



MESY

Mobility and Energy storage Systems

T H E P O W E R - T O - G A S G R O U P

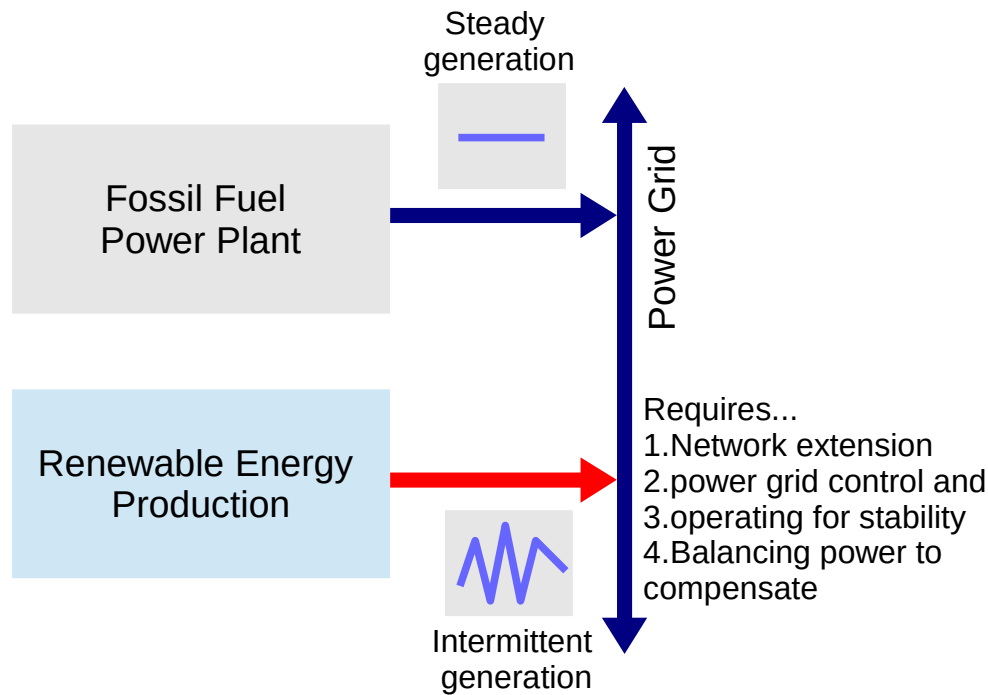
MESY's Carbon Emission Reduction strategy



New strategy for cost savings of Billions in the Energy Market

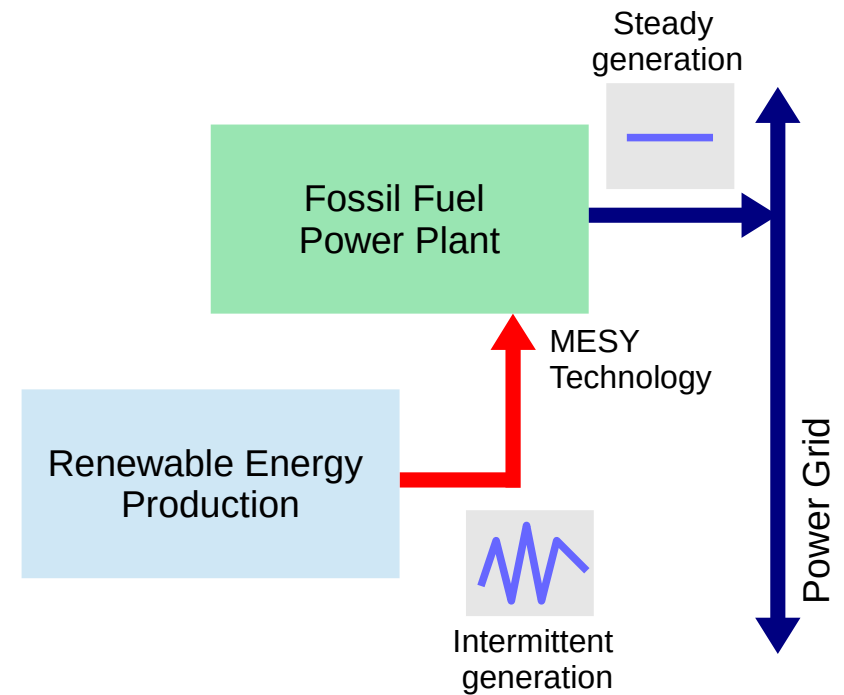
Very expensive and complex.

Requires Billions of Investments to stabilize Power Grids
(e.g. Germany 21 Milliarden €)



Very cheap and simple.

No Investments necessary to stabilize the power grids.



