INEVITABLE POLICY RESPONSE | Quarterly Forecast Tracker
Global progress against IPR policy scenarios

Quarterly Forecast Tracker

Update of global energy/land policy and technology developments

Q3 2022

October 4, 2022

INEVITABLE POLICY RESPONSE

Q3 2022

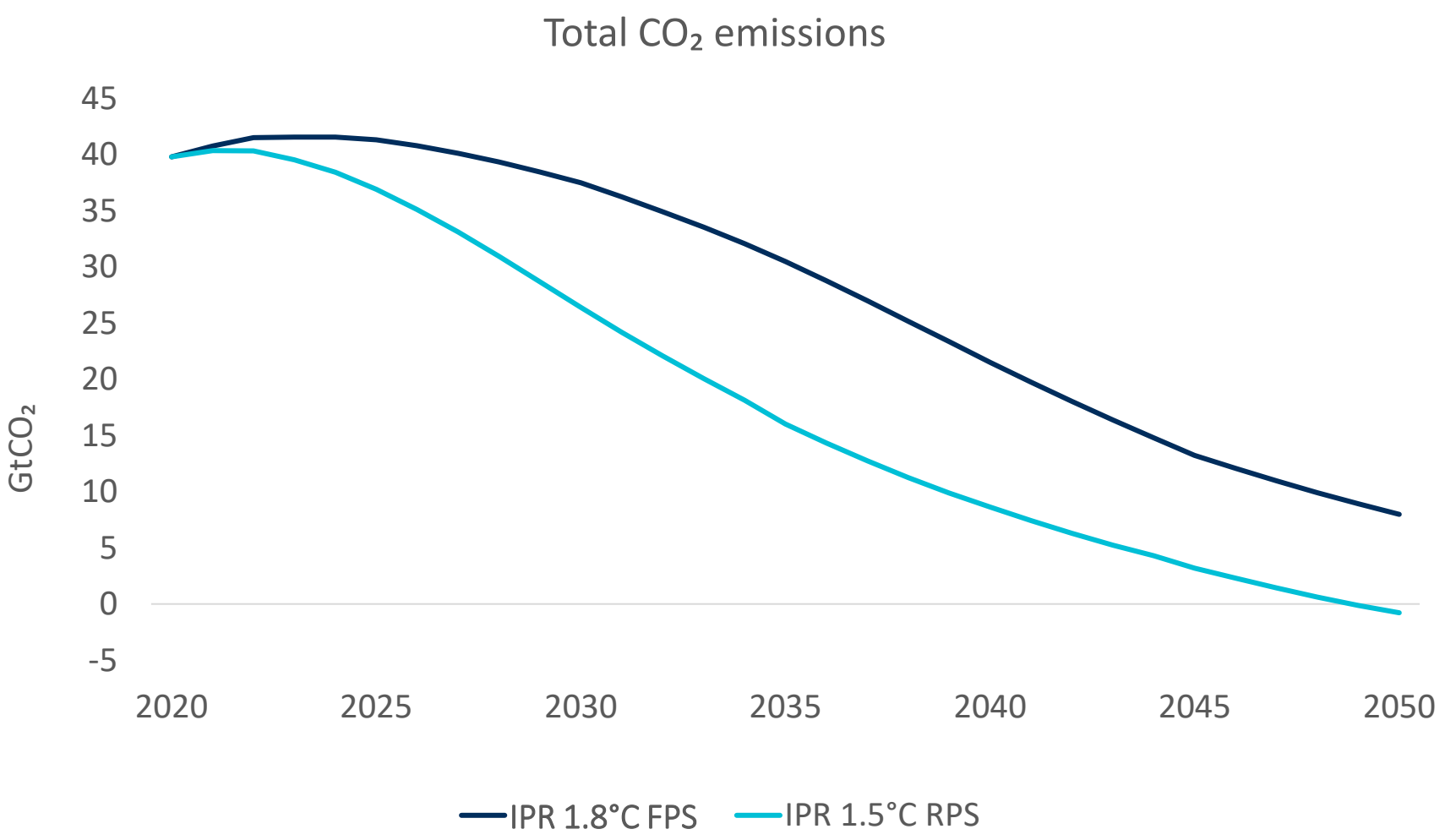
IPR has developed high-conviction policy-based forecasts of forceful policy responses to climate change and implications for energy, agriculture and land use, across two scenarios

Please see the IPR Home Page on the PRI website for further details

Scenario	Policy Forecast Details	Open Access Database
IPR 1.8°C Forecast Policy Scenario (FPS) • Models impact of forecasted policies on the real economy • Global emissions fall by 80% by 2050, aligned with warming below 2C (1.8°C)	IPR 1.8°C FPS Policy Details IPR 1.8°C FPS Energy and Land Use System Results Summary *See Appendix for summary of key FPS forecasts*	IPR FPS 2021 Value Drivers
IPR 1.5°C Required Policy Scenario (RPS) • Required policies to align to a **1.5°C objective** building on the International Energy Association's Net Zero scenario and deepening analysis on policy, land use, emerging economies and value drivers	IPR 1.5°C RPS Energy and Land Use System Results including Policy Details *See Appendix for summary of key RPS requirements*	IPR RPS 2021 Value Drivers

IPR has published a set of publicly available outputs from the 1.8°C FPS and 1.5°C RPS that offer significant granularity at the sector/country level, allowing investors to assess their own climate risk across 4,000+ variables

The IPR FPS (2021) results in total CO_2 emissions (land and energy) equating to 1.8°C. The IPR 1.5°C RPS requires emissions below zero by 2050



- IPR 1.8°C FPS sees emissions rising **in the short term** through 2025/6 before they start declining. IPR 1.5°C RPS declines slightly by 2025
- IPR forecasts policy action **before 2025** that drive momentum from then through to 2050
- When we assess **quarterly policy developments in the QFTs** we do this against **these longer-term outcome forecasts**

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IPR continues to track policy and technology momentum around achieving a 1.8°C climate objective (FPS) while falling well short of 1.5°C RPS (no overshoot)

QFTs track momentum and level of ambition on energy and land transition policy and technology developments. These are related to the IPR Forecast Policy Scenario (FPS) which results in 1.8°C of warming and are also put in the context of the 1.5°C Required Policy Scenario (RPS).

IPR FPS expects rapid policy action by the 2025 Paris Ratchet, which could result in warming being held well below 2°C. So far 2022 QFT finds policy is mostly supportive or confirmatory of the 1.8°C FPS pathway (of 122 policies of impact, 95 support or confirm 1.8°C FPS).

This is not enough to hold warming to 1.5°C with Net Zero in 2050, which requires greater action sooner.

In early September, G20 climate talks in Bali failed to agree on a joint communique, amid objections over language used on climate targets (1.5°C versus 2°C), climate finance and war in Ukraine. Instead, energy ministers agreed on a non-binding Bali Compact, which includes voluntary principles for improving renewable energy infrastructure, financing, investment and technology transfer, and which will be further discussed at the G20 leaders' summit in November.

This raises concerns particularly on prospects for 1.5°C (no overshoot).

Executive summary

In Q3 we are still tracking **positive momentum** in developments **reinforcing IPR's 1.8°C Forecast Policy Response** pathway. In Q3 2022 we track 37 policies of impact with 27 supporting or confirming our forecast, 4 that provide evidence of increased ambition and 6 with less.

With recent US and Australia climate legislation, we now have increased policy momentum IPR 1.8°C FPS for the bulk of **OECD countries**.

The US has passed the **Inflation Reduction Act (IRA)** which creates **significant momentum in the climate transition**. The package is broadly supportive of its NDC and **provides substantial visibility and confidence in US policy forecasts**. An accompanying **IPR paper by Kaya Advisory** shows that up to US$1 trillion dollars of climate stimulus is now in the system.

In **non-OECD countries**, we see policy ambition continue to build in China along with new supportive announcements from India, Mexico and Nigeria.

Energy Security continues to be a central driver since the war in Ukraine. In the EU, we have maintained that emissions trajectories are still manageable through capacity utilization and EU prospects for renewable power and heat, energy efficiency and hydrogen (see **IPR paper by Kaya Advisory**). Against this backdrop, the EU continues to face delays to expansion of the ETS as part of the Fit for 55 package.

This quarter has also seen a **potential weakening in international agreement**. A previous G7 commitment to end international fossil fuel financing has been undermined by a call for temporary investment into gas infrastructure. G20 climate leaders also failed to agree in September on a joint communique over language used on climate targets (e.g. **1.5°C versus 1.8°C**), climate finance and the war in Ukraine.

On technology and land use developments there have been **positive trends in renewables and EV deployment and in hydrogen, battery, and alternative protein innovation**. Deforestation trends in Brazil, continue to be of concern.

We continue to track the increasing importance of **Just Transition concepts** in international climate policy making. An accompanying **assessment by LSE** examines JT elements in recent US policies.

