

Hydrogen Forum

Idrogeno: risorsa energetica sostenibile e alleato chiave della transizione ecologica

Le strategie dell'idrogeno: scenario europeo ed italiano

22 Marzo 2023

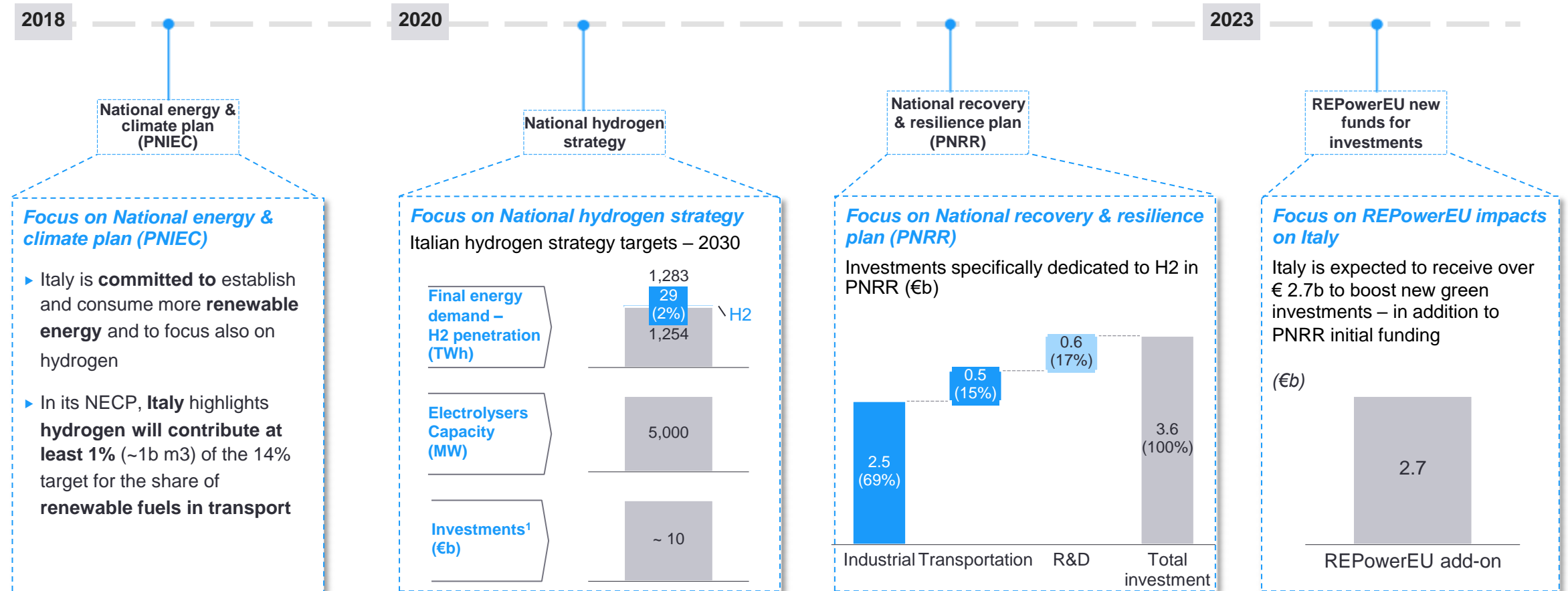
Preparato per



Italy is aiming at producing ≈ 0.7 m tons by 2030, according to National H2 Strategy, and has been committing over € 3.6m grants with PNRR that has been fostering