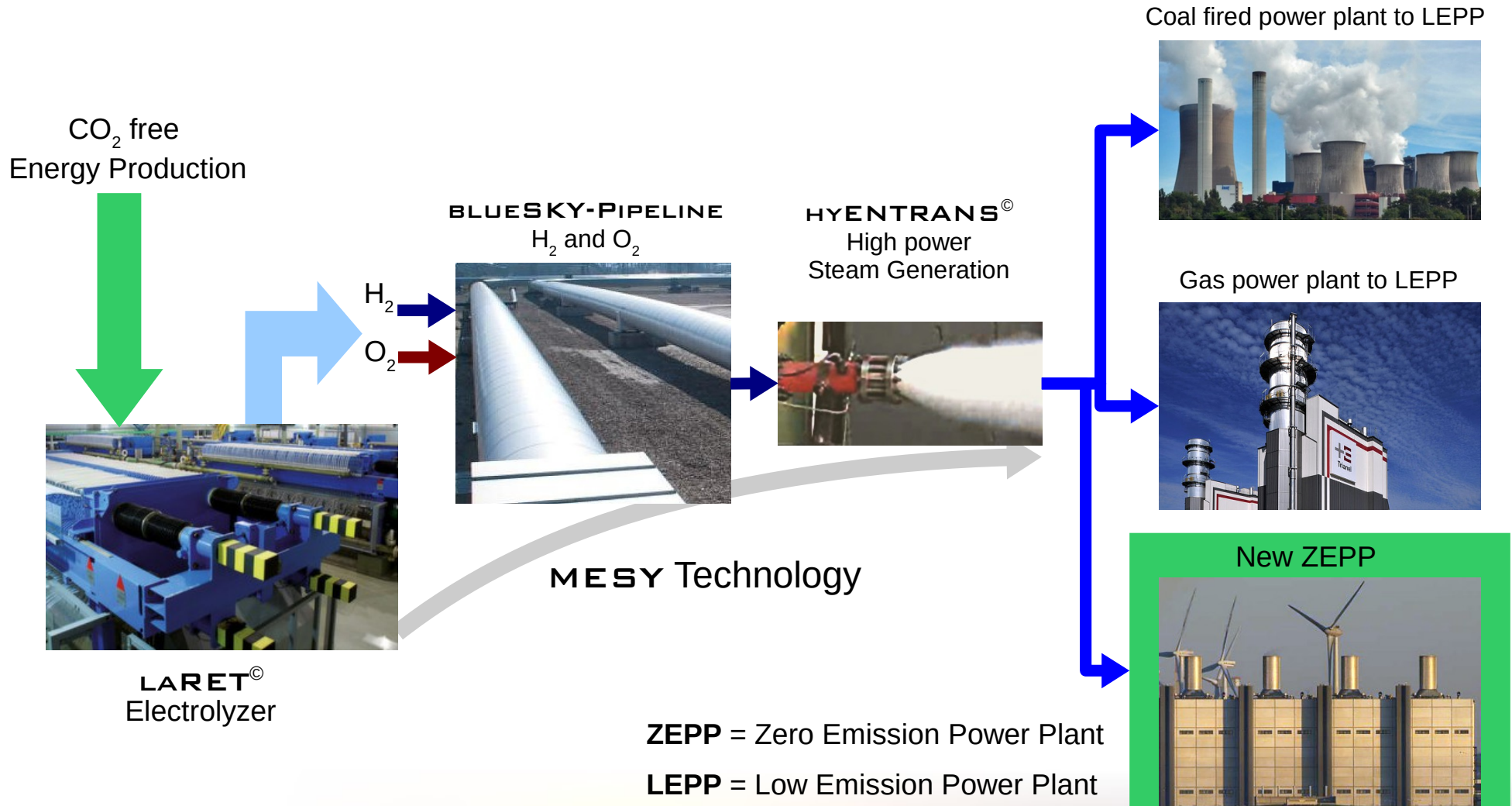
Economy effects for the energy markets

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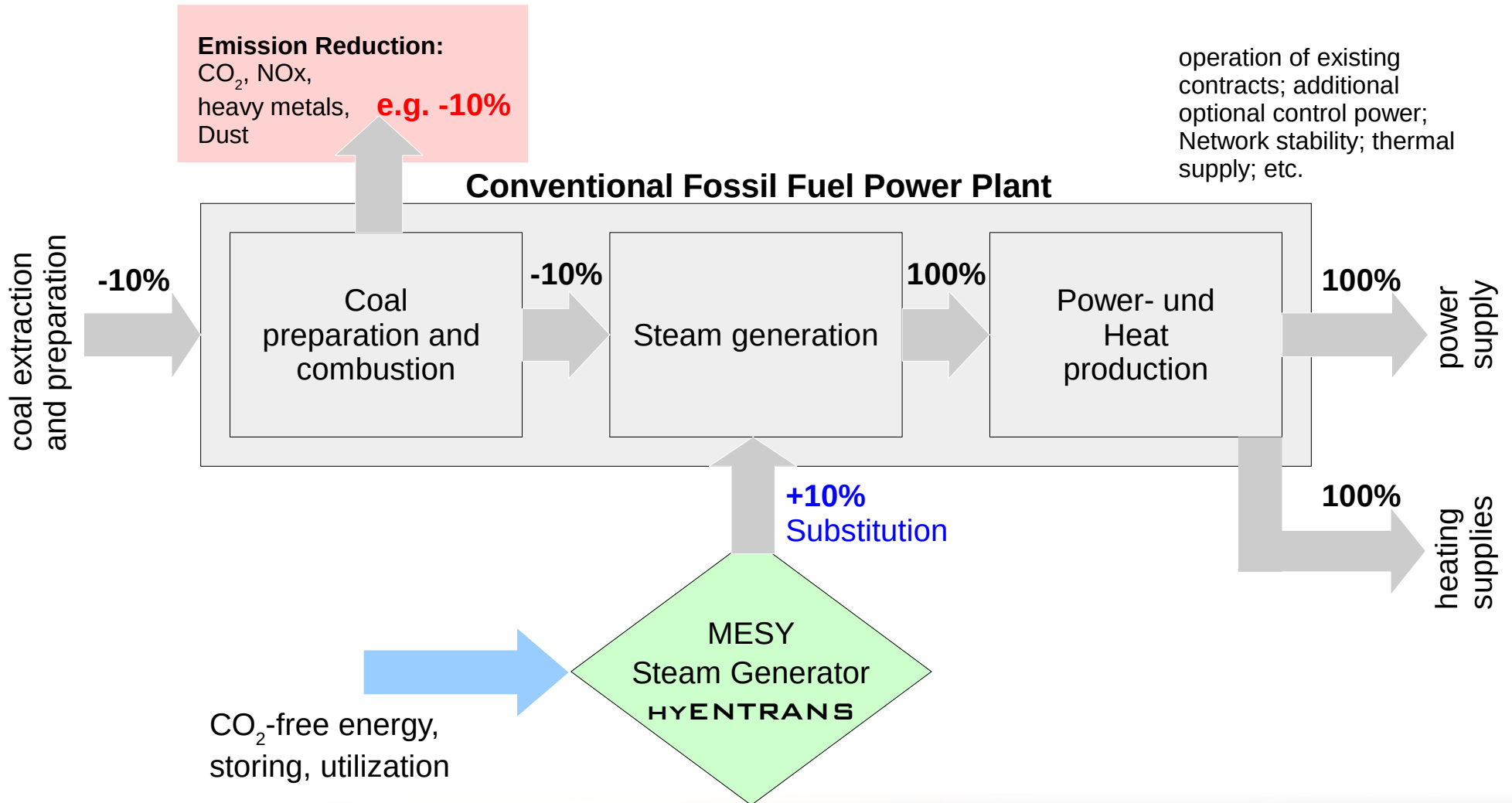
1. Examples

CO₂-Reduction without follow-up costs, worldwide



The Strategy of CER

Carbon Emission Reduction

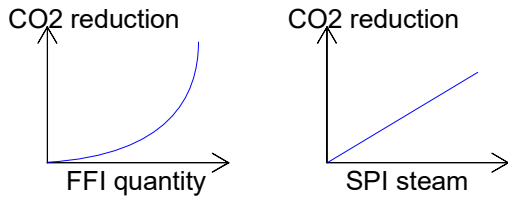


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The CER project in the application

Expected effect

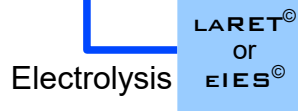


CER technology requirements:

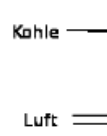
Input:

