



**Setting the context – the ingredients of the climate and energy transition are centered around:**

- Technology as a driver.
- Policy as an enabler and forcer.
- Temperature targets for the climate which act as a constraint and require swift action which policy can force.
- Changes in consumer preferences towards sustainability.

**What is The Inevitable Policy Response (IPR)?**

- Within this context of technology trends and consumer preferences, and the need to act swiftly, the IPR forecasts realistic policy action to force the climate transition which will affect the real and financial economy.
- As such it prepares participants in financial markets for what is policy / regulatory risk.
- Companies will need to respond.
- Investor portfolios will be affected. And action from investors will help shape the transition in conjunction with policy action, supplying capital to green energy investments and encouraging a switch from high carbon activities.
- Regulators will test resilience of the financial system and focus on disclosure.

## Financial markets are underprepared for climate-related policy risks

A forceful policy response to climate change is not priced into today's markets.

As policy makers are bound to act decisively, this leaves investor portfolios **exposed to significant risk**.

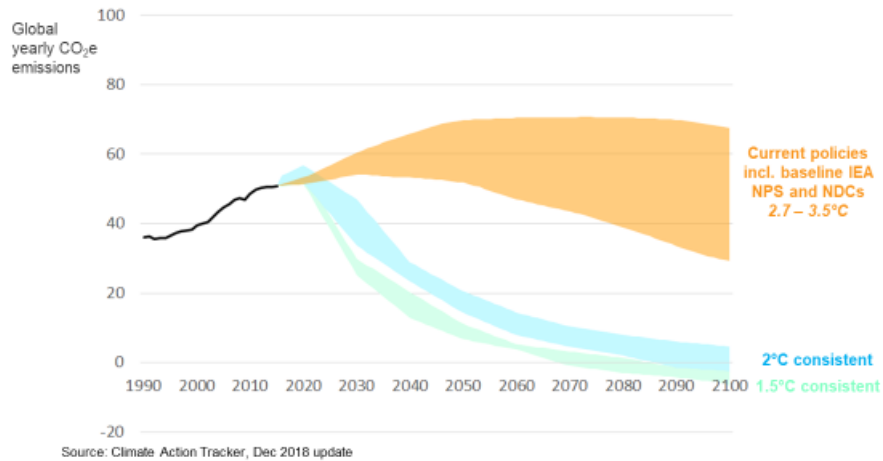
The longer the delay, the more disorderly, disruptive and abrupt the policy will inevitably be.

In anticipation, PRI, Vivid Economics and ETA are building a landmark forecast of the financial impact of this **Inevitable Policy Response (IPR)**, including:

- How will it affect **the economy**?
- Which **asset classes** will be impacted?
- Which **sectors** are most at risk?

- Financial markets are hearing more and more about the financial risk of climate change to their portfolio – mainly focused on **physical risks**.
- There is **one serious category of investment risk that today's markets have not even attempted to price in: regulatory and policy risk**.
- **The longer the delay, the more disruptive and costly the policy response to business and therefore investors.**
- **Regardless of whether we meet Paris or not, it's more probable than not that climate policy and regulation will become tougher in the next 3 -5 years *than it is today*.**
- **Landmark research has been commissioned to model and forecast the potential risk to investors.**
- From September, we will publish detailed modelling:
  - How much it will cost the economy?
  - And, for the first time:
    - Which **asset classes** will be impacted?
    - Which of the world's **sectors** are most at risk?

**The setting: current policies fail to get even close 2°C let alone the Paris Agreement ambition of well-below 2°C**



- IPR is needed because most research shows the world is on track for more like a 3°C outcome.
- The most quoted and used scenario used by investors and companies as the “base case” is the IEA’s New Policies Scenario (NPS).
- The NPS is in effect an NDC scenario which includes announced policies but not the potential for further policy action and is therefore conservative.
- If the science is right, this outcome would create intolerable pressure on governments to act well before we get to 3°C.

