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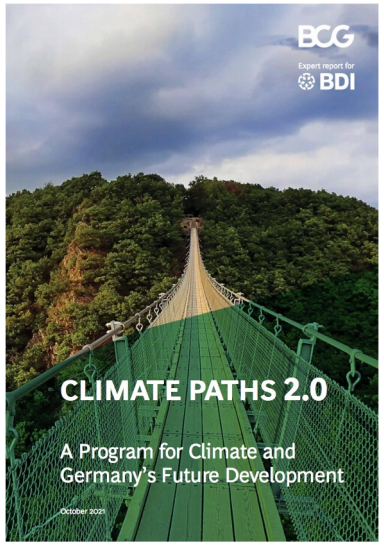
Update on the Comparative Analysis of Long-Term Scenarios discussing Decarbonization Strategies in Japan and Germany in Times of Change

Overview of selected scenarios

Published: April 2021
CN until: 2045

Published: October 2021
CN until: 2045



Published: October 2021
CN until: 2045

Published: December 2020
CN until: 2050

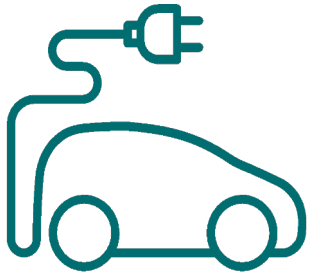
Germany: Selected key assumptions

GHG emission reductions

2030: -65% (UBA: -70%)

2045: -100%

Battery-electric vehicles

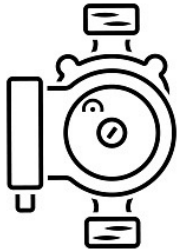


2030: 9-14 mill

2045: 32-39 mill

(UBA 2050: 18 mill)

Heat pumps



2030: 4-6 mill

2045: 9-15 mill (UBA 2050: 16 mil)

Renovation rate of building stock

2030: 1,6-1,9 (UBA: 2,5)

