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MEDITERRANEAN GREEN ELECTRONS AND MOLECULES NETWORK

Energy storage

The big picture

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Brussels, November 2024

European Hydrogen Week

Flow

1. The role of storage in our energy system
2. A strategic storage vision for Europe

1. The role of storage in our energy system

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Global primary energy demand: 167,900 TWh/a

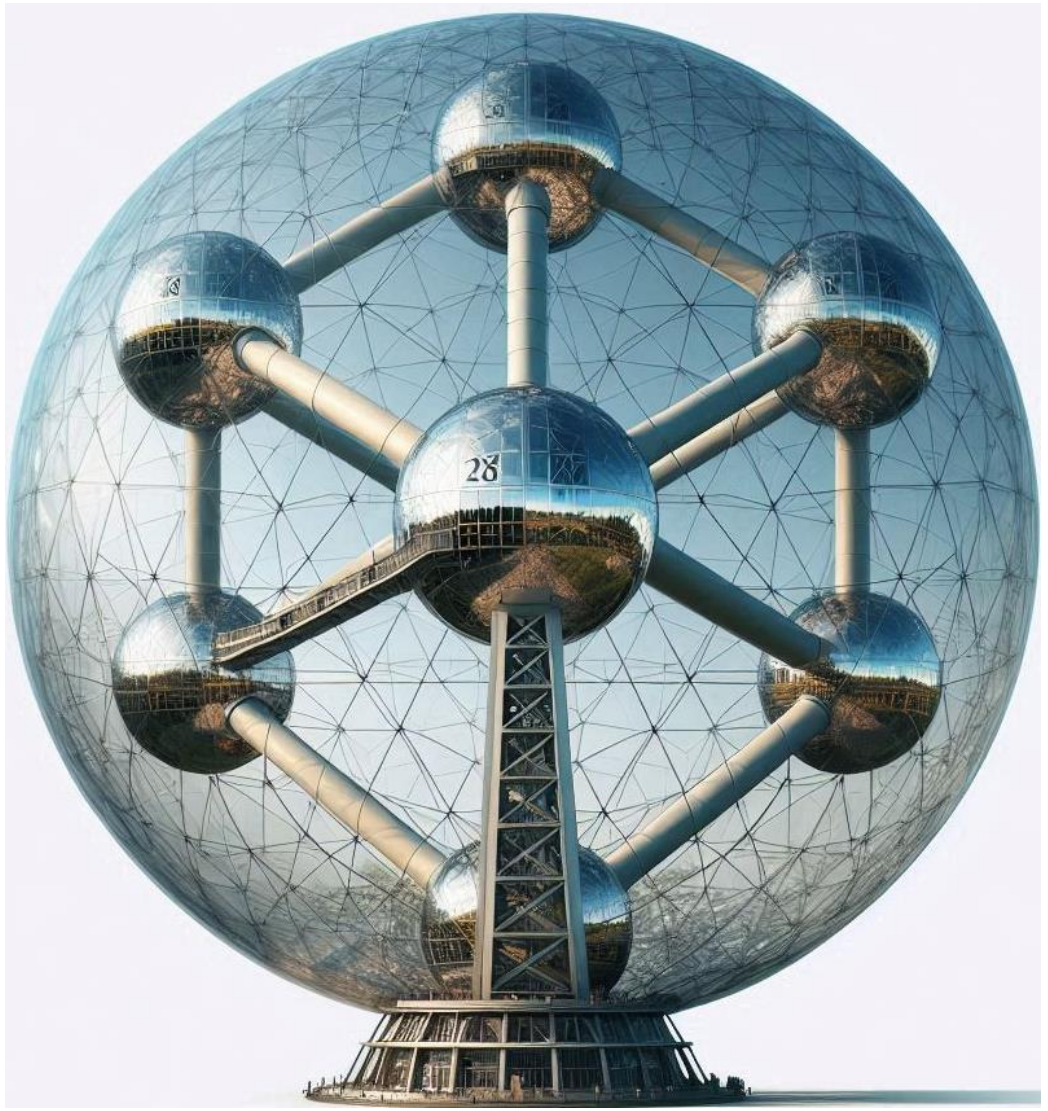
Oil (32%)	Coal (27%)	Natural gas (24%)	Electricity (17%)
			
Storage: 26.8%	Storage: 20.6%	Storage: 13%	Storage: 0.03%

Average storage in molecules: 20.8%

Electricity and storage

Electricity demand: 137m

Pumped hydro storage: Golf ball (4.3cm)



How does our electricity system work?

