

An energy mix for net-zero emissions worldwide

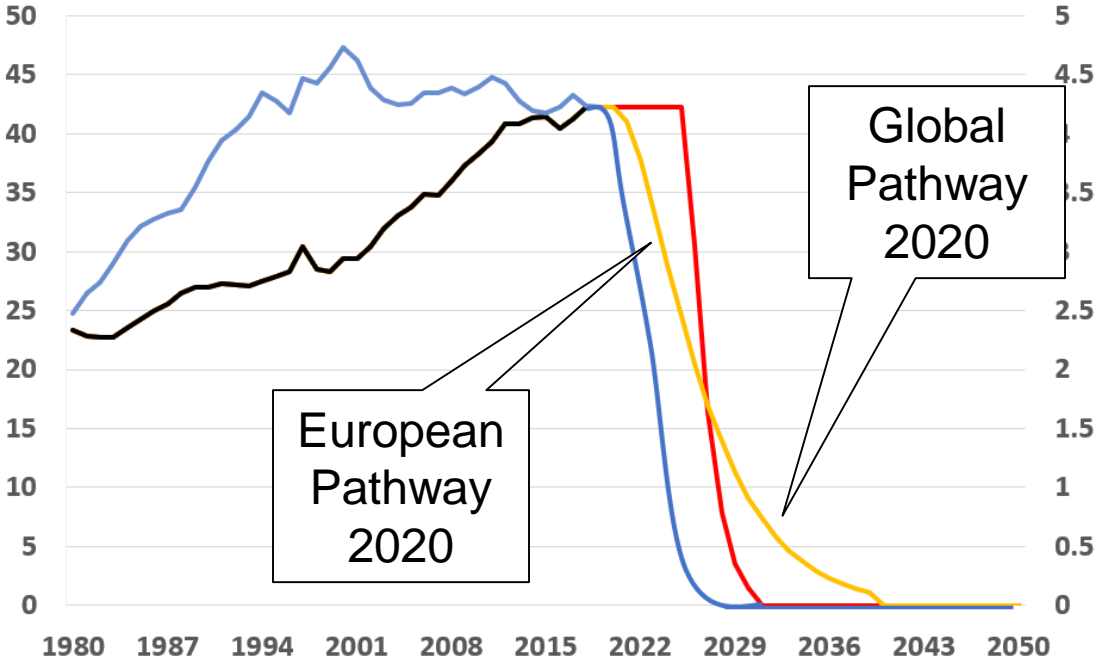
Thure Traber
CRO Energy Watch Group

Workshop on Paris Agreement Compatible
Scenarios for Energy Infrastructure
Brussels, 09 October 2019

Thure Traber
Chief Research Officer
Energy Watch Group

Monumental emission reductions facilitate Paris' 1.5° target

CO2 Emissions in Gigatons Global/Europe (blue right scale)



The world needs to aim at zero emission by 2030

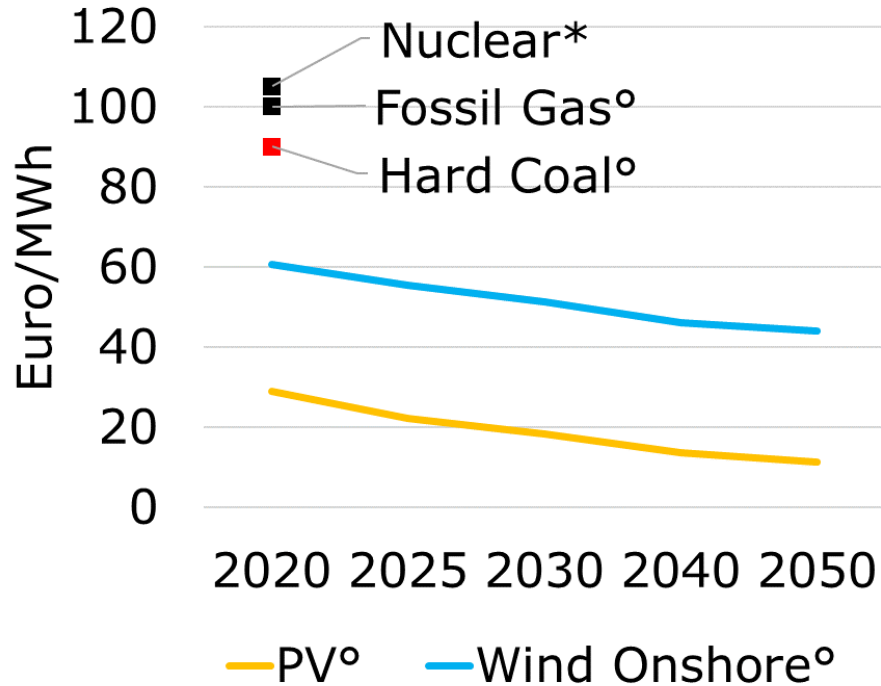
Europe has to deliver well before

Source. Global Carbon Project, own calculation.