Key Q3 policy and technology announcements

OECD policy developments

With recent US and Australia climate legislation, we now have increased confidence in policy momentum towards IPR 1.8°C FPS for the bulk **of OECD countries**

The **U.S.** passed the Inflation Reduction Act in August, authorizing ~$400B in spending climate mitigation programs to support clean manufacturing, renewables, clean transport, climate-smart agriculture, and green banks. IRA significantly increases confidence in the US pathway under IPR 1.8C FPS out to 2030. The combination of the IRA and two prior laws (Infrastructure Act and CHIPs and Science Act) make nearly $1 trillion available for the clean energy transition (see **Kaya paper**)

Australia enshrined its 2030 climate reduction and 2050 net zero target into law and we expect this to be a key driver of further climate policy action

In **non-OECD countries**, where emission reductions are forecast to be slower due to rapid growth in energy demand, we see policy ambition continues to build in China along with new supportive announcements from India, Mexico and Nigeria

China could be accelerating relative to 1.8 FPS due to announcements for significant investments in clean power and peaking emissions from carbon-intensive industries by 2030

India has approved an updated national climate plan, including increased capacity of clean power sources, approved energy conservation bills and proposed a carbon trading system

Mexico is operationalizing its emissions trading scheme and **Nigeria** announces plans for a cap-and-trade system and a transition plan

Technology/Sector Developments

Multiple announcements are supportive or suggest an acceleration in innovation, deployment and cost reduction (e.g., for renewables, hydrogen, battery and storage technologies)

Renewable costs continue to fall across the world, with notable deployment in the US this year

Major investments in **green hydrogen** announced in **Australia** and the **EU**

Advances in lab-grown meat continue, raising prospects for agriculture emissions reductions

Brazil continues to experience **high deforestation levels.**

Brazil election critical to Amazon outcomes and IPR 1.8C FPS land use emissions trajectory

At the time of going to press, the first round of elections in Brazil will have occurred (October 2nd).

We have previously noted this is an absolutely critical election given the negative trends for deforestation under President Bolsonaro compared with historic decline in deforestation rates that the challenger and former president Lula was able to orchestrate in his term.

An IPR paper published in July by Kaya Advisory explores this, using detailed analysis of a raft of policies on the congressional docket dubbed the 'death package' for the Amazon.

The conclusion is that, no matter who is elected, an end to Net Deforestation by 2025 as required in the 1.5C RPS looks virtually unattainable. If, however, Lula is elected, this leaves the door open to an end to illegal deforestation which accounts for 90%+ of land clearing activity. Lula's election also makes it possible that net zero emissions could potentially happen if combined with afforestation by 2030 as forecast in the 1.8C FPS.

Can Lula save the Amazon? A Brazil Policy Analysis - by Kaya Advisory

Methodology update to QFTs

Following feedback, we are adopting a further categorization to our rating of policy announcements:

- **Legislated** – this covers any enforceable or funded policy from policymakers or regulators
- **Announced but not yet legislated**

Legislated or announced policies can be:

- **Supportive** of our policy forecasts, but where further strengthening of policies may be required
- **Confirmatory,** or align closely with 1.8°C FPS forecast thereby moving the forecast into current policies
- Signal an **acceleration** or **deceleration** in policy forecast

In terms of our QFT ratings these can be termed as:

- **No change in 1.8°C FPS policy forecast:** 5
- **Policy acceleration:** 6+
- **Policy deceleration**: 4-

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Policy developments are scored using a 10-point scale to indicate magnitude and direction of impact on IPR scenario forecasts

A 10-point scale applied to policy developments to indicate impact on IPR 1.8°C FPS policy forecasts (implications for the 1.5°C RPS policy forecasts can also be drawn)

- 0-1 indicates **increasing evidence for deceleration** in policy forecast
- 2-4 indicates **evidence for deceleration** in policy forecast
- 5 indicates **no change** in policy forecast
- 6-8 indicates **evidence for acceleration in** policy forecast
- 9-10 indicates **increasing evidence for acceleration** in policy forecast

A similar 10-point scale is applied to energy/land technology developments

Scale	Details	Impact on policy forecast
0	Evidence for significant deceleration in policy forecast	Potential for 10+ year downgrade
1	Evidence for large deceleration in policy forecast	Potential for 10-year downgrade
2	Evidence for moderate deceleration policy forecast	Potential for 5-year downgrade
3	Evidence for small deceleration in policy forecast	Potential for <5-year downgrade
4	Some evidence for marginal deceleration in policy forecast	Monitor developments
5	**Legislated or announced policies that 1) support and increase probability of 1.8°C FPS or 2) confirm FPS policy forecast**	**No change to 1.8C FPS forecast**
6	Some evidence for marginal acceleration in policy forecast	Monitor developments
7	Evidence for small acceleration in policy forecast	Potential for <5-year upgrade
8	Evidence for moderate acceleration in policy forecast	Potential for 5-year upgrade
9	Evidence for large acceleration in policy forecast	Potential for 10-year upgrade
10	Evidence for significant acceleration in policy forecast	Potential for 10+ year upgrade

Greater likelihood of 2.3°C IEA STEPS[1] scenario

1.8°C IPR FPS

Greater likelihood of 1.5°C IPR RPS scenario

* The IEA's 'Stated Policy Scenario' or STEPS reflects current policy settings based on a sector-by-sector assessment of the specific policies that are in place, as well as those that have been announced by governments around the world

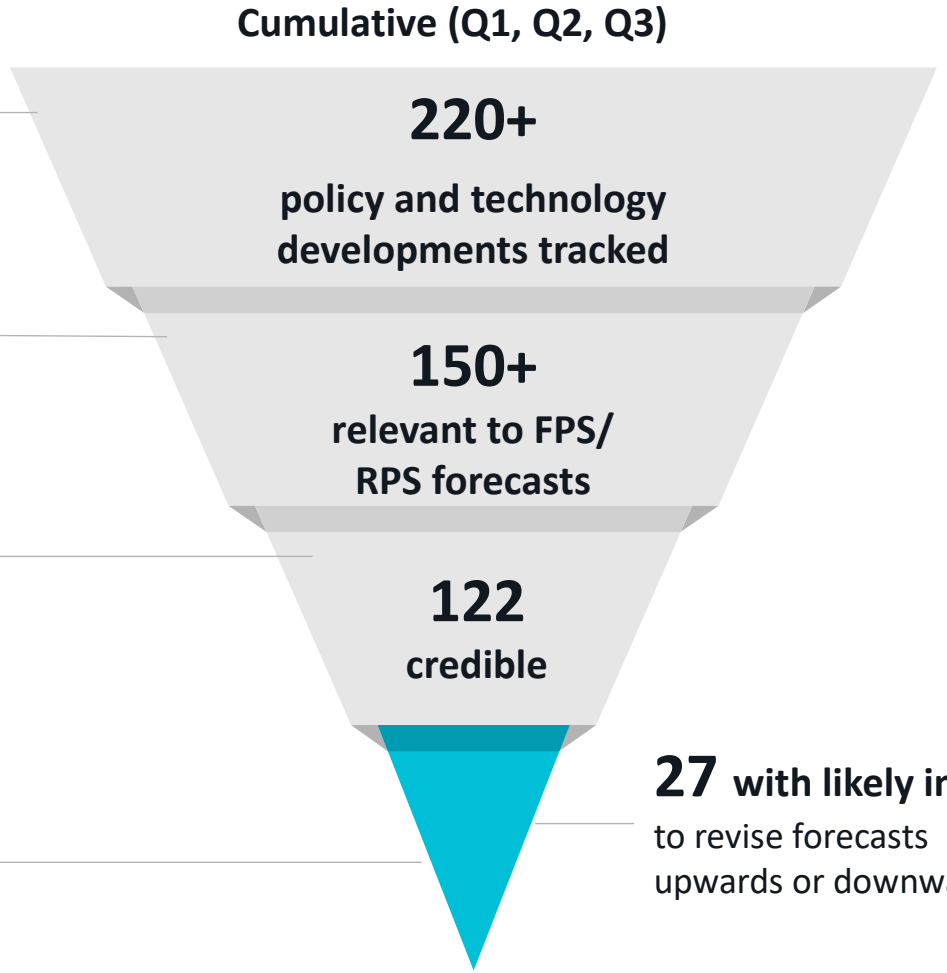
IPR QFT assessment adopts a multi-step approach to assessing key policy and technology developments impacting 1.8°C FPS and 1.5°C RPS

1. **Track/compile** announcements between October 2021 – September 2022

2. Determine **relevancy** to IPR FPS and RPS forecasts:

3. Assess **credibility** of announcement
   - Less credible: off or on-the record statement
   - Credible: Public position on direction of travel
   - More Credible: Published strategy, or enacted legislation

4. **Score impact** of development on RPS and FSP forecast (see previous slide)
   - Legislated or announced policies that 1) support and increase probability of 1.8°C FPS or 2) confirm 1.8°C FPS policy forecast
   - Signal acceleration or deceleration of policy relative to forecasts



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Cumulative announcements and developments between COP 26 and September 2022 have reinforced the 1.8°C Forecast Policy Scenario pathway

Greater likelihood of 2.3°C IEA STEPS* scenario ← **1.8°C IPR FPS** → **Greater likelihood of 1.5°C IPR RPS scenario**

	Significant deceleration	Large deceleration	Moderate deceleration	Small deceleration	Marginal deceleration	No change to policy forecast	Marginal acceleration	Small acceleration	Moderate acceleration	Large acceleration	Significant acceleration	
Score	0	1	2	3	4	5	6	7	8	9	10	Total
Global					3	14	3					20
US				1	3	19						23
China						8	4					12
EU						13						13
Germany						4	3					7
France							1					1
UK					1	7		1				9
Brazil					4	5	1					10
India						5						5
Indonesia						3						3
Canada						2			1			3
Nigeria						4						4
South Africa						1						1
Saudi Arabia						2						2
South Korea						1						1
Japan						2	1					3
Australia						4						4
Mexico						1						1
Total				1	11	95	13	1	1			122

i. This assessment covers the period from COP 26 to mid-June 2022

ii. The IEA's 'Stated Policy Scenario' or STEPS reflects current policy settings based on a sector-by-sector assessment of the specific policies that are in place, as well as those that have been announced by governments around the world

