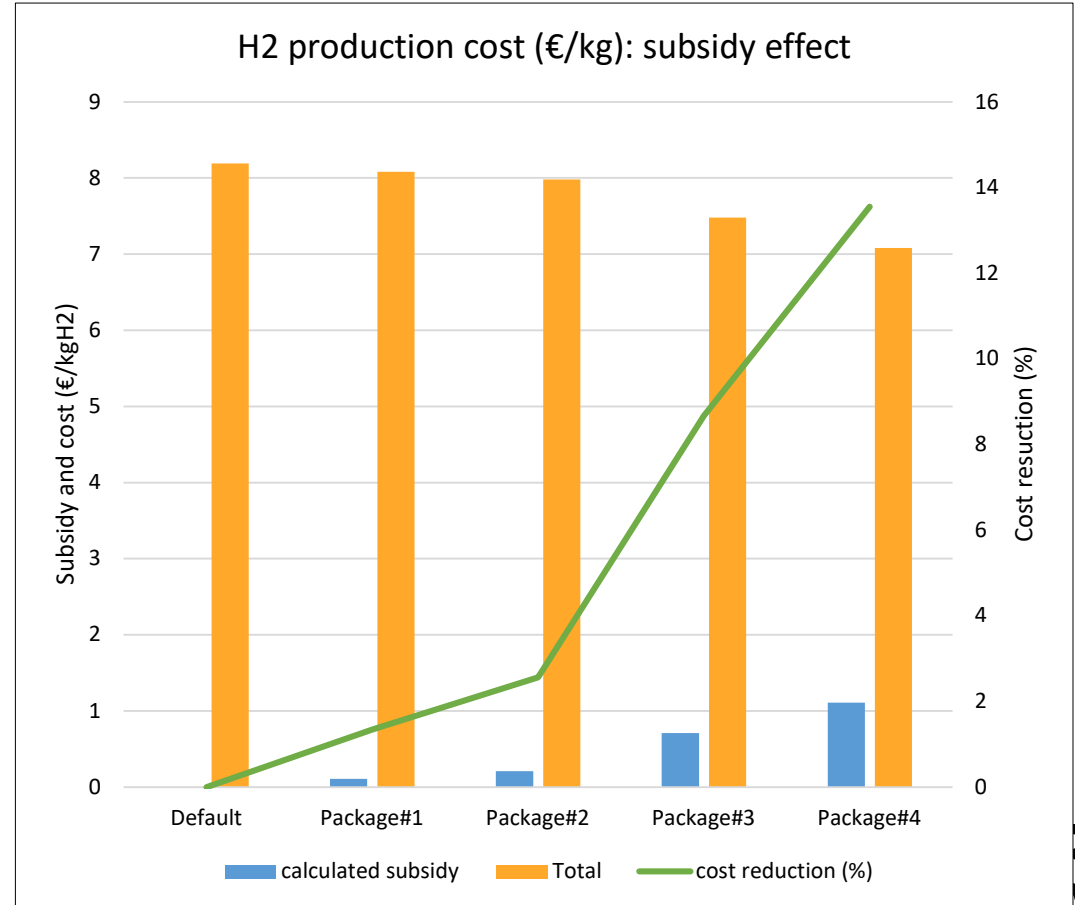


- Cost can vary between 8,5-10 €/kgH₂
- Higher contribution of CAPEX
- More even cost distribution between countries compared to grid-connected option

Sample results: effect of subsidies

- Selected case: Wind in Germany
- Subsidy type 1: CAPEX investment subsidy
- Subsidy type 2: Green premium subsidy

