



Joint EASE/EERA recommendations for a
**European
Energy Storage
Technology
Development
Roadmap towards 2030**

http://www.ease-storage.eu/Technical_Documents.html

**IRENA International Electricity Storage Policy
and Regulation Workshop**

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Technologies addressed in Roadmap

1. **Chemical Energy Storage**
2. **Electrochemical Energy Storage**
 - Batteries
 - Electrochemical capacitors (supercapacitors)
3. **Mechanical Energy Storage**
 - Compressed Air Energy Storage
 - Flywheel energy storage
 - Pumped Hydro Energy Storage
4. **Thermal Energy Storage**
5. **Electrical Energy Storage**
 - Multi-Functionality Hybrid Energy Storage Systems

Numbers as used in the report
(Not a ranking order)

Status and Recommendations for RD&D on Energy Storage Technologies in a Danish Context

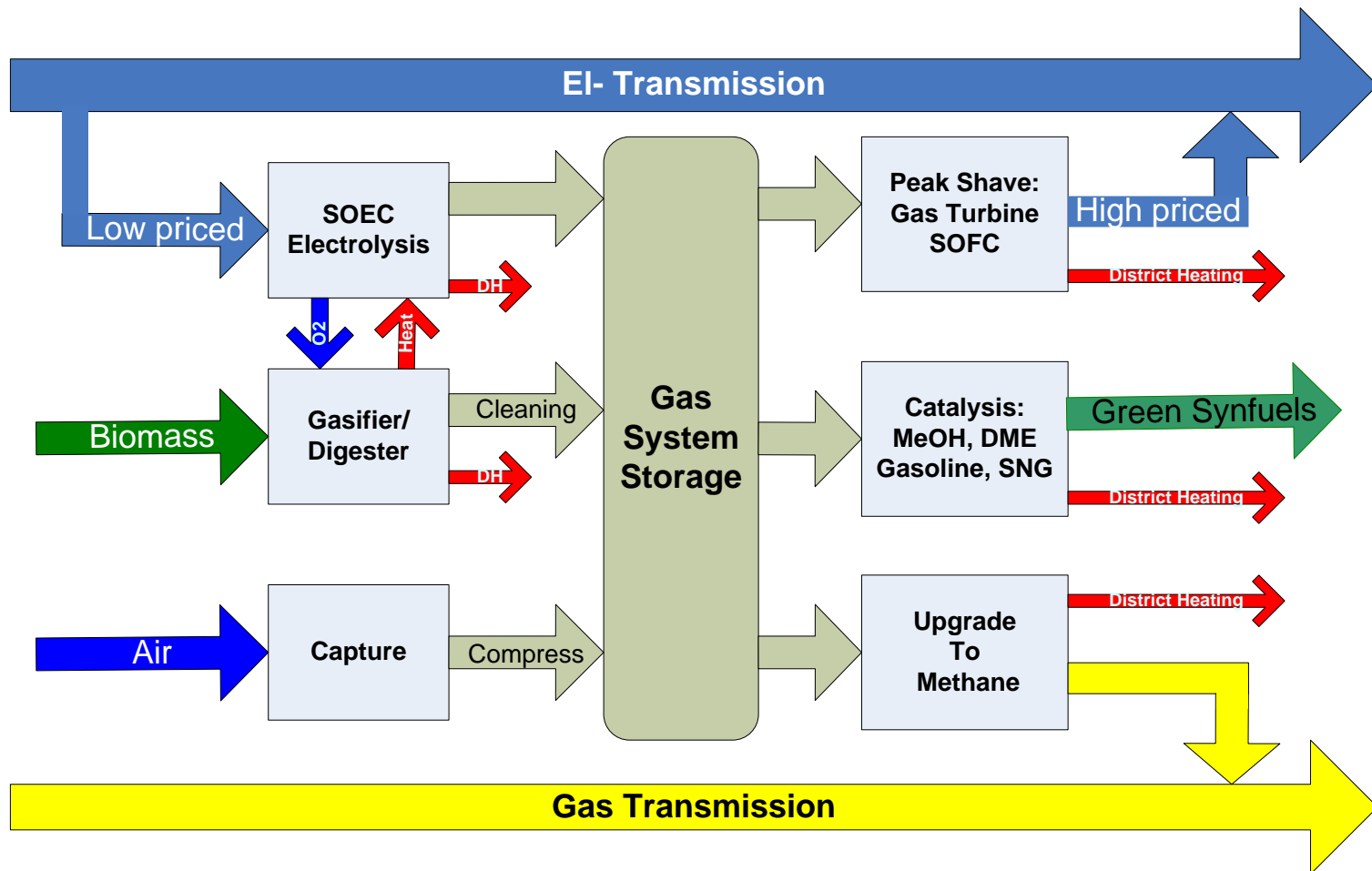
http://www.energinet.dk/SiteCollectionDocuments/Danske%20dokumenter/Forskning%20-%20PSO-projekter/RDD%20Energy%20storage_incl%20app.pdf



