

Innovative Energy Storage Technologies

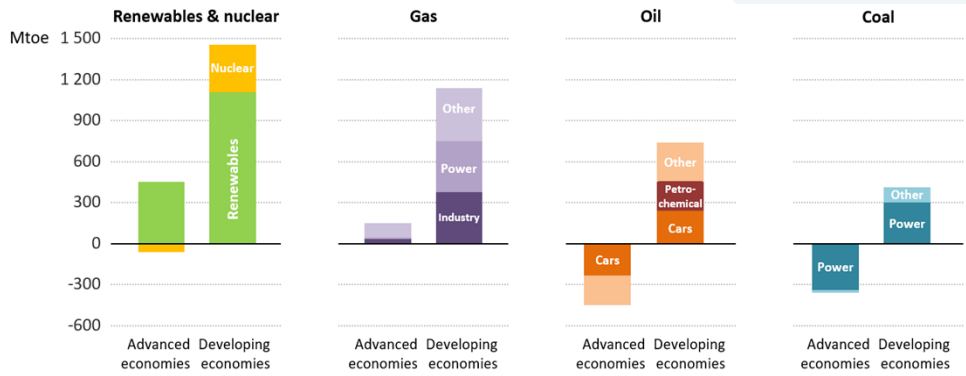
Opportunities for the OSCE Area

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Federal Ministry for Sustainability and Tourism
27th OSCE Economic and Environmental Forum, Session III
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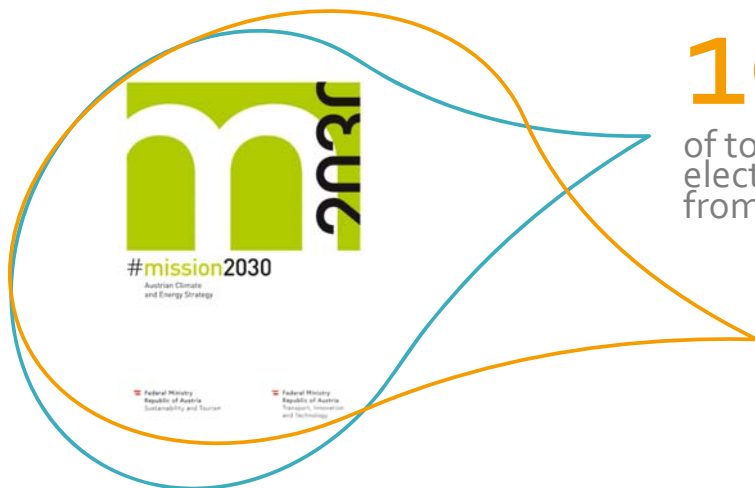
Message:

*Finding a **cost-efficient** and **universal** solution to the question of **storing renewable energy** is the key to maximising its contribution to the energy mix, to improving **energy security** and achieving a substantial **reduction of CO₂ emissions**.*

