

Energy Transition to Net Zero

The state of global energy markets and investments

#1 Positive trends

2021 was a year of great optimism. The implications of Covid-19 were receding, with signs of a strong rebound in economic activity. At the same time geopolitical tensions had cooled, with a return to political orthodoxy in the Biden administration. COP 26 also delivered commitments to phase down coal, as well as raise the salience of climate within the investor community.

Where were we in 2021?

Optimism post-Covid, with positive economic and political conditions. The energy transition looked on a stable path, maintaining high salience and commitment despite the shock of the pandemic.



Global Cooperation

China and the US agreed to boost climate cooperation

Countries agreed to strengthen emissions targets to 2030



The End of Coal?

COP agreed action on “phasing down” of coal – rather than “phasing out”

Failed to commit to phase out “fossil fuel subsidies”



Economic Bounce Back

The economic restrictions imposed by the pandemic were being alleviated

Strong economic rebound by surplus savings and major fiscal and monetary stimulus



High Climate Salience

Public consciousness of climate-related issues continued to rise, amidst political and activist campaigns as well as COP 26

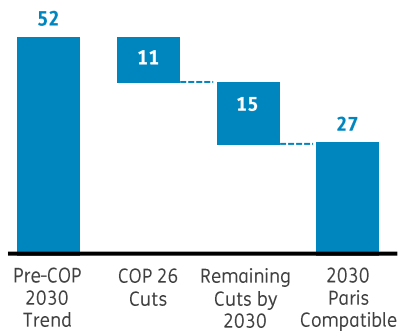


Investor Pressure

ESG and wider stakeholder capitalism agenda drove increasing investor activism with capital deployment to green technologies

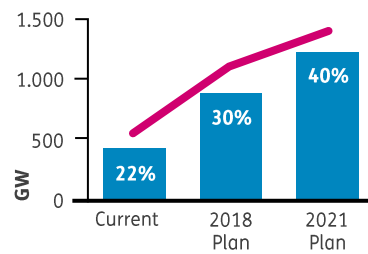
Where were we in 2021? (continued)

COP 26 Success (Gt CO2)



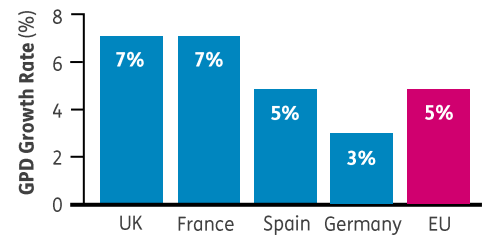
Source: Climate Action Tracker

EU Upgrades Renewable 2030 Targets



Source: EU Commission

Strong Economic Rebound 2021



Source: World Bank

High Point of Target Setting

2021 saw a new high-water mark in terms of target setting.



- ▲ Net Zero by 2060 (verbal commitment)
- ▲ Peaking GHG emissions “before 2030”
- ▲ Reduce emissions intensity of GDP by “over 65%” by 2030 compared to 2005



- ▲ Net Zero by 2050 (executive order)
- ▲ 50-52% GHG reduction by 2030 compared to 2005
- ▲ Zero carbon power generation by 2035



- ▲ Net Zero by 2050 (regulatory directive)
- ▲ Reduce GHG emissions by at least 55% by 2030, compared to 1990



- ▲ Net Zero by 2070 (verbal commitment)
- ▲ Reduce emissions intensity of GDP by 33-35% by 2030 compared to 2005

Corporate Net Zero Commitments



The Russian invasion of Ukraine has generated four impacts, each with the potential to alter the course of the energy transition.



Gas and Power Price Shock

Shortage of Russian pipeline gas has sent fossil fuel prices spiking, with European benchmarks in particular seeing unprecedented highs.



Stagflation

Rising commodity prices have stoked a bitter cocktail of accelerating inflation and decelerating growth. As a consequence, the growth outlook globally has been slashed.



Energy Security

Governments have placed renewed importance on the imperative of energy security as faith in global supply chains has been rocked on account of Putin's weaponisation of gas supplies.



