



The role and value of gas storage in cross-sectoral flexibility

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GIE quantitative study analyses the impact of gas storage on the ability to meet electricity demand in 2030



At Madrid Forum 2018, GIE explained the growing role that gas storage can play to support EU's energy objectives and ask for externalities (System and Insurance Values) to be internalised in the regulatory framework

'The Forum invites GIE/GSE to further consider the role and value of storage in consultation with the gas industry, considering the work on developing a cross-sectoral flexibility market.'

Objectives of the study

Perform a quantitative analysis of the cross-sectoral impacts of a reduced gas storage capacity:

- *Ability of the electricity system to meet the demand*
- *Evaluation of the capacity value of European gas storage capacities (by assessing the extra costs to meet the demand)*

Scope

- *European level / 2030 / electricity and gas*
- *Ability to meet electricity demand for different gas storage assumptions*

Assumptions

- *ENTSOE and ENTSOG TYNDP 2018 Sustainable Transition scenario*

Model: Artelys Crystal Super Grid

- *Tool allowing to simulate the European electricity and gas systems*
- *All technologies represented at country level*
- *Hourly resolution*
- *Also used by EC and JRC*

Simulation

- *Removal of gas storage capacity of 10%, 20% and 30%*

Gas storage prevents higher operating and investment costs in the electricity sector



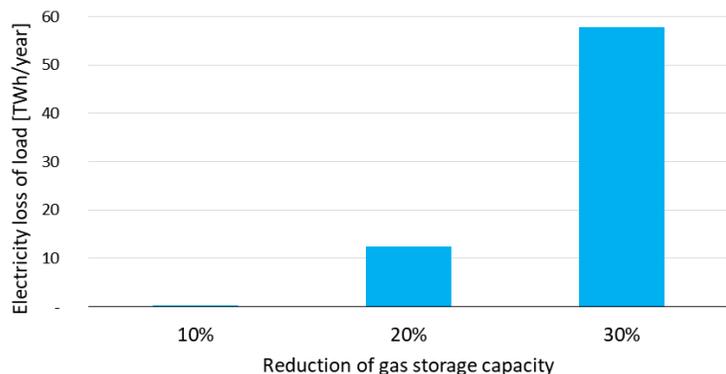
Main outcome



Sufficient flexibility in the electricity system to compensate for the reduction of gas storage capacity **only to certain level**

- › Extra-costs in the electricity system from **10%** of gas storage capacity reduction
- › Electricity demand curtailment arises between 10% and 20% of gas storage capacity reduction.

For illustration, System value with 30% of gas storage capacity reduction



Gas storage flexibility is essential to ensure SoS/resilience

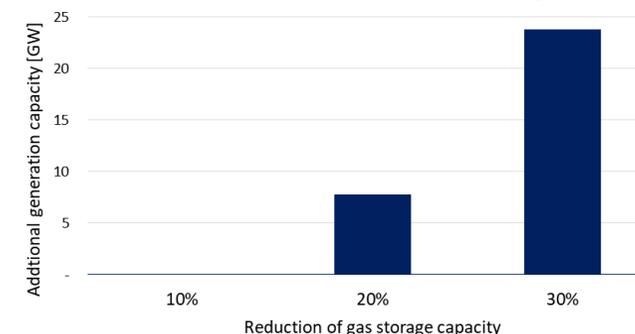


System value

At the European level, important investments can be avoided thanks to the presence of the gas storage

› Additional operating costs of more expensive units **1 B€/year**

› **23 GW CAPEX 55B€ + OPEX 8B€/year**



Gas storage assets prevent investments in electricity generation

1

2

Gas storage reduces variability of electricity prices

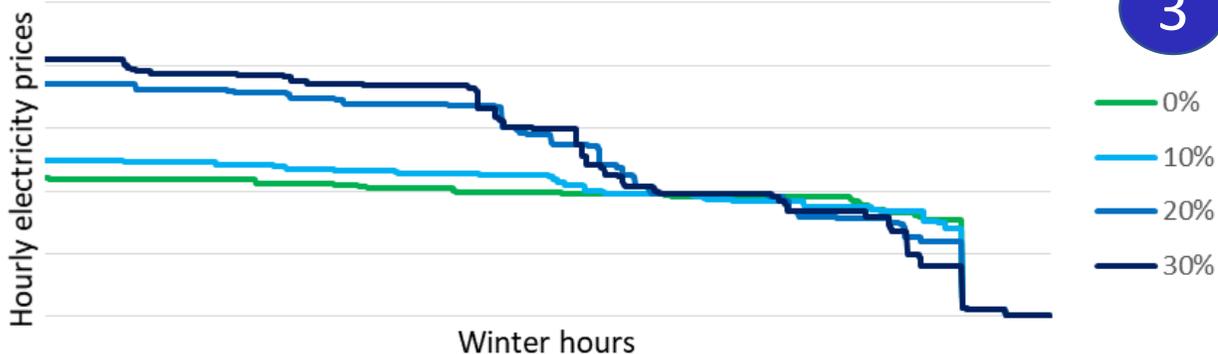


Price volatility



The presence of the gas storage ensures lower electricity price volatility

For illustration, with 30% reduction of gas storage, the variability of power prices is found to double