Change in global energy demand 2017 – 2040



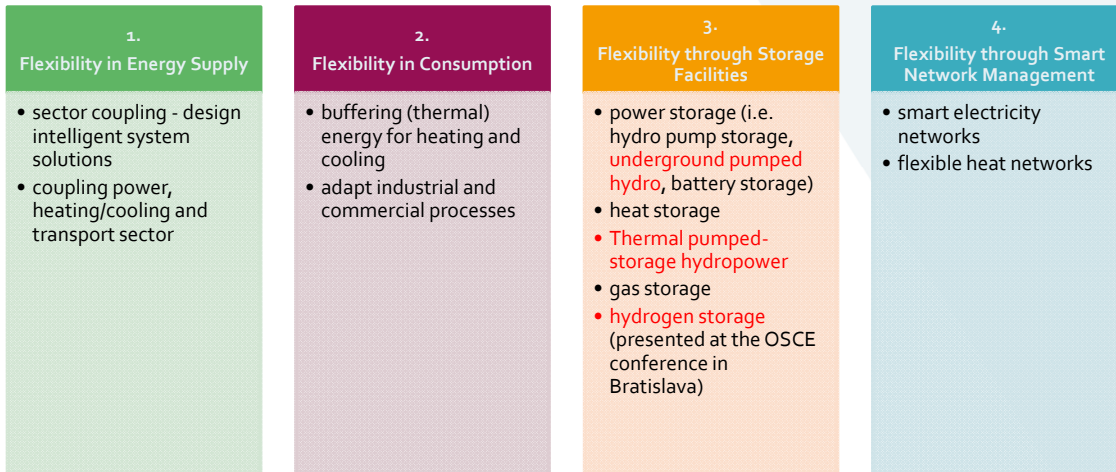
Source: IEA, World Energy Outlook 2018



100%
of total national
electricity consumption
from renewable sources

45-50%
share of renewable
energy in final energy
consumption

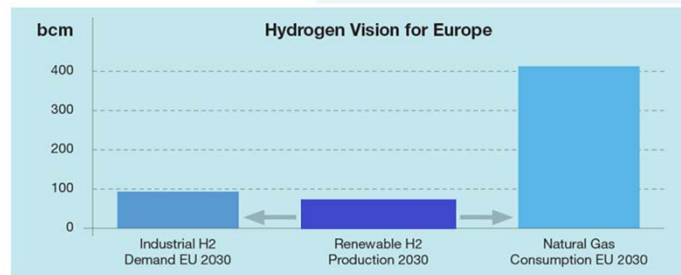
The "4 F" - Flexibility is Key



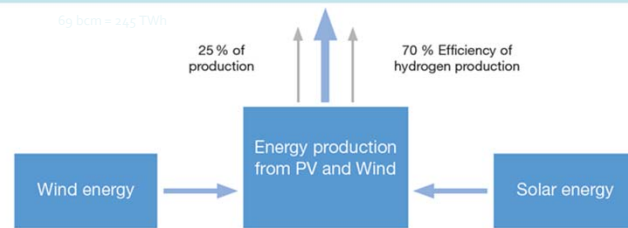
Production of Green Hydrogen



Source: <https://www.h2future-project.eu/technology>



69 bcm = 345 TWh



bcm = billion cubic meters

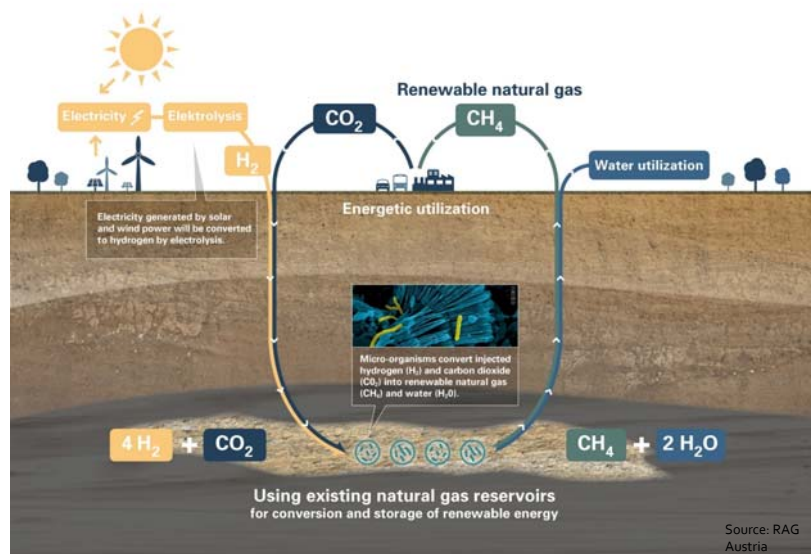
1) Töpler et al. 2017

2) Data derived from PRIMES

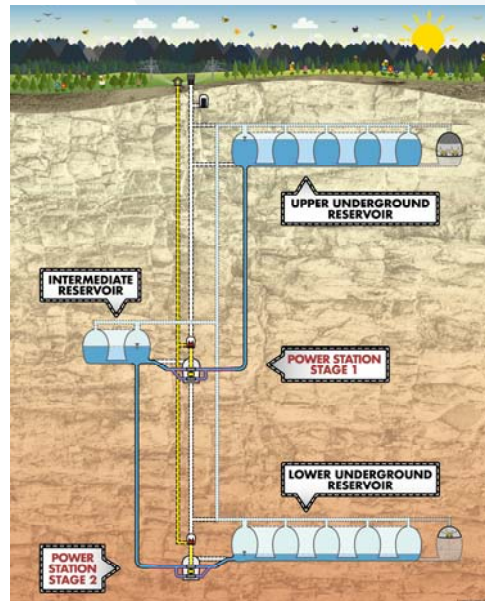
3) Assumption of 70% efficiency of hydrogen production

4) Certify Project 2015

Underground Sun Conversion



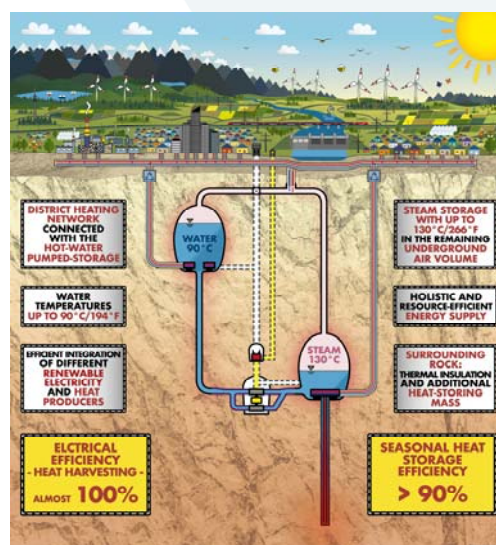
Underground Pumped-Storage Hydropower



Source: TU Graz

Thermal Pumped-Storage Hydropower

Hybrid hydraulic energy storage
(heat and electricity) for energy supply of
entire cities and urban areas