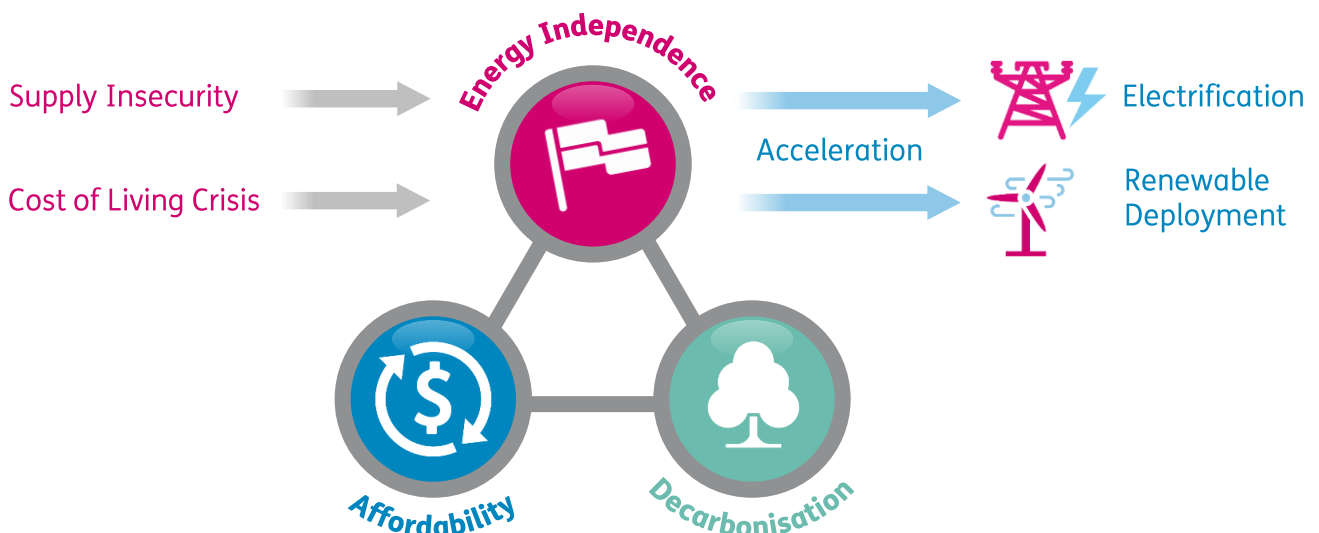
Political Tension

The invasion of Ukraine has signalled an abrupt end to the stability of the post-Cold War era. New geopolitical blocs create instability abroad, whilst an emerging cost of living crisis threatens to enflame discord at home.

Shifting Priorities: The Energy Trilemma

Increasing supply insecurity and price volatility have driven a renewed emphasis on energy independence.

The weaponisation of Russian gas flows has created a paradigm shift in thinking regarding the energy trilemma in Europe. The role of supply security and energy independence has been re-prioritised. In Europe, where there is a lack of domestically available fossil fuels, this is expected to lead to an accelerated transition to reduce foreign dependencies.



The Implications for Energy Investors into the Energy Transition

Reasons to be positive, and to be cautious.



- 1 Accelerated Electrification in Europe**
 Energy security concerns will drive an accelerated transition in Europe. Decarbonisation through electrification is the preferred route to ensure energy security, not least because it aligns with climate goals. This will necessitate the mass rollout of electric heat pumps and EVs, requiring accelerated renewable energy deployment.
- 2 Positive Renewable Economics with High Commodity Price**
 Elevated commodity prices are expected to create a prolonged period of high power prices. This will both increase the attractiveness of renewables relative to fossil fuels and also increase profitability for power generators and developers.
- 3 Accelerated Renewable Rollout**
 An accelerated renewable deployment is expected to be pursued to reduce the role of gas in the energy mix and secure energy independence. This will put pressure on existing renewable pipelines.
- 4 Acceleration of Alternative Gases**
 The acceleration of renewable deployment will increase the challenges posed by renewable intermittency. Alternative sources of power flexibility including biofuels, synthetic fuels and hydrogen and its derivative products will become more prominent as natural gas is removed from the mix.