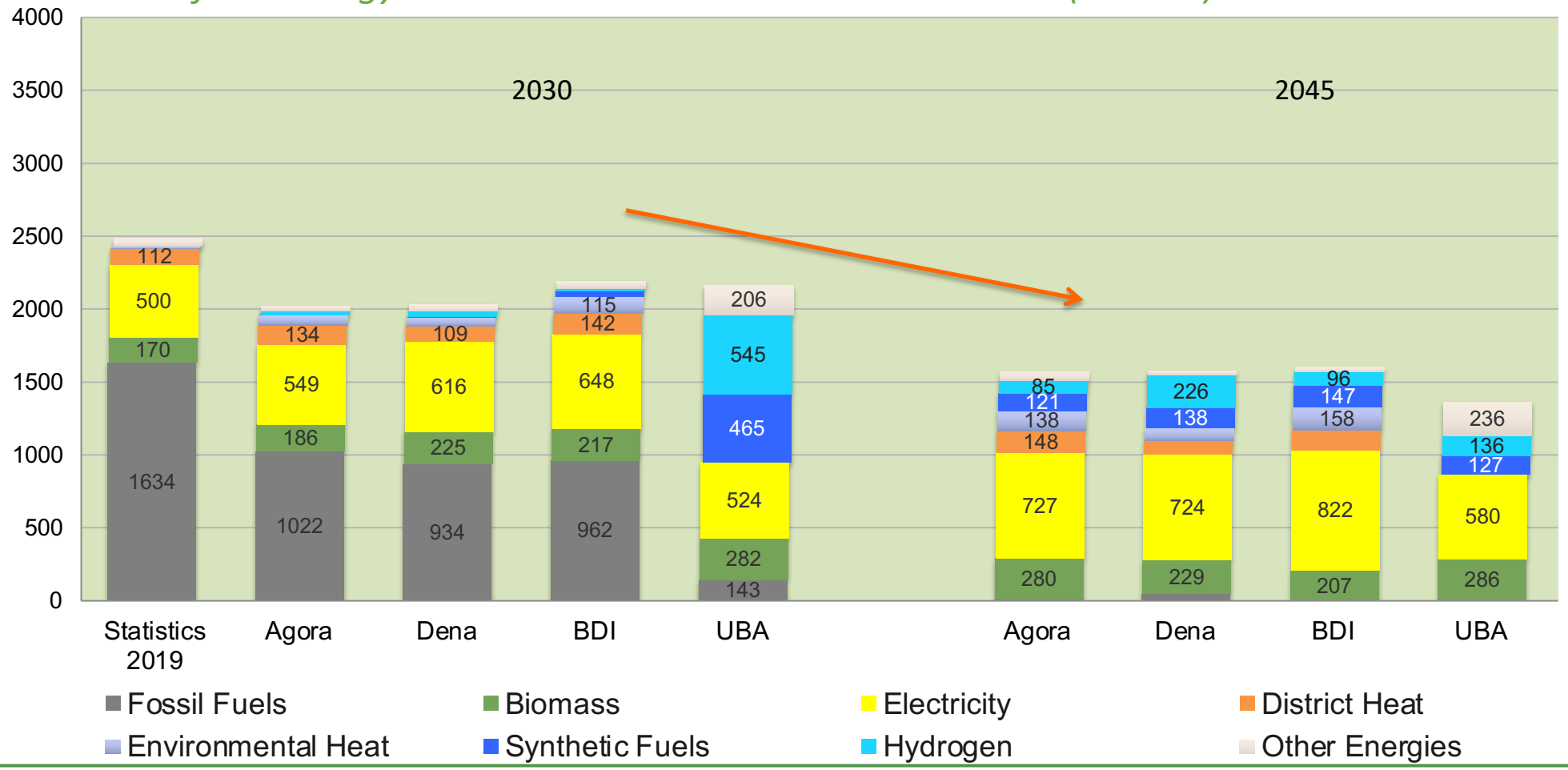
2045: 1,7-2,1

(UBA: 3,3 (2040) + 3,9 (2050)

Results (1): Energy demand