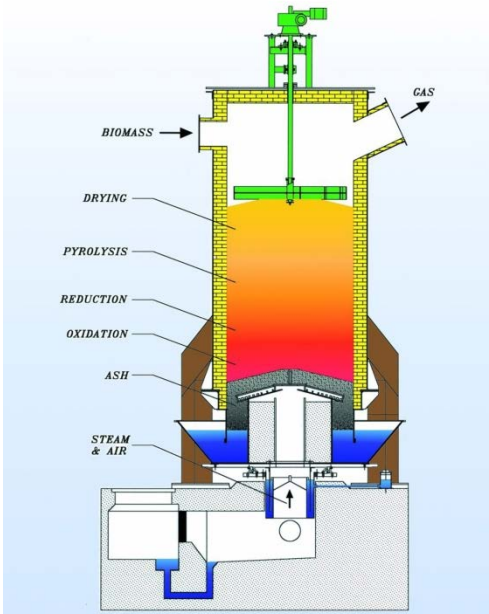
Main focus on:

- **Chemical**
- **Electrochemical and**
- **Thermal Energy Storage**

Energinet.dk's vision for fossil fuel free Denmark in 2050 – The Wind Scenario



Chemical storage: synergy with biomass and existing infrastructure



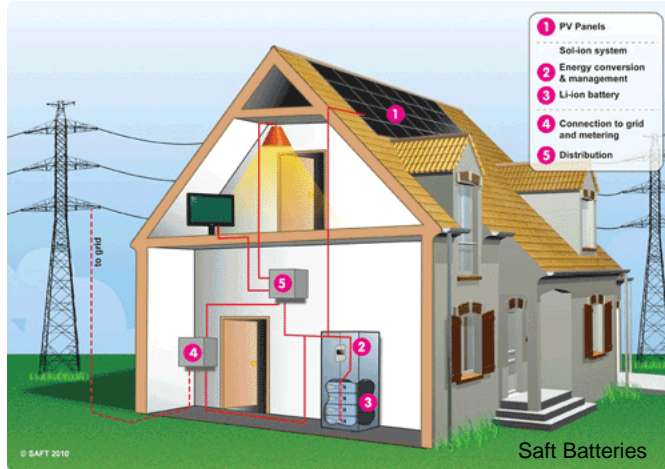
<http://www.chamco.net/Gasification.htm>

Batteries

A fundamental problem about batteries: the energy density. Can we improve?

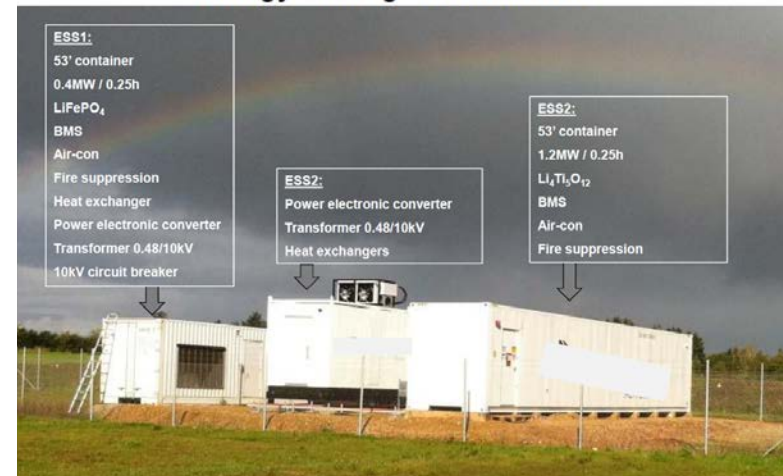
New materials / materials combinations for Li ion technology