- 1 Longer-Term Economics Risk**
 The uncertain trajectory of future commodity prices creates downside risk for power generators if commodity markets move from famine to feast. Equally, a cost of living crisis is incentivising political action to cap the upside of energy profits or attempt to decouple renewable prices from commodities.
- 2 Rising Cost of Capital**
 Rising inflation is causing interest rates to rise, ending a period of unprecedentedly low interest rates since 2008. This will increase the costs of raising finance for developers.
- 3 Permitting and Grid Constraints**
 There will be persistent challenges in converting accelerated renewable demands into greater supply owing to planning, permitting and grid capacity issues.
- 4 Supply Chain and Production Costs**
 Increasing demand, coupled with rising material costs, is creating price pressure on the renewable supply chain. The rise of local sourcing requirements risks compounding these price pressures further.
- 5 Government Spending**
 Economic pressures and politicisation of the decarbonisation agenda risk reductions in fiscal support for green technologies.

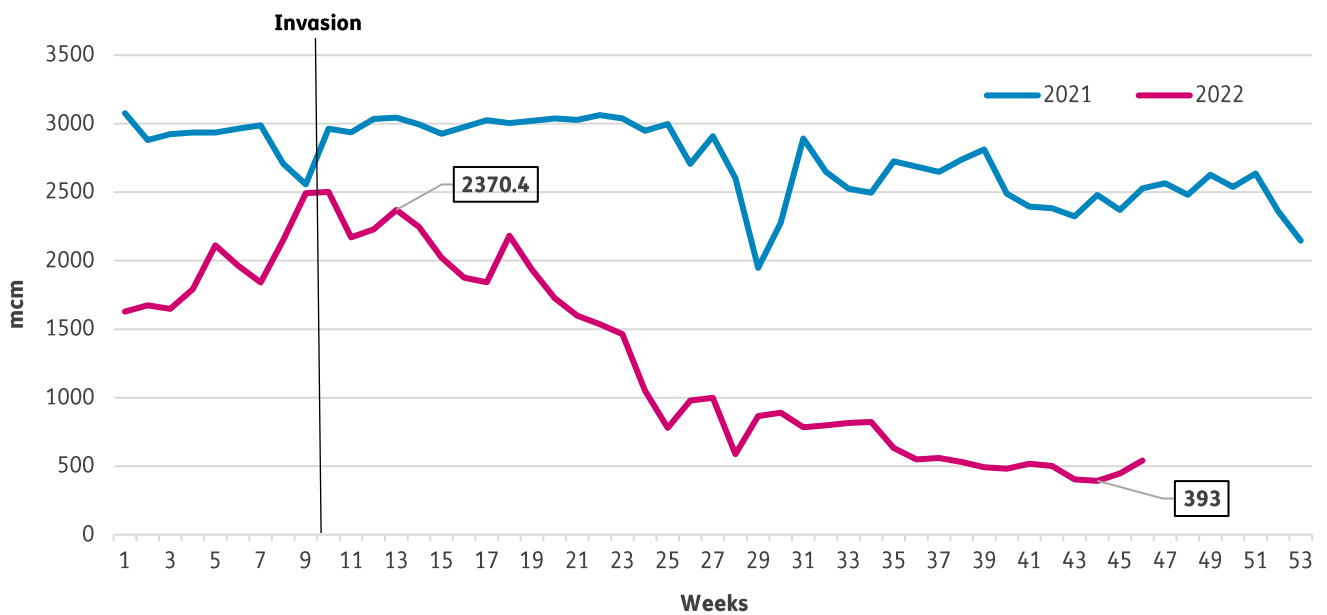


1 Energy Security through Accelerated Electrification in Europe

The invasion of Ukraine has highlighted the extent of European dependency on Russian energy.

