

# CIP

Copenhagen Infrastructure Partners

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## Energy Island Project

*How CIP wins the procurement*

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The PowerPointers



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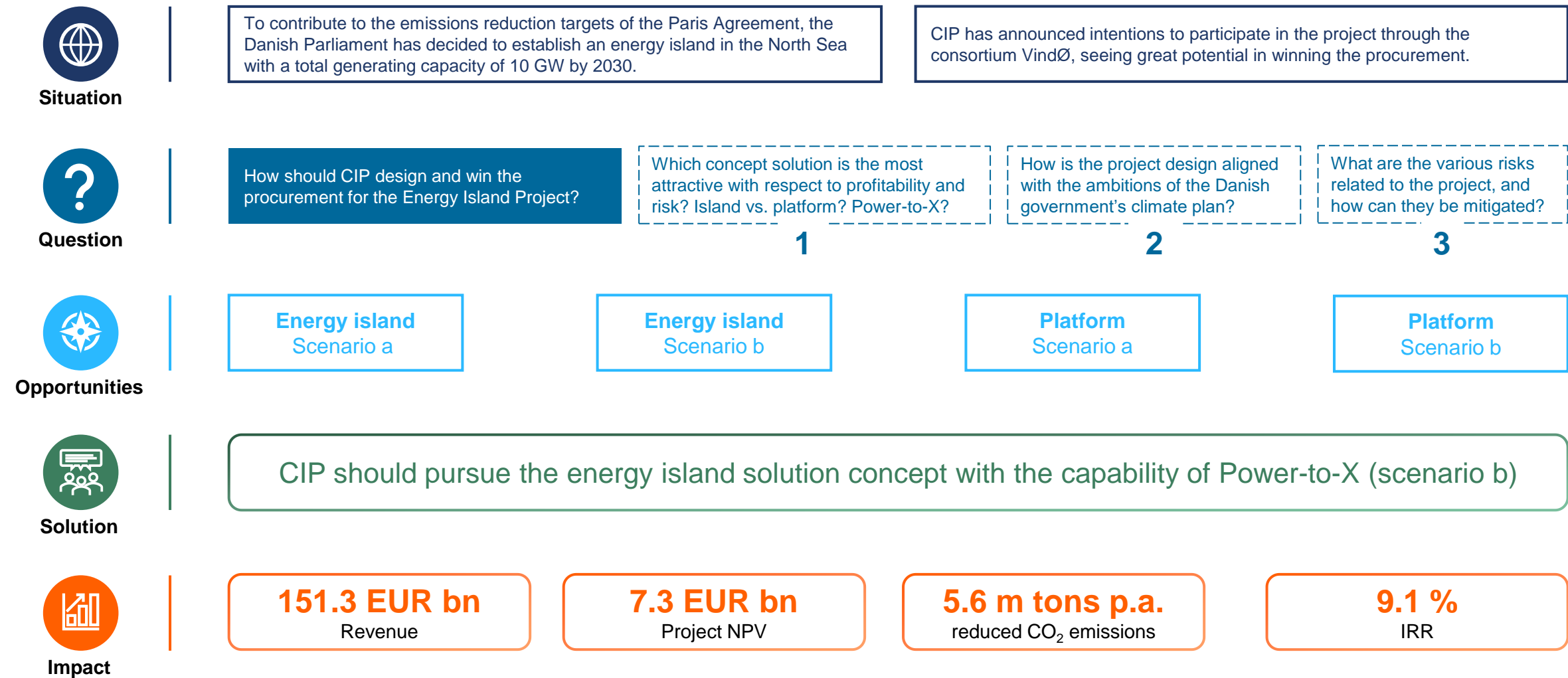


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# Executive summary: It is optimal for CIP to build the energy island with PtX, yielding a project NPV of 7.3 EUR bn and reducing emissions by max 5.6 m tons p.a.