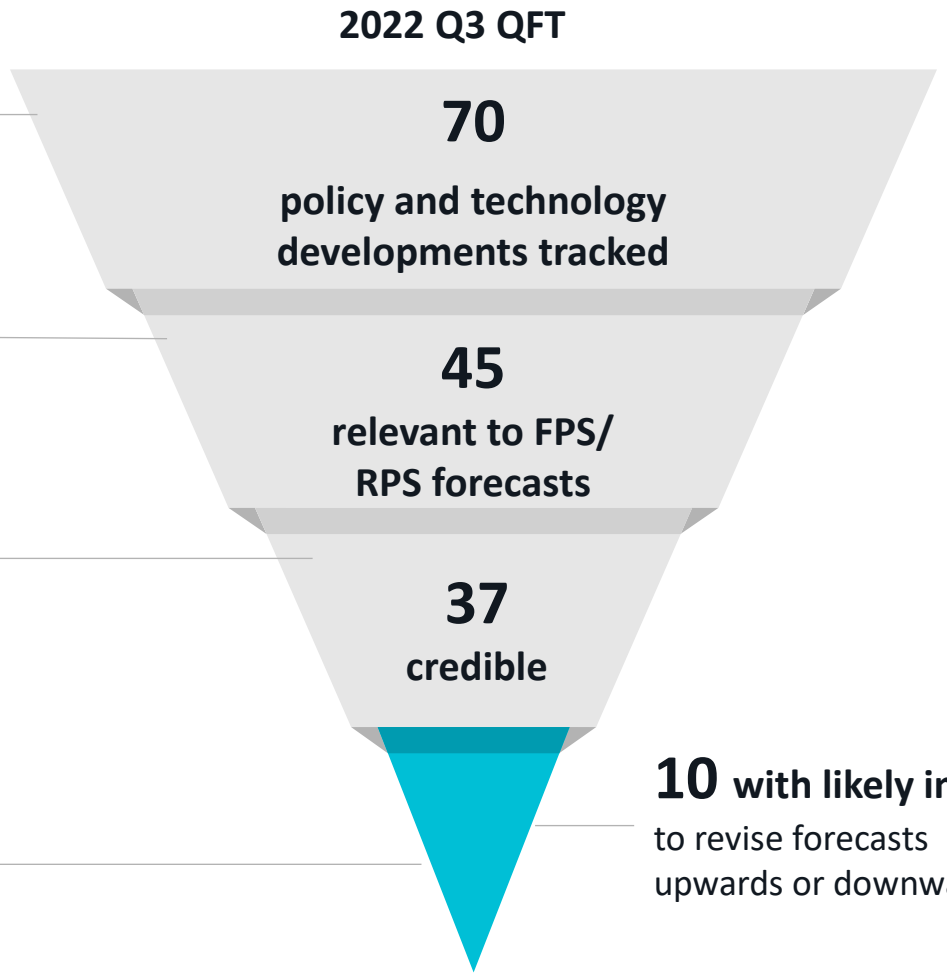
IPR QFT in Q3

1. **Track/compile** announcements between end of June 2022 – September 2022

2. Determine **relevancy** to IPR FPS and RPS forecasts:

3. Assess **credibility** of announcement
   - Less credible: off or on-the record statement
   - Credible: Public position on direction of travel
   - More Credible: Published strategy, or enacted legislation

4. **Score impact** of development on RPS and FSP forecast (see previous slide)
   - Legislated or announced policies that 1) support and increase probability of 1.8°C FPS or 2) confirm 1.8°C FPS policy forecast
   - Signal acceleration or deceleration of policy relative to forecasts



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Q3 2022 policy and technology announcements and developments reinforce the 1.8°C Forecast Policy Scenario

Greater likelihood of 2.3°C IEA STEPS* scenario | **1.8°C IPR FPS** | **Greater likelihood of 1.5°C IPR RPS scenario**

	Significant deceleration	Large deceleration	Moderate deceleration	Small deceleration	Marginal deceleration	No change to policy forecast	Marginal acceleration	Small acceleration	Moderate acceleration	Large acceleration	Significant acceleration	
Score	0	1	2	3	4	5	6	7	8	9	10	Total
Global					2	3						5
US					1	7 →						8
China						1	1					2
EU						6						6
Germany							1					1
France												0
UK					1	2						3
Brazil					2							2
India						2						2
Indonesia												0
Canada						1			1			2
Nigeria						2						2
South Africa												0
Saudi Arabia												0
South Korea												0
Japan							1					1
Australia						2						2
Mexico						1						1
Total	0	0	0	0	6	27	3	0	1	0	0	37

Visibility provided by IRA significantly boosts confidence in US policy forecasts

i. This assessment covers the period from the end of June 2022 - to mid-September 2022

ii. The IEA's 'Stated Policy Scenario' or STEPS reflects current policy settings based on a sector-by-sector assessment of the specific policies that are in place, as well as those that have been announced by governments around the world

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Global policy announcements/developments

A previous G7 foreign minister commitment to end international fossil fuel financing by the end of 2022 is potentially undermined by the energy crisis and call for exception for temporary investment into gas infrastructure, which could lead to risk of fossil fuel lock in. In early September, G20 climate leaders failed to agree on a joint communique, raising concerns for 1.5°C.

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
Global	Fossil fuels including coal phase outs	Following a May pledge to end international fossil fuel financing by the end of 2022, in June at a G7 summit in Bavaria, Italy and Germany pushed the group to introduce an exception for temporary investment into gas infrastructure to the club's pledge. The measure is aimed at temporarily alleviating the current energy crisis though this has received opposition from climate campaigners.	**1.8°C FPS:** • Policy signals (bans, EPS, carbon pricing) and market reforms end new coal build from 2020 in first mover countries, by 2025 in Tier 2 countries and by 2030 in Tier 3 countries • No policy forecast for oil/gas phaseouts	**Announced; monitor developments, policy headwinds:** In the Q2 QFT IPR noted full support to end taxpayer funding for oil, gas and coal projects overseas could shift approximately US$33bn per year from fossil fuels to clean energy sources. The recent G7 proposal to introduce an exception for temporary investment in gas infrastructure risks undermining momentum and further fossil-fuel lock in.	4 Announced; Monitor developments
	Multiple, including climate targets	In September, G20 climate talks in Bali failed to agree on a joint communique, amid objections over language used on climate targets (1.5C versus 2C), climate finance and war in Ukraine.	IPR's FPS 2021 forecast shows rapid policy is likely by the 2025 Paris Ratchet, which could result in warming being held to well below 2°C To hold warming to 1.5 ° C with Net Zero in 2050, greater action and sooner will be required (including rapid end to deforestation before 2030, unabated coal fully decommissioned in advanced economies by 2025, phase out of new fossil cars in almost all markets by 2040, and 100% clean power globally by 2045.	**Announced; monitor developments:** The lack of agreement on wording for a communique ahead of COP27 raises concerns for 1.5°C (RPS).	4 Announced; Monitor developments

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Australia policy announcements/developments

Australia passes landmark climate bill, enshrining 2030 43% reduction and 2050 net zero targets into law, reinforcing 1.8°C FPS outlook for emissions reductions and sector decarbonisation pathways.

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
Australia 	Multiple including  Net zero targets	In September, Australia's Senate passed the new government's climate targets into law, with the country's emissions target now being a 43% reduction in GHG emissions in 2030 relative to 2005 levels and a net zero target by 2050. This is following the bill passing in the lower house in July.	**1.8°C FPS:** Net zero by 2050	**Legislated and confirmed, policy tailwinds.** In the Q2 2022 QFT, IPR noted that more ambition would be likely to emerge with the new government. Australia's landmark climate bill will likely be a key driver of further policy action and targets in key sectors driving the energy and land transition.	5 Legislated Confirmed

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Canada policy announcements/developments

Canada has made confirmatory announcements including a consultation to cap emissions in oil and gas and legislation mandating a decrease in the carbon intensity of fuel.

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
Canada	Carbon pricing	In July, Canada's federal government launched a consultation to introduce a cap on emissions from the oil and gas sector, either through: 1) a carbon trading programme or 2) modifying its 'backstop' CO_2 pricing system. The government expects to outline the design of the emissions cap early next year.	**1.8°C FPS:** • US$85 by 2030	**Announced and supportive.** This is confirmatory of the forecast as it supports Canada's carbon price development and is imposing caps on their highest emitting sector.	5 Announced and supportive
	Clean transport	Canada's Clean Fuel Standard (CFS) **regulation will be introduced in July 2023, 7 months later than initially planned. The government justified the delay as necessary to allow early credit creation and a consequent lower initial compliance cost for refineries. The CFS will mandate a c.15% decrease in the carbon intensity of gasoline and diesel by 2030 vs. 2016 levels, an increase from c.13% in a previous draft.**	**1.8°C FPS:** • Policy to deliver **100% ZEV sales from 2040**.	**Legislated and confirmatory.** In February of 2022, Canada announced its 2030 Emissions Reduction Plan including a sales mandate of 20% new LDV sales to be zero emissions by 2026, 60% by 2030, **and 100% by 2035**. This signalled an acceleration in policy ambition relative to FPS (which forecast a 2040 100% ZEV sales policy). Introduction of a clean fuel standard for transport fuels will further support Canada's ambition for clean transport.	8 Legislated Potential for 5-year upgrade

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China policy announcements/developments

China could be accelerating relative to forecasts due to significant investments in clean power. Furthermore, a plan to peak emissions in carbon-intensive industries by 2030 confirms forecasts, although this could have implications for the global supply chain.