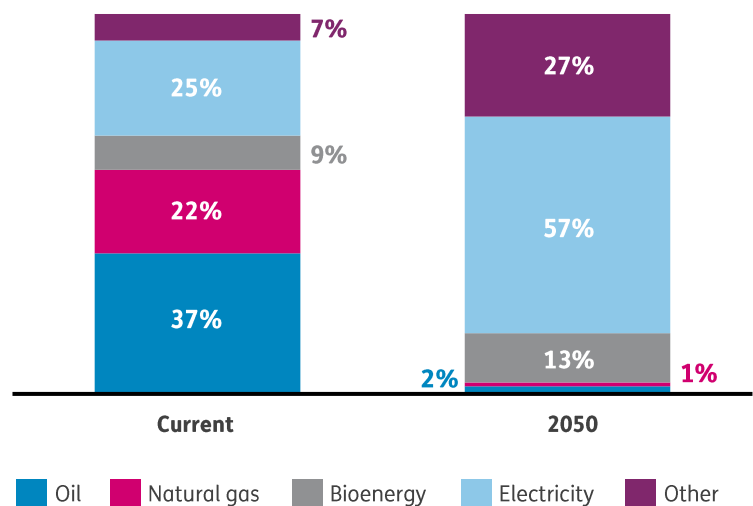
With most domestic sources of fossil fuels either mature or exhausted, an acceleration of electrification is expected to reduce the need for foreign fuel imports. The EU intends to reduce the proportion of gas in final energy demand from 22% today to under 1% by 2050. Electricity consumption, by contrast, is expected to rise from 25% to 57%. This will involve the widespread conversion of fuel appliances into electric, such as heat pumps and EVs.

Weekly Russian Pipeline Gas to EU



- ▲ The invasion of Ukraine has undermined the belief that co-dependency between consumer and producer would ensure energy security, with Russia weaponising gas supplies as political leverage.
- ▲ In the short term the available options to replace Russian gas are limited to LNG, which is causing significant price pressures.
- ▲ As a consequence, a new consensus on securing greater energy independence has emerged through an accelerated electrification.

EU Commission Final Energy Demand Targets



Source: Baringa Analysis & EU Commission Repower EU Plan

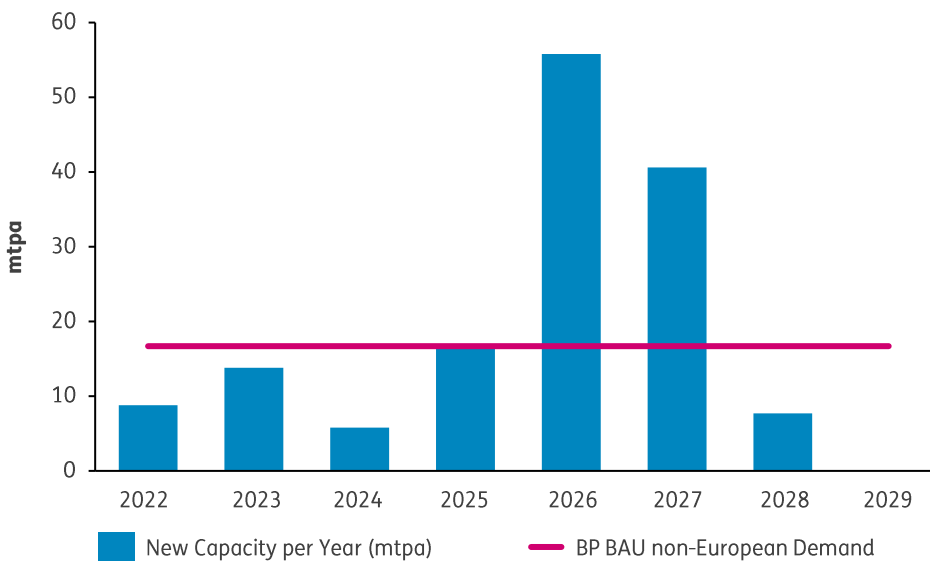


2 Positive Economics under Current Market Design

Gas markets are expected to remain tight, producing a prolonged period of elevated power prices.

LNG markets are expected to remain tight until at least 2025, where net supply exceeds annual demand. This will contribute to an elongated period of high commodity prices, increasing power prices accordingly owing to the position of gas in the merit order. This provides the opportunity for high merchant profits for renewable assets.