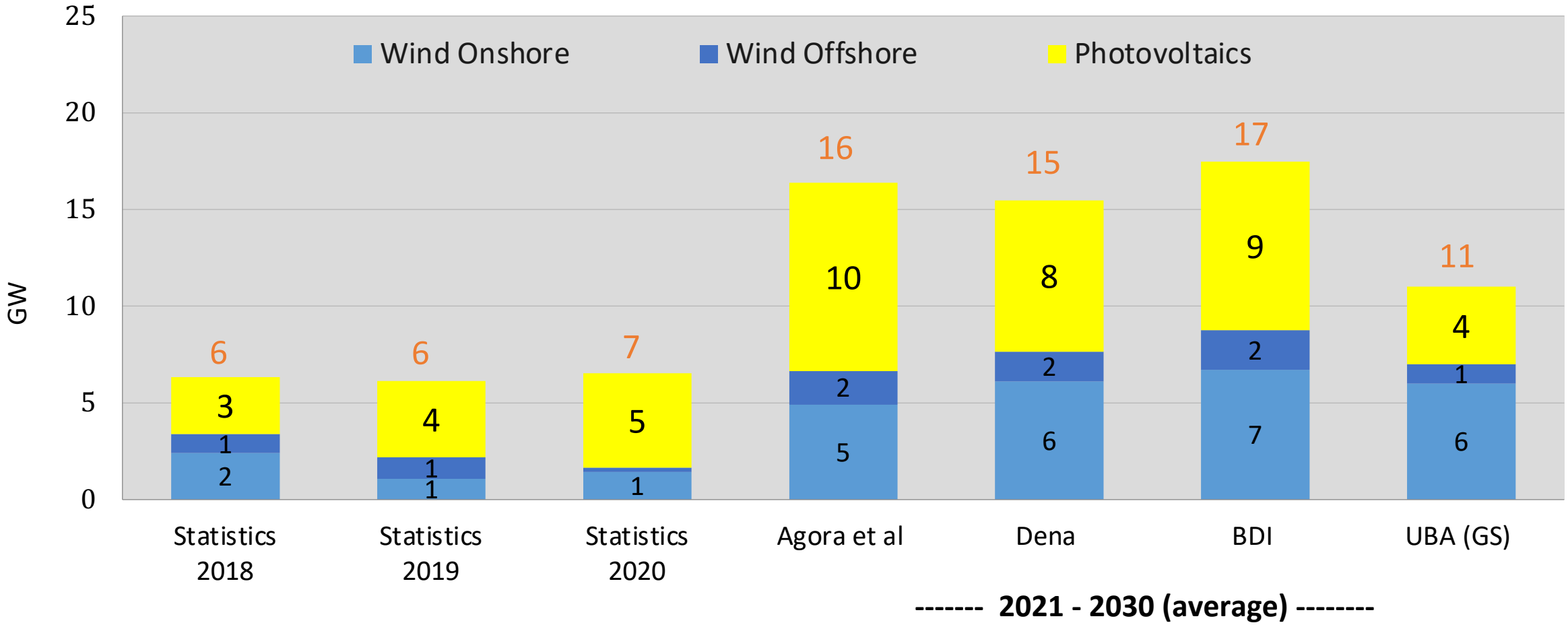
Final energy demand reduced to approximately 60% of 2019's demand by 2050

