



**Energy storage systems are the key to a successful energy transition and to overcome the energy crisis.**

Raymond C. Decorvet  
Global Business Development CO<sub>2</sub> Heat-Pumps & ETES (LDES)  
MAN Energy Solutions Schweiz AG

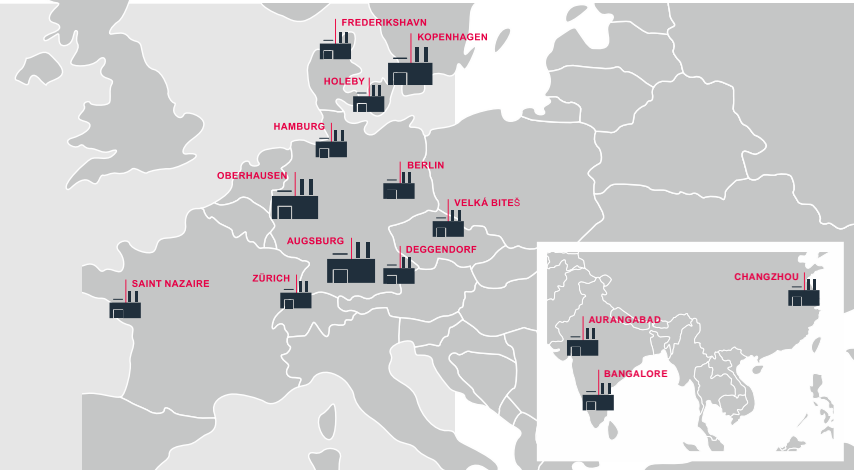
# MAN Energy Solutions @ a Glance

## Vision:

Building on our unique range of capabilities, we create **pioneering solutions** to master the business, technical, and operational challenges of **decarbonization**.

We enable customers to achieve **sustainable value** creation in the transition towards a **carbon neutral future**.

- 11** Production sites in Europe
- 3** Production sites in Asia
- 30** Licensees in 7 countries (two- and 4-stroke, turbocharger)
- +14'000** Employees worldwide
- 3.3bn €** Revenue 2021
- Augsburg / Germany**



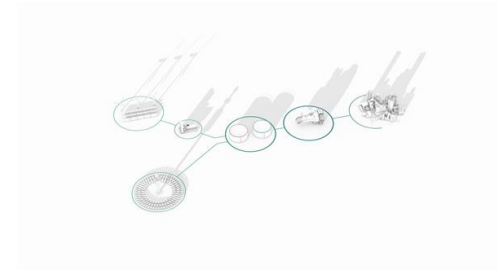
# MAN-ES – Energy Storage Solutions



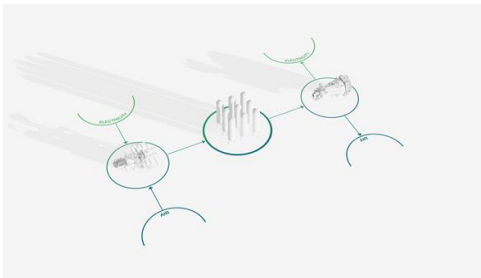
**ETES** (Electro Thermal Energy Storage)



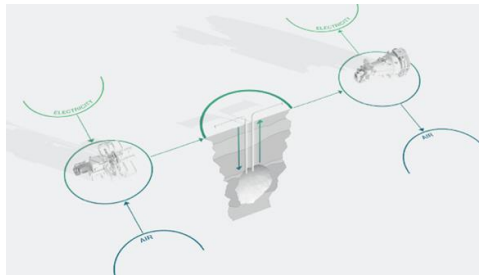
**Power-to-X** (Hydrogen)



**MOSAS** (Molten Salt Storage)



**LAES** (Liquid Air Energy Storage)



**CAES** (Compressed Air Energy Storage)

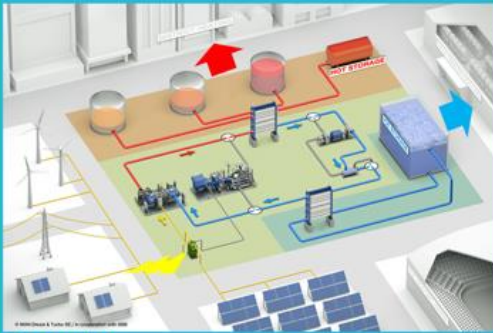
# How ETES (Electro Thermal Energy Storage) works



## ETES – Bulk thermal & electricity storage

**MAN ETES**

- Heat pump
- Storage
- Re-electrification



**Supply:**

- Electricity (primary)
- Heat & cold (0° - 150°C)
- Heat & cold storage (0° - 150°C)

- Charging 4000+ electric cars
- Electricity for 10'000+ households for 1 day
- Covering demand of **heat**, **cold** & **electricity** for 10 mid sized breweries