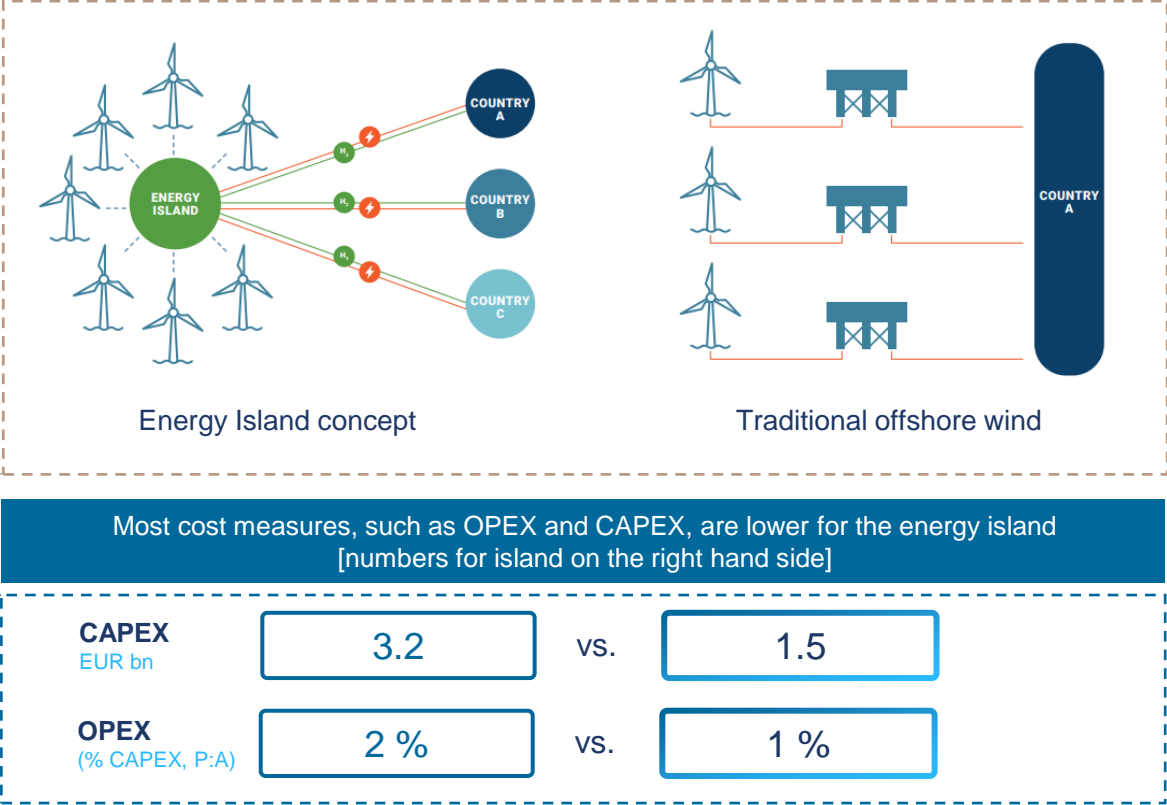


# The energy island concept solution is more attractive based on several factors, including lower costs and scalability in multiple dimensions

Based on a general comparison of the two solution concepts, the energy island look to be the more attractive choice