Total final energy demand and mix in German scenarios (in TWh)



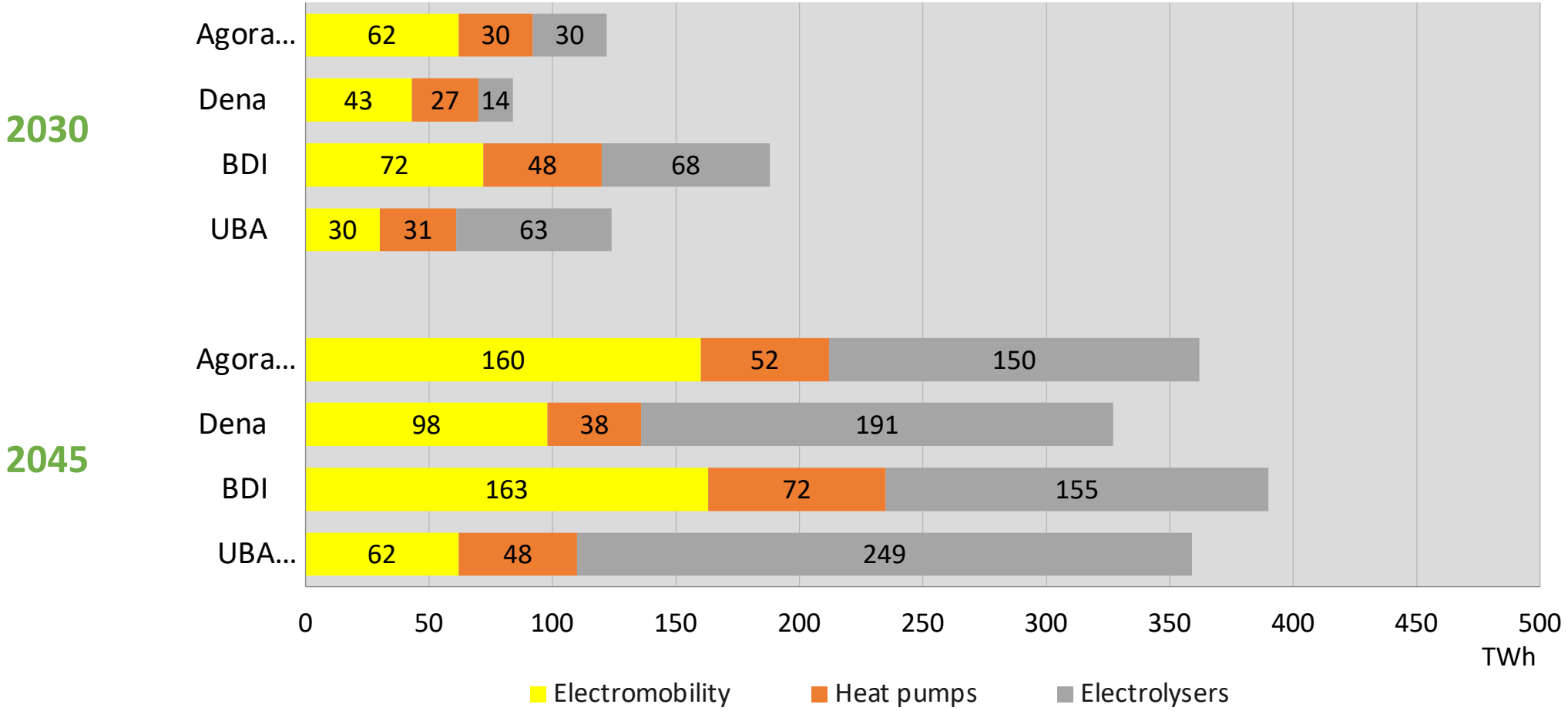
Results (2): Energy mix – Share of renewable energies