Italy hydrogen market timeline

Italian hydrogen market and regulation overview



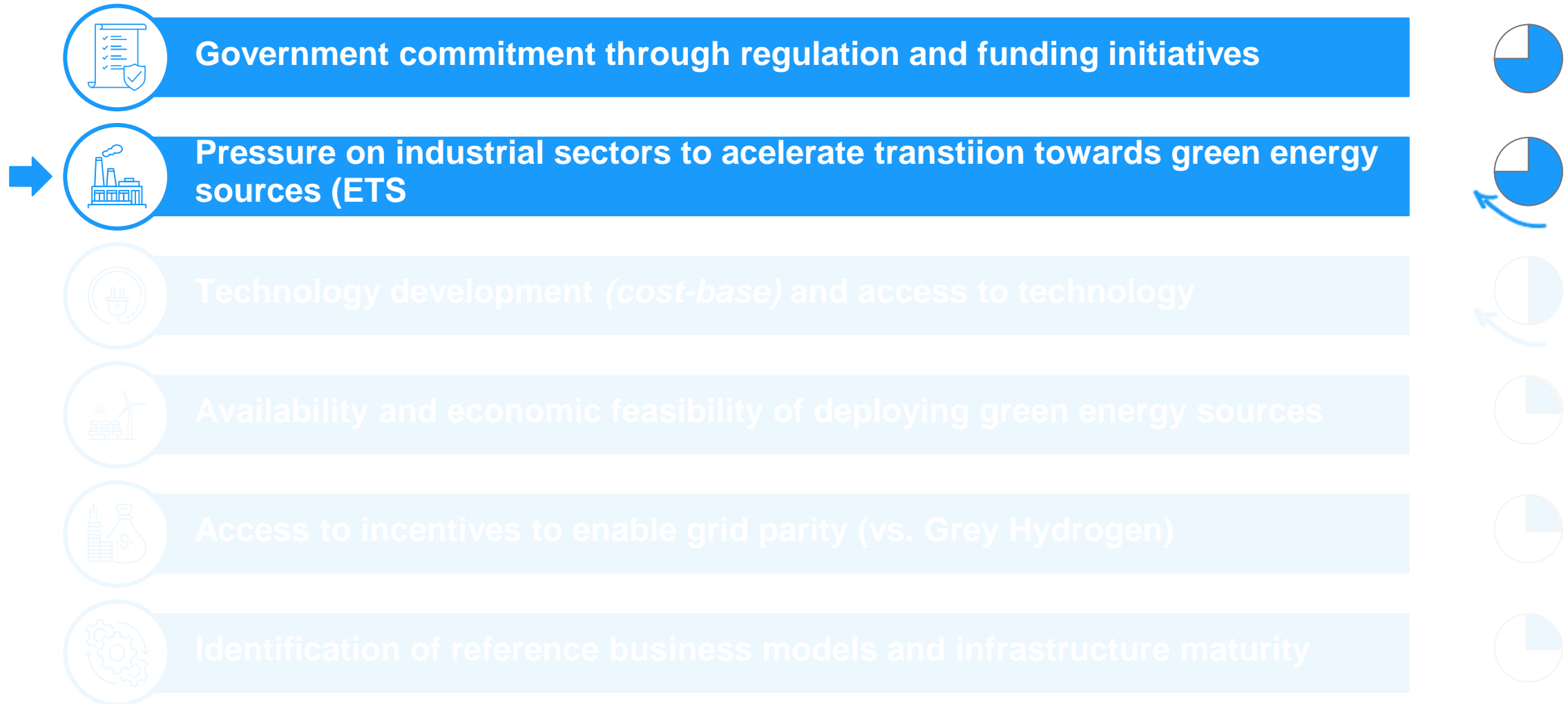
1. Not considering investments in RES

Source: National Hydrogen Strategy; The H2 Challenge; National recovery and resilience plan (PNRR); EY-Parthenon analysis

Key enablers to speed up green hydrogen development and adoptions present different maturity levels