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
China	Clean Power	• In July, China's housing department and the National Development and Reform Commission announced a plan for new-build public buildings and factories in towns and cities to be covered 50% by solar panels by 2025. • This complements an existing scheme set out by the National Energy Bureau in September 2021 which allows local authorities to partner with solar developers to meet rooftop solar targets. • The pilot could deliver installed solar PV capacity of 100 GW, with 600 GW of potential capacity if rolled out across the entire country.	• **1.8°C FPS:** Strong policy signal to deliver 100% clean power by 2050 • **1.5°C RPS:** Strong policy signal to deliver 100% clean power by 2040	**Announced and supportive, signals an acceleration in policy ambition, policy tailwinds.** This scheme introduces large capacity increases to China's clean power and indicates that China's clean power forecast may be accelerated. IPR to monitor developments. Following this announcement in August, months-long droughts have also raised concerns around the reliance of some states on hydropower, with empty dams and rivers resulting in power outages. This creates need for additional energy sources, including renewables and coal.	6 Announced Signals an acceleration in policy ambition relative to FPS; monitor developments
	Industry Decarbon-ization	• In July, China released a plan to guide carbon-intensive industries to reach peak emissions by 2030. • The joint plan by the Ministry of Industry and Information Technology, the National Development and Reform Commission and the Ministry of Ecology and Environment has assigned targets across seven industrial sectors (steel, building materials, petrochemicals, non-ferrous metals, consumer goods, equipment manufacturing and electronics) to reduce energy consumption and increase recycling. • Industrial enterprises with an annual revenue of over US$2.9m will need to reduce their energy intensity by 13.5% by 2025 compared to 2020 levels.	• **1.8°C FPS:** 100% clean industry >2060 • **1.5°C RPS:** 100% clean industry by 2055	**Announced and supportive, policy tailwinds.** Supportive of IPR FPS forecasts in a sector that often lacks a policy framework. China's focus on industrial decarbonisation may have implications for international supply chains.	5 Announced; Supportive

European Union policy announcements/developments (1/2)

In September, Russia announced it will not resume gas supplies to Europe until sanctions are lifted. This will stress already limited energy supplies and will increase uptake of renewables and fossil fuel energy sources in the short term, however long-term impacts are likely positive for renewables because of this. In the EU, additional emergency measures to cut electricity use and cap prices enter the discourse. The EU is also looking to decrease energy demand in response to the energy crisis by reducing natural gas use by 15% this winter and potentially legislating a 14.5% energy efficiency goal for the first time.

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
EU	Multiple Clean Power Buildings Industry	In July, the European Commission proposed to set a target for each member state to reduce natural gas demand by 15% between 1 August 2022 and 31 March 2023 in response to a potential shutoff in gas from Russia this winter. • The voluntary reduction in gas use may become legally binding in the event of a crisis. • The plan also states that members should prioritise switching fuels to renewables or coal, oil or nuclear power if necessary and suggested that cities could mandate levels of heating and cooling in public buildings.	1.8°C FPS: • Strong policy signal to deliver 100% clean power by 2045	**Announced and supportive**: These plans would contribute towards the transition to renewable sources and reduction in natural gas use, although could increase fossil fuel use in the short term. In short term, low gas levels this winter could significantly impact EU industry, with economic consequences, however this would likely be followed by a massive acceleration in the energy transition.	5 Announced; supportive
	Buildings	The EU's four largest political groups, the European People's Party (EPP), the Socialists and Democrats (S&D), the Renew Europe (RE) and the Greens, proposed a 14.5% efficiency goal by 2030 relative to 2020 in July. This is up from 13% as part of the REPowerEU plan published in response to Russia's invasion of Ukraine, already an increase from 9% proposed last year as part of the Fit for 55 package. The extent of the target will be decided at trialogue talks between the EU institutions later in the year.	1.8°C FPS: • End sale of fossil fuel heating systems by 2035	**Announced and supportive:** If the legislation is passed then it will be the first-time energy savings become a legal obligation for EU member states.	5 Announced; supportive
	Clean Power	Emergency measures including mandatory 5% electricity saving and 10% gross electricity reduction and a cap on non-fossil fuel electricity, currently under negotiation by council.	1.8°C FPS: • Strong policy signal to deliver 100% clean power by 2045	**Announced and supportive:** Agreement on these measures could occur by end of October. European Commission leadership has announced that it will seek long-term reform of EU electricity markets, which may take years to formalise.	5 Announced; supportive

European Union policy announcements/developments (2/2)

EU continues to face delays and challenges to expansion of the ETS as part of Fit for 55 in negotiations against the backdrop of its response to the energy crisis. European Commission has announced creation of a new €3 billion Hydrogen Bank to support ambitious REPowerEU goals for green hydrogen production.

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
EU	Multiple including Carbon pricing ICE ban Buildings Land use and Forestry	**In July, EU countries negotiated climate bills proposed last year:** • An amendment to the EU's carbon market which increases their pledge to cut emissions to 61% by 2030 and extend it to cover shipping. • Approved an ETS 2 covering road transport and buildings, applying to fuel distributors for these sectors. The Council proposal is for auctioning of allowances from 2027 and surrender from 2028. • The proposed CBAM from 2026 but with a different trajectory for phasing out free allowances, with a slower reduction at the beginning and a faster rollout towards the end until full phase out is reached in 2035. • Requiring new cars sold in the EU to emit zero CO2 from 2035 and forming a €59bn EU fund to shield low-income citizens from the policy's costs from 2027 to 2032. • An agreement was reached on laws to strengthen the national emissions-cutting targets and increase natural carbon sinks such as forests.	**1.8°C FPS:** • Carbon prices reaching US$75 by 2030 • Strong policy signal to deliver 100% clean power by 2045 • 100% ZEV sales from 2035 • 100% zero carbon heating sales from 2035 • End net deforestation by 2025; deliver afforestation at scale by 2025	**Announced and supportive, but with potential for policy headwinds.** Policies are still undergoing trilogue negotiations, and under the current energy situation, there is potential for delayed timelines for ETS2 and CBAM.	5 Announced Supportive
	Cross-cutting	In September, European Commission leadership announced plans for creation of a new €3 billion European Hydrogen Bank to support hydrogen deployment, leveraging funds from the EU Innovation Fund, and with a $3 billion.	**1.8°C FPS:** • Hydrogen capacity to start building up in 2031 and reach ~25 Mt by 2050	**Announced and supportive.** Supportive of REPowerEU target to produce 10 Mt of green hydrogen per year by 2030.	5 Announced Supportive

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Germany policy announcements/developments

Germany has legislated an 80% renewables target for 2030, raising prospects for delivering 100% clean power earlier than 2045 (currently forecast in 1.8°C FPS)

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
Germany 	Clean Power	Germany's Federal Council passes laws approving a target for renewables to deliver 80% of electricity generation by 2030 in July. Although parties dropped the target of 'near 100% renewables' in the grid by 2035 under final negotiations for its energy transition reforms, other targets remain unchanged including for solar PV and onshore wind (215 GW and 115 GW in 2030, respectively).	**1.8°C FPS:** Strong policy signal to deliver 100% clean power by 2045	**Legislated, signals an acceleration in policy ambition.** A legislated target for 80% renewables by 2030 could put Germany on a path for reaching 100% clean power earlier than 2045 (currently forecast in FPS).	6 Legislated Signals acceleration in policy ambition; monitor

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India policy announcements/developments

Recent policy action in India is supportive of 1.8°CFPS forecast, notable around clean power, however policy needs to be legislated and actioned.

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
India	Net Zero target Clean Power	In July India approved an updated national climate plan which includes a 2070 net zero target and: • A 45% reduction in emissions intensity by 2030 relative to 2005 levels. This is an increase in ambition from 33-35% by 2030. • Half of installed generation capacity should come from non-fossil fuel sources by 2030, rather than half of energy use which would have been more difficult to achieve. The current non-fossil capacity is 40%, including nuclear and hydro dams.	**1.8°C FPS:** Net zero by 2060 **1.8°C FPS:** Strong policy signal to deliver 100% clean power by 2050	**Announced and supportive, policy tailwinds.** India is making strides to advance emissions reductions and increase capacity of clean power sources. This follows from a verbal pledge PM Modi made at COP 26.	5 Announced and supportive
	Clean Power Carbon pricing	In August, India approved an energy conservation bill in their lower house ahead of submitting their updated NDC which: • Mandates large residential and commercial buildings to use a minimum portion of clean energy for their needs and includes penalties for not reaching targets. • Proposes a carbon trading system. The power minister stated that India will ban the export of carbon credits until India meets its own climate targets. More information will be released on the proposed carbon market later in the year. The bill is now going through India's upper parliament.	**1.8°C FPS:** Strong policy signal to deliver 100% clean power by 2050 **1.8°C FPS**: US$50 by 2030	**Announced and supportive, policy tailwinds.** This confirms India's forecasts for clean power and carbon pricing, but the bill will need to pass the Upper house before it is legislated.	5 Announced and supportive

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Japan policy announcements/developments

Japan is introducing large nuclear capacity to support its energy demand and decarbonization which confirms their clean power forecast

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
Japan	Clean Power	In August, Japan's PM has proposed a major shift in the country's energy policy post-Fukushima by restarting nuclear power plants beginning in summer 2023 and considering a new generation of plants, to address a structural challenge facing Japan such as electricity shortages and decarbonization delays. Japan's prime minister is expected to propose plans to restart 17 nuclear power plants beginning summer 2023. This will contribute towards a goal of constructing next generation power plants from 2030.	**1.8°C FPS:** Strong policy signal to deliver 100% clean power by 2045	**Announced and supportive.** This is a significant shift for Japan which has long avoided nuclear power and a significant move towards securing clean power. The IPR FPS forecast a decline in nuclear capacity alongside an increase in renewable capacity and generation in Japan. Although early days, a dual strategy of new nuclear and renewables could raise prospects for achieving 100% clean power at an earlier date in Japan. IPR to continue to monitor developments.	6 Signals an acceleration in policy ambition; monitor developments

Mexico and Nigeria policy announcements/developments

Mexico is operationalizing its emissions trading scheme.