Thure Traber

Chief Research Officer
Energy Watch Group

Cost decline enforces the case for renewables



Cost reductions make Wind 30% and PV 60% cheaper already today

Full costs of renewable electricity soon cheaper than operating costs of fossils

Thure Traber

Chief Research Officer
Energy Watch Group

Source: ETIP (2019), * Hinkley Point C, °Fraunhofer ISE (2018).

Hourly Simulation of Global Energy System Across All Sectors

100% Renewables are cheaper than current energy system



EWG/LUT 100% Renewable Energy Study: Method/Results

- Global all energy Sectors (incl. Water)
- Pathway 100+ technologies 8 supporting years x 8760 hrs
- RES-potentials in 50km²- resolution @equator
- 148 countrywide aggregates and 7 continental regions
- Final energy demand growth as historically experienced
- Cost minimisation of 100% renewable energies facilitating zero emissions
- Self-reliant countries fuelling all sectors at costs below today's
- Electricity main carrier for efficient transition

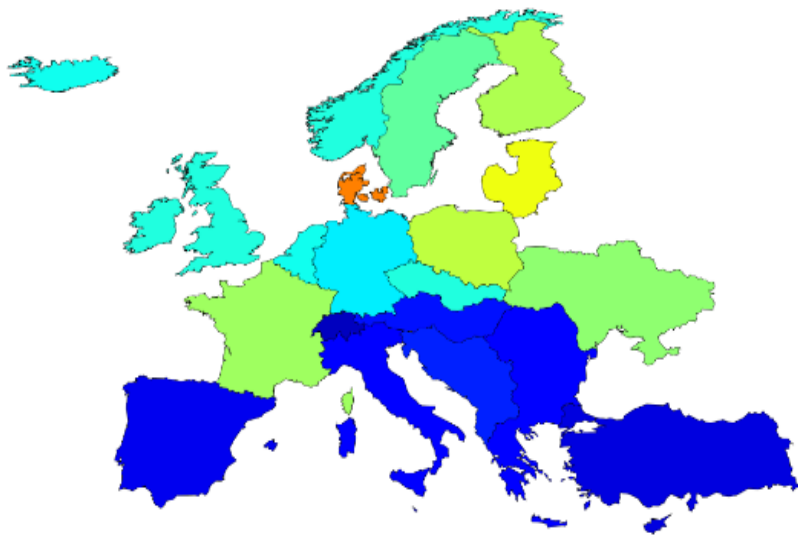
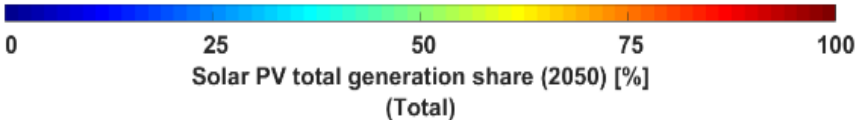
Thure Traber

Chief Research Officer
Energy Watch Group

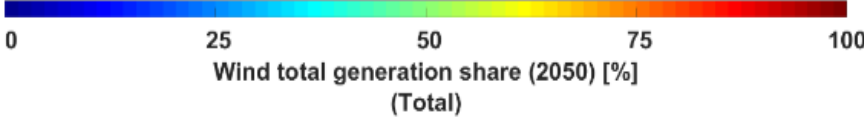
100% Renewables all Sectors: PV dominates Solar South, Breezy North-West