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Dii

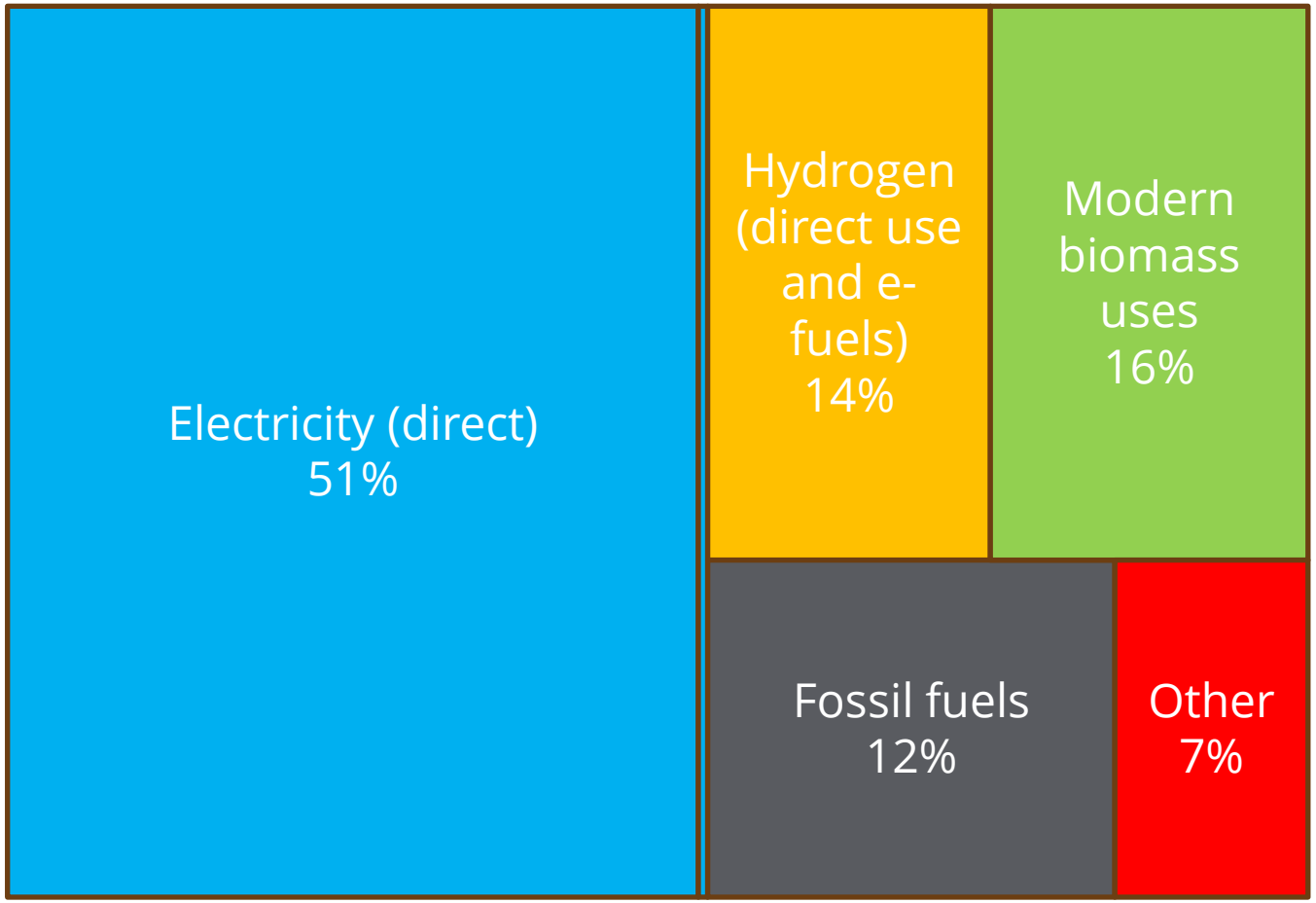
	Stored energy (TWh)	Overall annual demand (TWh)	Percentage
Molecules			
Oil	14,200	53,200	26.8%
Coal	9,227	44,900	20.6%
Natural Gas	5,114	39,400	13.0%
SUM/AVG Molecules	28,541	137,300	20.8%
Electrons			?
Electricity (PHS)	9.5	30,600	0.03%
Molecules and Electricity	**28,551**	**167,900**	**17.0%**

Three reasons for storage

- **Technical**: Supply and demand balance
- **Anxiety**: Energy security
- **Greed**: Trade