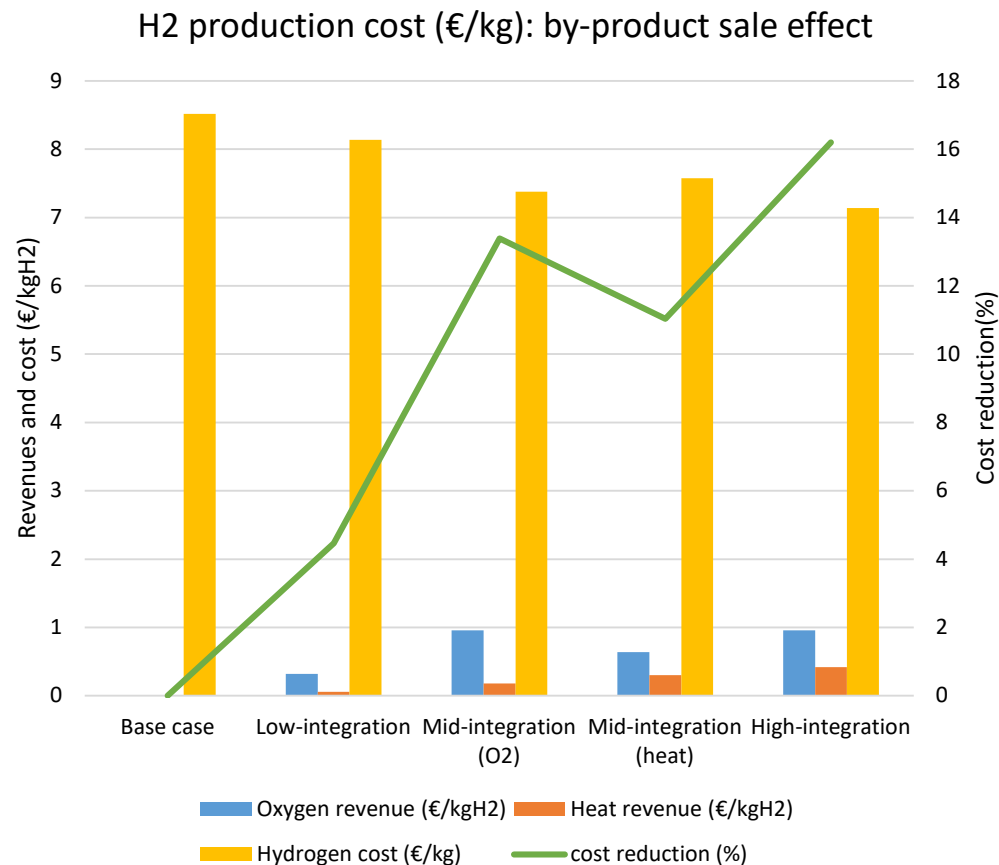
Subsidy package	CAPEX investment subsidy (€/kW)	Green premium (€/kgH2)
Default	0	0
Package#1	100	0
Package#2	200	0
Package#3	200	0,5
Package#4	100	1



Sample results: effect of byproduct sale

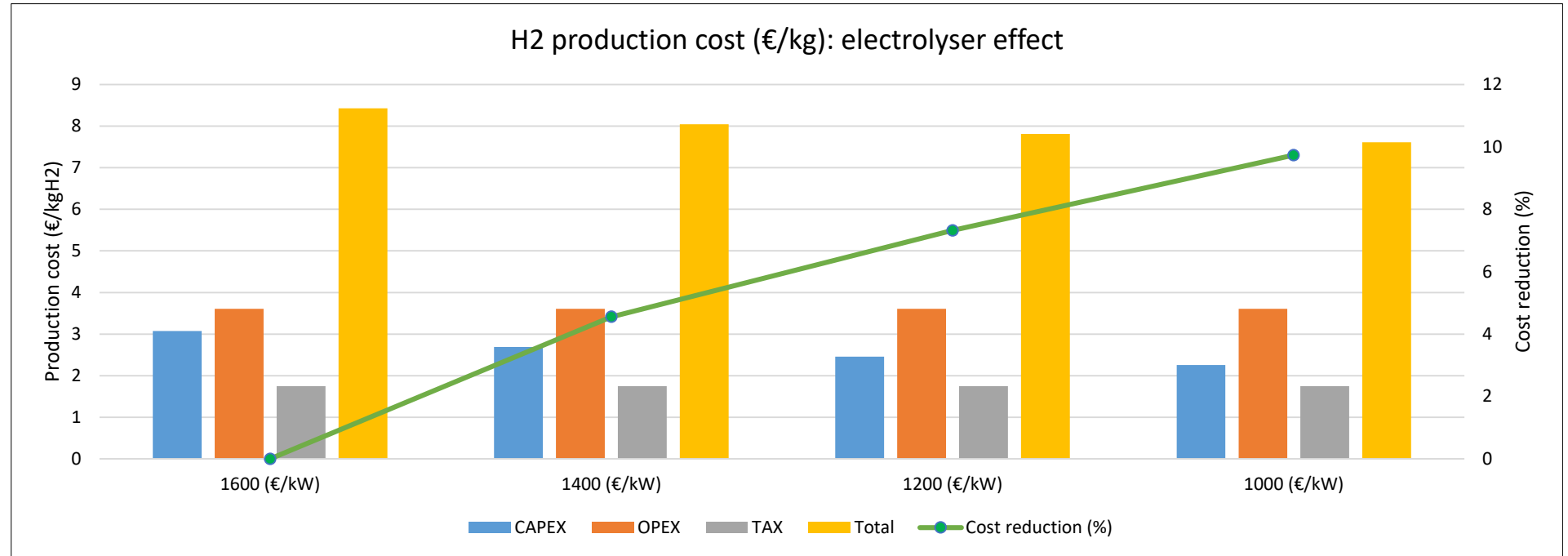
- Selected case: grid-connected in Germany
- Sale of Oxygen
- Sale of waste heat
- Cognizant of integration cost and seasonal needs