# What? Creating reserves for later use !



# Yes, we did also well in the past.... but times have changed !



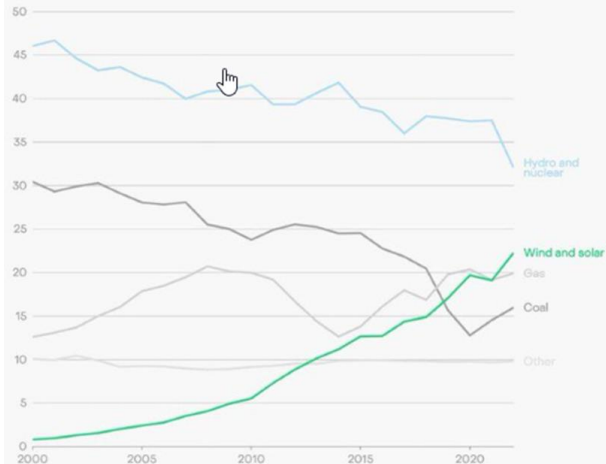
Recent years and **Summer 2022** - in Europe - showed, that we cannot take sufficient water for granted anymore !!



# More renewables (wind & solar) demands faster expansion of LDES (Long Duration Energy Storage) - thermal & electricity

EU wind and solar generated more than gas for the first time

Share of electricity generation (%)

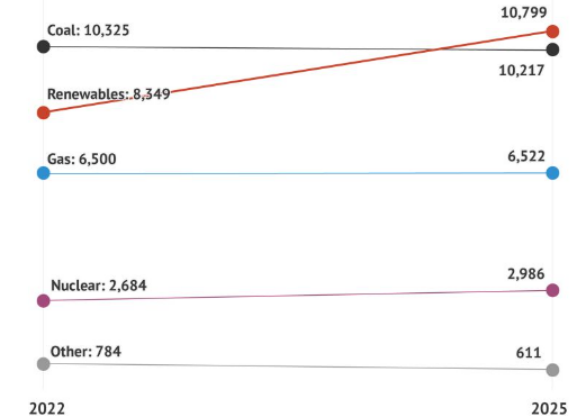


Source: Annual electricity data, Ember

EMBER

Renewables will become world's largest electricity source within three years, IEA data reveals

Global electricity generation by source, 2022-2025, TWh

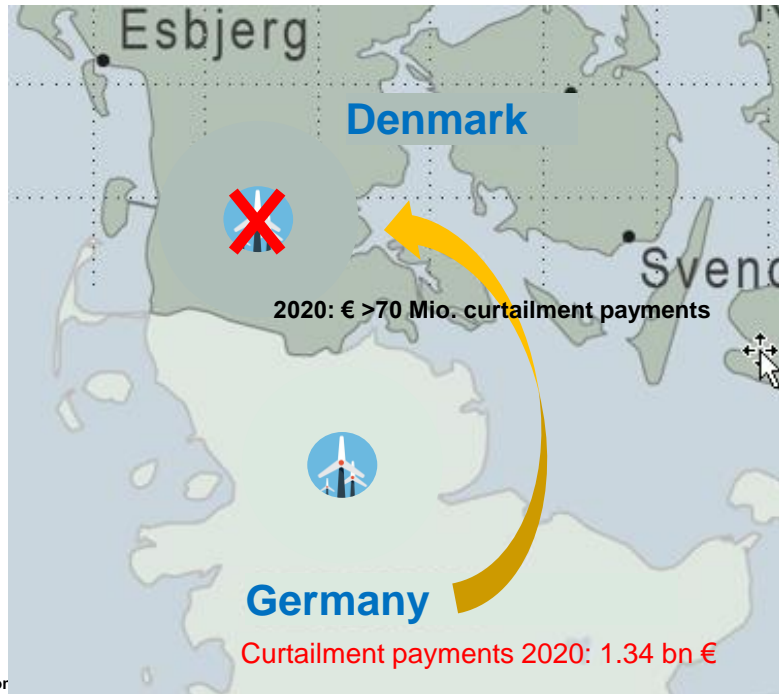


Source: Carbon Brief analysis of IEA figures

CarbonBrief



# To much renewables cause problems



## Facts

- Special regulations between Denmark and Germany (TSO Tennet)
- Tennet struggles to handle overcapacities from wind-power. Protecting grid
  - balancing supply & demand
  - stimulate power consumption by lowering price / minus tariffs
  - reduce / stop renewable electricity generation
- Curtailment payments to Danish wind farm operators (2020: >70 Mio. Euros)
- Curtailment payments quadrupled in 2020 over 2019 !!  
= **1700 GWh / 425'000 households (Horns Rev3)**

## Consequences

- Curtailment payments on top of electricity price
- Renewable capacity kept idle = wasted / opportunity costs
- CO<sub>2</sub> reduction results negatively impacted in Denmark

## What are the problems?

- 25 year old EU regulations inhibit TSO/DSO to have own electricity storage
  - Exception are batteries for frequency stabilisation
- Increasing renewables YES → but not without also expanding **Energy Storage** drastically
  - Leads to more constraints (payments)
  - More idle renewable assets (wind / solar)
- Waste of green electricity must be stopped → e.g. stimulating power consumption by minus tariffs
- **Energy Storage** deserves own asset class in EU

**I look forward to the panel discussion. Thank you !**