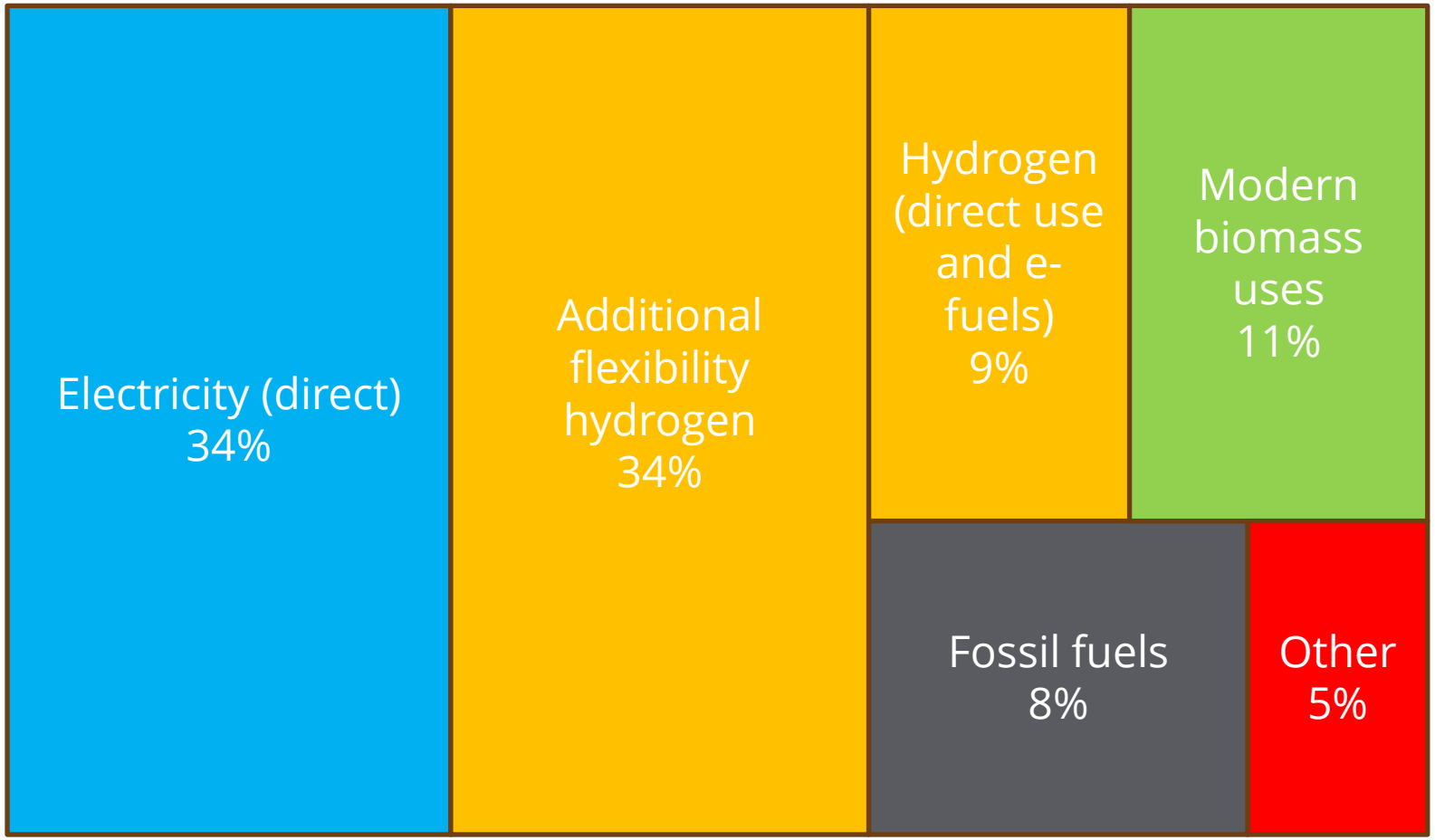
IRENA's World Energy Transition Outlook 2023

IRENA 2050 (1.5°C Scenario): 98,056 TWh/a



IRENA's World Energy Transition Outlook 2023

IRENA 2050 (1.5°C Scenario, revised): 148,066 TWh/a



Now and then

	Now	2050
Overall demand	167,900 TWh/a	148,066 TWh/a
Overall storage	17%	16.7%
Percentage of electricity storage	0.03%	0.05%
Overall storage capex	$3 trillion	$18 trillion