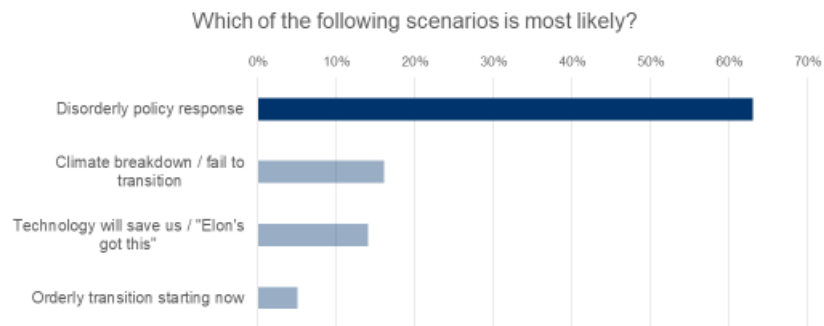
**Growing awareness and momentum on climate issues makes a near-term, forceful policy response more likely**

<p><b>Changing weather trends</b></p>	<p><b>Impacts on security</b></p>	<p><b>Cheaper renewable energy</b></p>
	<p>The effects of a changing climate are a <b>national security issue.</b></p> <p>- US Dept. of Defense</p> 	<p><b>FINANCIAL TIMES</b></p> <p>Europe 'watershed' as green energy set to overpower coal</p> <p>- 03/06/2019</p>
<p><b>New climate research</b></p>	<p><b>Civil society action</b></p>	<p><b>Stakeholders demanding clarity</b></p>
<p>Global warming report, an 'ear-splitting wake-up call' warns UN chief</p> 		<p>The catastrophic effects of climate change are already visible around the world. We need collective leadership and action across countries, and we need to be ambitious.</p> 

**Why a forceful policy response is inevitable:**

- The simple argument is that if the climate science is right then failure to reach the temperature goal of Well below 2°C simply is so disruptive to the world economic system and society some policy response is indeed *inevitable*. It is inconceivable governments could not react. The question is when and what.
- The pressure will come from all angles – environmental including air pollution, social, economic – fuelled by fears over national security, enabled by advances in technology, and pressure by electorates and citizens to act.
- From an economic standpoint, the main drivers are the low costs of green alternatives and the gains of shifting to a low carbon economy. It is in many cases cheaper to substitute solar with batteries for coal-fired power stations for instance.
- Meanwhile businesses are faced with the uncertainty of not knowing when there will be action. If you are building assets with a 20 - 40 year lifetime that is extremely risky. Those who see the inevitable will indeed act ahead of the announcements.
- Civil society action in the face of climate disruption continues to accelerate (Greta Thunberg).
- **In this climate, it is inconceivable governments could not react. The question is when and what.**

## Investors acknowledge that there will be a policy response, and that it will be delayed and disruptive



Source: UN PRI September 2018

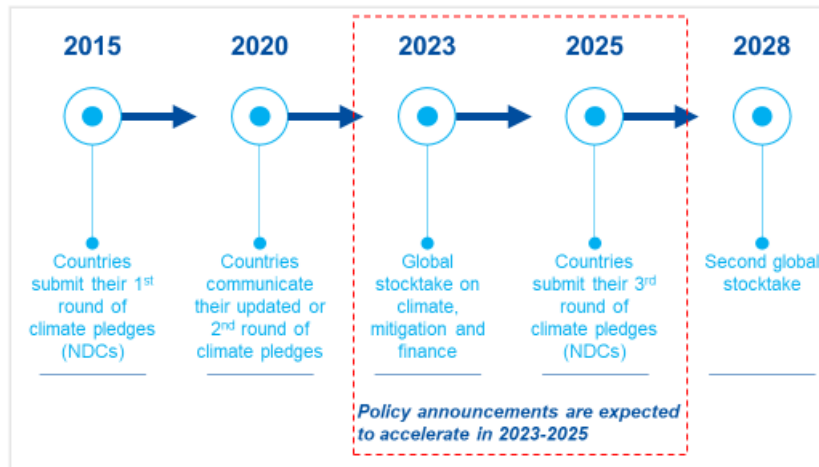
### When a forceful policy response will take place

The question of *when a forceful policy response takes place remains central to any forecast.*

Indeed, there is evidence that investors believe that policy will catch up eventually.

- At the UN PRI in Person September 2018 meeting, the opening plenary was asked to vote on what they thought the most likely outcome would be to the climate transition.
- The option included a “Disruptive Policy Response” which entails both a delay and forceful element.
- This was the leading expectation – in effect IPR.
- When combined with technology trends – a key driver of IPR itself – this came to a 75% level of expectation.









