

The ENERTRAG-Hybrid Power Plant



Our company



- ENERTRAG is an active player on the european energy market who is specialized in sustainable development



- Construction and maintenance of wind farms
 - Financing of energy projects
 - Establishment and operating of grids
- Developing and controlling of networked plants
 - Technological development

1000 Million € of investment

650 MW of installed capacity

440 wind turbines

1.200 wind turbines in charge (EN-Service)



250 Million € of annual turnover

1402 Gigawatt hours per year

370 employees- 170 in the service department

16 apprentices

Basis: ENERTRAG-Grid



Facts:

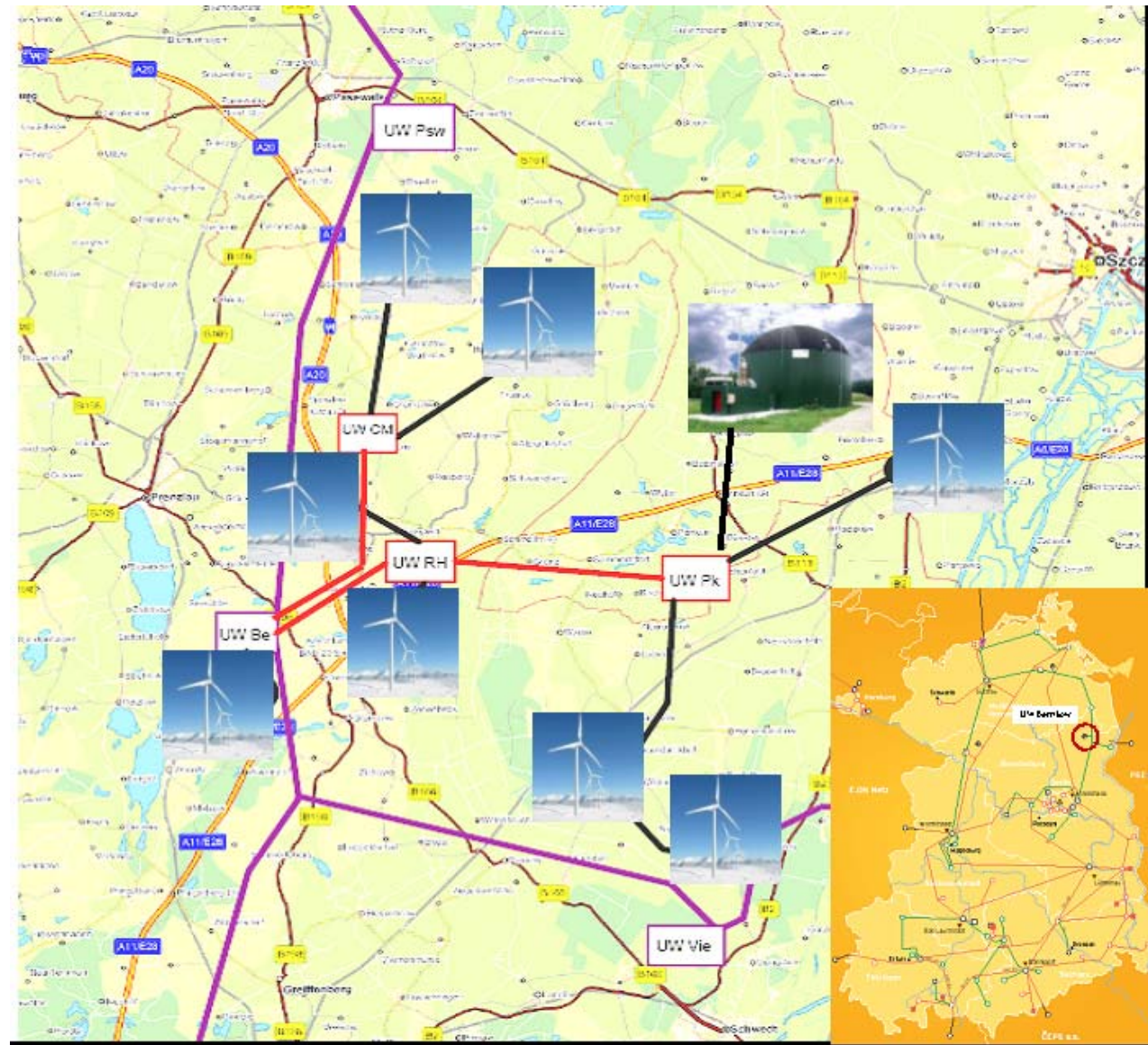
20 megawatts biogas
230 megawatts wind

40 km 110-kV-cables
75 km 20-kV-cables

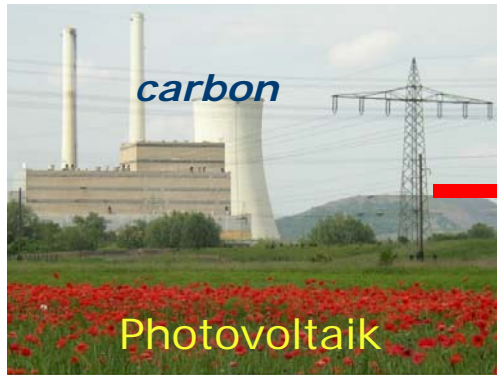
4 transformer stations

Online control of all plants via fibre optic cables

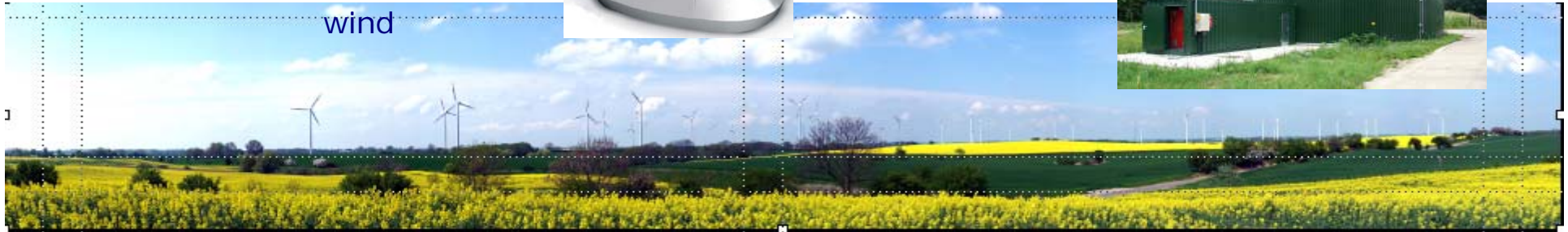
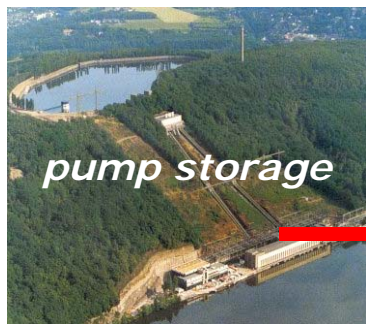
The energy mix within the feed-in grid is the basis of the hybrid power plant.