Share for electricity generation almost 100% and for primary energy demand 93-97% in **2045**



Results (3): Energy mix – Electrification

Share of electricity contributing to total final energy demand increases to 41-51% until 2045 (as compared to 20% in 2019)



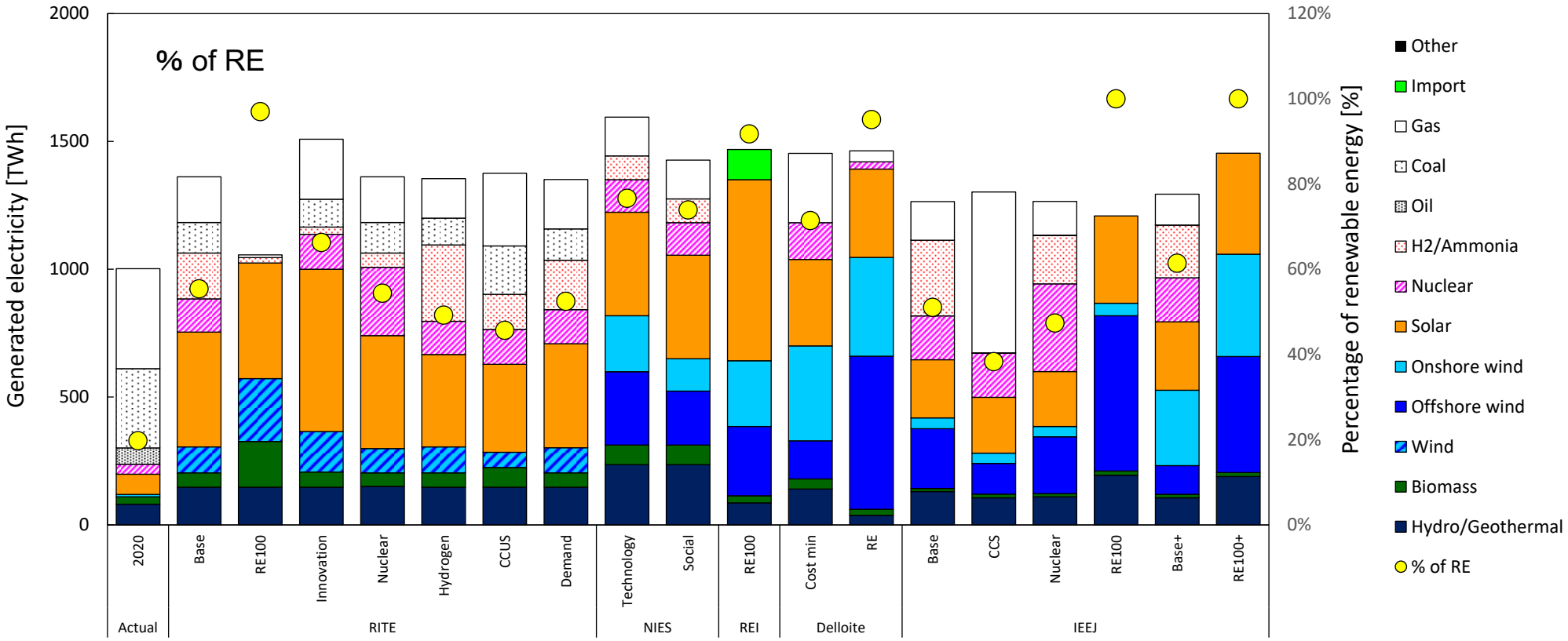
Germany: Shortcomings in the scenarios

- **„Energy efficiency first“:** only partially included, existing potentials not fully exploited (e.g. in the transportation and building sector)
- Combination with **material efficiency/circular economy strategies** only partially pursued in the UBA Study
- **Rebound and lifestyle effects, sufficiency policies** only partially included (in UBA study): e.g. values; behaviour, innovation/exnovation, change management
- **Distributional effects for households, companies and regions not reflected** („just transition“)
- **Dependance on energy imports** not (thoroughly) discussed
- **Hydrogen:** Infrastructure and possible target conflicts concerning domestic and imported hydrogen (e.g. perspectives of exporting countries/global competition)
- **Ambition level and target year to achieve the 1,5 degree target** not discussed

Result (1) Energy mix

The share of RE in the energy mix is approximately 40% - 100%*.
Many scenarios consider other low emission technologies (Nuclear, Gas + CCS, Ammonia) that are utilized to cover the total electricity demand.

Generated electricity in 2050 [TWh]



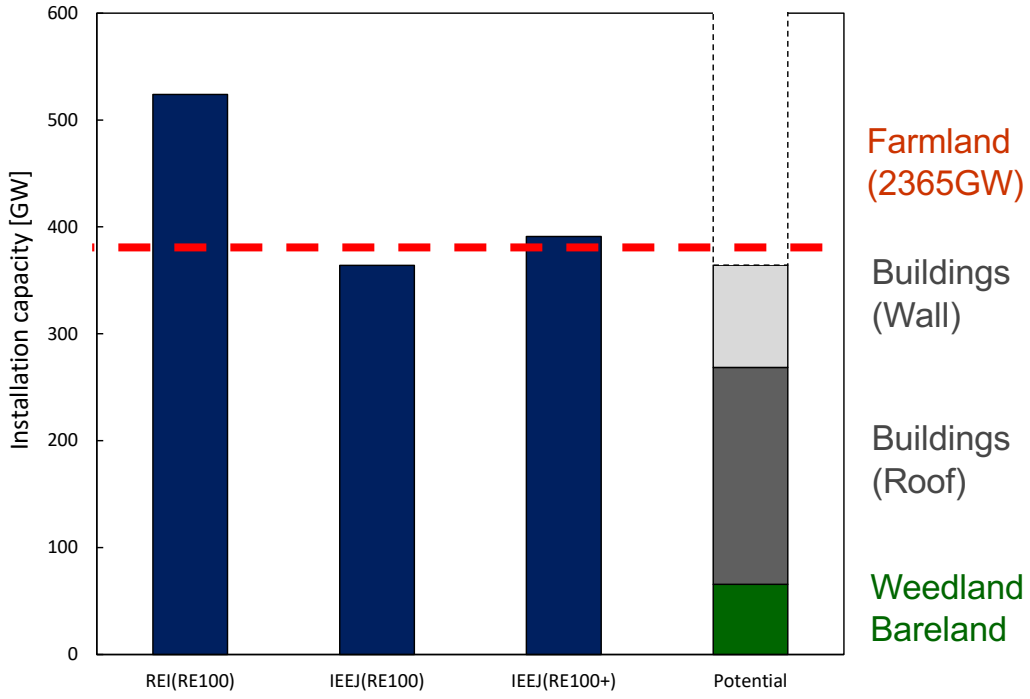
Result (2) Renewable energy capacity in RE 100

Although some scenarios show a RE100-scenario like the German scenarios, PV system or wind turbines would have to be installed in restricted areas such as farmland or forest.