- Deionized water
- CO₂-free Electric power

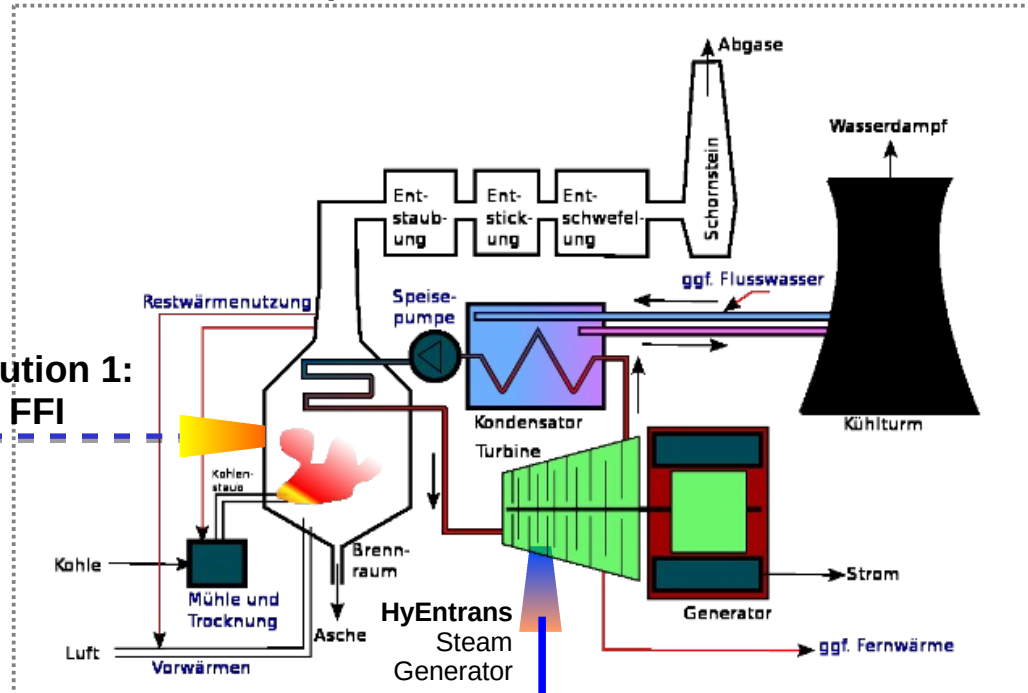
Zero CO₂ Energy Production



Solution 1: FFI



Example: Coal Fired Power Plant



Solution 2: SPI



CER technology products:

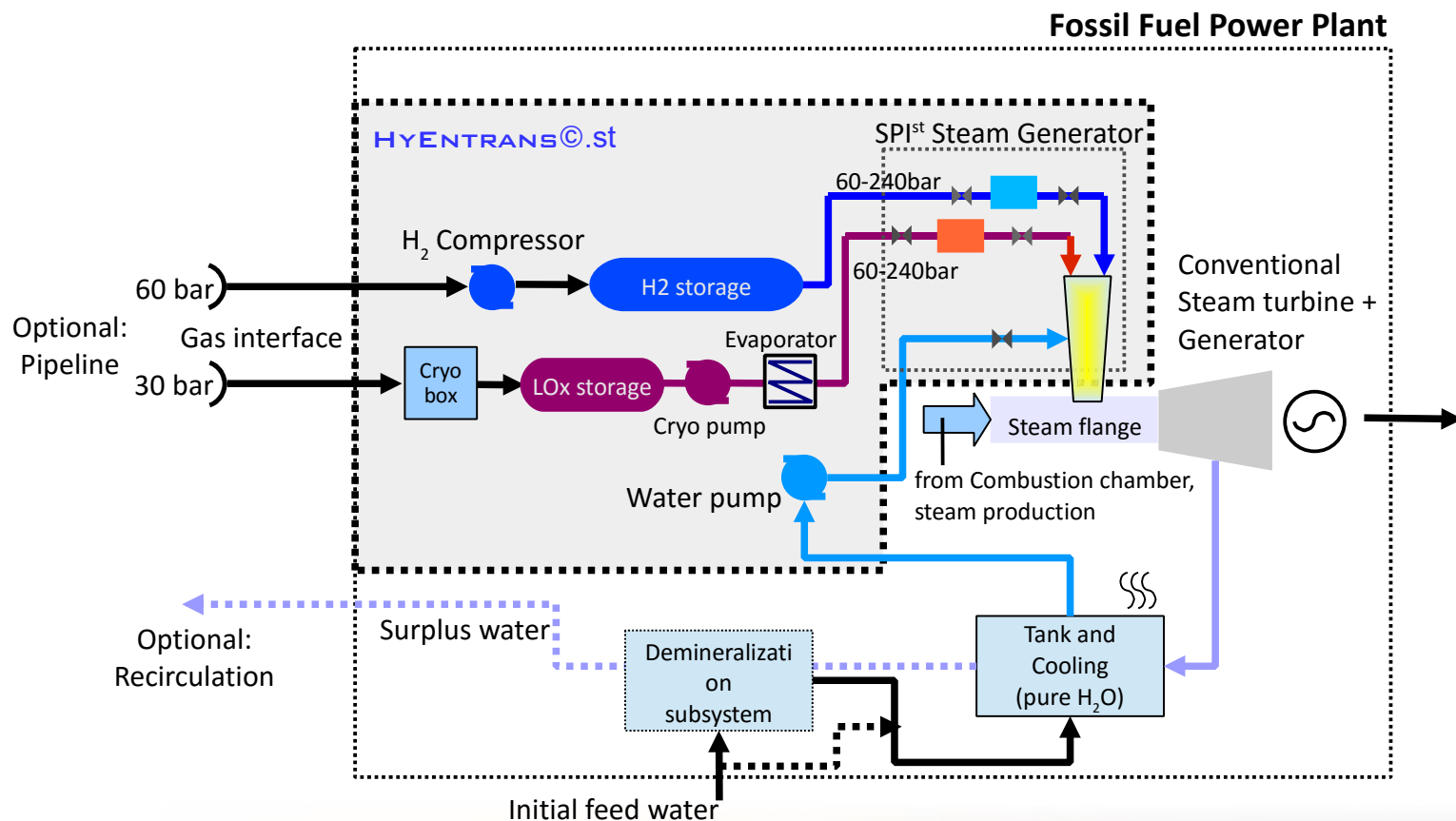
Output:

- Full flexible Electric power
- Steam
- Heat
- Gas (Hydrogen + Oxygen)



Products- and Interfaces: HYENTRANS *Hydrogen Energy Transformation Facility*

HYENTRANS[®]-st System Overview



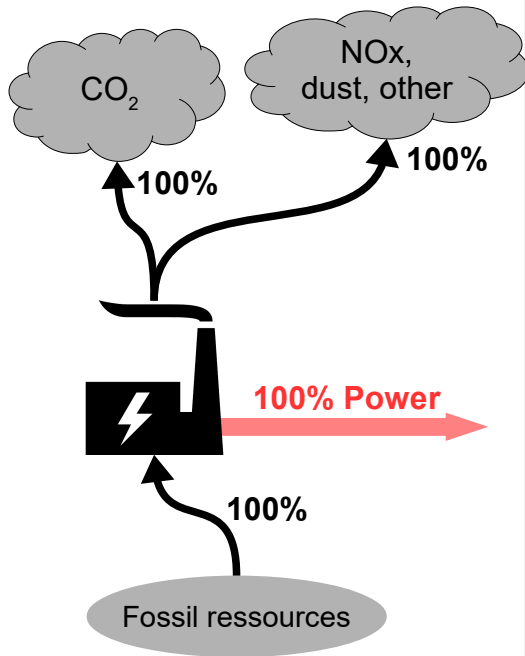
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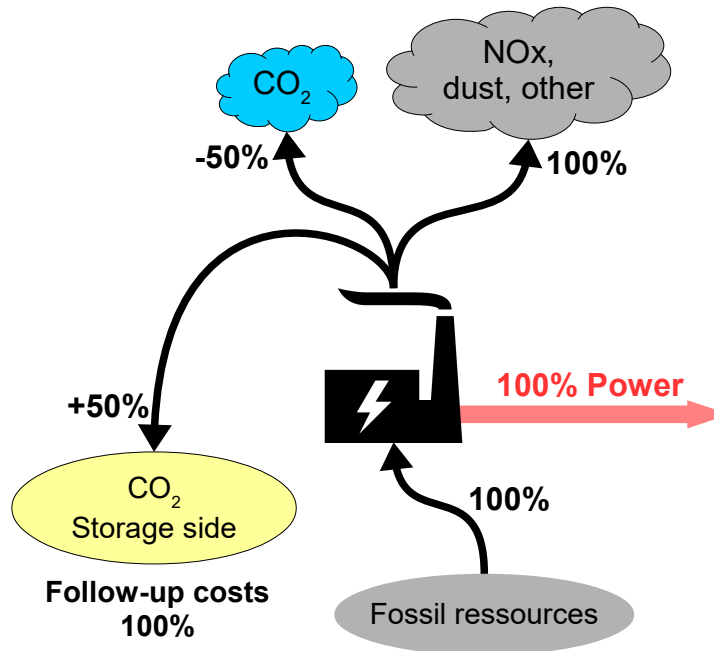
Differences between CCS and CER