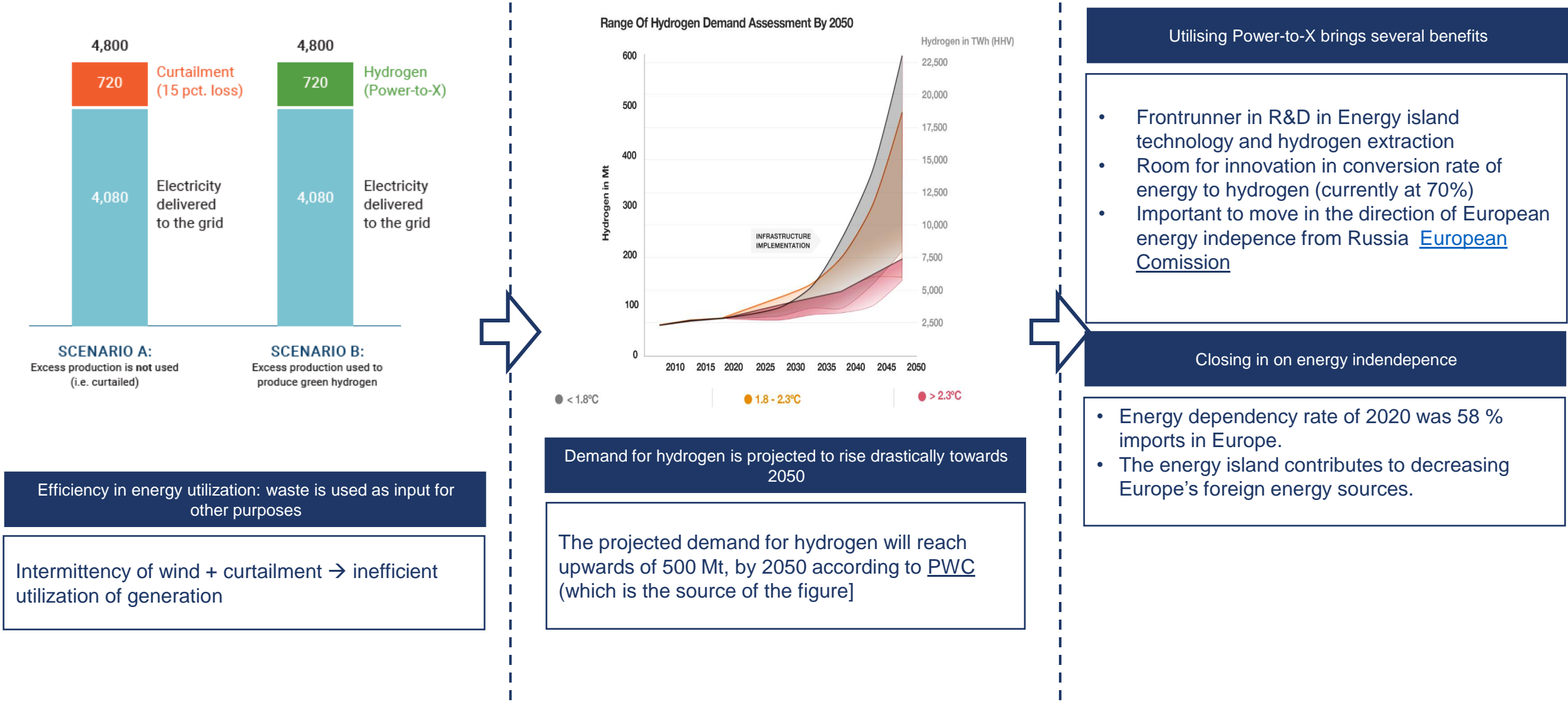
Differences in transmission structures favors the energy island, which has better scalability and also integration for export purposes

Platforms	Energy island
Flexibility (modularity)	Economies of scale
Emissions from construction	Potential for innovation
Biodiversity (artificial reef)	Transmission costs and structure
Lower risks technology is more mature	Construction costs (CAPEX) lower
	Operational costs (OPEX) lower
	Lifespan 70 years



We recommend choosing the energy island as the concept solution.

# Utilizing Power-to-X, CIP will become a pioneer within energy island technology and be ahead of the curve in the hydrogen energy sector.



Range Of Hydrogen Demand Assessment By 2050

Hydrogen in TWh (HHV)

Hydrogen in Mt

2010 2015 2020 2025 2030 2035 2040 2045 2050

● < 1.8°C ● 1.8 - 2.3°C ● > 2.3°C

Demand for hydrogen is projected to rise drastically towards 2050

The projected demand for hydrogen will reach upwards of 500 Mt, by 2050 according to [PWC](#) (which is the source of the figure)

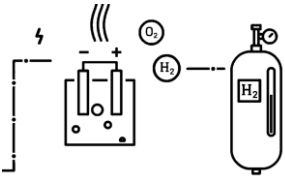
Utilising Power-to-X brings several benefits

- Frontrunner in R&D in Energy island technology and hydrogen extraction
- Room for innovation in conversion rate of energy to hydrogen (currently at 70%)
- Important to move in the direction of European energy independence from Russia [European Comission](#)

Closing in on energy indendence

- Energy dependency rate of 2020 was 58 % imports in Europe.
- The energy island contributes to decreasing Europe's foreign energy sources.