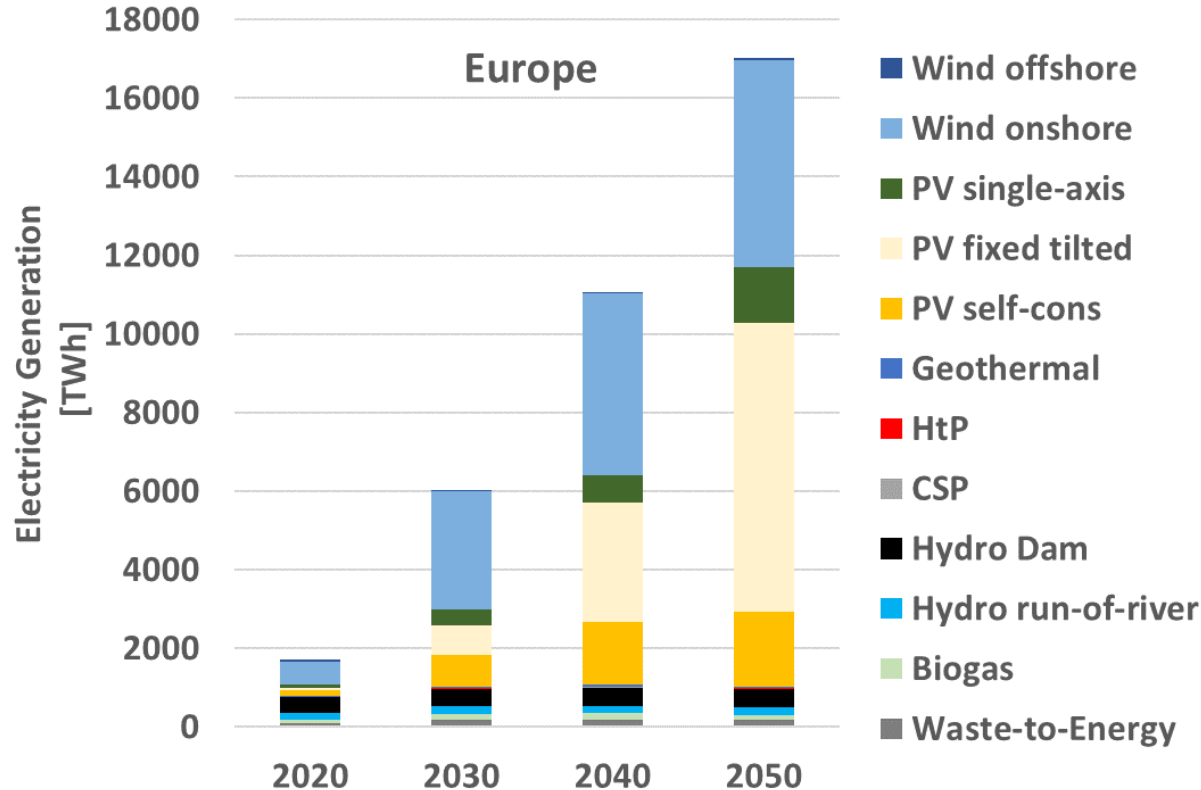
average for regions: 62.2%



average for regions: 32.0%



Renewables have the potential for 100%



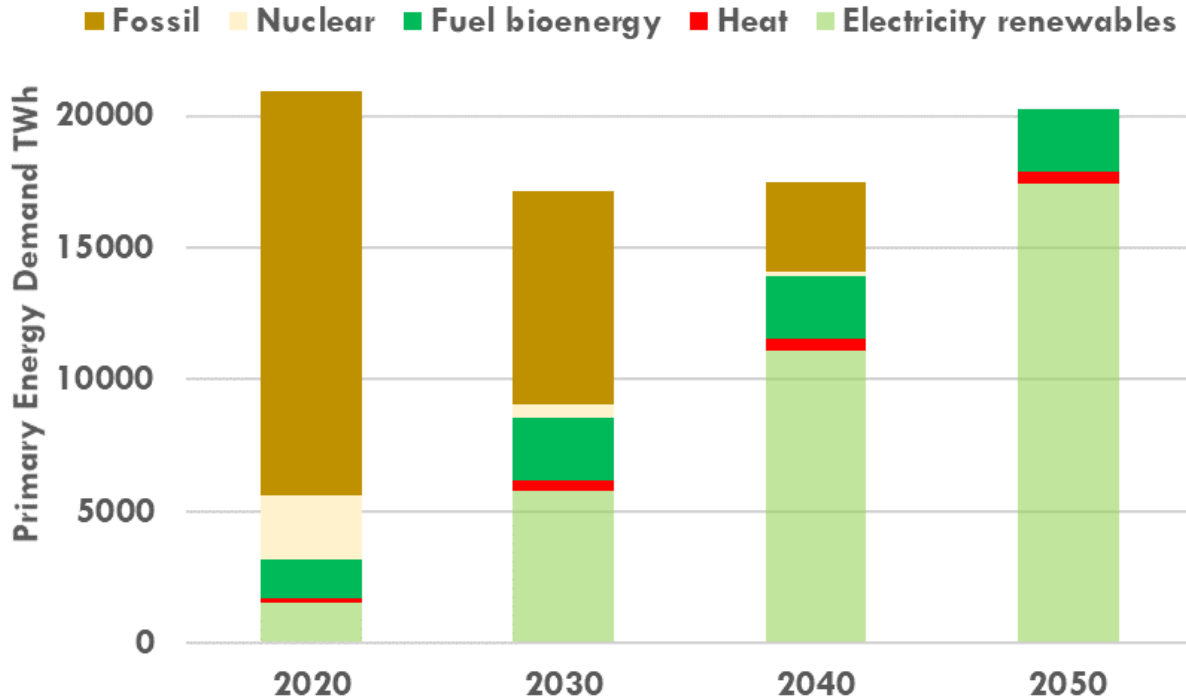
- Electricity generation quadruples
- PV workhorse of transition: 26% by 2030 and 54% of renewable electricity by 2050
- Self-consumption PV Important particular through 2040