Nigeria announces plans towards a national cap-and-trade system and published a transition plan which supports its forecasts for clean power.

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
Mexico	Carbon pricing	In September, Mexico announced that its emissions trading scheme will begin in 2023, freely distributing all allowances before reducing this over time.	**1.8°C FPS:** US$50 by 2030	**Announced and supportive.** This is a follow on from the pilot which began in 2021 and supports the existing forecasts.	5 Announced; supportive
Nigeria	Carbon pricing	Nigeria announced first steps towards a national cap-and-trade system in September.	**1.8°C FPS:** US$35 by 2030	**Announced and supportive:** To monitor further developments.	5 Announced; supportive
	Clean Power	In September, Nigeria published a gas-led transition plan in line with its 2060 net zero target. • The plan includes a request for US$10bn in support ahead of COP27, similar to South Africa's US$8.5bn agreement announced at COP26. • The plan includes a focus on just transition, calls for the complete elimination of diesel/petrol generators and the expansion of generation capacity via renewable resources, primarily solar, with some initial ramp up of gas generation.	**1.8°C FPS:** Strong policy signal to deliver 100% clean power by 2050	**Announced and supportive:** This plan supports the clean power forecast for Nigeria, with planned increases in solar supporting transition to clean power. A short-term focus on gas as a transition fuel, however, may have a lock in effect.	5 Announced; supportive

United Kingdom policy announcements/developments

The United Kingdom's developments in increasing renewable capacity are supportive of the clean energy forecast. IPR will monitor the lifting of fracking restrictions and any announcements or developments from new leadership with potential to undermine the energy transition.

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
UK	Clean Power	In July, the National Grid has laid out plans for £54bn in upgrades to the UK's electricity infrastructure to connect new offshore wind deployment to population centres.	**1.8°C FPS:** Policy to deliver 100% clean power by 2040	**Announced and supportive:** This supports the UK forecast as it allows for increased renewable capacity.	5 Announced; supportive
		In July, the UK government has granted development permission for Sizewell C new nuclear plant in Suffolk, a 3.2GW development. • The UK government will take a 20% stake in the project and French utility EDF will take another 20%. • The final investment decision is expected in 2023, once financing has been decided.	**1.8°C FPS:** Strong policy signal to deliver 100% clean power by 2040	**Legislated and supportive** of UK clean energy forecast as increasing clean energy supply.	5 Legislated; supportive
		In September, the new UK Prime Minister Liz Truss has lifted a ban on shale gas fracking in an energy plan to increase fuel supply. This is subject to local support and could start in as soon as six months.	**1.8°C FPS:** Strong policy signal to deliver 100% clean power by 2040	**Announced and policy tailwinds, monitor developments** of UK clean energy forecast if fracking and gas supply increase. This measure is introduced to provide additional energy resources during the energy crisis but will likely take years before a significant amount of gas is able to be extracted and could lead to a lock in of fossil fuel energy source.	4 Announced Monitor developments

United States passes landmark climate bill in August, significantly increasing visibility and confidence in policy forecasts under IPR 1.8°C FPS

In late August, Congress passed, and President Biden signed the Inflation Reduction Act.

- This landmark climate law, although slimmed down from the Build Back Better bill that failed to passed in 2021, puts the US on a path towards reinforcing a 1.8°C climate objective across key sectors driving the energy and land transition, including development of clean energy supply chains
- In previous QFTs, a lack of federal climate action, potential for an unfavorable Supreme Court ruling on the ability of the EPA to regulate GHGs, and renewable supply chain constraints together signaled a deceleration in policy ambition in the US
- In passing the IRA, the US has significantly increased visibility and confidence in achieving its policy forecasts

Included	Not included
~US$400B in total energy security and climate tax credits across: Energy, manufacturing, environment, agriculture and conservation, clean transportation and water.	Carbon pricing: 13 states currently have carbon pricing policies (either own or regional initiatives) Further measures (e.g. executive action) may address any gaps in law

An overview and detailed breakdown of the IRA follows on the next two pages.

United States policy announcements/developments (1/4)

Visibility provided by IRA significantly boosts confidence in US policy forecasts across key sectors driving the energy and land transition.

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
US 	 Multiple, including net zero targets	In July, President Biden signed into law the Inflation Reduction Act (IRA) which contains ~US$400bn in funding for climate and energy provisions over the next ten years. The breakthrough was an agreement between Manchin and Schumer in the Senate after previous negotiations in 2021 on the Build Back Better bill had failed. Initial estimates have suggested that the Inflation Reduction Act could cut US emissions by 40% in 2030 relative to 2005 levels, which compares against the US NDC target of a 50-52% emissions reduction in 2030 relative to 2005 levels. IRA focuses on investments to accelerate domestic clean energy manufacturing across the full supply chain of clean energy/transportation technologies. The combination of the IRA and the recently passed Infrastructure and Investment Jobs Act and The CHIPS and Science Act along with other sources make nearly $1 trillion available for the clean energy transition and climate in the U.S. (see Kaya paper). **See following slide for sector-by-sector assessment of IRA climate provisions relative to the 1.8°C FPS outlook.**	Multiple, including net zero target by 2040 (see following slide for more sector-by-sector assessment)	**Legislated; supportive, policy tailwinds:** IPR's forecast for the US in FPS was ambitious, banking on legislation in support. In Q2, IPR signaled a reversal of a potential downgrade of its 2021 forecast for power sector decarbonization and this is further supported by this bill which is supportive for multiple forecasts. Estimates suggest that IRA may not be enough to help the US achieve its 50% target, therefore additional actions may be needed to close the gap. Clean energy manufacturing support will likely encourage domestic production/sourcing, lead to build-out of domestic EV, battery, and charging infrastructure manufacturing. These provisions build on the Infrastructure Act, CHIPS and Science Act which included $2.3B to boost domestic battering manufacturing and supply chains as well as semiconductor manufacturing. The IRA also includes funding for green banks to facilitate investments in low carbon infrastructure, including in disadvantaged communities.	5 → Legislated; Substantial increase in confidence and transparency

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United States policy announcements/developments (2/4)

The IRA builds policy momentum in key sectors including power and transport; executive/state level action likely to drive further reductions

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
US	Clean Power	US$180B to extend and modify production tax credit, for technology-neutral investments in generation and storage, and to extend lifespans of existing nuclear reactors.	**1.8°C FPS:** Policy to deliver 100% clean power by 2040 (for example, through announcement of a 100% clean power standard for 2040)	**Legislated; supportive:** Through a focus on tax incentives and production credits, IRA is estimated to reinforce a US path for achieving 80% clean power by 2030[1] through supporting a substantial increase in utility-scale solar and onshore wind capacity.	5 → Legislated; Substantial increase in confidence and transparency
	ICE ban	US$20.2B in consumer tax credits for new and used EVs, lifting a manufacturing cap, tax credits for qualified commercial vehicles, support for purchasing clean Postal Service vehicles, incentives for installing EV charging.	**1.8°C FPS:** 100% ZEV sales from 2040	**Legislated; supportive:** a removal of manufacturing caps could drive further uptake however expanded tax credits contingent on meeting domestic manufacturing requirements OR sourcing materials from countries in free trade agreements with US, which could impact supply in shorter term. Provisions could fall short of FPS 100% ZEV sales target but additional measures (e.g. state subsidies, Infrastructure Act funding to support EV charging infrastructure) and falling costs could drive further uptake.	
	Industry Decarbon-isation	Introduction of new production tax credit for production of qualified clean hydrogen. Extends and modifies tax credit for industrial carbon captured, sequestered and reused.	**1.8°C FPS:** 100% new zero carbon production facilities from 2040	**Legislated; supportive:** Green hydrogen credit will likely support grid parity. Carbon capture estimated to support ~200 MtCO2 capture capacity by 2030 (from ~25 Mt capacity today)[2].	
	Buildings	US$49.2B in grants or loans for administered through DOE, GSA for buildings and energy efficiency, and tax credits.	**1.8°C FPS:** 100% zero carbon heating sales from 2040	**Legislated; supportive:** Focus on retrofit and high-efficiency electric home rebates and incentivizing installation of more efficient gas appliances.	
	Agricul-ture	US$25B+ in IRA to protect and promote climate-smart agricultural practices.	**1.8°C FPS:** Nationwide market incentives to encourage farmers to reduce emissions from crop production and livestock from 2029	**Legislated; supportive:** including US$8.5B in Environmental Quality Incentives Program which includes grants for farmers/ranchers that utilize diet and feed management to reduce enteric methane emissions from ruminants.	

1. Rhodium Group (August 12, 2022) A Turning Point for US Climate Progress, https://rhg.com/research/climate-clean-energy-inflation-reduction-act/
2. Princeton University REPEAT; Preliminary Report: The Climate and Energy Impacts of the Inflation Reduction Act of 2022; repeatproject.org

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United States policy announcements/developments (3/4)

In late June, the Supreme Court limited the EPA's ability to regulate the power sector. The passing of the IRA has raised prospects for the U.S. vis-à-vis a 1.8C climate target. Recent bipartisan support in the Senate towards signing a 2016 international agreement on the phaseout hydrofluorocarbons in cooling applications signals further policy momentum.