## The Paris Agreement's "ratchet mechanism" increases the likelihood that governments will strengthen policy by 2025



### When a forceful policy response will take place

- The Paris Agreement has a ratchet process every 5 years of gathering together all the policy announcements at all levels of government, placing pressure on members to act at the same time – starting with the Global Stocktake (2023).
- This is not some global meeting that produces the result, but it gives a framework for governments at all levels – Regional, National, State and Local to operate within, and presses them to raise ambition.
- The ratchet mechanism also supports countries that exceed their targets to push for higher ambition thresholds.
- There is a significant degree of political capital at stake.
- We expect continued action and announcements before 2025 in certain regions, but the 2023 stocktake leading to the 2025 ratchet and pledges are the key focus of our Forecast.

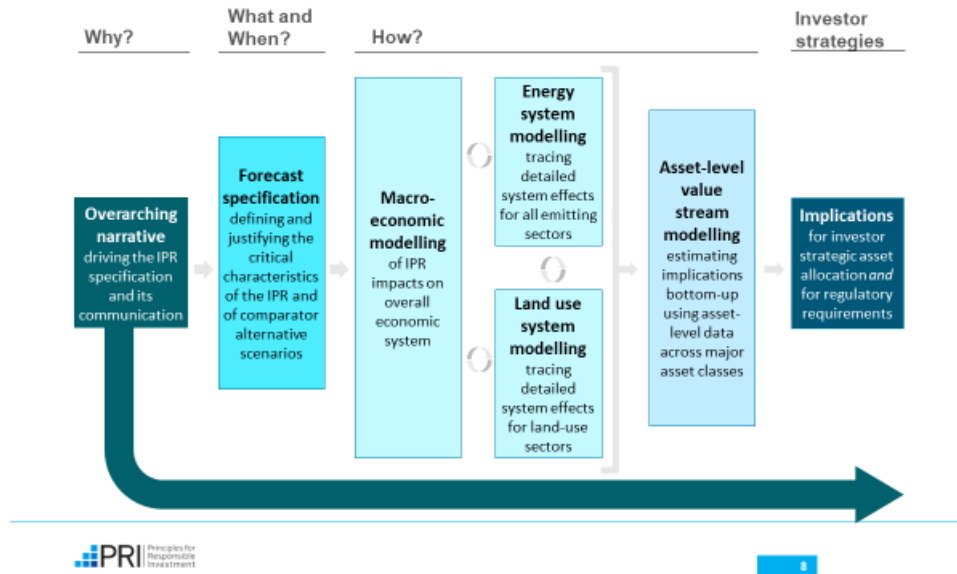
## The most likely policy levers to secure an accelerated and 'just' transition are starting to emerge

<p><b>Coal bans</b></p>  <p>The UK has committed to phase out unabated coal use by 2025, and support for a just transition is starting to emerge</p>	<p><b>ICE bans</b></p>  <p>All new cars to be emissions-free in the Netherlands by 2030</p>	<p><b>Carbon pricing</b></p>  <p>There are 57 carbon pricing initiatives around the world and 20% of global emissions are covered by a carbon price</p>	<p><b>Encouraging the green economy supply side response</b></p>  <p>Increasing capital availability and reducing its cost. Post subsidy targeted policy intervention in market structures</p>
<p><b>Energy efficiency</b></p>  <p>A coalition of 8 European cities have pledged to completely decarbonise their existing building stocks by 2050</p>	<p><b>Nuclear capacity</b></p>  <p>China has 46 nuclear reactors in operation and 13 under construction</p>	<p><b>Re/afforestation</b></p>  <p>58 countries have committed to the Bonn Challenge which aims to bring 350 Mhas of deforested/degraded land into restoration by 2030</p>	<p><b>Bioenergy crops</b></p>  <p>Bioenergy represents over 20% of total primary energy supply in Brazil, Finland, Sweden and Denmark</p>

### What a forceful policy response will look like:

- Modelling policy forecasts is central to the project.
- Recent trends suggest policy will develop within some clearly defined levers.
- Our policy assumptions build on consensus views, existing initiatives and recent announcements, but assumes a heightened level of ambition.
- All policies will be considered based on technical feasibility and under a just transition lens.
- A key theme is the costs of green technologies. As their cost falls, policy makers will be able to more easily impose greater performance standards across the economy, making it more efficient. Good examples are bans on coal and internal combustion engine, and rising energy efficiency standards.