Thure Traber

Chief Research Officer
Energy Watch Group

Phase-out of fossil and nuclear energies

Europe



Fossil and nuclear fuels vs 2015:

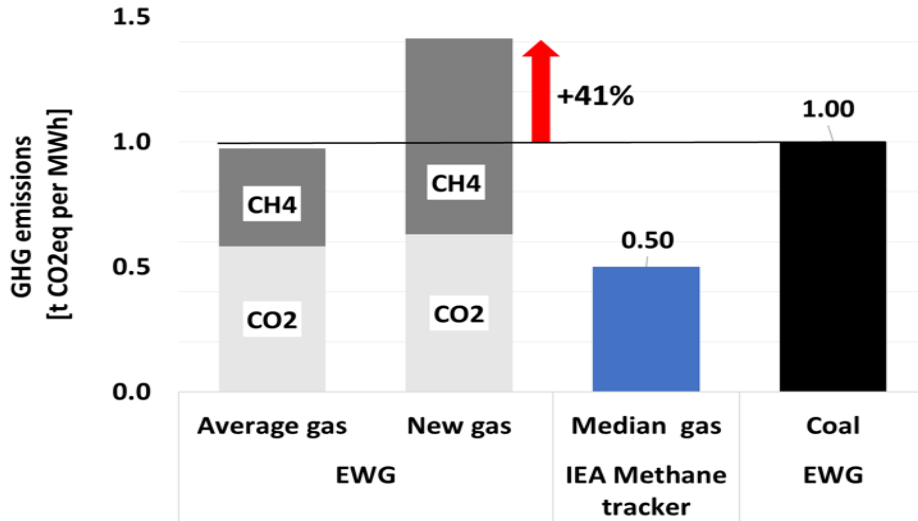
- 11% by 2020,
- 83% by 2030
- 94% by 2040

Thure Traber

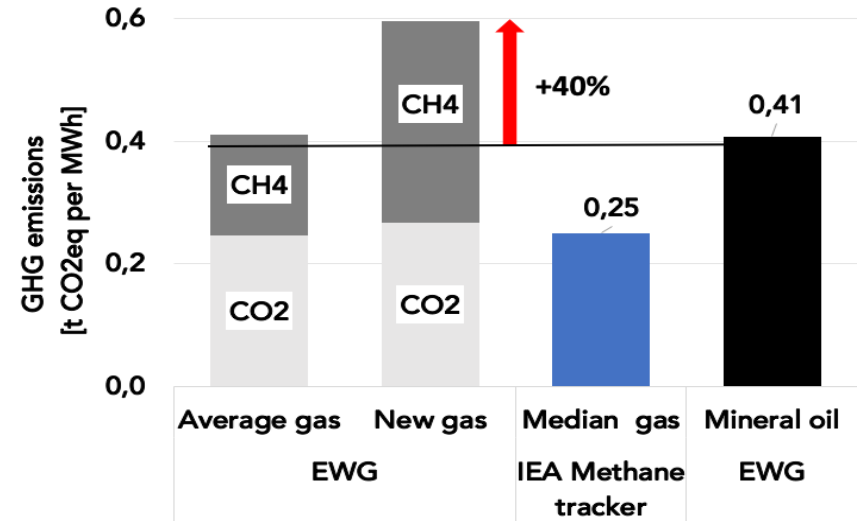
Chief Research Officer
Energy Watch Group