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
US 	Clean Power	In late June, the Supreme Court ruled that the EPA cannot regulate carbon emissions of power plants through generation shifting, that is shifting electricity generation to low-carbon energy sources, because it goes beyond the EPA's authority to limit greenhouse gas emissions under the Clean Air Act. Following this, a group of attorney generals have written to the EPA to describe their proposed rules as 'regulatory overreach'.	**1.8°C FPS:** Strong policy signal to deliver 100% clean power by 2040	**Legislated, signaling a decrease in policy ambition, policy headwinds:** This ruling against the ability of the EPA to regulate emission may be countered by subsequent executive action. Developments to be monitored.	4 Legislated Monitor developments
	Non-CO_2 F-gases (HFCs)	In September, the Senate voted in a bipartisan deal to approve the 2016 Kigali Amendment to the UN Montreal Protocol, an agreement to reduce hydrofluorocarbons (HFCs) through incremental targets (up to an 86% reduction by 2036). HFCs are used in refrigeration, air conditioning, and other cooling services. 137 countries have been signatories to the agreement.	**1.8°C FPS:** No explicit forecasts, but if fully implemented, the Kigali amendment could prevent an estimated maximum of 0.5C in warming by end of the century.	**Policy tailwinds.** Bipartisan support signals further policy momentum alongside IRA. In practice, the US has implemented policies to reduce HFCs by 85% over the next fifteen years and industry has pursued alternative chemicals.	5 Supportive

United States policy announcements/developments (3/4)

Leading states such as California continue to deploy aggressive climate policies (ICE bans, O&G restrictions)

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
US 	Multiple including  Net zero targets  Clean Power  Industry Decarbon-isation	• In early September, five of six climate bills proposed in California's legislature passed. They include: • Codifying the state's 2045 climate neutrality goal; requiring that, by 2035, 90% of the state's retail electricity must be from renewables and 95% by 2040. • Directing the California Air Resources Board to develop a program and set regulations for CCUS. • Requiring the state set targets for removing GHG emissions with nature-based methods. • Prohibiting new or extensive retrofitting of existing oil operations within 3,200 feet of homes, schools, nursing homes and hospitals. • The one failed bill attempted to raise California's 2030 target for emissions reduction to 55% (from 40%), relative to 1990 levels.	**1.8°C FPS:** Strong policy signal to deliver 100% clean power by 2040	**Legislated and supportive:** These policies support the broader US policy forecasts across clean energy and industry.	5 Legislated; supportive
	 ICE ban	California Air Resources Board approved a plan to phase out the sale of fossil fuel cars by 2035 in August. This will be implemented incrementally, with 35% of new car sales required to be zero emission by 2026, 51% in 2028, 68% in 2030 and 100% in 2035. This is the continuation of a 2020 executive order mandating that all vehicles sold in the state must be zero emission by 2035.	**1.8°C FPS:** Strong policy signal to deliver 100% clean power by 2040	**Legislated and supportive:** This target is supportive of the national level forecast.	5 Legislated; supportive
	 Clean Power	In August, the California Energy Commission (CEC), the primary energy policy and planning agency for the state of California, has adopted a new goal of reaching 25 GW of offshore wind capacity by 2045, with two to five GW by 2030. The target out to 2025 is higher, with the US Bureau of Land Management announcing plans to greenlight 29 GW of new utility-scale solar on public land by that year.	**1.8°C FPS:** Strong policy signal to deliver 100% clean power by 2040	**Legislated and supportive:** This support the national US forecast by increasing renewable capacity.	5 Legislated; supportive

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Technology developments: Renewables

Increased cost competitiveness of renewables and global increases in clean energy capacity support IPR clean energy forecasts.

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
Global	Clean Power	A new report from the International Renewable Energy Agency (IRENA) indicates that most of the renewable energy installed in G20 countries in the last year had lower costs than the cheapest coal power in the world.	**1.8°C FPS:** Cost reduction across all major clean energy technologies	**Supportive:** Increasing cost competitiveness of clean energy and declining economics of coal support the IPR clean energy and coal phaseout forecasts.	5 Supportive
		An estimated 8% rise in global energy investment in 2022 to US$2.4 trillion, driven overwhelmingly by a 12% rise in clean energy spending, is still far from enough to tackle the energy crisis and to put the world on the path to a greener and more secure energy future.	**1.8°C FPS:** Investment and extensive deployment of renewables out to 2030 and beyond	**Supportive:** Increased investment in clean power supports the IPR forecast.	5 Supportive
US		Renewable resources accounted for more than two-thirds of the new US electrical generating capacity added during the first six months of 2022.	**1.8°C FPS:** Policy to deliver 100% clean power by 2040	**Supportive:** Increasing clean energy capacity supports the US clean policy forecast.	5 Supportive

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Technology developments: Hydrogen

Investment in green hydrogen continues and supports cost reduction and increased adoption as a fuel in line with IPR forecasts.

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
Australia 	Hydrogen	Hydrogen Fuels Australia (H2FA) and compatriot Clara Energy plan to invest AUD 600 million (US$419.7m/EUR 399m) to create a network of refuelling stations for the distribution of green hydrogen coming from a large complex between Melbourne and Sydney.	**1.8°C FPS:** • Hydrogen capacity to reach ~3Mt by 2050	**Supportive**: Australia is making large investments in Hydrogen and operationalising hydrogen use which supports IPR forecasts.	5 Supportive
EU: Nether-lands	Hydrogen	Plans to build a major hydrogen plant in the Netherlands will go ahead following a final investment decision by subsidiaries of oil and gas giant Shell. Shell said the Holland Hydrogen I facility would be "Europe's largest renewable hydrogen plant" when operations start in 2025, generating as much as 60,000 kilograms of renewable hydrogen every day.	**1.8°C FPS:** • Hydrogen capacity in Europe to start building up in 2031 and reach ~25 Mt by 2050	**Supportive**: the Netherlands is making large investments in Hydrogen to create Europe's largest renewable hydrogen plant, supporting IPR forecasts.	5 Supportive

Technology developments: Agriculture, Land Use and Forestry

Advancements in lab-grown meat can reduce emissions from livestock by decreasing supply, however these need to be scaled and operationalised before the impacts on forecasts can be understood.

Region	Sector	Development	2021 IPR Forecast	Impact on forecast	Impact score
US	Agriculture	Researchers at UCLA have created an edible particle that helps make lab-grown meat, known as cultured meat, with more natural muscle-like texture using a process that could be scaled up for mass production. The researchers said that the microcarrier manufacturing process could be used to produce large amounts of meat quickly and cheaply. Meat of different textures could be produced by manipulating microcarrier stiffness and texture.	**1.8°C FPS:** Nationwide market incentives to encourage farmers to reduce emissions from crop production and livestock from 2029	**Supportive:** Advancements in lab-grown meat technology will reduce livestock emissions, however these technologies need to be scaled and operationalised before they can have an impact.	5 Supportive
Global		Alternative Protein Market is expected to reach a valuation of nearly US$496.56 Billion by 2032. Microbial-based protein is expected to possess 40% market share for alternative protein market in the forecast period 2022-2032.		**Supportive:** Advancements in lab-grown meat technology will reduce livestock emissions, however these technologies need to be scaled and operationalised before they can have an impact.	5 Supportive
Brazil	Land use and forestry	In September data from an independent forest monitoring group confirmed that deforestation in the Brazilian Amazon is on track to reach the highest level in 15 years.	**1.8°C FPS:** • End net deforestation by 2030 • Deliver afforestation at scale by 2033	**Monitor developments:** Deforestation is rising rather than decreasing, which could signal that ending net deforestation by 2030 is less certain.	4 Monitor developments

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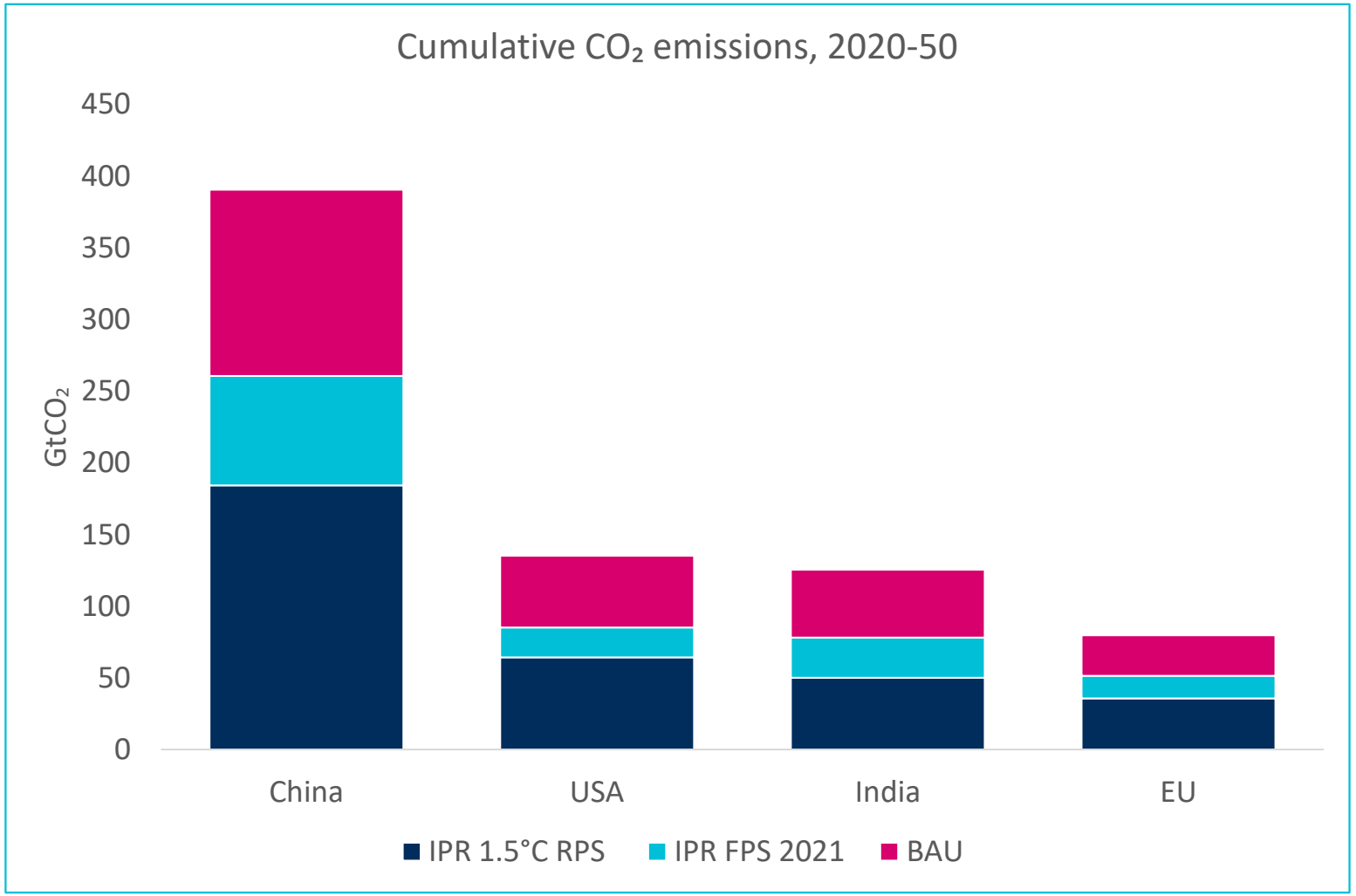
Embedded in the IPR FPS 2021 are substantial emissions reductions, additional reductions to achieve the IPR 1.5°C RPS will be challenging