Key enablers to green hydrogen development

Maturity level



Enablers moving to next stage of maturity level

Low ... High

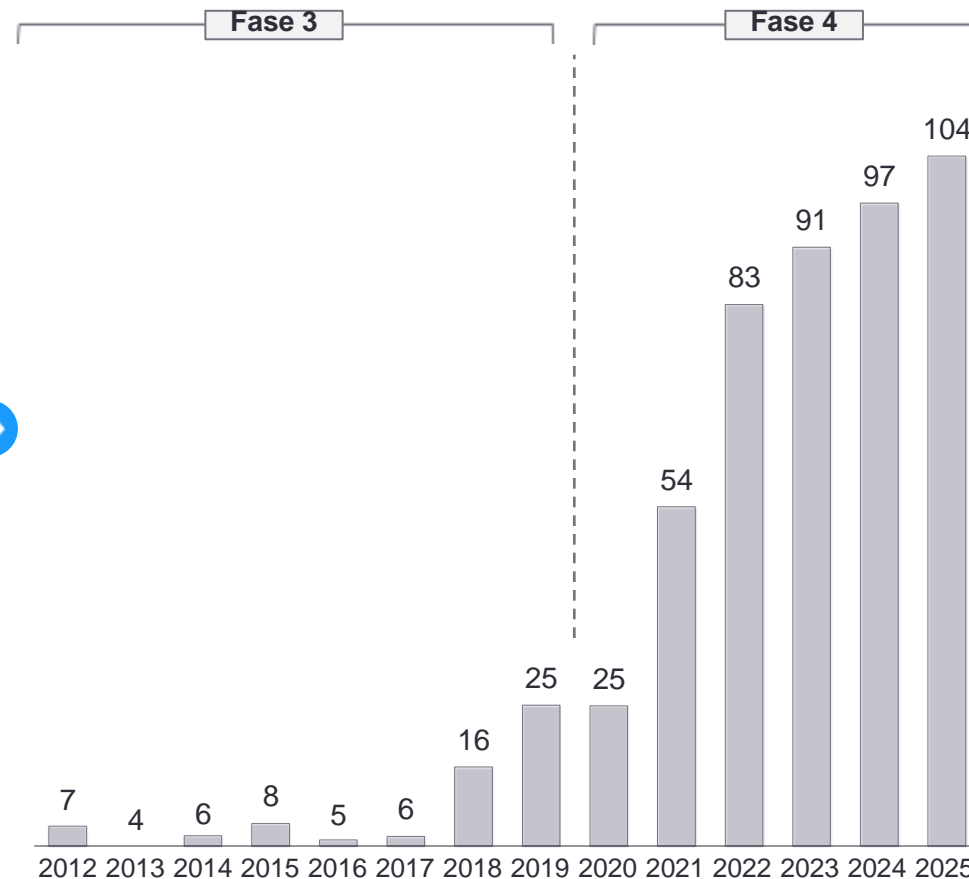
ETS is conceived as an incentive mechanism for CO₂ emission reduction initiatives – average CO₂ price per ton is estimated to be more than € 100 in 2025

Regulation



- ▶ **The European Emission Trading System** is the largest international CO₂ emissions trading system, designed as an incentive mechanism for sustainability investments
- ▶ It emits a **finite amount of emission quotas** calculated on the top 10% virtuous companies
- ▶ **Reduces the quantity of authorized quotas** by 2.2% per year
- ▶ It offers a CO₂ trading system according to **market logic** (supply and demand)
- ▶ 1 quota = 1 CO₂ ton

Average CO₂ price per ton (€ ton)



Application perimeter

- ▶ Several companies are committing to policies and initiatives to **lower their impact on greenhouse gases emissions**, even without being directly subjected to ETS
- ▶ Some examples could be seen in **industries** such as:
 - Food&Beverage
 - Retail
 - Pharma
 - Fashion
 - Financial services & investments

Geo impact (import)

- ▶ The introduction of **Carbon Border Adjustment Mechanism (CBAM)** has the objective of encompass into the import price an estimated impact of ETS costs that EU is facing
- ▶ CBAM enables **import prices** to be **even** compared to European costs – including ETS – leading to a **carbon neutrality**



Tightening ETS mechanism with increasing avg. prices of CO₂ are promoting a progressive shift towards clean energy solutions; so far, no direct carbon credits mechanism are yet introduced in the market

Key enablers to speed up green hydrogen development and adoptions present different maturity levels