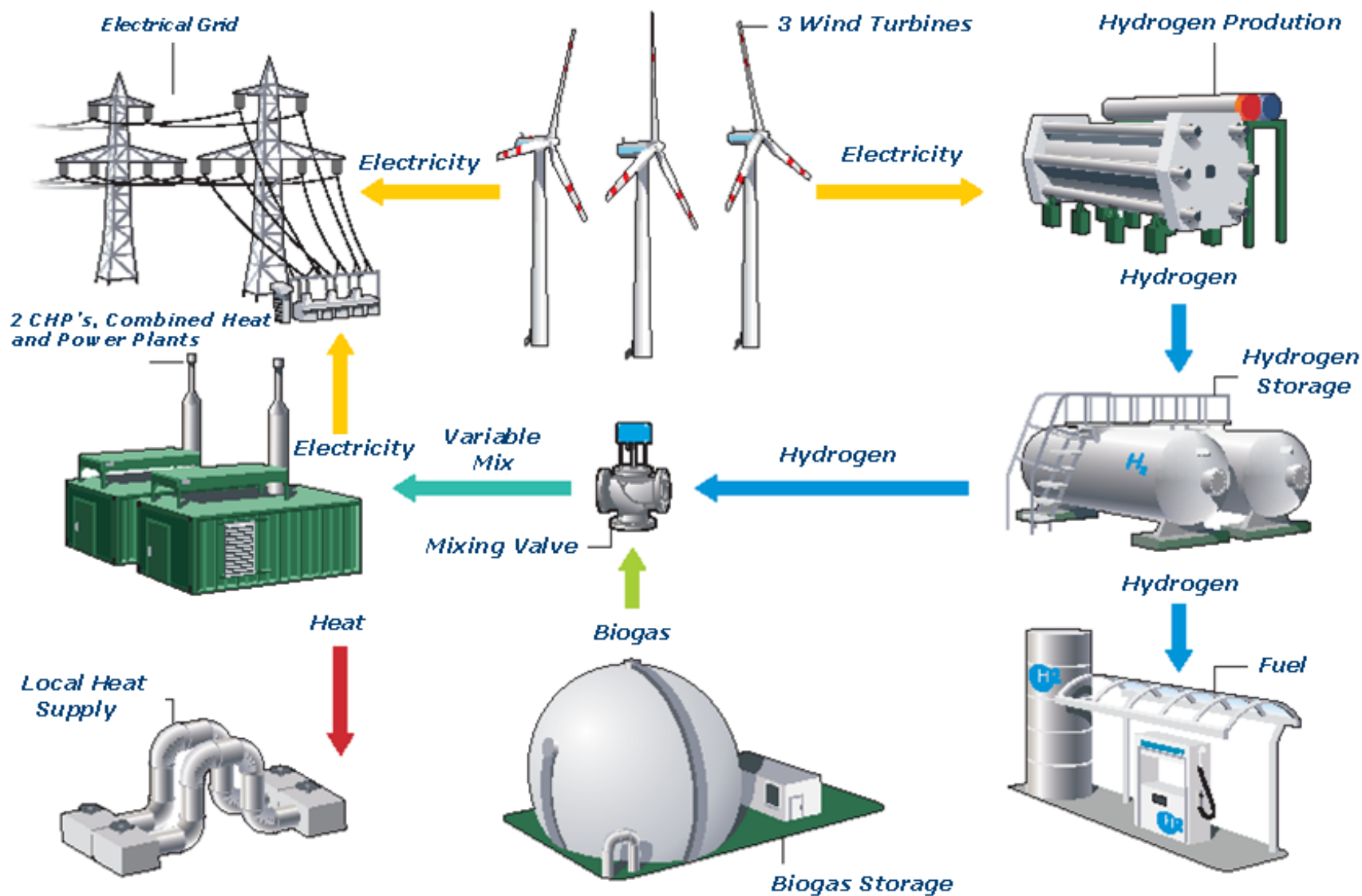
Energy according to our needs – the energy mix 2020



energy management



ENERTRAG-Hybrid Power Plant



Operating strategies:

- Production of hydrogen for mobility and industry
- Ensurance of electrical basic load
- Guarantee of forecast stability
- Providing Peak load (EEX)

Technical data of main components:

1. Grid-connected wind turbines: 3 x 2 MW
2. Biogas plant: installed capacity 1 MW
3. Electrolyzer: installed capacity 500 kW (120Nm³/h)
4. Compressors: 2 x 60Nm³/h, discharge pressure 30bar
5. Hydrogen storage: capacity 1.350kg @ 30bar (5 storage tanks)
6. Combined heat and power plants: 2 ; 350kW_{el}/340kW_{th}; proportion of the gas mix: min. 30% biogas + 70% hydrogen, variable up to 100% biogas