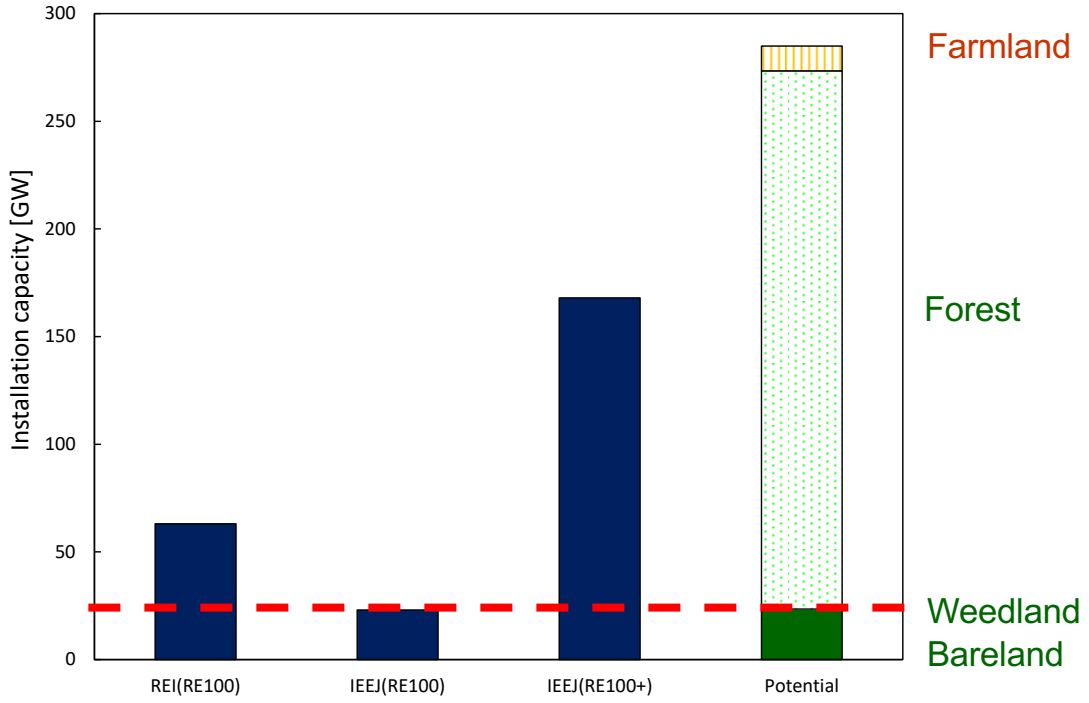
-> Local environment or social acceptance must be considered carefully.

Installed capacity in 2050 in RE100 scenarios[GW]