Fossil gas provides no Bridge due to alarming Methane Emissions

Electricity



Heat



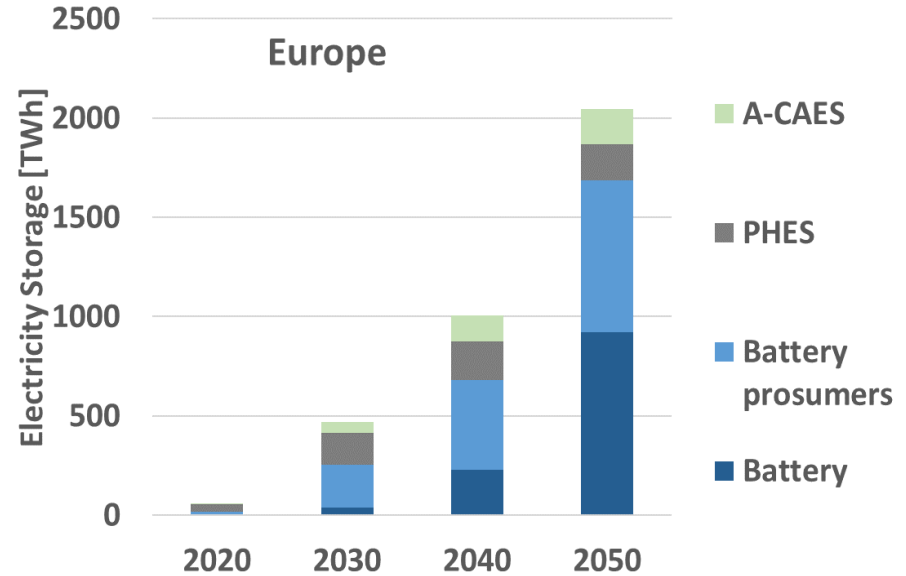
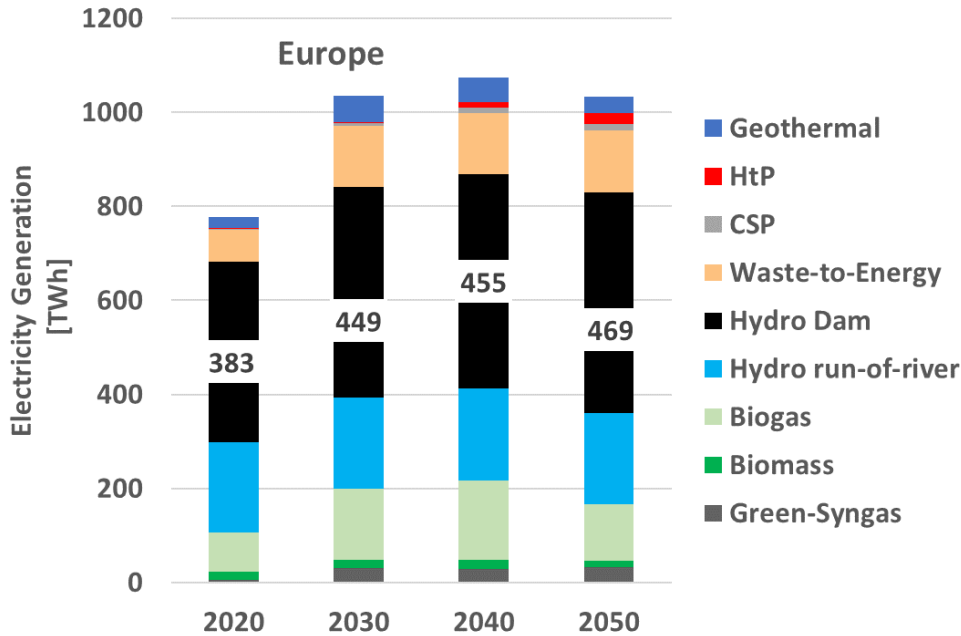
New evidence of methane emissions + IEA's emissions data
 About **40% increased climate effect** when switching fossil fuels!