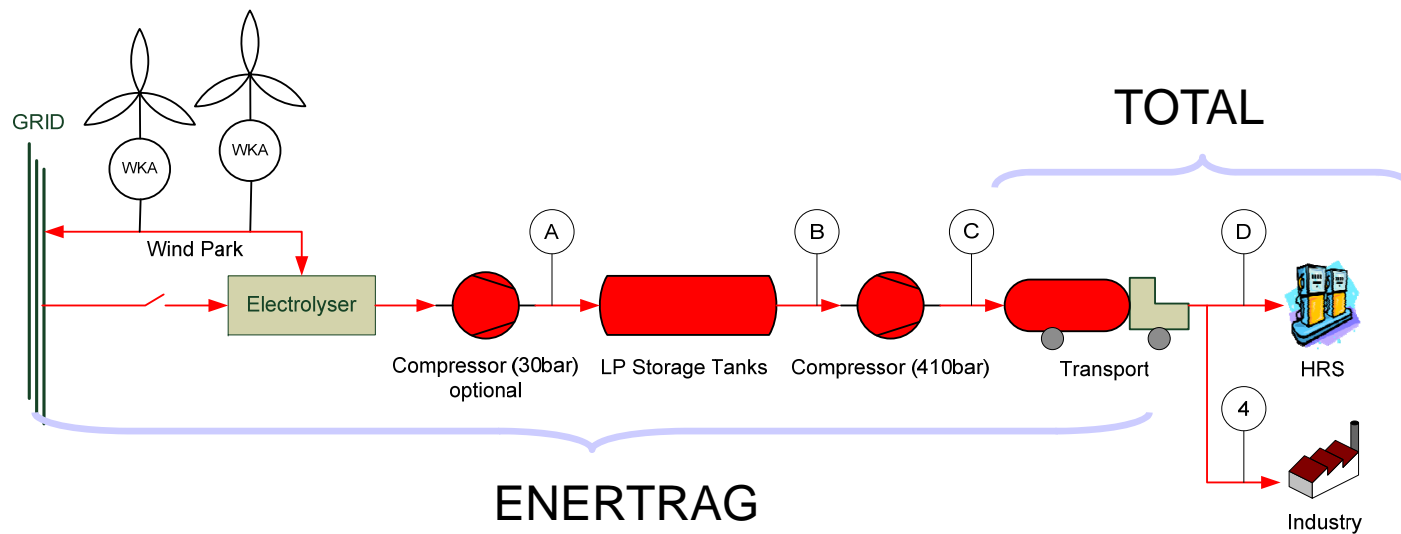
Investment: about 21 Million Euro



Importance of the hydrogen technology in the mobility sector

- Hydrogen is the fuel for future mobility and Brandenburg is able to continue several leading initiatives:
 - National Innovation Program „Hydrogen and Fuel Cell Technology“ (NIP)
 - National Organization „Hydrogen and Fuel Cell Technology“ (NOW)
 - European Joint Technology Initiative „Fuel Cells and Hydrogen Joint Undertaking“
 - Hydrogen and electrical vehicles to observe the future CO₂-norms
 - Binding annual emission aims and emission concessions for car manufacturers from 2011 on
 - Max. emission of 95 g CO₂/km from 2020 on
 - European Directive on the Promotion of Electricity produced from Renewable Energy Sources
 - Use of process hydrogen in refineries (PCK)
 - Actual H₂-projects related to public transport of Berlin, Bozen, Eberswalde
 - Existing cooperation agreement with TOTAL

- TOTAL and Enertrag both brings the needed expertise in the green H2 business
 - Enertrag has a know-how in electricity and H2 production
 - TOTAL is the European leader in H2 stations
 - **Both companies cover the whole green H2 business chain from the production to the consumption**



- TOTAL's and Enertrag's estimations lead to the following costs, taking in account a H2 production rate of 3t/day and a facility investment of € 10 m, with a capacity of 7 MW.

<i>Costs of production and transport [€/kg H2 at 200bar]</i>	12% profit ratio	0% profit ratio
100% wind energy, no additional selling	8,10	7,30
Maximum use of available wind energy, conventional support	7,50	6,90

With an IRR up to 12% (before taxes) and the exclusive use of existing and industrially proven technologies, the project is financially sound.

Before any industrial realisation, our next steps will be:

- a deep analysis of the future demand of green H2
- clarifying the future tax system applying to green H2
- acquiring investment partners
- determining the operative structure for these projects