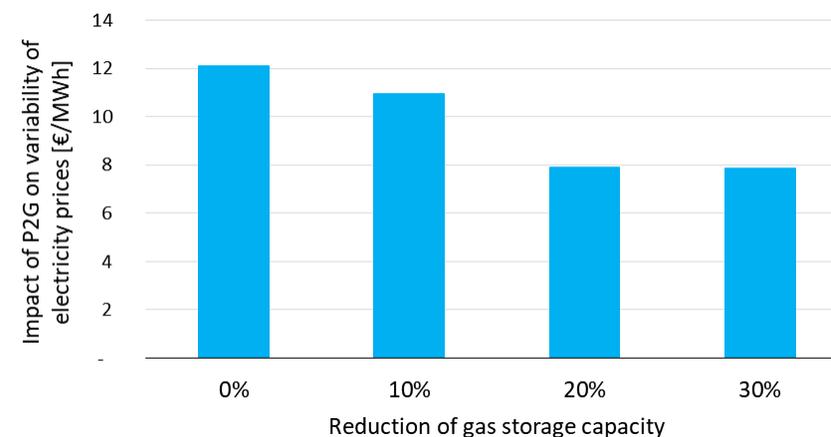
Gas storage reduces the variability of power prices

Insurance value - P2G



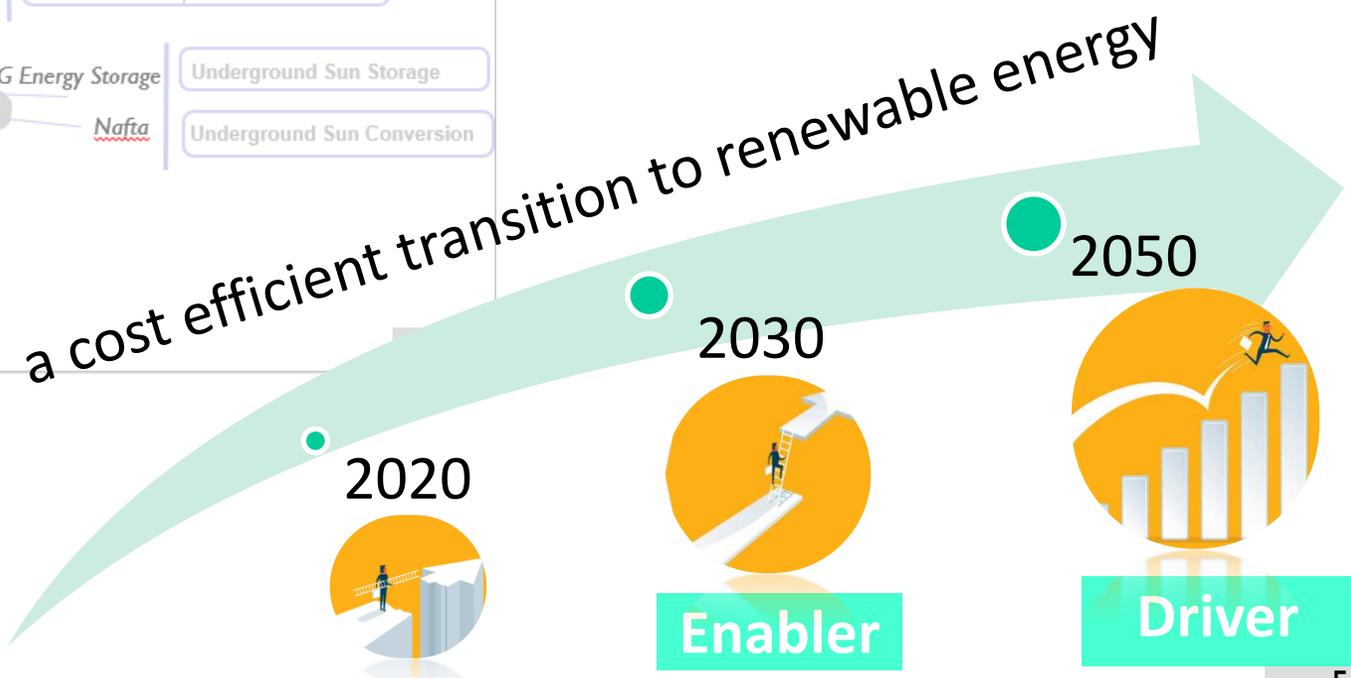
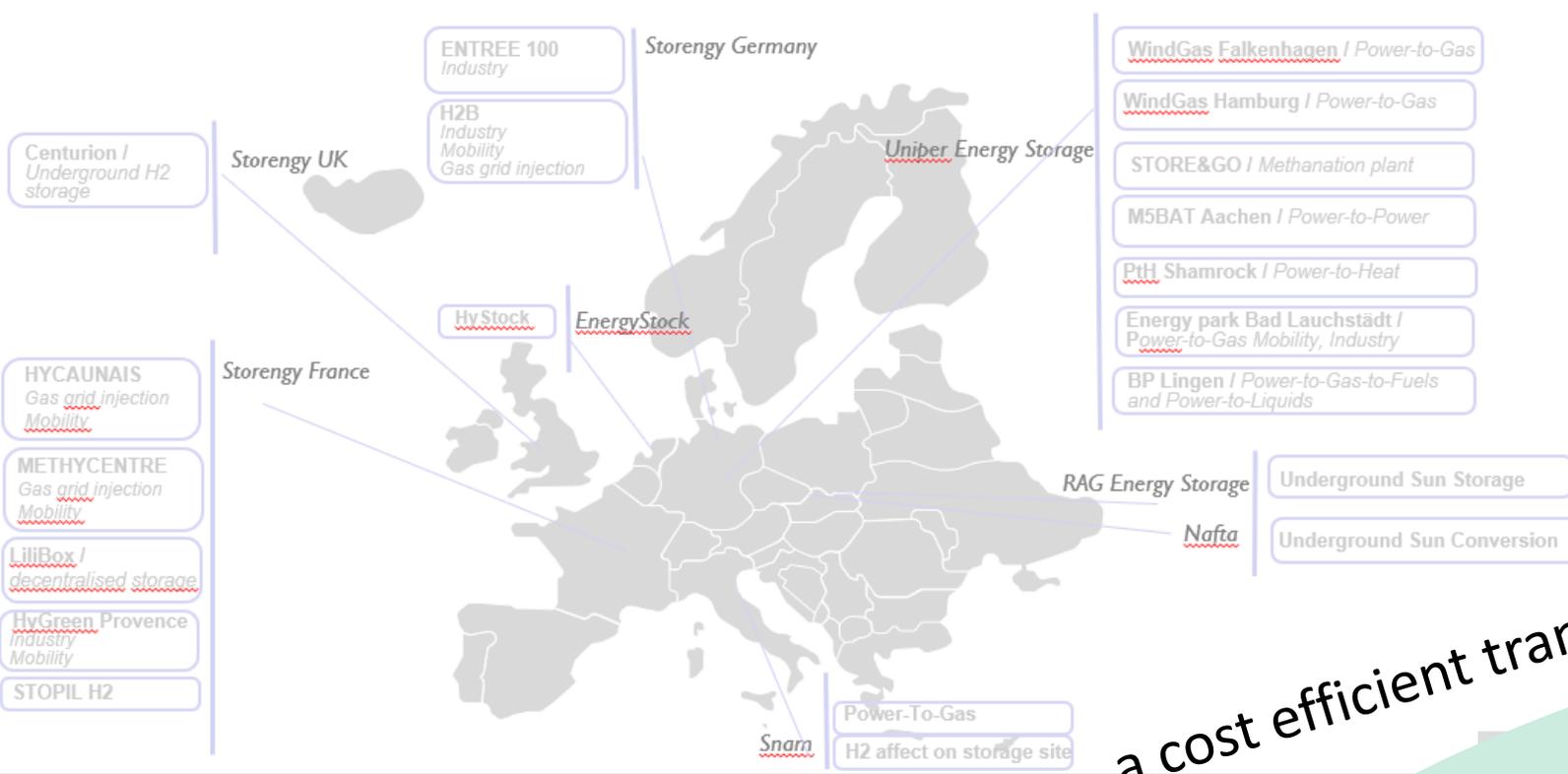
The ability of P2G to reduce electricity price variability is most effective with high gas storage capacity

For illustration, the impact of P2G on the standard deviation of price of electricity decreases from 12 to 8 €/MWh



The ability of P2G to reduce the variability of electricity prices is less effective as the gas storage capacity decreases