2. A strategic storage vision for Europe

Europe’s strategic energy reserves

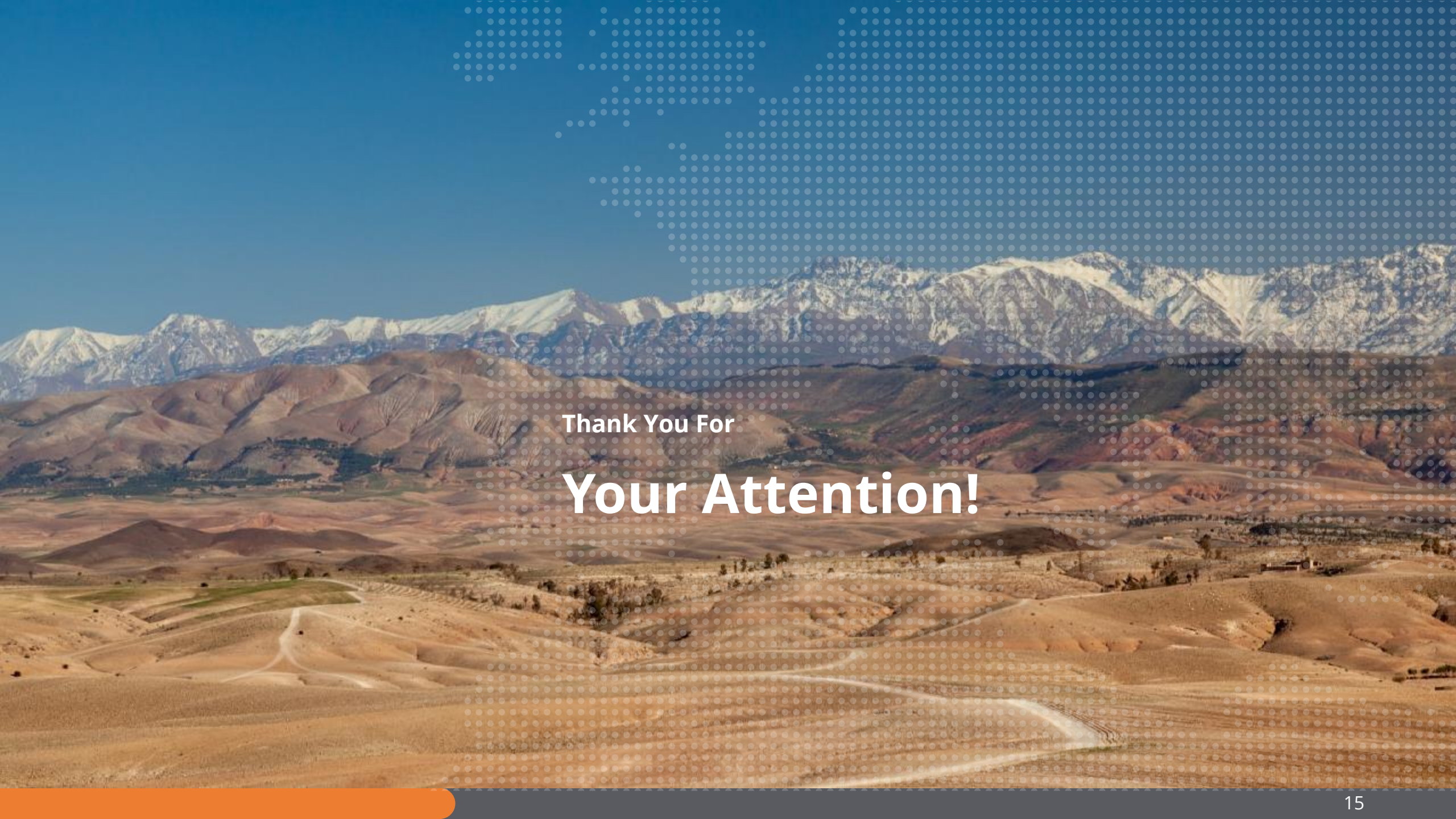
- Europe has **strategic reserves of oil and gas** to ensure energy security and reduce price shocks. The strategic reserve for oil is linked to the EU’s obligation as part of the IEA membership and amounts to 1,047 TWh. The mandatory gas storage levels are currently 1,025 TWh.
- REDIII: 42% of industrial hydrogen to be green and 1% RFNBO’s amount to a volume of up to **6.8 million tonnes by 2030**.
- We propose a **strategic hydrogen reserve of 25%**, amounting to **1.7 million tonnes** by 2030

A strategic hydrogen reserve – practical considerations

- Strategic reserve obligation applies to **imports and domestically produced** hydrogen
- We suggest including the strategic reserves as part of the **regulated TSO business** to accelerate their development
- We propose the involvement of **AggregateEU, the European Hydrogen Bank (EHB) and H2Global**
- Reserve to be financed by EU (EHB) and member states, **10-year offtake** agreements
- National **offtake quotas**

A hydrogen infrastructure roadmap

- Develop the European **Hydrogen Backbone** as formulated in the REPowerEU strategy and supported by European Gas TSO's.
- Develop **storage facilities** for clean hydrogen for at least 1.7 Mt as proposed in this paper by 2030.
- Realize a **strategic hydrogen reserve** of 1.7 Mt by 2030, whereby the EU and member states finance/buy the hydrogen over a defined period.
- Realize **additional hydrogen storage** for balancing supply and demand


Thank You For
Your Attention!