(A) PV system



(B) Onshore wind



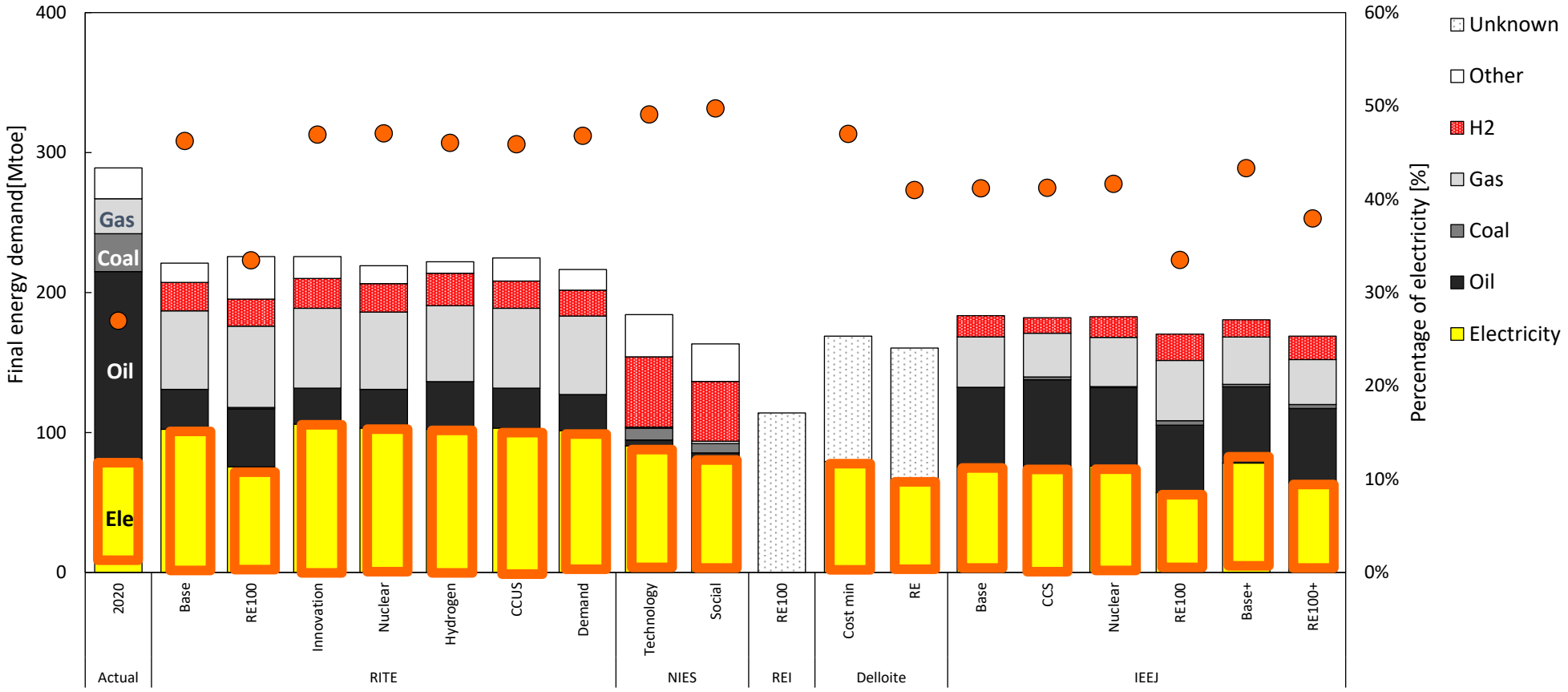
* RITE, NIES, Deloitte does not show installed capacity in 2050. Referring to generated electricity, the capacity of PV system in these scenario assumed to be similar to RE100 scenario in IEEJ. As for on-shore wind, the capacity assumed to be similar to REI scenario.

* Each scenario generally shows only installed capacity and not necessary specify the area where RE is installed.

Result (3) Final energy demand

Many scenarios show that the final energy demand is reduced to 2/3 compared to 2020.
The percentage of electricity will also increase up to 40 – 50%.

Final energy demand [Mtoe]



Comparative summary of the scenarios

Japan

- Reduction of primary energy demand by **33%** until 2050
- Share of RE in generated electrictiy **40-100%** until 2050
- Energy mix including nuclear power
- Residual emissions to be tackled by the use of **DAC + CCS**

Germany

- Reduction of primary energy demand by **50%** until 2045
- Share RE in electricity generation **100% (2045)**
- **Phasing out** of nuclear and coal
- Use of natural sinks, BEEC and DACCS for the remaining 5% of (residual) emissions

The **War in the Ukraine** put into question the supply with natural gas as bridging technology.