Key enablers to green hydrogen development

Maturity level

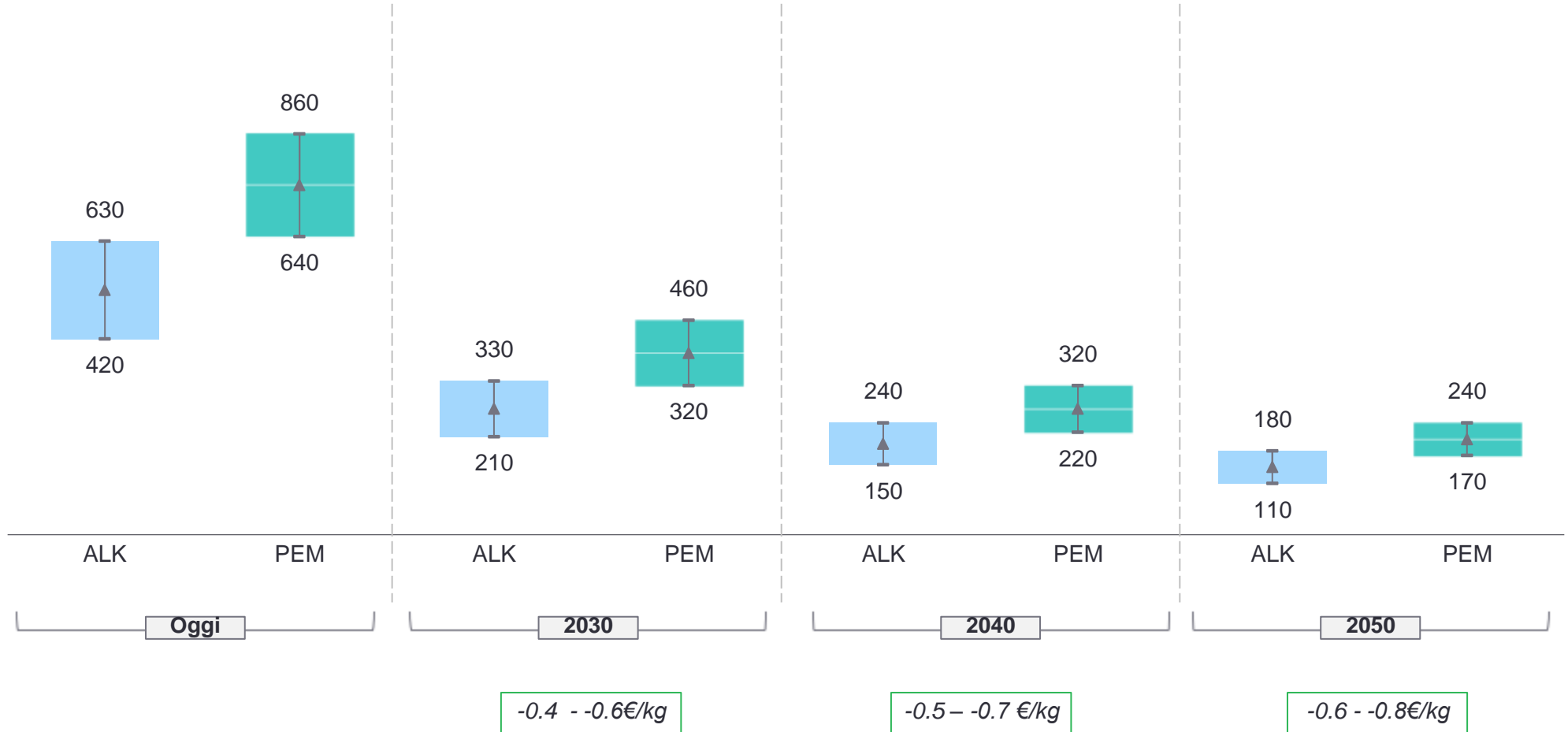


Enablers moving to next stage of maturity level

Low ... High

Focusing on production technologies, market envisages a progressive reduction of production technologies for green hydrogen

Evolution of systems cost by electrolysis technology – ALK vs PEM (€/kW, 2020-2050)



1.Green LCOH ranges, considering energy costs for 50 €/MWh and WACC around 7%
Source: Hydrogen Council 2021, EY-Parthenon analysis

Key enablers to speed up green hydrogen development and adoptions present different maturity levels

Key enablers to green hydrogen development

Maturity level



Enablers moving to next stage of maturity level

Low ... High

Green hydrogen production is estimated to potentially be competitive nowadays in case renewable energy supply would be at cost

