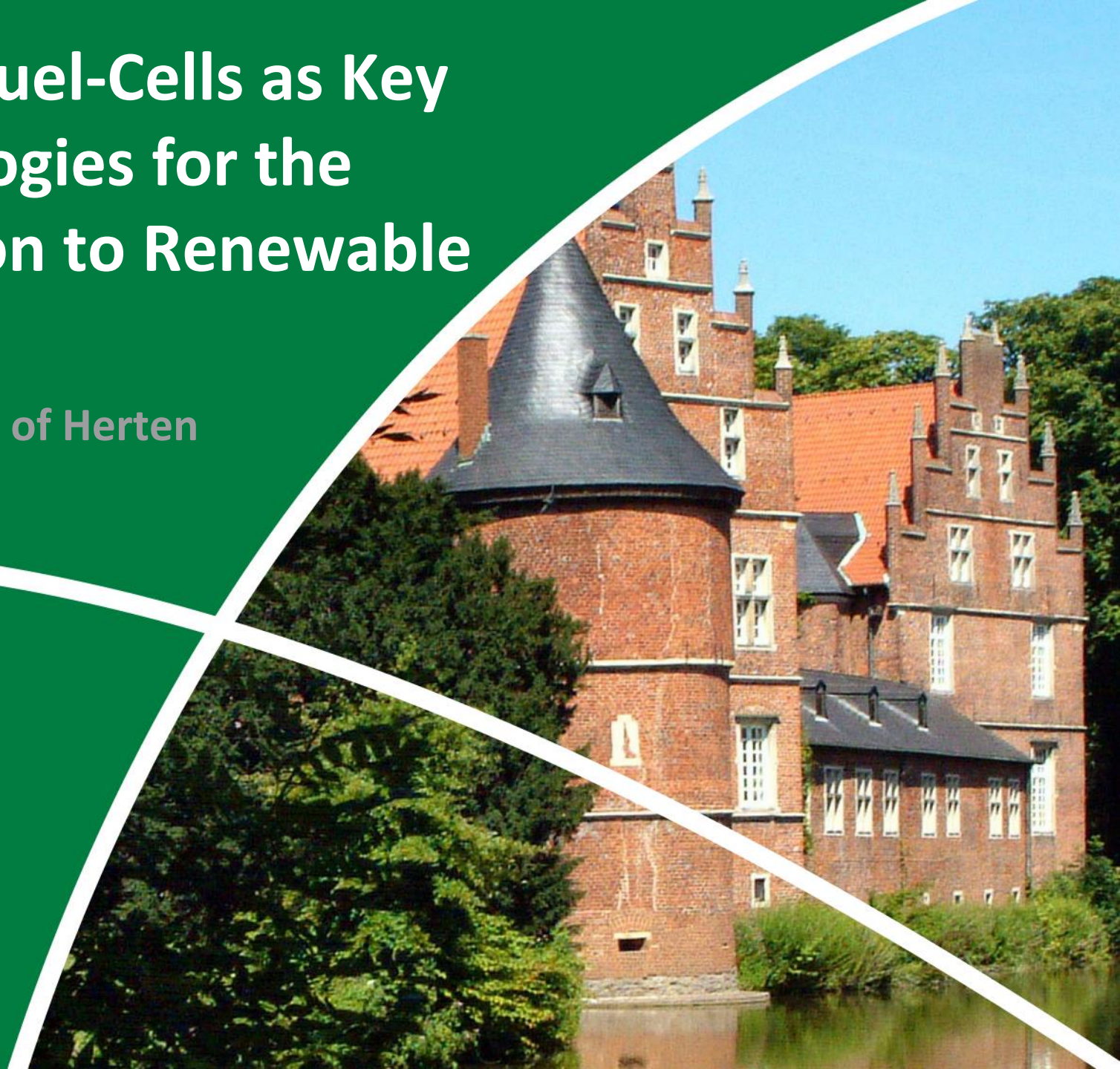


H₂ and Fuel-Cells as Key Technologies for the Transition to Renewable Energies

The example of Herten





Structural change





Structural weaknesses of our town

- Biggest town in Europe without a railway station
62.000 inhabitants
- Economy: 5 former coal mines
12 % unemployment
- Infrastructure for the Ruhr area:
Waste-to-energy plant RZR/AGR
biggest mine dump in Europe
- At the borders of the city in Gelsenkirchen and Herne
2 big coal plants (EON 2400 MW und STEAG
1500 MW)