Scenario	Oxygen price (€/ton)	Waste heat price (€/kWh)
Base case	0	0
Low-integration	50	0,01
Mid-integration (O2)	150	0,03
Mid-integration (heat)	100	0,05
High-integration	150	0,07



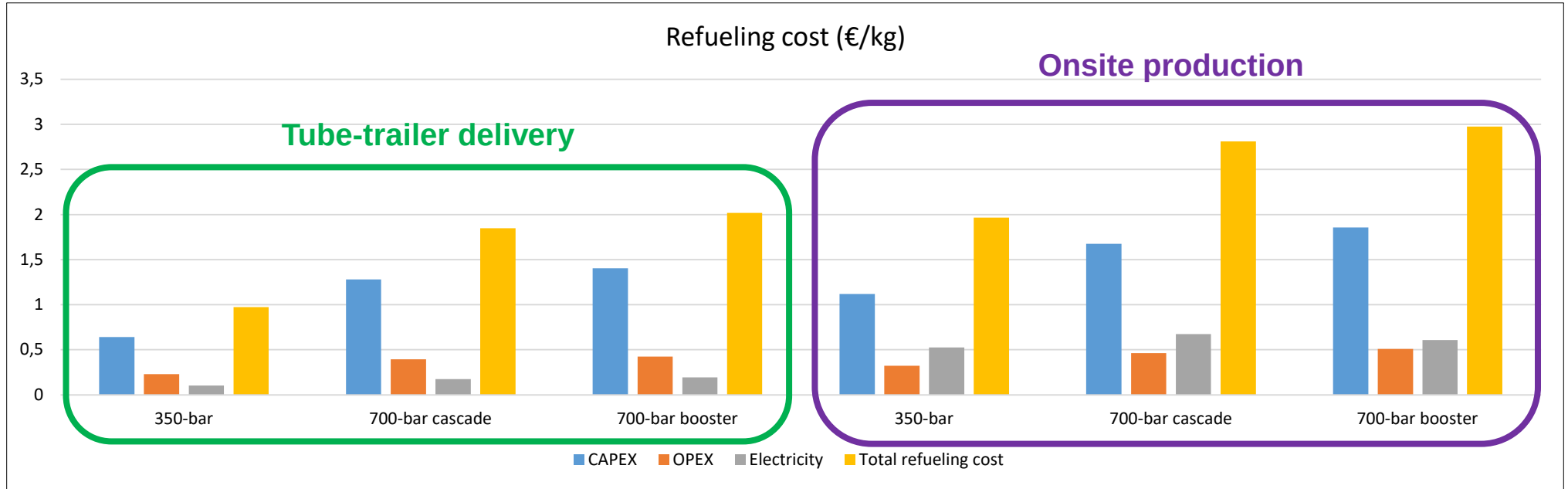
Sensitivity analysis: electrolyser cost

- Cost options: 1600 (base case), 1400, 1200, and 1000 €/kW
- Selected case: grid-connected in Germany



Business optimization model for HRS

Sample results: refueling cost per kgH₂



- Refueling cost range: 1-3 €/kg
- 700-bar vs. 350-bar (50% - 100% higher cost)
- Booster vs. cascade (6% - 9% higher cost)
- Onsite production vs. tube-trailer delivery (45% - 100% higher cost)

**Attention: cost analysis
boundary is the HRS!**

Sample results: refueling cost per kgH2

Electricity price ($\pm 25\%$)