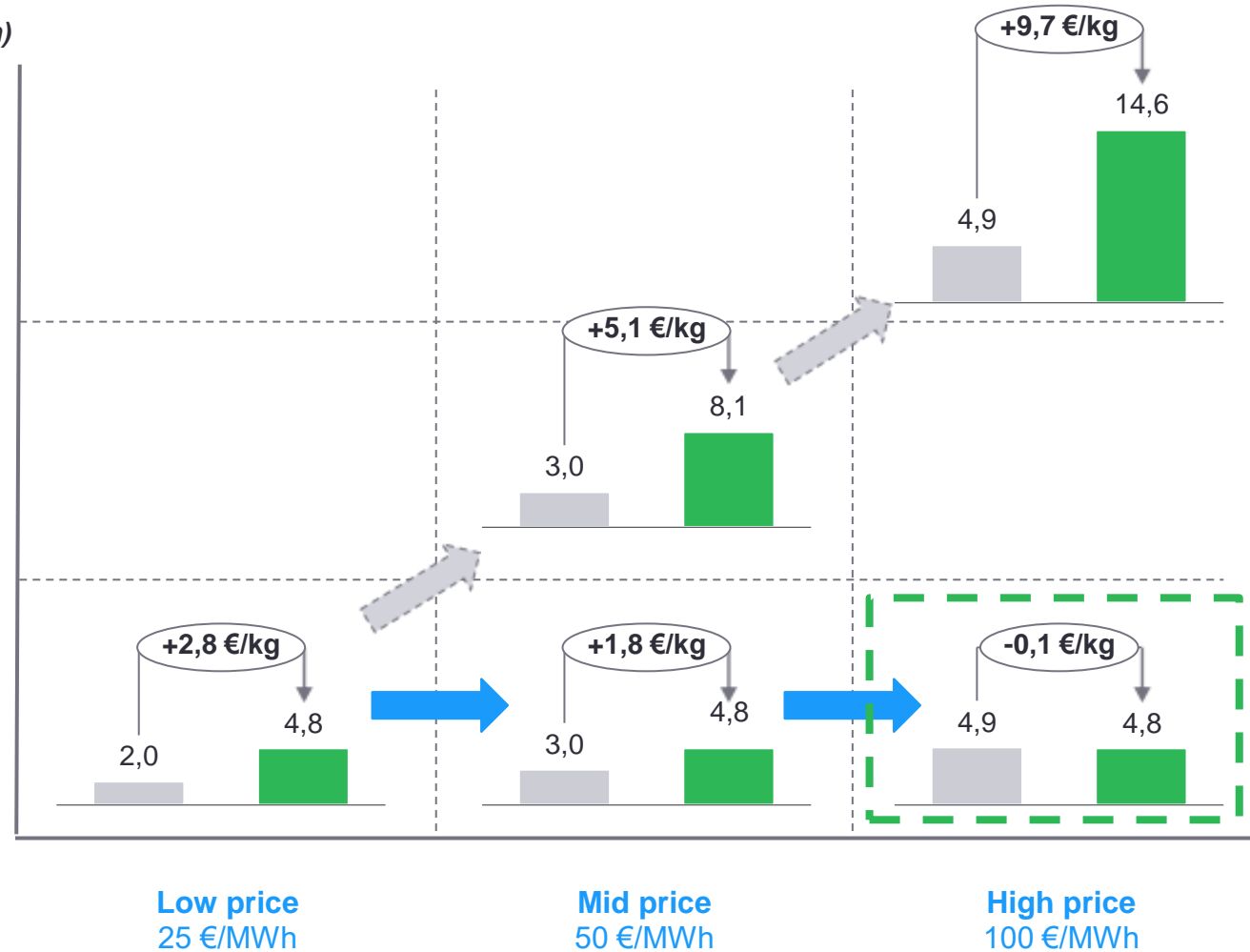
Estimatio of green energy sources impact – Grey vs gree Hydrogen (LCOH; €/kg)

Electricity price (€/MWh)

High price
200 €/MWh

Mid price
100 €/MWh

Low price
50 €/MWh



Legend:

- LCOH Grey
- LCOH Green

Positive trajectory
for green H2
development speed
up

Gas price (€/MWh)