**Our forecast of an Inevitable Policy Response is based on a robust and strategic analytic process**

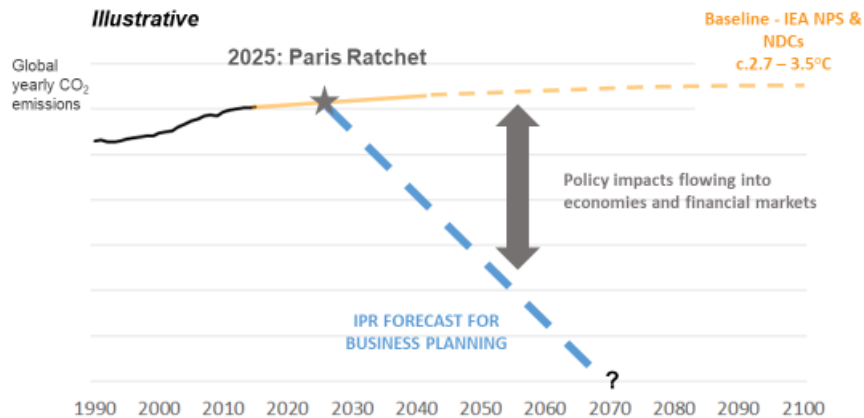


**Advantages of our model:**

- **Transparency** – defining and justifying a realistic outline of future policy response.
- **Implications at the company level** – estimating implications at the asset level for the first time.
- **Completeness** – more accurately capturing the interaction between impacts of the macro economy, the energy system and the land use system.



**Our forecast of an Inevitable Policy Response can replace the IEA NPS as a business planning case for investors, corporates & regulators**

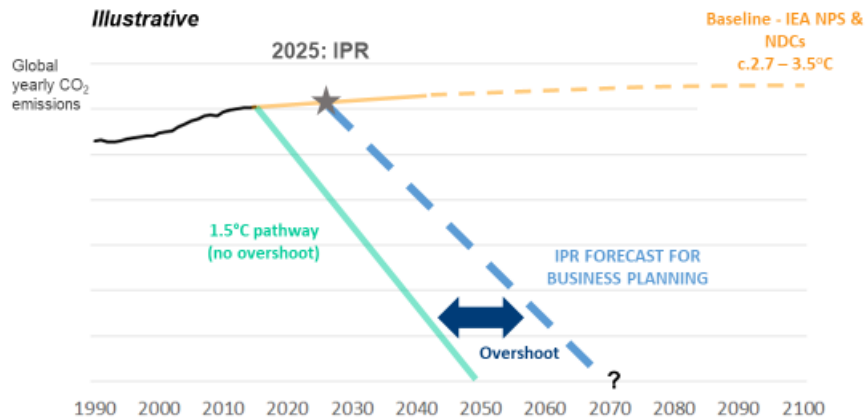


**How do we model the Inevitable Policy Response?**

- IPR is a *framework* for using financial climate modelling as a business planning tool that includes asset level impacts on portfolios.
- It centers on a forecast of policy and technology pathways rather than a low probability scenario used as a tail event stress test.
- While policy makers are expected to aspire to the Paris Agreement of “well below 2°C” the IPR Forecast is not constrained to meet a particular carbon budget.
- As such it seeks to replace the frequently quoted IEA NPS scenario as a business planning case for investors, companies and regulators.

# Still aspire to the Paris Agreement..

Reaching a 1.5 degrees outcome is a far bigger challenge – but should remain the Aspiration



- The carbon budget for a 1.5°C outcome is 580GtCO<sub>2</sub>e at a 50% chance of achieving that on the new IPCC estimates.
- Given GHG emissions running at more than 37 GtCO<sub>2</sub> per year, this would require a Net Zero year of 2050 at the latest.
- The IPR Forecast overshoots this 1.5°C pathway and therefore challenges policymakers further in order to stabilise the climate by 2100.
- Most 1.5°C scenarios tend to assume the Net Zero year around 2050 with significant NETs post the Net Zero year.
- Given our conservative approach to technologies not at scale such as CCS, we look at options to close this gap in this aspirational context.

## PRI's ambition is to limit warming to 1.5°C

- Aiming for a 1.5°C target matters – it is a much better outcome for the world than 2°C.
- Stakeholders should aspire to 1.5°C – and that ideally, they would set targets to reach this goal.
- However, in the interim they should proceed with realistic and transparent forecasts.