Heading to 2030 and beyond: gas storage operators are already involved in P2G, H2 and methanisation technologies

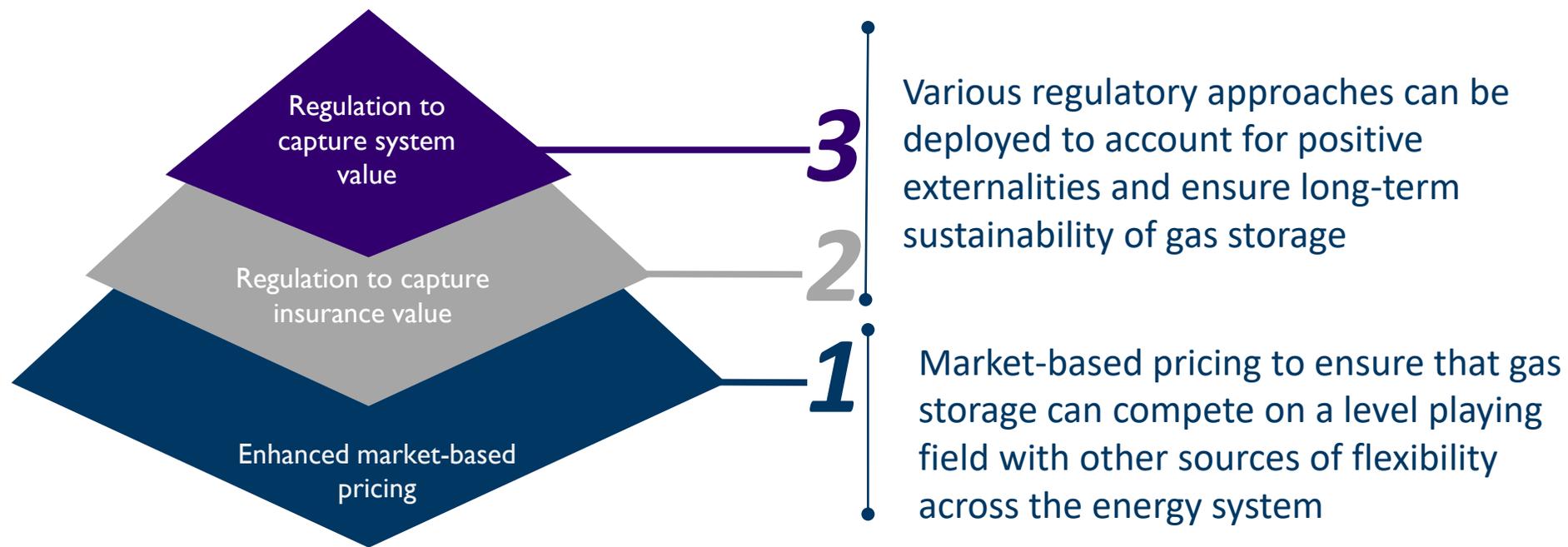


**Storage provides added system and insurance value to both, gas and electricity network on top of its market value.
To keep it for the future, regulatory support is needed.**



Storage business model in an energy integrated system

- Market-based pricing should continue to be central to the gas storage business model
- Regulatory measures should be deployed to internalise externalities which market-based pricing does not capture



There is a need to revisit regulatory framework

GE recommendations, next steps



Conclusions:

- ✓ The role and value of gas storage is **essential in cross-sectoral flexibility**
- ✓ The presence of gas storage ensures **security of supply and resilience of electricity and gas systems**
- ✓ **Electricity demand curtailment** situations begin to appear from 20% of gas storage capacity reduction
- ✓ **Avoiding electricity loss of load situations**
For illustration, 30% of gas storage reduction = **23GW** of electricity demand curtailment
System value = **55B€ CAPEX + 8B€/y OPEX**
- ✓ The presence of gas storage assets allow to **decrease the variability of electricity prices**

Specific measures proposed to ensure SSOs continue delivering these services:

- ✓ **Market-based pricing** of gas storage capacities to achieve efficient gas storage use in level playing field (wherever the current framework does not already recognize the full value of UGS)
- ✓ Assessing **insurance and system externalities** and ensuring they are **adequately captured** in the regulatory framework
- ✓ “Coupled regulation” to support efficient sector coupling, the ‘**silo**’ approach should move towards a **more holistic view** in optimization of an investment planning across the entire energy system
- ✓ **All relevant energy system users** who benefit from these externalities should be **able to capture the value**

Next step:

GIE is committed to engage in a discussion with the EC on legislative proposal on what is needed in addition to the current framework



Thank you for your attention