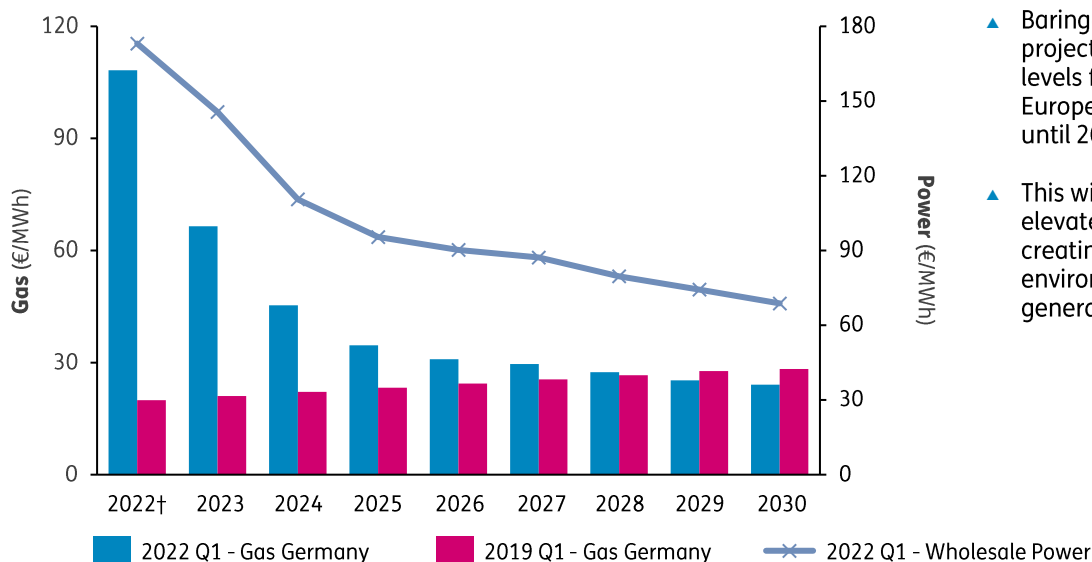
New LNG Gas Supply vs Demand



- ▲ Global LNG markets are expected to remain tight well into the middle of this decade.
- ▲ New US and Qatari volumes will exceed annual demand growth in 2026.
- ▲ However, Europe's pivot away from Russian pipeline volumes is expected to prolong the supply deficit in LNG markets as European markets pay a premium to reduce exposure to Russian gas.

Source: Baringa Power & Gas Market Reports

Gas & Power Price Outlook



- ▲ Baringa's reference case projects elevated price levels for gas across European benchmarks until 2027.
- ▲ This will contribute to elevated power prices, creating a positive revenue environment for power generators.

Source: Baringa Power & Gas Market Reports



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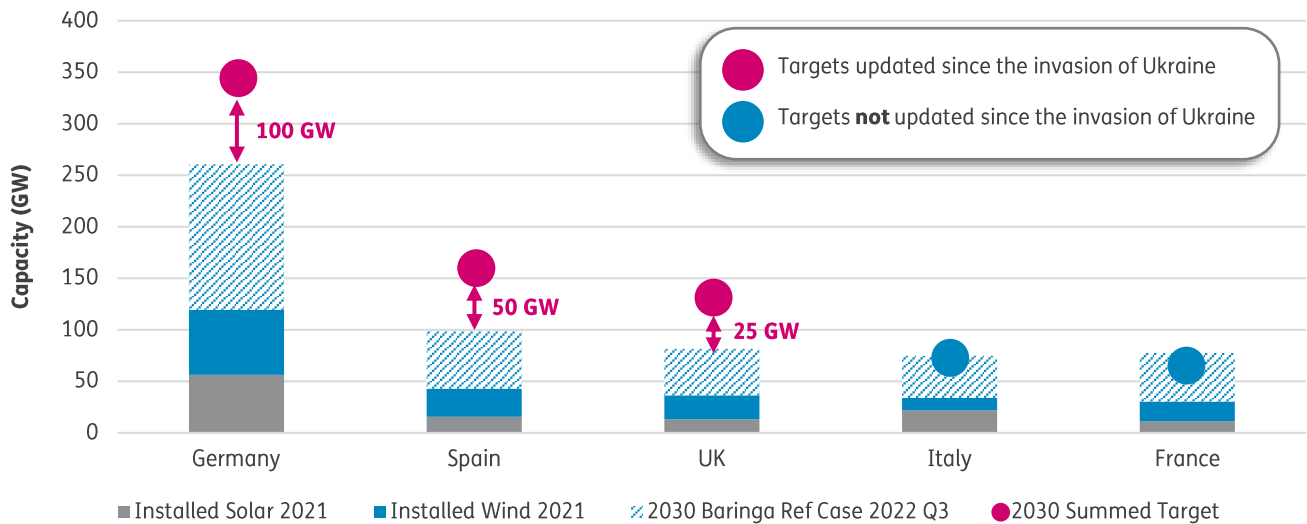
Accelerated Renewable Rollout Creates Aspiration Gap