Low price
25 €/MWh

Mid price
50 €/MWh

High price
100 €/MWh

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Key enablers to green hydrogen development

Maturity level

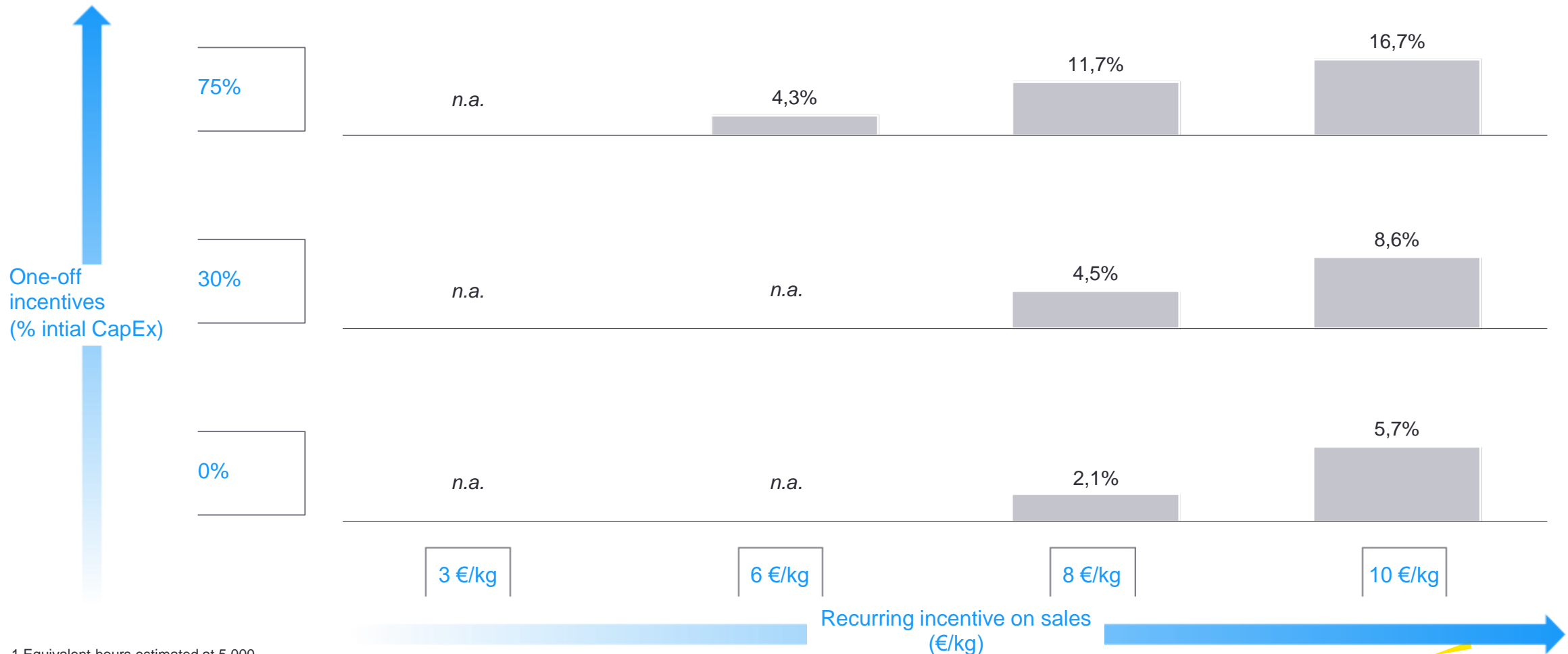


Enablers moving to next stage of maturity level

Low ... High

The incentive mix – one-off and recurring – for green H2 development and adoption boost (starting from 6 €/kg) would enable positive returns on investments

One-off and recurring incentive impact on project IRR



1. Equivalent hours estimated at 5,000

Source: EY-Parthenon analysis

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Key enablers to green hydrogen development