- The IPR FPS 2021 represents a substantial reduction in emissions relative to a business-as-usual (BAU) scenario
- China's emissions are around 35% lower than under a BAU pathway
- The United States and India's emissions are around 40% lower
- The EU's emissions are around 35% lower
- Smaller additional reductions are needed to achieve the IPR 1.5°C RPS, though these will be more costly and challenging than those delivered under the IPR FPS 2021

Policies with the greatest 2020-2050 Gt reduction between IPR 1.5°C RPS and IPR FPS 2021

Rank	Policy	Country	IPR 1.5°C RPS vs IPR FPS 2021 Gt reduction
1	Coal phase out	China	40.0
2	End deforestation and NBS	Sub-Saharan Africa, South East Asia and Latin America	19.0
3	100% clean industry	China	19.0
4	Coal phase out	India	14.1
5	100% clean industry	India	8.3
6	100% clean industry	MENA	7.2
7	100% clean power	MENA	6.7
8	Fossil vehicle phase out	China	6.3
9	Coal phase out	Indonesia	5.4
10	100% clean industry	South East Asia	5.2

Reduction is also substantial for OECD countries e.g. for the United States accelerated 1.5°C RPS policies deliver:

- **20 $GtCO_2$ reduction beyond FPS across all policies**
- **4.9 $GtCO_2$ reduction beyond FPS for 100% clean industry policy**

Reduction is also substantial for methane and nitrous oxide emissions that result from accelerated 1.5°C RPS policies related to animal protein demand:

- **24 $GtCO_2eq$ reduction beyond FPS across all countries**
- **4.3 $GtCO_2eq$ reduction beyond FPS in India alone**

IPR 2021 top ten policy forecasts

Carbon pricing	**1.**	Carbon Border Adjustments Mechanisms (CBAMs) for carbon will become increasingly a policy option. This could lead the United States to announce a national carbon pricing system by 2025 and signal a strong carbon price path to reach a backstop of $65 by 2030.
	2.	The European Union's evolving commitments will deliver substantial carbon prices. By 2030, we expect EU policy to backstop an EU ETS carbon price of $75/tCO2 to ensure long-term action toward decarbonisation in heavy emitting sectors.
Coal	**3.**	In India, rapidly evolving Indian policy and prospects for market reforms and pricing has already ended further investment in new coal.
	4.	China will end construction of new coal fired power production after 2025, driven by new policies to facilitate its 2060 net zero target, geopolitical trends and risk considerations*
	5.	The United States will end all coal-fired power generation by 2035, through a combination of emission performance standards and carbon pricing at the Federal and State levels, combined with market forces.

Note: Emissions reduction are approximate and include come additional sector-specific CO_2 reduction such as energy efficiency

IPR 2021 top ten policy forecasts

Clean power	**6.**	The United States will implement a binding and credible 100% clean power standard for 2040 ending unabated fossil electricity generation.
Zero emission vehicles	**7.**	China, France, Germany, Italy and Korea will end the sale of fossil fuel cars and vans in 2035. Jointly these large markets will accelerate the auto industry transition to electric drive, and precipitate further policy action internationally.
Industry	**8.**	All major industrial economies including the US, Germany, Japan and China will require all new industrial plants, led by steel and cement, to be low-carbon by 2040, through a combination of emissions performance standards and carbon pricing.
Agriculture	**9.**	The US, Canada, Australia and other major agricultural producers will have comprehensive mitigation policy in place by 2025 to reduce emissions from production of crops and livestock.
Land use	**10.**	Major tropical forest countries will end deforestation by 2030, with domestic policy responding to international climate finance and corporate supply chain pressures.

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Instructions: how to read the following tables containing IPR policy forecasts

The following section provides an overview of the FPS and RPS forecasts for each country or region.

IPR 1.8°C Forecast Policy Scenario (FPS)

- Models impact of forecasted policies on the real economy.

IPR 1.5°C Required Policy Scenario (RPS)

- Required policies to align to a **1.5°C objective**

How to read the tables

Each table presents the **estimated time by which the forecast will be achieved for different countries or regions** around the world.

In the sample table below for Australia (AU), under the FPS coal will be phased out by 2040, whereas the RPS requires coal to be phased out by 2030.

Phase out of existing unabated coal

	Timeline									annual reduction*	
	2020	2025	2030	2035	2040	2045	2050	2055	2060	RPS	FPS
Australia			RPS		FPS					10%	5%
Brazil				RPS		FPS				7%	4%
Canada		RPS		FPS						20%	10%
China				RPS		FPS				7%	4%
Central and South America				RPS		FPS				7%	4%
Eastern Europe			RPS		FPS					10%	5%
Eurasia						RPS			FPS	4%	3%

The final two columns show the annual reduction in coal necessary to achieve these targets.

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To meet a global coal phase out of 2045, immediate policy action is required

Phase out of existing unabated coal

	Timeline								annual reduction*	
	2020	2025	2030	2035	2040	2045	2050	2055	2060	RPS	FPS
Australia			RPS		FPS					10%	5%
Brazil				RPS		FPS				7%	4%
Canada		RPS	FPS							20%	10%
China				RPS		FPS				7%	4%
Central and South America				RPS		FPS				7%	4%
Eastern Europe			RPS		FPS					10%	5%
Eurasia						RPS			FPS	4%	3%
Gulf States						RPS			FPS	4%	3%
India						RPS			FPS	4%	3%
Indonesia						RPS			FPS	4%	3%
Japan				RPS		FPS				7%	4%
Middle East and North Africa						RPS			FPS	4%	3%
Russia						RPS			FPS	4%	3%
Saudi Arabia						RPS			FPS	4%	3%
South Africa				RPS	FPS					7%	5%
SEAO						RPS			FPS	4%	3%
South Korea				RPS		FPS				7%	4%
Sub Saharan Africa						RPS			FPS	4%	3%
United Kingdom		Both								20%	20%
United States of America			RPS	FPS						10%	7%
Western Europe			RPS		FPS					10%	5%

** reduction in coal generation as a share of 2020 levels*

INEVITABLE POLICY RESPONSE

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To meet 100% clean power by 2050, immediate policy action is required

100% clean power

	Timeline									annual reduction*	
	2020	2025	2030	2035	2040	2045	2050	2055	2060	RPS	FPS
Australia					RPS		FPS			5%	3%
Brazil					RPS		FPS			5%	3%
Canada			RPS	FPS						10%	7%
China					RPS		FPS			5%	3%
Central and South America					RPS		FPS			5%	3%
Eastern Europe				RPS		FPS				7%	4%
Eurasia						RPS			FPS	4%	3%
Gulf States						RPS			FPS	4%	3%
India						RPS			FPS	4%	3%
Indonesia						RPS			FPS	4%	3%
Japan				RPS		FPS				7%	4%
Middle East and North Africa						RPS			FPS	4%	3%
Russia						RPS			FPS	4%	3%
Saudi Arabia						RPS			FPS	4%	3%
South Africa				RPS	FPS					7%	5%
SEAO						RPS			FPS	4%	3%
South Korea				RPS		FPS				7%	4%
Sub Saharan Africa						RPS			FPS	4%	3%
United Kingdom				RPS	FPS					7%	5%
United States of America				RPS	FPS					7%	5%
Western Europe				RPS		FPS				7%	4%

** reduction in power CO2 emissions as a share of 2020 levels*

Light duty vehicles: new fossil vehicles must be phased out between 2030 and 2045 under RPS, five years earlier than under IPR FPS 2021 policies

Fossil vehicle phase out (light duty)

	Timeline									annual reduction*	
	2020	2025	2030	2035	2040	2045	2050	2055	2060	RPS	FPS
Australia				RPS	FPS					7%	5%
Brazil					RPS	FPS				5%	4%
Canada			RPS	FPS						10%	7%
China			RPS	FPS						10%	7%
Central and South America				RPS	FPS					7%	5%
Eastern Europe			RPS	FPS						10%	7%
Eurasia					RPS	FPS				5%	4%
Gulf States					RPS	FPS				5%	4%
India				RPS	FPS					7%	5%
Indonesia				RPS	FPS					7%	5%
Japan				RPS	FPS					7%	5%
Middle East and North Africa				RPS	FPS					7%	5%
Russia					RPS	FPS				5%	4%
Saudi Arabia						RPS	FPS			4%	3%
South Africa				RPS	FPS					7%	5%
SEAO				RPS	FPS					7%	5%
South Korea			RPS	FPS						10%	7%
Sub Saharan Africa						RPS	FPS			4%	3%
United Kingdom			Both							10%	10%
United States of America				RPS	FPS					7%	5%
Western Europe			RPS	FPS						10%	7%