Key technology for the energy market

Coal power plant „State of the art“ principle

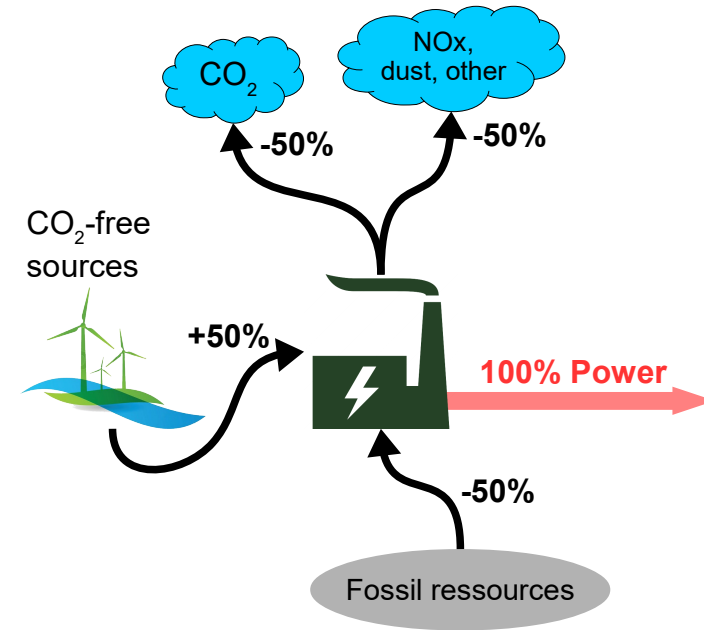


CCS principle



CCS = Carbon Capture and Storage

MESY's CER principle



CER = Carbon Emission Reduction

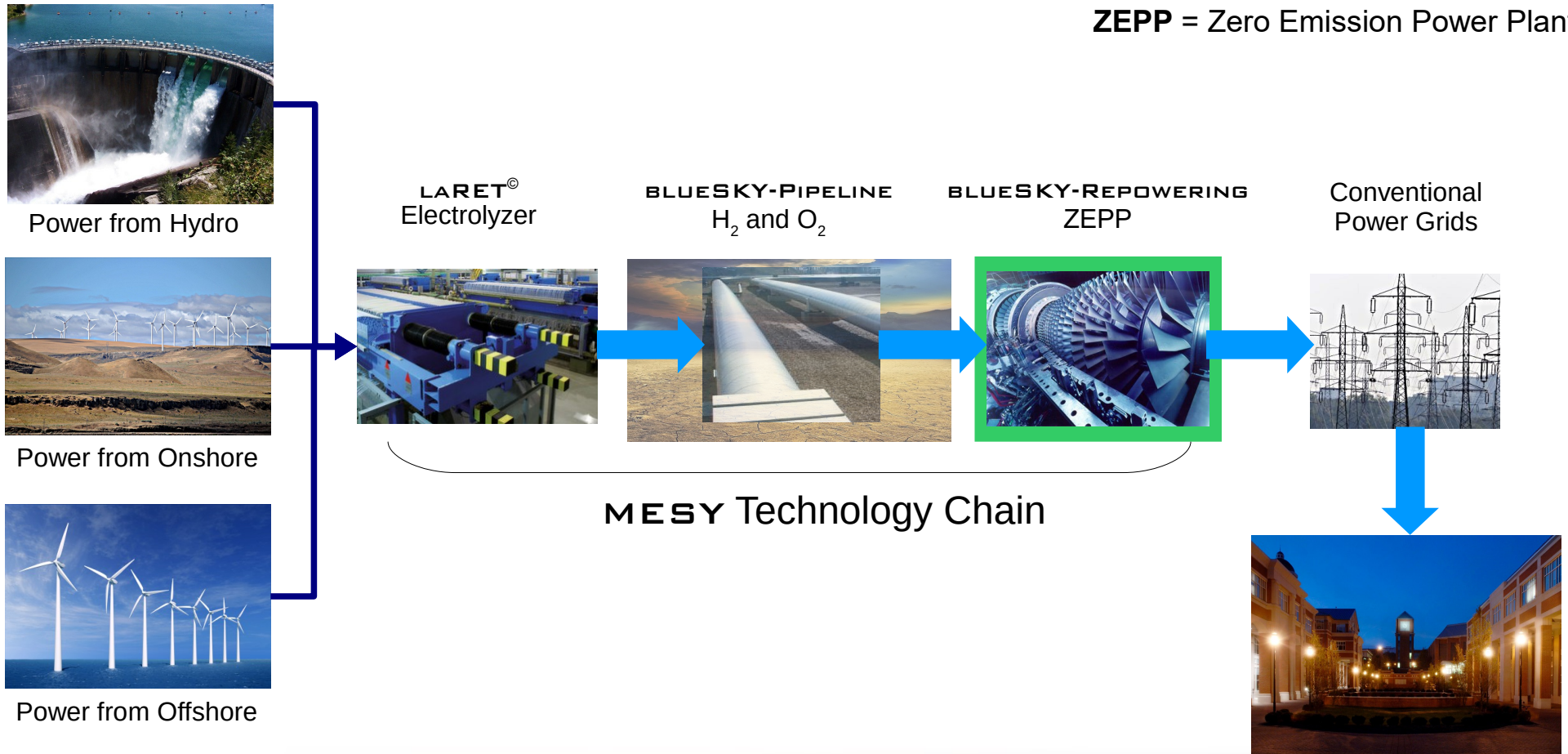
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2. Example

Energy transport over very long distances

ZEPP = Zero Emission Power Plant



The combination of fossil energy production and renewable energy production reduces pollutant emissions drastically and save money.