Source: EWG Natural Gas Study (2019), downloadable.

Thure Traber

Chief Research Officer
 Energy Watch Group

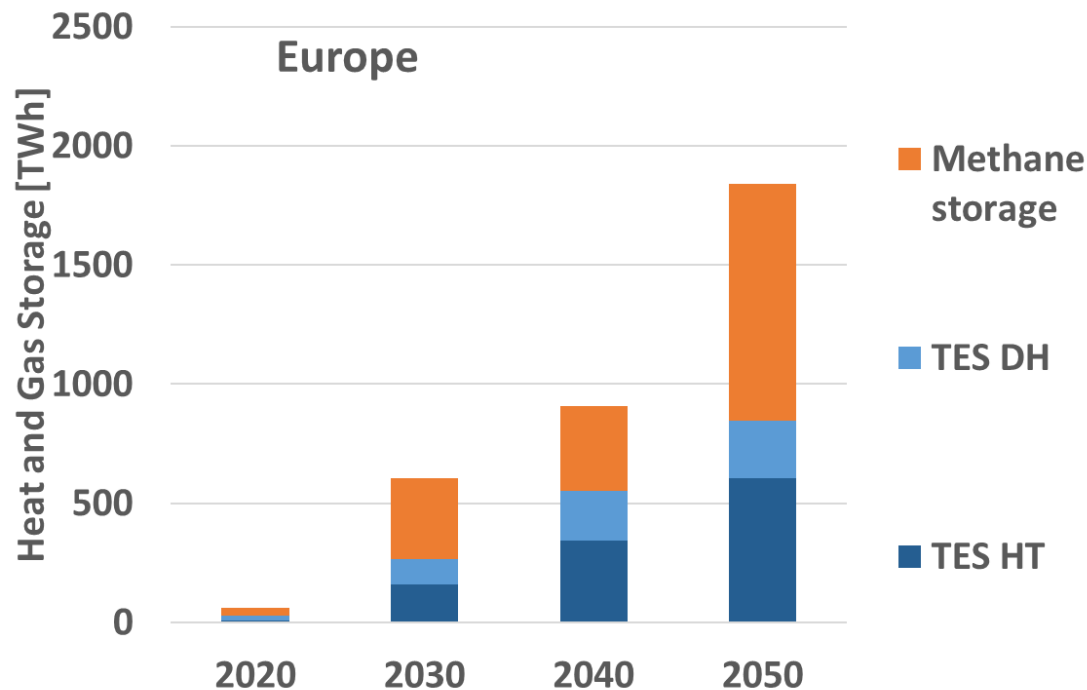
Dispatchable generation: Biogas & Syngas + Storage