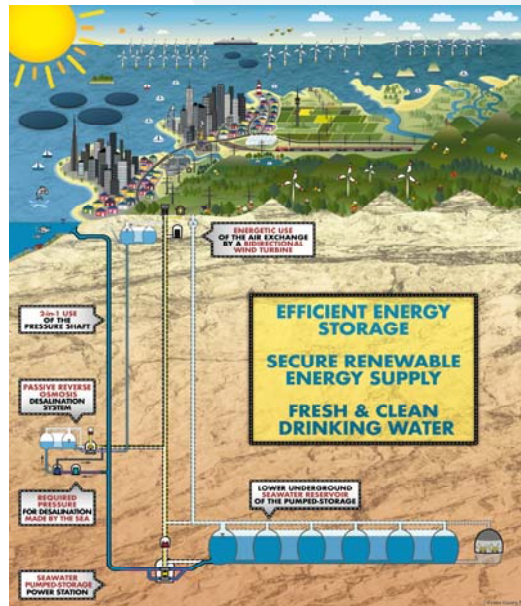
Source: TU Graz

Federal Ministry
Republic of Austria
Sustainability and Tourism

bmnt.gv.at

Underground Pumped-Storage Hydropower combined with Seawater Desalination

The future supply of renewable
energy and drinking water -
Presentation at HYDRO 2019
Conference, Porto, 15 October 2019

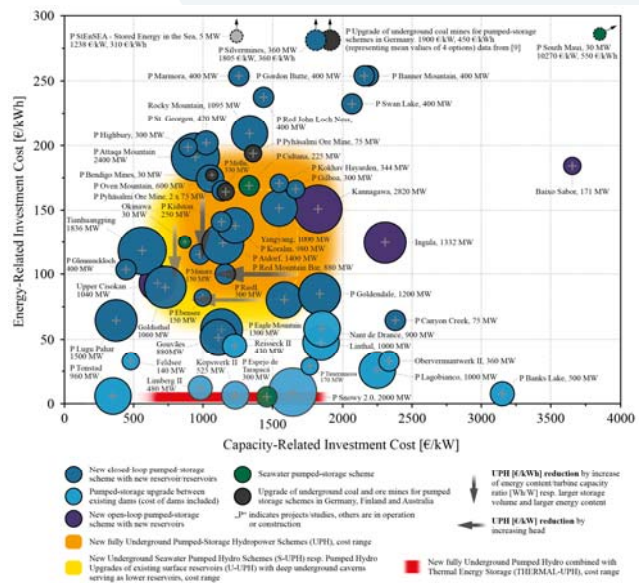


Source: TU Graz

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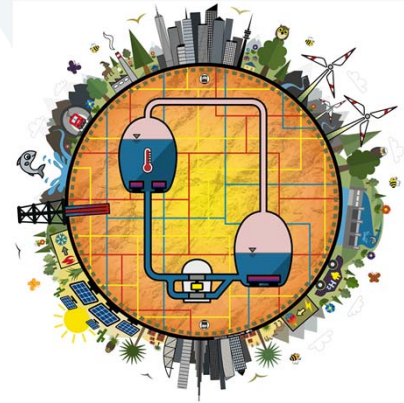
Economic Feasibility



Source: TU Graz

Summary

- **Innovative energy storage:** economically viable key technologies for green growth already exist
- **Sector-coupling, multifunctional and resource-efficient storage facilities** for global implementation
- **Underground construction** fully addresses various environmental challenges



Summary

- **Scalability** of renewable hydrogen and underground (thermal) pumped storage hydro power – **deployment regardless of location** (independence of natural topography)
- **Strengthening** national/local economy over entire lifecycle
- These innovative storage technologies will be **key success factors** of the energy transition

Summary

- **Renewable hydrogen** and underground (thermal) **pumped-storage hydro power** have great potential throughout the OSCE area
- For instance on the **Caspian Sea**, Seawater UPH combined with desalination can provide secure, sustainable and reliable energy and drinking water
- **Partnership OSCE/international financial institutions** to implement a **pilot project**, possibly within the OSCE project “Promoting Green Ports and Connectivity in the Caspian Sea Region”

Thank you!

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