Testing improved battery technologies in renewable energy environments



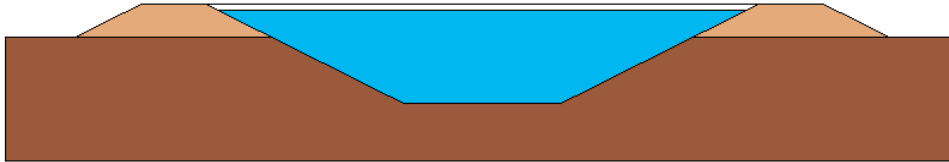
DTU Energy Conversion, Technical University of Denmark

Energy Storage installation

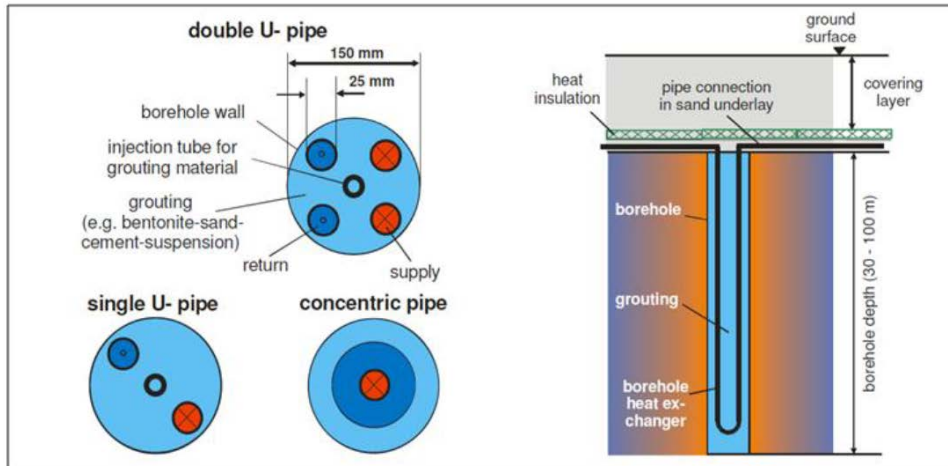


Thermal Energy Storage

Pit Thermal Storage



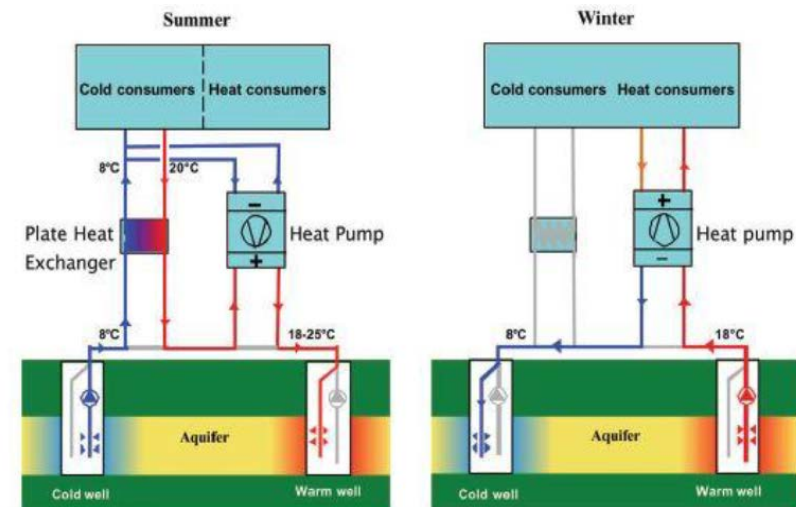
Borehole Thermal Storage



Thermal Energy Storage:

- Sensible
- Phase Change
- Thermochemical

Aquifer Thermal Storage



..... many thanks for your attention!