Maturity level

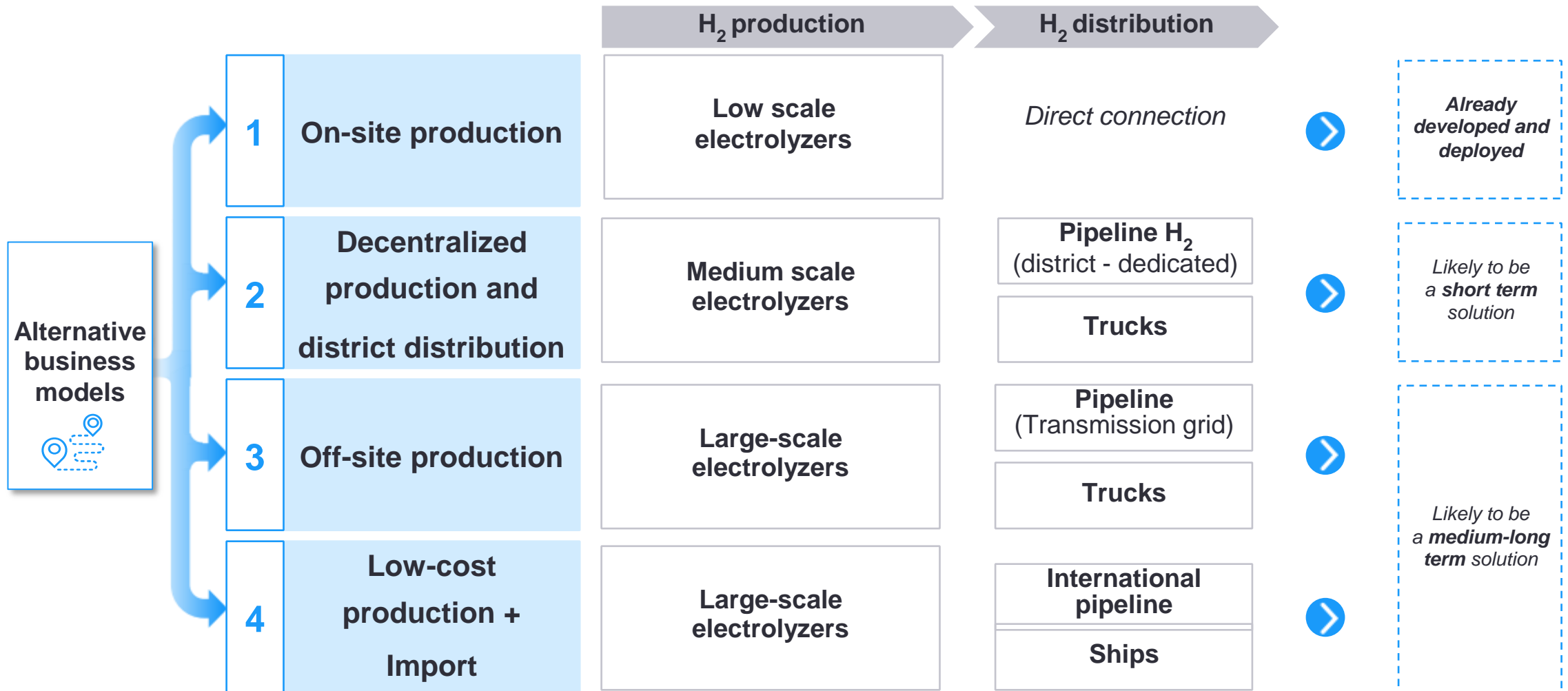


Enablers moving to next stage of maturity level


Low ... High

Four main business model for green hydrogen production have been analyzed, presenting different maturity level; nowadays, none appears to be dominant in the market

Main business models



Government and companies as critical players to speed up key enablers for green hydrogen development and adoption

		Government initiatives	Companies initiatives
 <p>H₂ Key Success Factors</p>	1	Government commitment through regulation and funding initiatives	□ □
	2	Pressure on industrial sectors to accelerate transition towards green energy sources (ETS)	□ □ □ □
	3	Technology development (<i>cost-base</i>) and access to technology	□ □
	4	Availability and economic feasibility of deploying green energy sources	□ □
	5	Access to incentives to enable grid parity (vs. Grey Hydrogen)	□ □ □ □
	6	Identification of reference business models and infrastructure maturity	□ □

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