

Electrolysis calculator

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Dimensioning

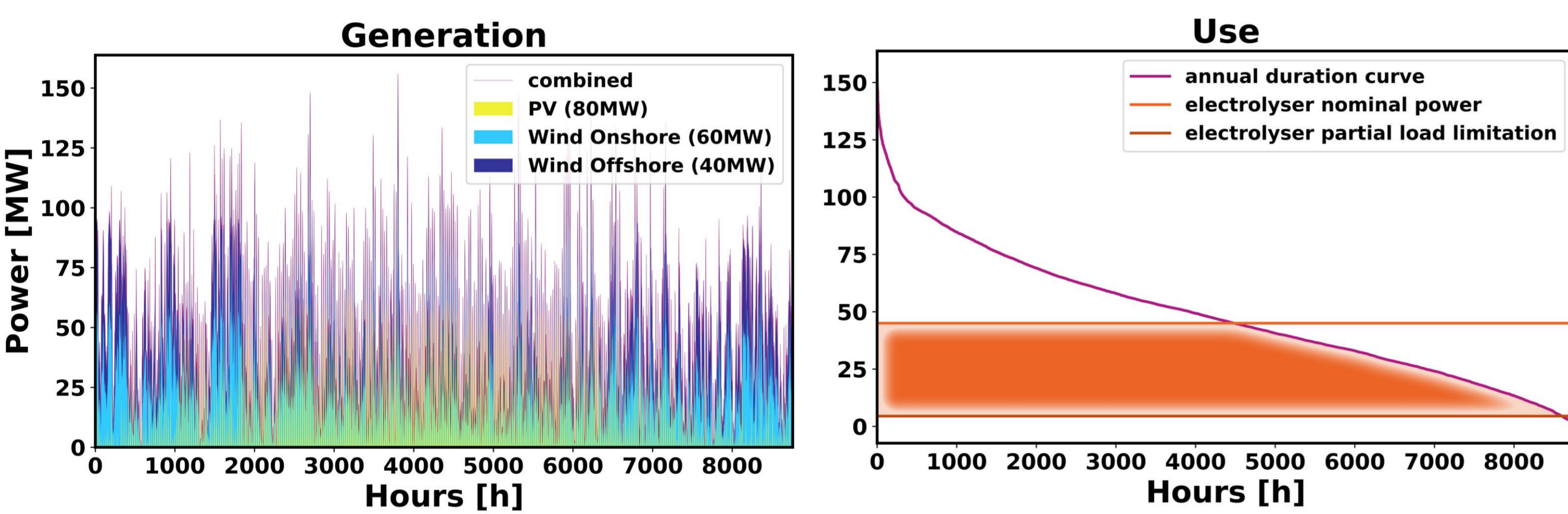
Intuitive setting of the renewable generation capacity from photovoltaic(PV) and/or wind energy (onshore/offshore) as well as the electrical nominal capacity of an electrolyser by means of a slider.

Dimensioning target in two directions:

- Generator sizing based on target electrolyser output.
- Electrolyser design based on a renewable generation portfolio

System design

A combined sum profile in hourly resolution determines the available electrical power for the operation of the electrolyser. The operating parameters of the electrolyser are determined via the annual duration curve of the generation power.



Two donut diagrams visualise the selected system dimensioning in real time and provide information on:

- Total generated energy of the renewable portfolio.
- Proportions of renewable generators in the total generation
- Proportion of energy used by the electrolyser
- Proportion of energy not used by the electrolyser due to:
 - Partial load limitation
 - Maximum load limitation

Case examples for hydrogen applications

Selected use cases for the use of the generated hydrogen convey to the user the orders of magnitude for alternative supply in different sectors for 1 year each.

Hydrogen in the transport sector:

- Number of operable fuel cell passenger cars
- Number of operable fuel cell buses

Hydrogen in industry:

- Amount of crude steel that can be produced in tonnes

Hydrogen in the building sector:

- Number of heatable residential buildings using H₂ condensing boilers
- Number of heatable residential buildings using waste heat from electrolysis (also possible in combination with other uses)