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Economy Effects of CER

Benefit for fossil fuel power plant operators

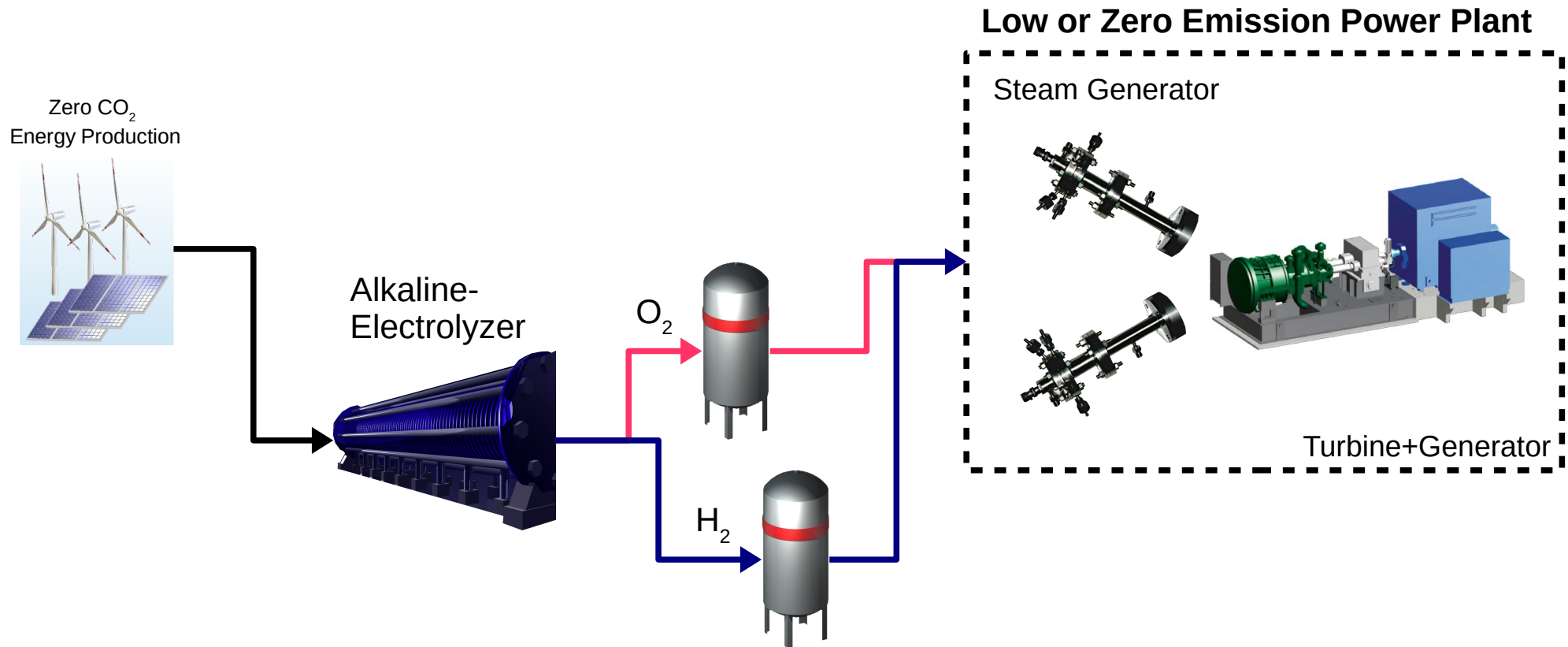
- Reduction in CO₂ emissions with NO follow-up costs
- Fast control performance for supporting grid stability
- Simple and save installation
- Simple integration and control
- Simple and low costs of dismantling
- High performance compression per volume
- No changes to the existing facilities
- **In other countries:** Reduction of investments in the expansion of electricity networks, because fluctuating electricity production from wind farms are smoothed before being fed. (In Germany, the potential would **11 Bil.€** investment savings = 25% Renewable Energy Production (=total green energy production of 2014), appraisal ~50% of 21 Bil.€ planed investment of Germany “Network Development Plan”, Status 2013)