** reduction in fossil vehicle sales as a share of 2020 levels*

INEVITABLE POLICY RESPONSE

Q3 2022

Heavy duty vehicles: new fossil vehicles must be phased out between 2035 and 2050 under RPS, five years earlier than under IPR FPS 2021 policies

Fossil vehicle phase out (heavy duty)

	Timeline									annual reduction*	
	2020	2025	2030	2035	2040	2045	2050	2055	2060	RPS	FPS
Australia					RPS	FPS				5%	4%
Brazil					RPS	FPS				5%	4%
Canada					RPS	FPS				5%	4%
China				RPS	FPS					7%	5%
Central and South America					RPS	FPS				5%	4%
Eastern Europe				RPS	FPS					7%	5%
Eurasia						RPS	FPS			4%	3%
Gulf States						RPS	FPS			4%	3%
India					RPS	FPS				5%	4%
Indonesia					RPS	FPS				5%	4%
Japan				RPS	FPS					7%	5%
Middle East and North Africa					RPS	FPS				5%	4%
Russia						RPS	FPS			4%	3%
Saudi Arabia							RPS	FPS		3%	3%
South Africa					RPS	FPS				5%	4%
SEAO					RPS	FPS				5%	4%
South Korea				RPS	FPS					7%	5%
Sub Saharan Africa							RPS	FPS		3%	3%
United Kingdom				Both						7%	7%
United States of America					RPS	FPS				5%	4%
Western Europe				RPS	FPS					7%	5%

** reduction in fossil vehicle sales as a share of 2020 levels*

Q1 2022

INEVITABLE POLICY RESPONSE

Q3 2022

Industry: the sector has a 30-year transition opportunity to net zero

100% clean industry

	Timeline								annual reduction*	
	2020	2025	2030	2035	2040	2045	2050	2055	>2060	RPS	FPS
Australia							RPS		FPS	3%	2%
Brazil								RPS	FPS	3%	2%
Canada							RPS		FPS	3%	2%
China								RPS	FPS	3%	2%
Central and South America								RPS	FPS	3%	2%
Eastern Europe							RPS		FPS	3%	2%
Eurasia								RPS	FPS	3%	2%
Gulf States								RPS	FPS	3%	2%
India								RPS	FPS	3%	2%
Indonesia								RPS	FPS	3%	2%
Japan							RPS		FPS	3%	2%
Middle East and North Africa								RPS	FPS	3%	2%
Russia								RPS	FPS	3%	2%
Saudi Arabia								RPS	FPS	3%	2%
South Africa							RPS		FPS	3%	2%
SEAO								RPS	FPS	3%	2%
South Korea							RPS		FPS	3%	2%
Sub Saharan Africa								RPS	FPS	3%	2%
United Kingdom							RPS		FPS	3%	2%
United States of America							RPS		FPS	3%	2%
Western Europe							RPS		FPS	3%	2%

** reduction in industry CO2 emissions as a share of 2020 levels*

Q1 2022

INEVITABLE POLICY RESPONSE

Q3 2022

Buildings: new fossil heating systems must be phased out globally by 2040 under RPS, and by 2030 in regions with large heating needs

New fossil heating system phase out

	Timeline									annual reduction*	
	2020	2025	2030	2035	2040	2045	2050	2055	2060	RPS	FPS
Australia			RPS	FPS						10%	7%
Brazil					RPS		FPS			5%	3%
Canada			RPS	FPS						10%	7%
China					RPS	FPS				5%	4%
Central and South America				RPS	FPS					7%	5%
Eastern Europe			RPS	FPS						10%	7%
Eurasia					RPS		FPS			5%	3%
Gulf States					RPS		FPS			5%	3%
India					RPS		FPS			5%	3%
Indonesia					RPS		FPS			5%	3%
Japan				RPS	FPS					7%	5%
Middle East and North Africa					RPS		FPS			5%	3%
Russia					RPS		FPS			5%	3%
Saudi Arabia					RPS		FPS			5%	3%
South Africa			RPS	FPS						10%	7%
SEAO					RPS		FPS			5%	3%
South Korea				RPS	FPS					7%	5%
Sub Saharan Africa					RPS		FPS			5%	3%
United Kingdom			RPS	FPS						10%	7%
United States of America				RPS	FPS					7%	5%
Western Europe			RPS	FPS						10%	7%

** reduction in fossil heating system sales as a share of 2020 levels*

Achieving 1.5°C RPS animal meat consumption reductions requires a shift in policy acceleration of five years compared to the IPR FPS 2021

	2020	2025	2030	2035	2040	Reduction in per capita meat consumption* 2020-2050 (%) IPR FPS 2021	IPR 1.5C RPS
Australia		RPS	FPS			42	51
Brazil		RPS	FPS			38	48
Canada		RPS	FPS			43	52
China				FPSRPS		35	45
Central and South America		RPS	FPS			34	45
Eastern Europe		RPS	FPS			40	50
Eurasia			RPS	FPS		30	42
Gulf States			RPS	FPS		25	37
India			RPS	FPS		0	14
Indonesia			RPS	FPS		18	31
Japan		RPS	FPS			40	50
Middle East and North Africa			RPS	FPS		28	39
Russia		RPS	FPS			36	46
Saudi Arabia			RPS	FPS		6	22
South Africa			RPS	FPS		-13	6
SEAO			RPS	FPS		20	33
South Korea		RPS	FPS			40	50
Sub Saharan Africa					FPSRPS	-13	6
United Kingdom		RPS	FPS			41	50
United States of America		RPS	FPS			42	51
Western Europe	RPS	FPS				40	50

*kcal per person

Large drop in SSA happens post 2035

INEVITABLE POLICY RESPONSE

Q3 2022

Ending deforestation by 2025 in 1.5°C RPS and 2030 in IPR FPS 2021 will require immediate policy action

Deforestation of natural forest halted through command and control policy

	End of deforestation			Change in forest cover 2020-2050 (m ha)	
	2020	2025	2030	IPR FPS 2021	IPR 1.5C RPS
Australia		FPSRPS		3	3
Brazil		RPS	FPS	12	16
Canada	FPSRPS			1	1
China		RPS	FPS	92	92
Central and South America		RPS	FPS	10	14
Eastern Europe		FPSRPS		4	4
Eurasia		RPS	FPS	1	2
Gulf States	FPSRPS			0	0
India		RPS	FPS	13	13
Indonesia		RPS	FPS	2	6
Japan	FPSRPS			0	0
Middle East and North Africa		RPS	FPS	-1	1
Russia		RPS	FPS	1	2
Saudi Arabia	FPSRPS			0	0
South Africa		RPS	FPS	0	1
SEAO		RPS	FPS	3	11
South Korea	FPSRPS			0	0
Sub Saharan Africa		RPS	FPS	0	15
United Kingdom	FPSRPS			1	1
United States of America		FPSRPS		17	17
Western Europe		RPS	FPS	11	12

Under IPR scenarios, carbon pricing and NDC commitments could combine to stop net deforestation by 2030

Countries/region like CAN, GCC, Japan, SA, SK, UK have virtually zero net deforestation

Q1 2022

Some countries achieve net zero CO_2 emissions on a territorial basis, while others require international carbon offsets to meet commitments

Contribution from each sector to total % change in CO2 emissions, 2020-50 and net zero year (territorial basis)

Group	Region	Power	Transport	Buildings	Industry	Land	Total	Net zero year
OECD	United States	-39%	-31%	-10%	-10%	-7%	**-100%**	2050
	EU	-30%	-27%	-14%	-14%	-10%	**-100%**	2050
	UK	-36%	-21%	-11%	-13%	-12%	**-100%**	2050
	Japan	-38%	-18%	-9%	-18%	-2%	**-89%**	not achieved
	Korea	-40%	-18%	-7%	-17%	-1%	**-87%**	not achieved
	Canada	-10%	-22%	-11%	-10%	-26%	**-89%**	2069
	Australia	-38%	-21%	-3%	-9%	-20%	**-94%**	2058
Non-OECD	China	-41%	-7%	-3%	-24%	-11%	**-91%**	2059
	India	-34%	-7%	-1%	-7%	-14%	**-66%**	2061
	Brazil	-3%	-10%	-1%	-5%	-81%	**-101%**	2050
	Russia	-24%	-10%	-5%	-9%	-7%	**-64%**	2087
	Indonesia	-19%	-14%	-2%	12%	-33%	**-57%**	2081
	South Africa	-42%	-11%	-5%	-9%	-8%	**-90%**	not achieved
	South East Asia	-21%	-15%	-1%	2%	-22%	**-60%**	not achieved
	MENA	-20%	-22%	-6%	8%	-4%	**-47%**	not achieved
	Central and South America	-16%	-19%	-4%	1%	-43%	**-83%**	2078
	Eurasia	-30%	-10%	-8%	-1%	-13%	**-69%**	2068
	Gulf States (GCC)	-26%	-21%	0%	1%	0%	**-50%**	not achieved
	South Asia	-18%	-4%	-3%	14%	-20%	**-29%**	2078
	Sub-saharan Africa	-3%	-3%	0%	8%	-59%	**-58%**	not achieved

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