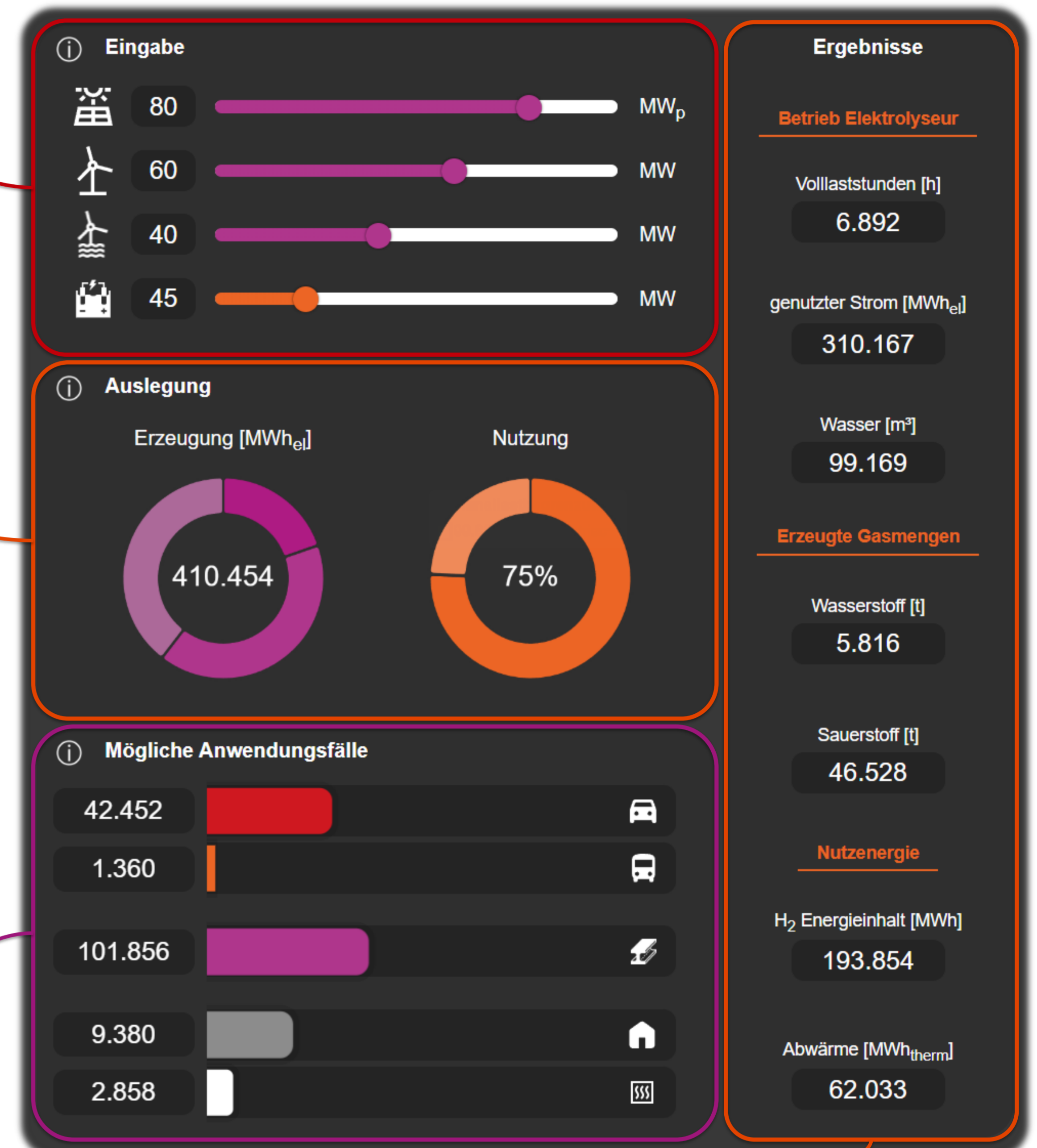
Simulation results

Gives an overview of the most important numerical calculation results according to the selected design regarding:

- Electrolysis operation (full load hours and resource demand).
- Electrolysis products (material and energy)

User Interface

Interactive and responsive user interface. Move the mouse over elements to get more information. Optimized for desktop and mobile use.



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Assumptions and basis of calculation

Constants			
Hydrogen	Lower heating value (LVH)	33,33 kWh/kg	
	Higher heating value (HHV)	39,41 kWh/kg	
	Density	998 kg/m ³	
Generation			
Generation profile	Wind and PV	Renewable Ninja	[4]
Wind	Offshore location (North Sea, Norderney)	4058 Full-load hours	[2]
	Onshore location (Oldenburg)	2789 Full-load hours	[2]
PV	Germany, Cologne	986 Full-load hours	[1]
Elektrolyser	Efficiency	electrical: 62,5 % thermal: 20 %	[5, 6]
	Partial load limitation	10 %	
	Oxygen factor (gravimetric)	1:8 (H ₂ :O ₂)	
	Water demand per kg H ₂	17 kg H ₂ O	[7]
Supply			
Car	Average mileage	13700 km/a	[8]
	Consumption	1,0 kg H ₂ /100 km	[9]
Bus	Average mileage	45000 km/a	[10]
	Consumption	9,5 kg H ₂ /100 km	[11]
Residential building*	Average living space	140 m ²	[12]
	Specific heat demand	155 kWh/m ² a	[3, 13]
	Efficiency (LHV) H ₂ -Condensing Boiler	~105 %	[14]
Crude steel production	Specific hydrogen demand	57,1 kg H ₂ /t crude steel	[15]

*: averaged building based on the building stock of Germany

Further information on methodology, applied literature and definitions can be found here.