By 2030 storage at a level of 12% of today's consumption

Thure Traber
 Chief Research Officer
 Energy Watch Group

Heat and Methane storage comparable to Batteries and Pumped Hydro



Thermal energy storage cost-effective and promising

- Hot stones
 - Liquid metal
- } 2nd life PP

For heating

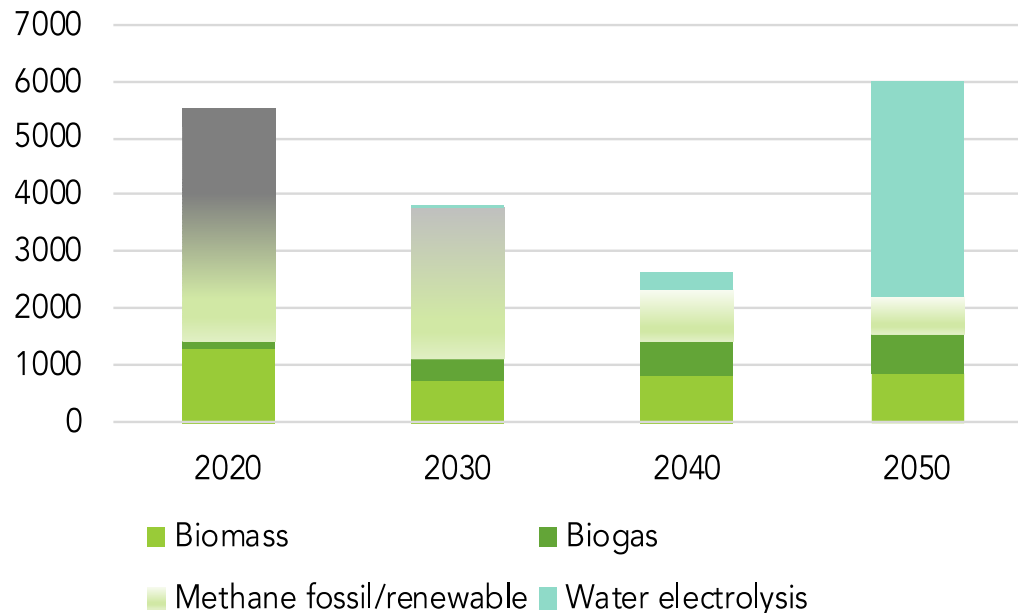
- Molten salt
- Ice storage

Thure Traber

Chief Research Officer
Energy Watch Group

Storable Fuels: Natural gas will quickly lose - infrastructure utilisation set to go down

Europe

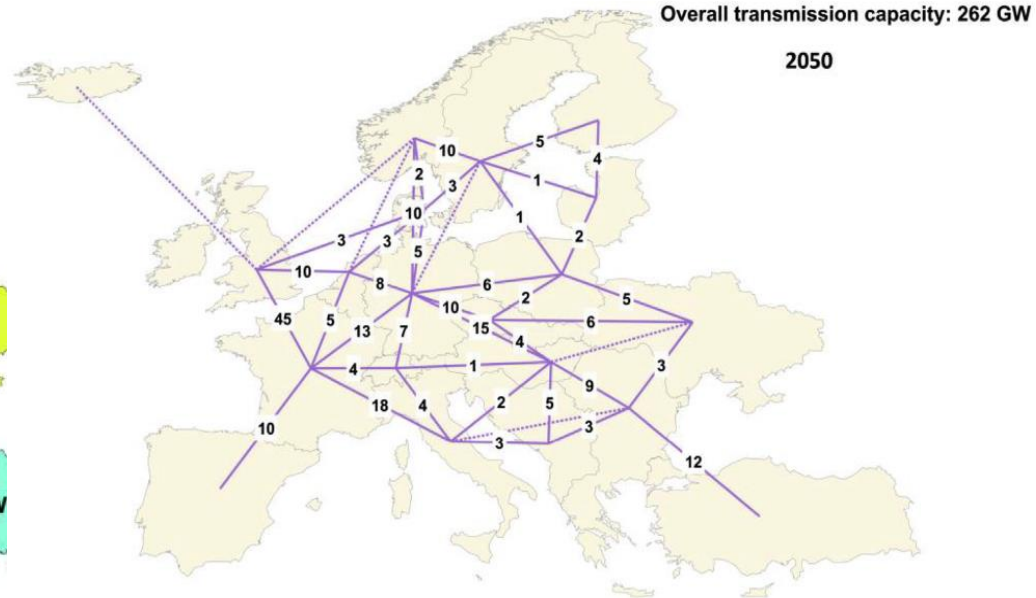
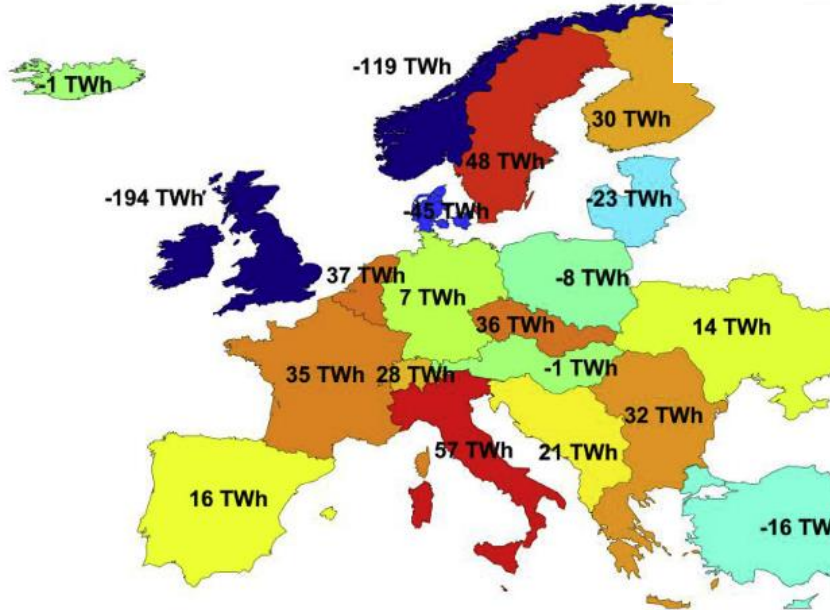