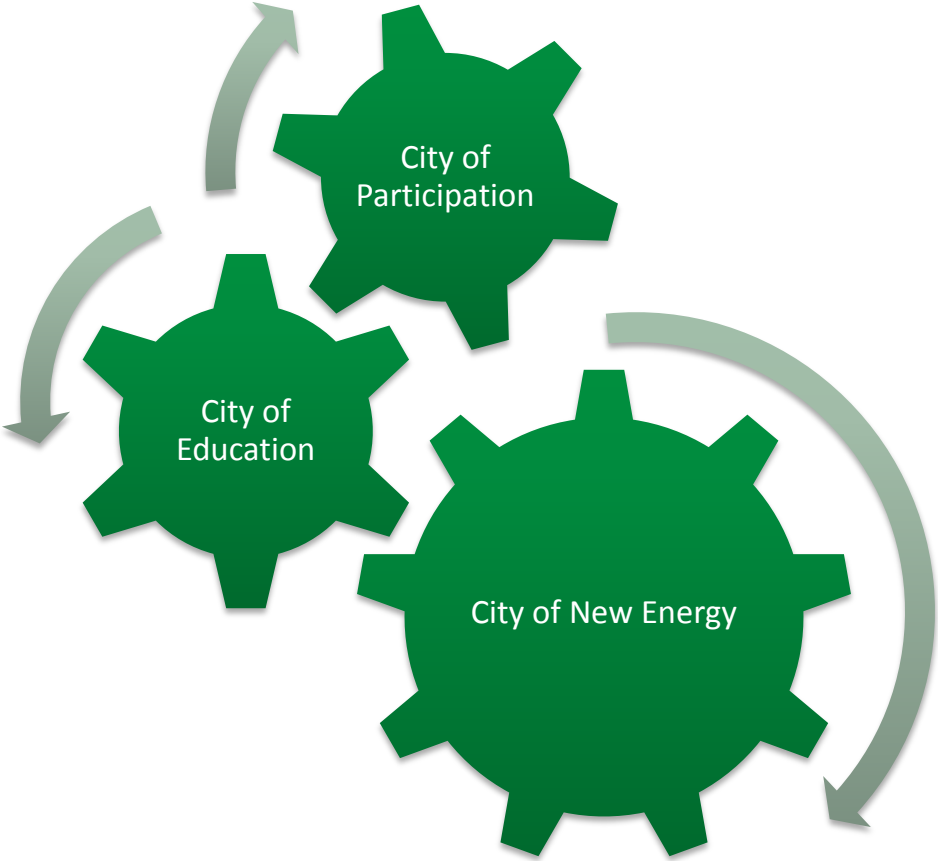
Transforming weakness into strength

- Waste-to-energy plant provides energy to Herten and is one of the biggest employers of the town: **The City as a power plant**
- Mine dump becomes hotspot for recreation and tourism: **Green City**
- Fallow lands of coal mining become development areas: **Ewald (Future technologies), Schlägel&Eisen (business – resistant to demographic changes), Westerholt (Energy technologies)**
- Town of Herten complements missing private entrepreneurship: “Konzern Herten”