Of the two alternatives, the optimal project choice is an energy island with PtX yielding the best trade-off between returns and risk



### Energy island with PtX

NPV of **7,330** EUR m (6% discount)  
(5.764)

LCOE **46.2** EUR/MWh - real fixed  
PPA at 50.3 EUR/MWh  
(49)

IRR of **9.1%**  
(8.4%)

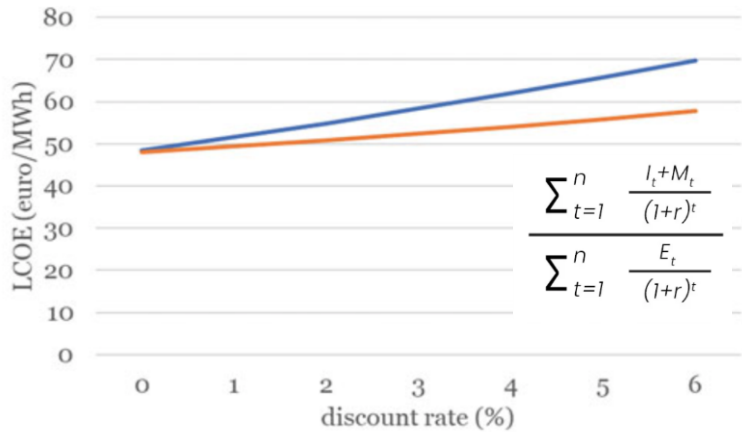


### Energy island without PtX

NPV of **2,855** EUR m (6% discount)  
(2.555)

LCOE **53.2** EUR/MWh  
(57.6)

IRR of **7.2%**  
(7.1%)



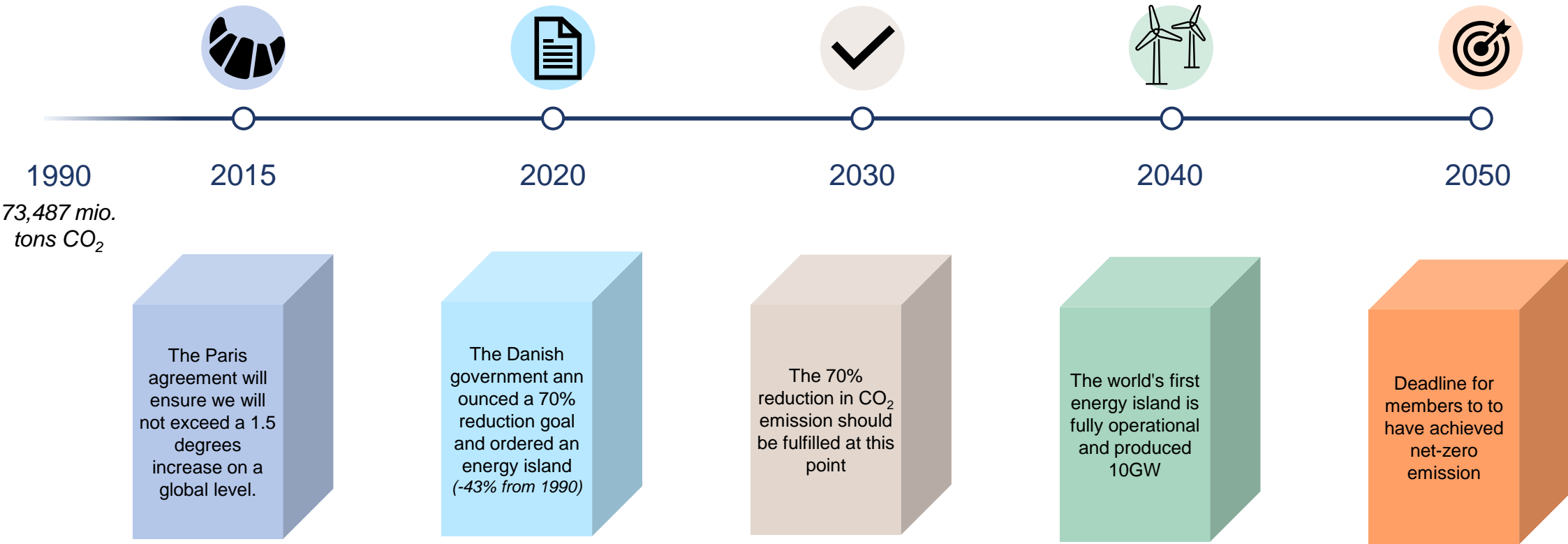
- ✓ Investment and cost pattern similar to a CCGT-plant
- ✓ Increases the need for wind and solar build out
- ✓ Used for heavy transport and as basis for green plastic
- ✗ Limited existing market and unpredictable returns

