Hydrogen:
investment need to 2050

Investment needs

2050 targets
Increase hydrogen production 5–7 times to 500–800 million tonnes for final energy use, ~85% of which is green hydrogen.

Investment needs
Hydrogen production: $40bn p.a.: green hydrogen supply, retrofit grey hydrogen facilities.
Transport and storage: $40bn p.a.: refueling stations, pipelines, import/export terminals, storage facilities.

*Investments in clean electricity generation for green hydrogen of around $390bn a year – see Power sector.*

Investment milestones
$2bn/year today → $80bn/year by 2030 → $120bn/year by 2040

Where?
High-income countries will dominate investments this decade as production scales up; many middle- and low-income countries are likely to be key low-cost green hydrogen locations in the long-term (e.g., Morocco, Namibia and Chile have access to cheap, large-scale renewable generation).

Gross or net?1
In general, hydrogen investment can be considered additional to what would otherwise occur, driven by decarbonisation objectives.

Global annual investment

<table>
<thead>
<tr>
<th>Year</th>
<th>Hydrogen storage</th>
<th>Hydrogen transport</th>
<th>CCS infrastructure</th>
<th>Retrofit grey hydrogen</th>
<th>Greenfield blue hydrogen</th>
<th>Electrolyser</th>
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<tbody>
<tr>
<td>2020</td>
<td>20</td>
<td>15</td>
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Average investment p.a. 2021-50

Outlook to 2030

- As natural gas prices have increased, green hydrogen is becoming cost-competitive with its fossil alternative - investments in green hydrogen production are becoming increasingly attractive and bankable.
- Hydrogen production incentives such as the $3/kg incentive in the US Inflation Reduction Act, increase bankability.
- 680 large-scale project proposals worth $240 billion have been put forward, but only about 10% ($22 billion) have reached final investment decision (FID).
- Early investments are still limited and face high risks due to uncertainty around offtake and the necessary transport and storage infrastructure.
- Demand is lagging supply.

2030 target
50 Mt clean hydrogen production
$80 billion investment
x40 scale up

Sources: BNEF (2022), Energy Transition Investments; Hydrogen Council (2022), Hydrogen Insights 2022.
1 The ETC's investment estimates differ in approach by sector. Gross investment refers to the total investment required under a 1.5°C net-zero pathway, regardless of how much investment would have occurred anyway. Net investment is the incremental investment required compared to a business-as-usual scenario.
Note: All figures are in US dollars.
# Hydrogen: how to mobilise finance

## Required real economy policies

<table>
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<tr>
<th>Challenges</th>
<th>Real economy policies needed</th>
<th>Priority policy</th>
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</table>
| Create a clear strategic vision                                            | • National and regional hydrogen strategies, including targets for production based on sector transition strategies, to give certainty to investors and clarity on sequencing of uptake across sectors.  
+ • Targets for zero-carbon electricity in 2030 and beyond to ensure sufficient supply for green hydrogen.  
+ • Bans on new greenfield grey hydrogen. | |
| Address the “green premium” challenge                                      | • Bridge green premiums with financial incentives, including contracts for difference and tax credits for both green and blue hydrogen (e.g., US Inflation Reduction Act).  
+ • Green procurement for hydrogen derived products (e.g., fertiliser).  
+ • Implement fuel mandates (e.g., Sustainable Aviation Fuel in aviation).  
+ • Carbon pricing (across regions and with wide sector coverage). | |
| Reduce downside risks                                                      | • Sector-specific contracts for difference for hydrogen use.  
+ • Support development of hydrogen clusters which offer certainty of demand.  
+ • Support demonstration projects for storage (e.g., R&D subsidies) to accelerate technology scale up. | |
| Remove supply bottlenecks                                                  | • Centralised, international infrastructure planning to design cross-border hydrogen networks where required (pipelines, shipping routes).  
+ • Streamline planning and permitting processes for renewable power generation + hydrogen infrastructure.  
+ • Strategic geological siting for hydrogen storage locations (e.g., salt caverns).  
+ • Develop clean hydrogen & products certification schemes.  
+ • Cooperate on international hydrogen and ammonia safety standards.  
+ • Set clear national standards on hydrogen purity for different end-uses. | |

## What obstacles cannot be fully addressed by real economy policies?

**Some additional action required**

- Further de-risking required: even with well-designed real economy policy, new technologies that have not reached scale yet can struggle to secure financing.
- Additional support required to scale up key infrastructure: investment in hydrogen production sometimes relies on sufficient transport and storage infrastructure being in place.

## Additional actions required

### Public investment banks

- Investments and/or access to low-cost finance to develop industrial clusters, transport and storage infrastructure and end-use applications.
- De-risking (e.g., guarantees) to mobilise private capital.

### Financial institutions

- Develop expert teams and capabilities in evaluating hydrogen projects (e.g., risks and market opportunities) to increase lending.
- Technology specific investment funds to help pool expertise and aggregate capital.
- Offer products that hedge against future carbon risk (e.g., for retrofitting grey hydrogen).