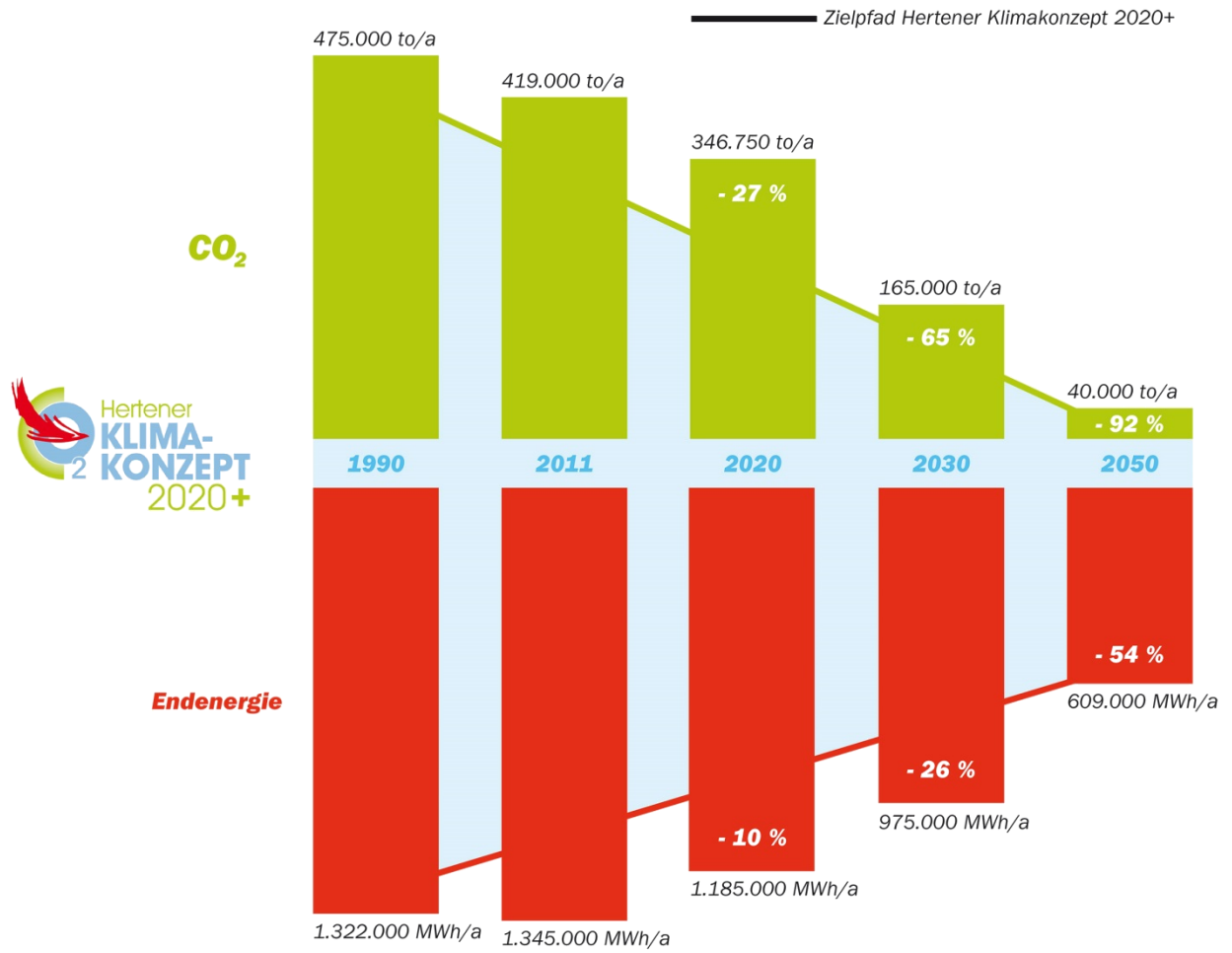


Herten 2020

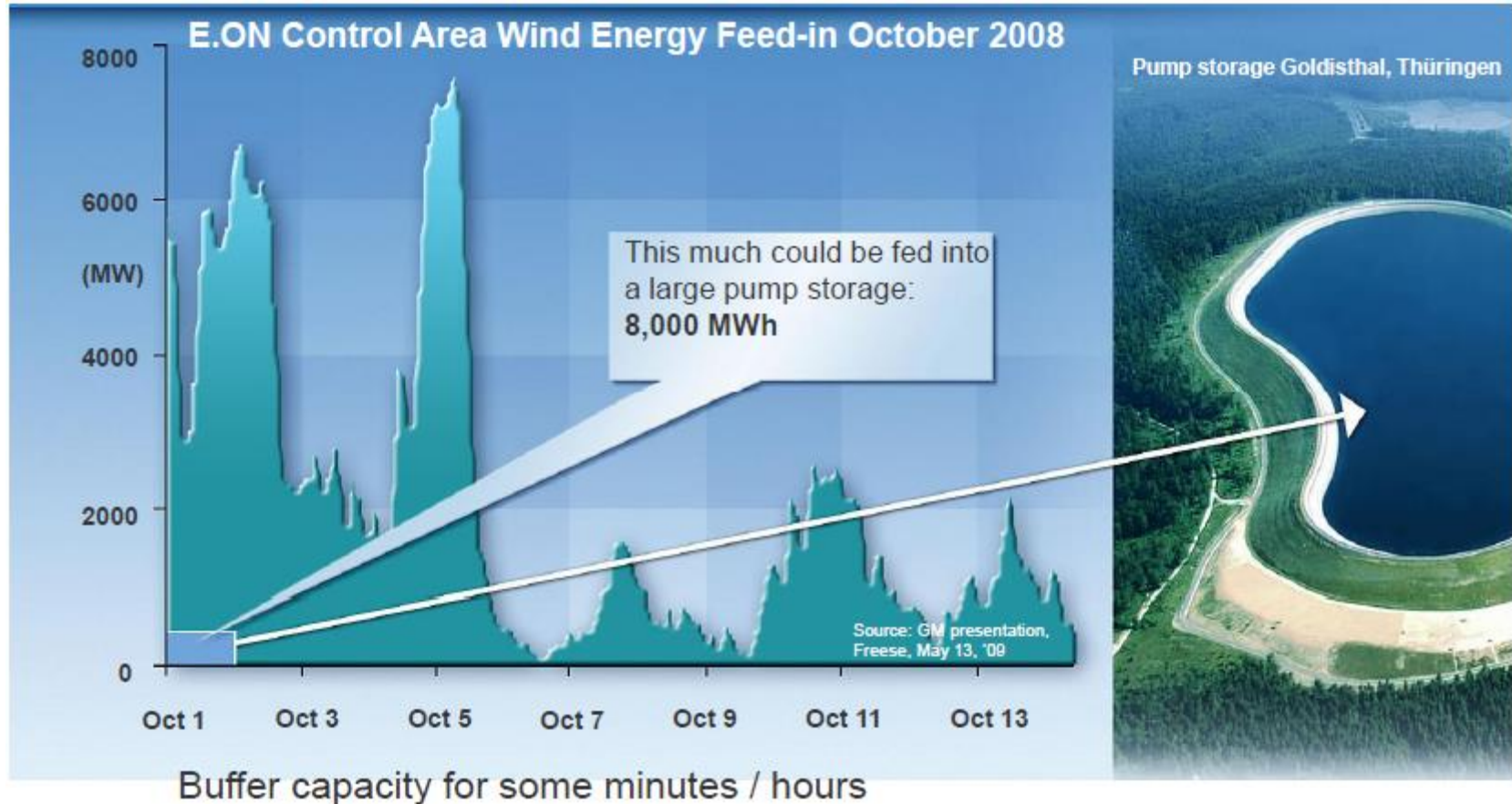




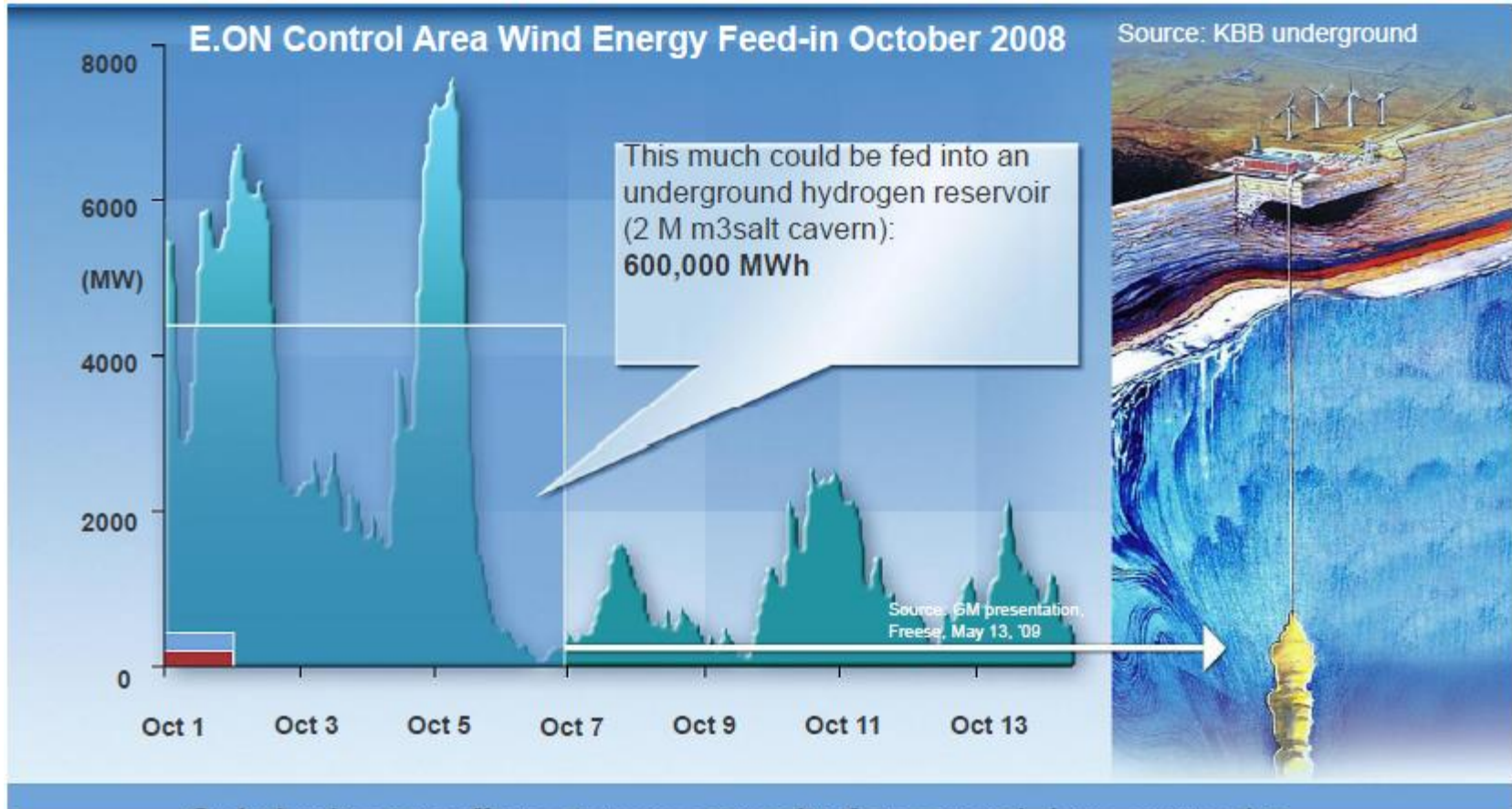
Climate concept „Herten 2020+“



Potential of Hydrogen as an Energy Storage - 1



Potential of Hydrogen as an Energy Storage - 2



Only hydrogen offers storage capacity for several days or weeks



Energy Complementary System - 1



Electrolyser 30 Nm³/h



WKA 600 kW



PEM-FC 50 kW



Kompressor 50 bar



Batterie Bank 28 kWh



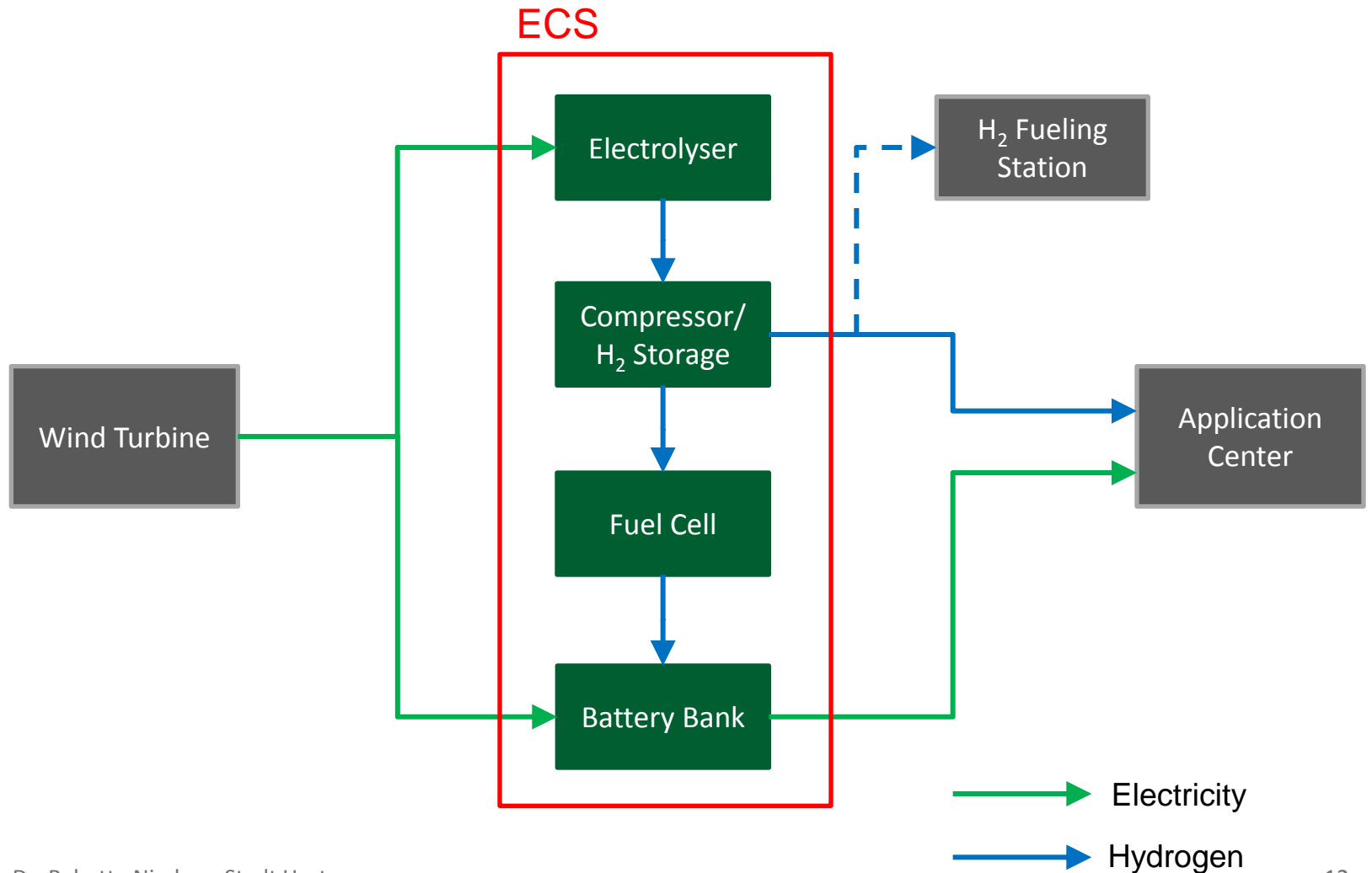


Energy Complementary System - 2