Most major European markets have an aspiration gap between their current pipeline and national targets.

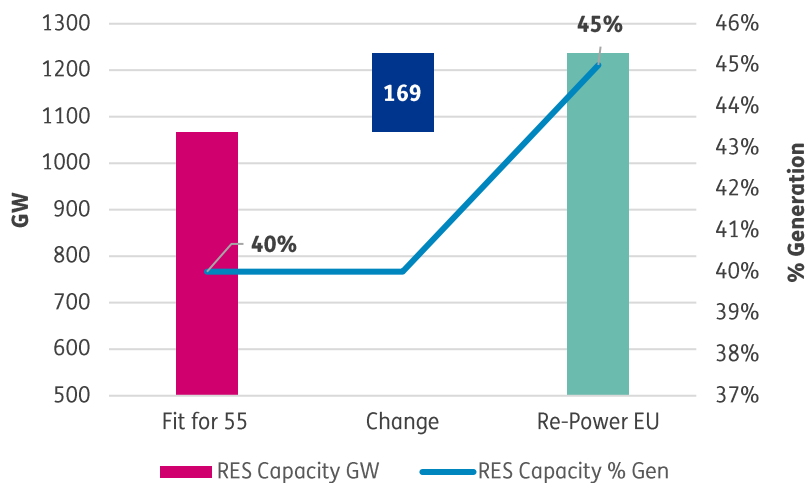
The natural consequence of an accelerated desire to electrify the economy to reduce dependency on foreign fossil fuels is the need to generate greater sources of domestic power. Renewables, by their nature, offer such a domestic power source. The new REPower EU plan represents a significant upgrade in ambition for renewable energy deployment of c.169 GW, increasing the opportunities for renewable energy investment.

Planned development pipeline insufficient to meet 2030 goals

Current Pipeline and Renewable Target



Renewable 2030 Acceleration



- ▲ The current pipeline, even including immature projects with plans submitted but not yet approved, creates an aspiration gap for all major European countries but Spain.
- ▲ Germany's aspiration gap is largest, owing to the inclusion of the EEG 2022 (Renewable Energy Act) which has substantially increased Germany's 2030 renewable energy target.
- ▲ Baringa Reference Case for Renewable Capacity in 2030 undershoots targets in Germany, the UK, France and Italy, owing to the persistence of permitting and grid capacity issues.

Source: Energy Monitor & Baringa Country Experts



Acceleration of Alternative Gases

Renewables will accentuate need for energy storage and flexibility.

The acceleration of electrification creates challenges for both energy storage and flexibility as well as the hard-to-electrify sectors of the economy such as high-heat furnaces.

These needs can be fulfilled by natural gas alternatives which would require significant capital infrastructure to support their deployment.

