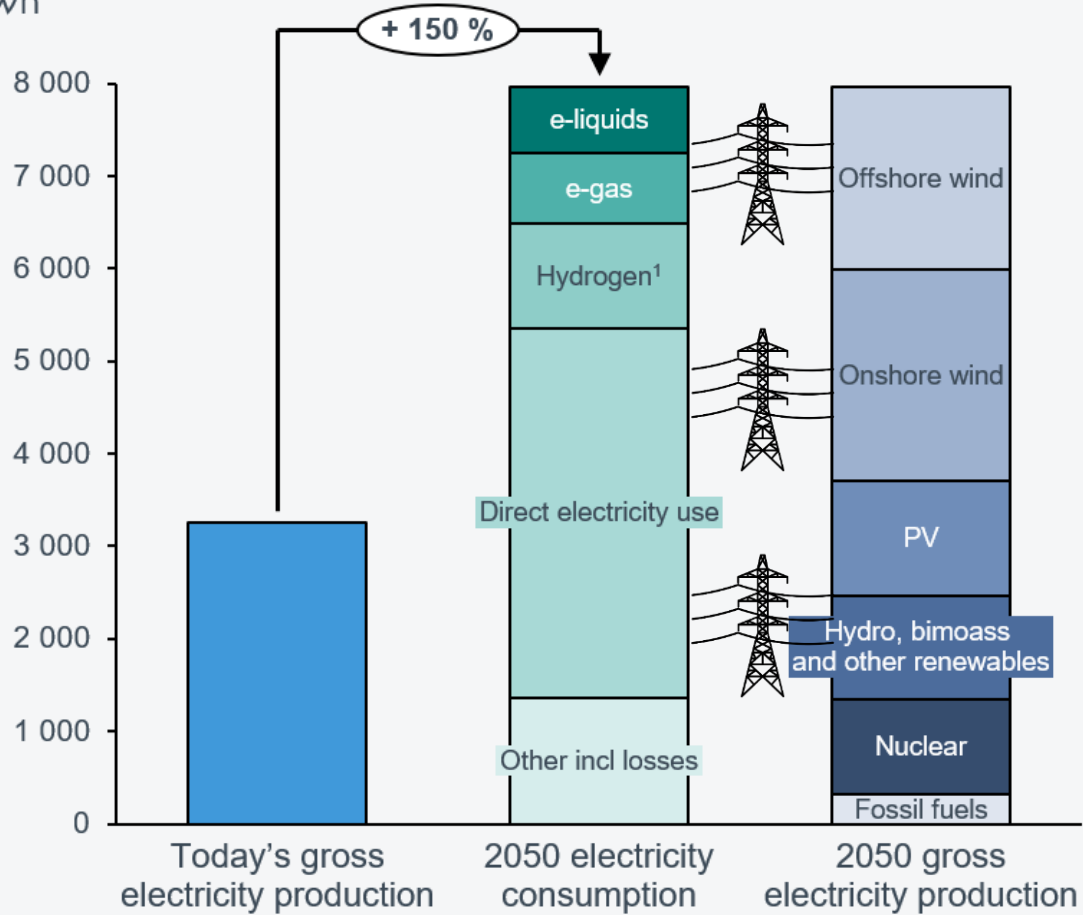


European renewable hydrogen from offshore wind

Potentials and barriers

Hydrogen will be used in the sectors that are hardest to decarbonise

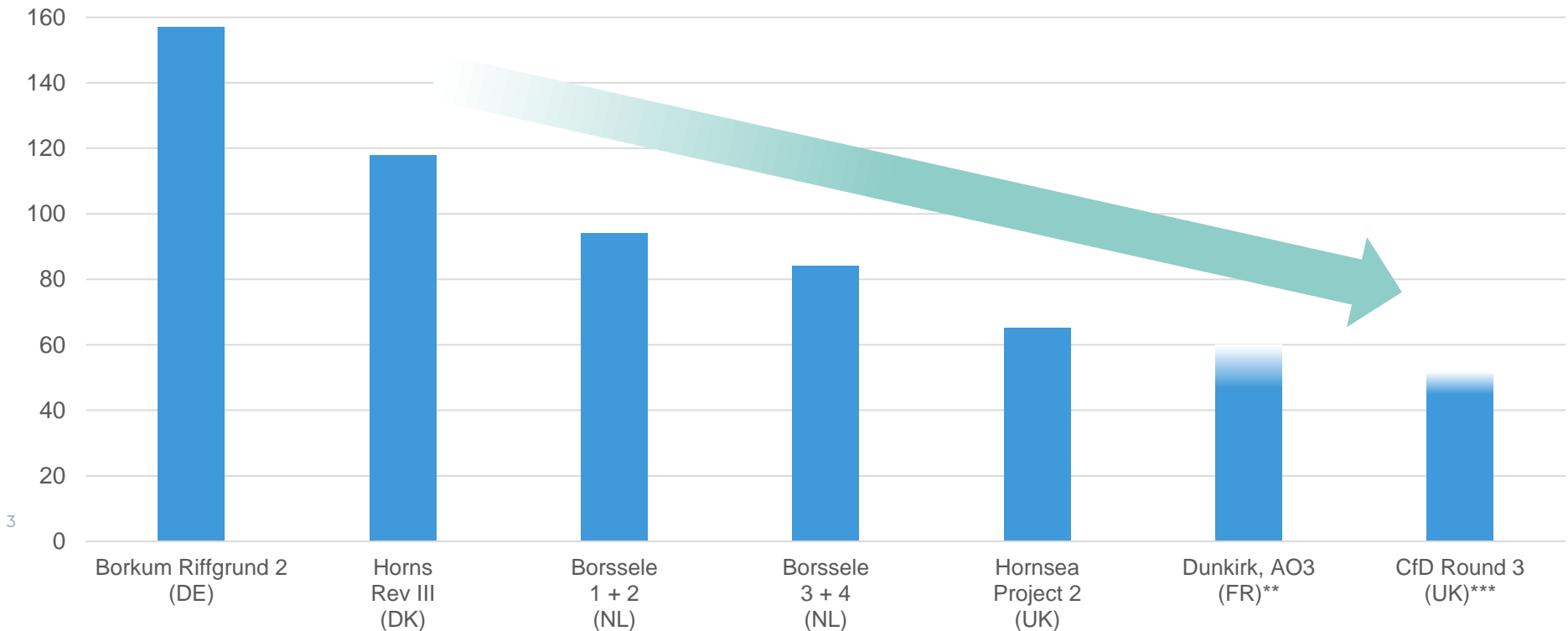
EU Roadmap 1,5 tech scenario
TWh



- ✓ Annual capacity to increase 6-fold
- ✓ Turbine sizes to treble
- ! Transmission to keep up with build-out
- ! Maritime spatial planning to reflect net-zero requirement

Offshore Wind and RES has seen rapid cost reductions, but the price of renewable hydrogen cannot be lower than electricity

Decrease in Levelized Cost of Electricity (LCoE, in EUR/MWh)*: 2015 – 2019

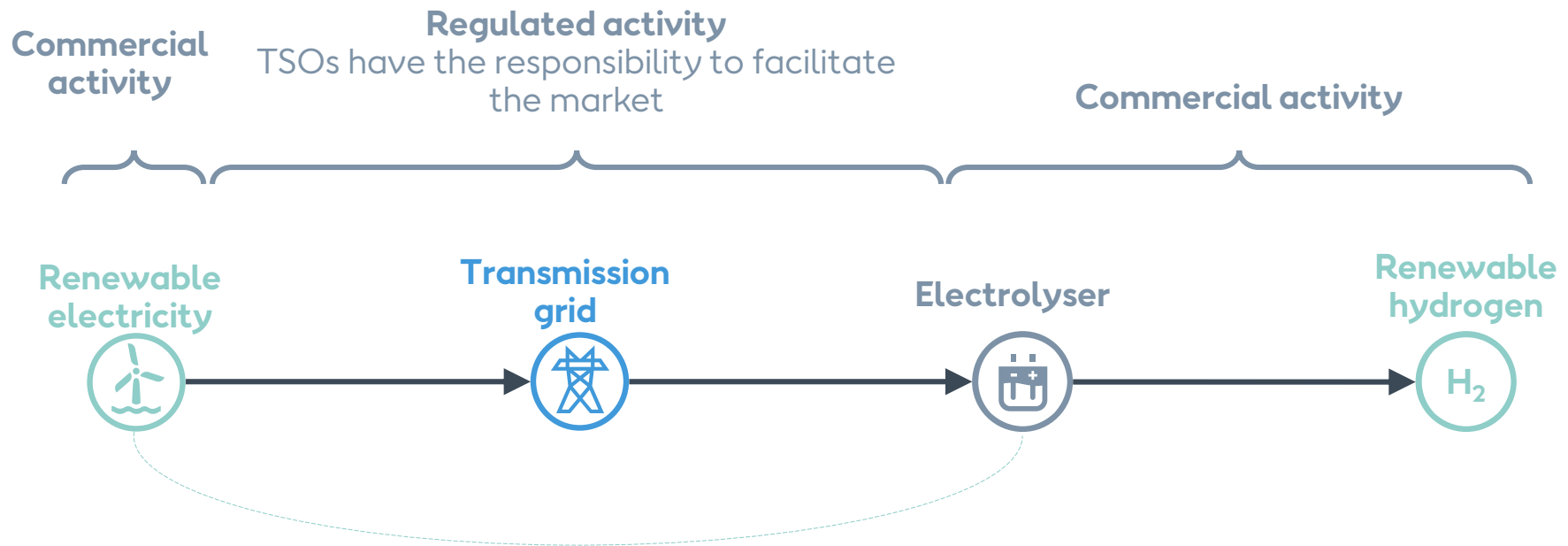


* Own calculations including costs for transmission to shore

** Estimated offshore transmission costs displayed on top of strike price for Dunkirk project (44 EUR/MWh)

*** Bids for UK CfD expressed in 2012 prices; offshore transmission included; uncertainty margin due to inflation until delivery year and fx-rates (EUR/GBP)

Developing the market for renewable hydrogen



1. Main challenge is to create a demand for renewable hydrogen; as it is more costly than fossil hydrogen. Funds are necessary to scale-up the technology in the short term.
2. OPEX (cost of electricity) is main driver of cost of hydrogen. This means cost reflective grid tariffs, ETS allowances, access to ancillary service markets, levies and taxes on electricity become crucial
3. Electrolyser ownership and operation should remain a commercial activity