- 100 % renewable electricity supply for the “h2herten application center”
- Energy storage with electrolyser, compressor and pressure storage tank
- Electricity supply with fuel-cell and battery bank
- Additional hydrogen supply for tenants
- Power electronics allow simulation of multiple load profiles for in- and output (disconnected from application center)



Energy Complementary System - 3





Integration of Hydrogen in an Economic Environment - Local

- Example: Concept “Energiepark Ewald”
 - Energy Complementary System as a key feature for storage and supply of hydrogen and electricity
 - Additional hydrogen supply for surrounding companies e.g. fork-lifts with fuel-cell drive at logistic companies
 - Additional hydrogen production - pyrolysis of biomass at “Blue Tower Herten”
 - Additional renewable energy supply e.g. photovoltaic cells on buildings
 - “Energy Network” for companies to increase efficiency





Integration of Hydrogen in an Economic Environment - Regional

- “h2-netzwerk-ruhr”
- Largest filling Station of hydrogen in Europe (Marl)
- Connection of hydrogen production and consumption with pipelines (e.g. 240 km in the Rhein-Ruhr area with filling station in Marl)
- Regional mobility projects – hydrogen for buses with fueling station in Herten
- Cooperation with regional research facilities





Future Prospects

- International cooperation with research facilities and companies
- Realization of the concept “Energiepark Ewald”
- Medium to large scale energy storages with knowledge from the “Energy Complementary System”
- Establishing more companies of the hydrogen and innovative energy business in Herten.
- Part of the “Klima Expo 2022”





THANK YOU!

B.NIEDER@HERTEN.DE