Storage and Gases to Address Intermittency

The challenge of renewable intermittency

Renewables have considerable variability in output. Fig 1 shows the daily variability in output for each month as well as the changing seasonal average in the UK. This variability needs to be balanced with power flexibility. There are two options:



1. Battery Storage

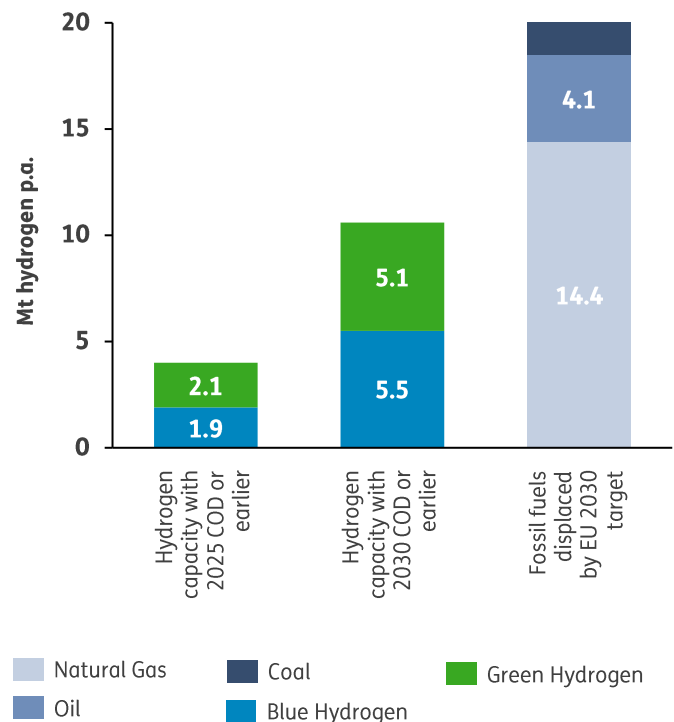
Whilst daily intermittency could be addressed through battery storage, capacity is currently not sufficient to address the longer periods of seasonal shortfalls produced by renewables.



2. Gases

Gas has the ability to be stored for long durations and provide grid balancing with ramp up and ramp down capability.

Hydrogen Development Pipeline



Natural Gas Alternatives

The need to identify gases which have the same advantageous qualities as natural gas is becoming much more pressing due to the acceleration of renewables and the renewed commitments to Net Zero. The below provide alternatives for specific uses such as storage, grid flexibility and high-heat combustion.

1. Green Hydrogen: a gas produced via renewable energy electrolysis. Can be produced at large volumes. However, storage requires high pressure (to store as a gas) or very low temperature (to store as a liquid), making it expensive to transport.

2. Ammonia: a gas derived from green hydrogen which can be liquefied and transported much more easily than hydrogen (at -33°C vs. -253°C). As a consequence, it can be used to, easily and cheaply, transport hydrogen over long distances before being cracked back into hydrogen for end use (although with 13-34% energy loss).

3. Biogas: a gas produced by anaerobic digestion of organic matter. The major challenge is being able to scale the technology to get significant volumes.

Source: UK National Grid Data

So What?

The implications for energy investors into the energy transition.



Will the macro environment remain favourable?

Investors in the energy transition are set to benefit from positive tailwinds set to impact the renewable energy ecosystem. Accelerated electrification, owing to the renewed emphasis on energy security and the elevated commodity price environment, will contribute to a favourable outlook for investors.



Are you well placed geographically to take advantage of these trends?

Geographical exposure to Europe (and US) provides an advantageous position to capture the trends towards accelerated renewable development. Investors must ensure they are optimally allocating resources across these markets to maximise the overall opportunity.



Solution design is becoming even more important.

The energy transition is creating a myriad of needs from governments and end users and simple offerings are becoming less compelling. Investors need to diversify their technology set, develop customer-oriented commercial propositions and services which are more compelling than before.



Innovation is required to overcome ongoing (and potentially strengthening) obstacles.

Challenges to accelerating renewable deployment to meet new targets are likely to continue to create frictions, particularly planning reform and grid connection. Innovation in business models and investment strategy will be required.



Competitive risks are becoming more acute.

The current climate is galvanising new entrants and raising financing costs. Investors need to combat these risks by growing bigger and broader, to stay at the front of the pack rather than being left behind.

If you are interested in hearing more, please get in touch with our experts.



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