Thus, the optimal scenario is to build an energy island with PtX

Sensitivity: CAPEX increase of 20% equals NPV of 4,244 EURm & IRR of 7.6%



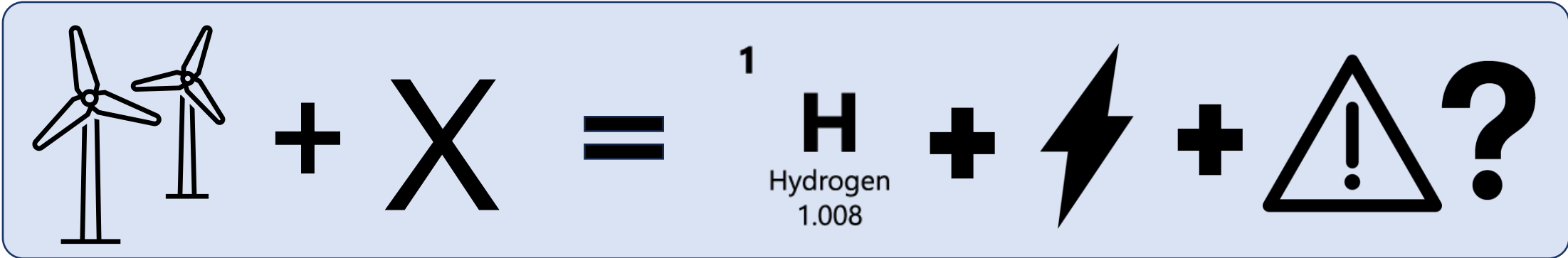
# The energy island concept solution plays an immediate role in coherence with the ambitions of the Danish government and the Paris Agreement



Furthermore, the energy island project is aligned with CIP values such as innovation and social responsibility, while also contributing to reaching UN's sustainable development goals.

# The energy island with Power-to-X leads to several risk concerning both environment and financials.

Risk		Likelihood	Consequence	Mitigation
1	Price fluctuations (electricity/hydrogen)	Likely	Moderate: Variability in prices makes forecasting difficult	PPAs of 50.3 EUR/MWh for electricity and 70.6 EUR/MWh for hydrogen
2	Damaging the seabed	Likely	Extreme: Endangering local marine life and negative publicity (e.g. Lynetteholmen)	Possible construction of artificial reefs in vicinity of island
3	Uncharted technological territory	Not likely	Moderate: Lack of knowledge in constructing energy islands	Close cooperation with specialist
4	Intermittency of wind	Likely	Mild: Periods of no wind/periods of excess wind	"Positive intermittency" → Power to X
5	Maintenance	Likely	Moderate: Dangerous work for maintenance workers	Safety-measures insured at the island, which leads to a more certain and faster response to possible operational failures
6	Increasingly bad weather (storms etc.)	Likely	Mild: Eroding of beaches, and threat to the natural habitat and the damaging of structures (wind turbines)	Innovation of the floating wind turbine



By gradual implementation the project, CIP takes the right and necessary action to achieve the goals set at the Paris Agreement and a more sustainable world by 2050