- Fast reduction of gas based energy through 2040
- H2-Electrolysis for completion towards 100%
- Biomass+Biogas comparably flat

Thure Traber

Chief Research Officer
Energy Watch Group

Prospectively efficient grid development for 100% Renewables: Electricity only Scenario



Thure Traber

Source: Child et al. (2019).

Chief Research Officer
Energy Watch Group

A fast transition needs decentral action

“grids will reduce [...] curtailment risks for renewable projects [...]. However, grid improvements usually have a much longer lead time than renewable electricity projects”¹

1) Swiss Re and Bloomberg New Energy Finance

Ongoing EWG study explores fixed Feed-in-Tariff for reliable local renewable energy provision

- ✓ Low Capital Costs
- ✓ Local value-added and taxes
- ✓ Social acceptance
- ✓ Security of supply and
- ✓ Robustness against fossil price chocks
- ✓ Private green investments

Thure Traber

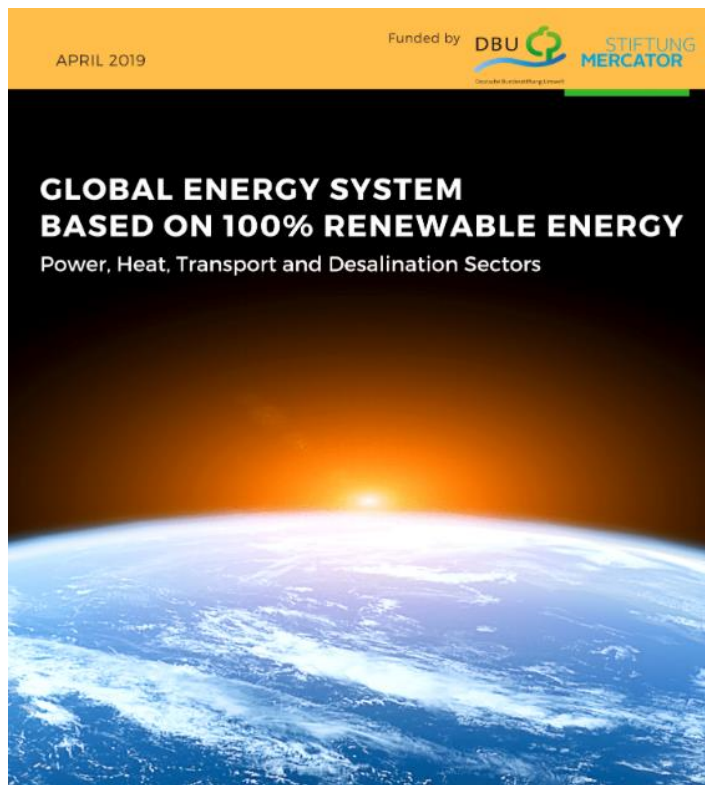
Chief Research Officer
Energy Watch Group

Status and Perspective

- Costs ca. 2016:
Learning faster than expected,
Particularly PV, Batteries, H2, BEVs
- Wind offshore development
- 2030 zero emission-perspective necessary!

Thure Traber

Chief Research Officer
Energy Watch Group



APRIL 2019

Funded by  

GLOBAL ENERGY SYSTEM BASED ON 100% RENEWABLE ENERGY

Power, Heat, Transport and Desalination Sectors

Study by



 ENERGYWATCHGROUP

PO Box 20
FI-00031 Lappeenranta
Finland
Tel.: +358 408 77854
Email: merkitt@lut.fi

Albrechtstr. 22
10117 Berlin
Germany
Tel.: +49 30 609 896 910
Email: office@energywatchgroup.org

ENERGYWATCHGROUP

The study was co-funded by:



Deutsche
Bundesstiftung Umwelt

STIFTUNG
MERCATOR

For more information please visit:

www.energywatchgroup.org

Thure Traber

Chief Research Officer
Energy Watch Group