Expenditure

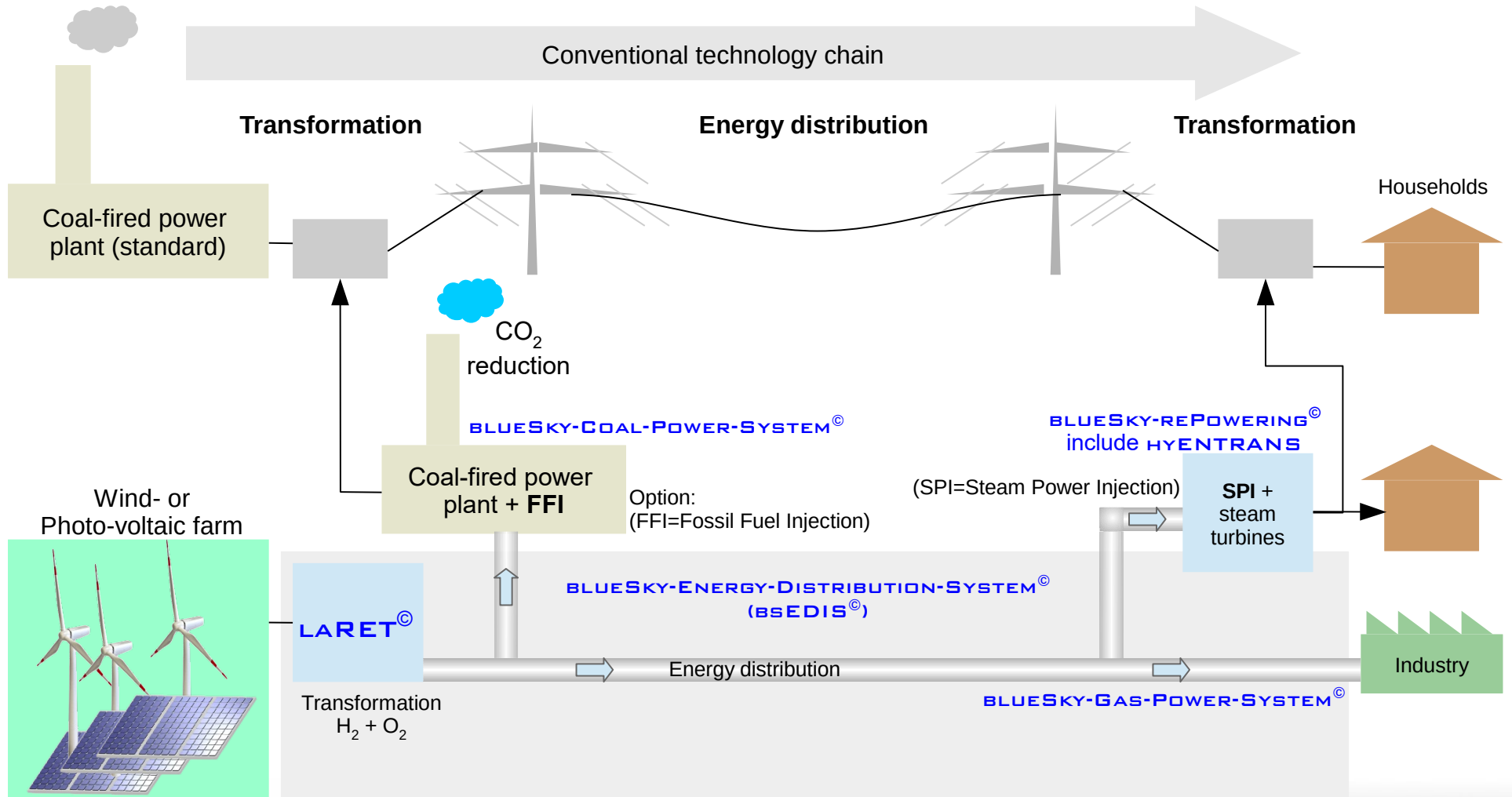
- Requires Green Energy and Transformation into gas for one or more power stations



Option for new power plants or installation in existing power plants



Infrastructure and full Overview



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MESY's solutions

LARET[®] LARGE RENEWABLE ENERGY TRANSFORMER

- **Function:** Transformation of green energy into storable gases (hydrogen and oxygen).

BLUESKY-ENERGY-DISTRIBUTION-SYSTEM[®] (bsEDIS[®]) includes

- **Function:** Transportation, storing and distribution of hydrogen and oxygen gases over 1000ends of km with pipelines. This system covers standard gas interfaces for industry applications.
- Interface: bsEDIS-dPIPE

• BLUESKY-COAL-POWER-SYSTEM[®]

- **Function:** Steam substitution system.
- Interface: bsEDIS-DPIPE
- Includes BLUESKY-HYENTRANS[®]

• BLUESKY-GAS-POWER-SYSTEM[®]

- **Function:** *Gas injection system with operational interfaces.*
- Interface: bsEDIS-DPIPE

• BLUESKY-REPOWERING[®]

- **Function:** Transform hydrogen and oxygen gas into electricity and heat.
- Interface: bsEDIS-DPIPE
- Includes BLUESKY-HYENTRANS[®]



Basic Data

Transformer Infrastructure **LARET**[©]

- Typically Investment Transformer: 600-900 €/kW
- Connecting power per unit: 50 MW
- Energy purchase cost limit ~ 3 cent €/kWh or lower
- H₂ gas production only 6.300 tons per year

HYENTRANS Steam Substitution and repowering

- Typically Investment **BLUESKY-HYENTRANS**[©]: ca. 120-160€/kW



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