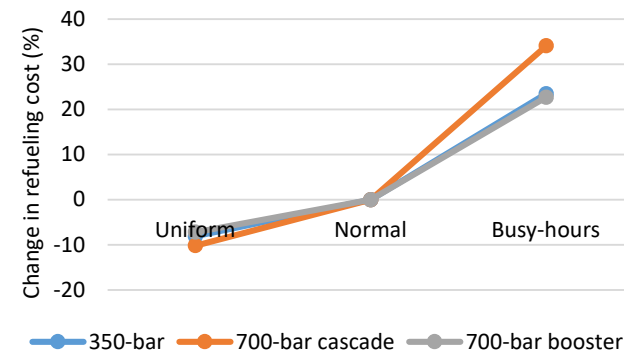
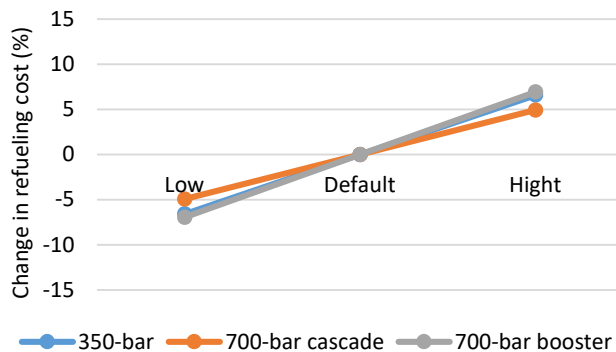
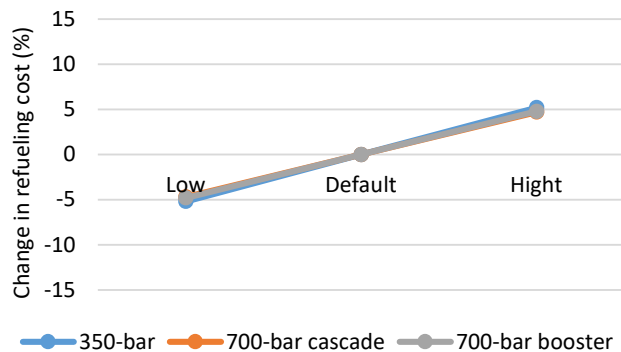
compressor price ($\pm 25\%$)

Operational load

Electricity price (tube-trailer)

Compressor price (tube-trailer)

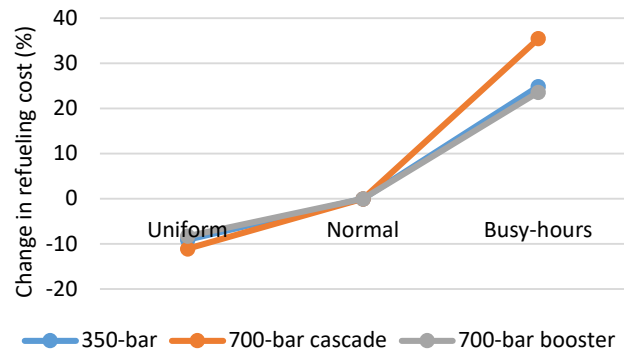
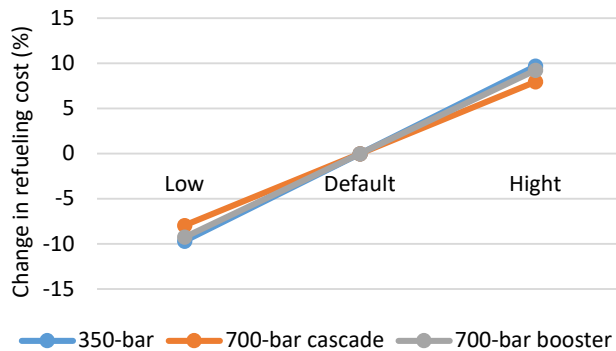
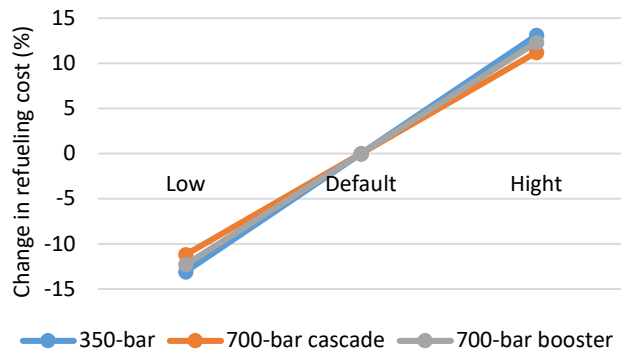
Operation load (tube-trailer)



Electricity price (onsite)

Compressor price (onsite)

Operational load (onsite)



Concluding remarks

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