### But our forecast tells that we will overshoot the 1.5°C target

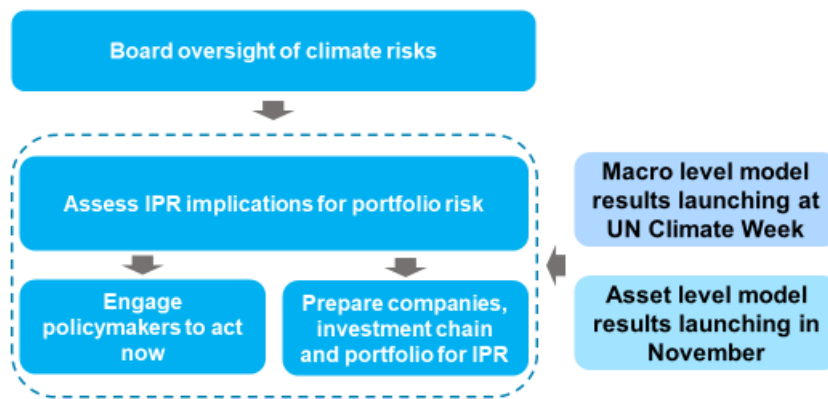
Therefore, Policy makers need also to focus R&D spending on key areas of the “Known Unknowns” such as:

- Faster policy action – ACT NOW
- Negative Emission technologies
- Scale up of CCS leads to bioenergy with CCS (BECCS)
- Direct air capture
- More aggressive agricultural practices
- Dietary Change leading to less beef usage
- Autonomous vehicles
- Low-carbon cement

- Negative emissions technologies such as Bio Energy with Carbon Capture and Storage (BECCS) and direct air capture and aggressive agricultural practices are key to most attempts to address an overshoot in a 1.5°C target.
- We will explore various “known unknown” technologies and policy options that can contribute to reducing the overshoot.

## Investors need to act now

- The greater the delay in responding the greater the cost
- Early action is needed to manage portfolio risk and protect value



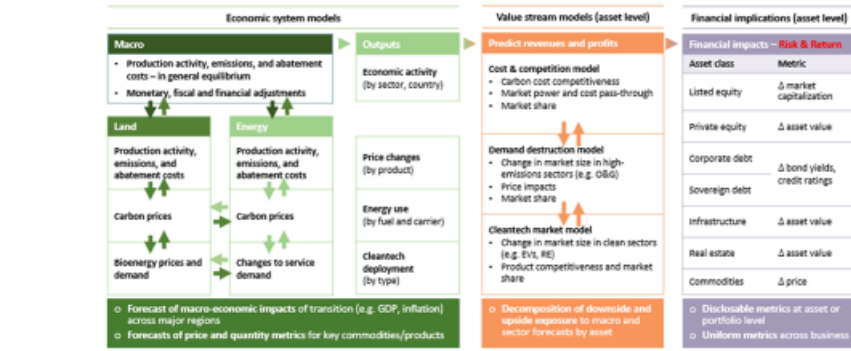
- As indicated throughout it is preferable to Act Now rather than waiting.
- This is true for policy makers, investors and corporations.
- And action from investors will help shape the transition in conjunction with policy action, supplying capital to green energy investments and encouraging a switch from high carbon activities. Our research programme will culminate in a Forecast-based set of modelling results reaching down from high level macro numbers to assets and portfolio impacts for investors.

# Appendix

## Our model analyses the impact of climate-related policy and regulatory risks on the financial markets

### ADVANTAGES OF OUR MODEL:

- **Transparency** – defining and justifying a realistic outline of future policy response
- **Implications at the company level** – estimating implications at the asset level for the first time
- **Completeness** – more accurately capturing the interaction between impacts of the macro economy, the energy system and the land use system



The Forecast will cover a wide range of policies (incl. carbon pricing, demand-side, supply-side and LU policies) which are translated into the macro, energy systems and land use models.

- These three ‘system’ models, which are aligned across key variables produce a set of economic outputs, including:
  - GDP per region/country, inflation rates and interest rates;
  - The energy mix;
  - The technology mix (e.g. EV deployment);
  - Changes in land use.
- The asset model uses these macroeconomic outcomes as inputs to provide projections of:
  - Market capitalisation impacts (MSCI ACWI);
  - Corporate debt impacts (MSCI ACWI issuers);
  - Sovereign debt impacts (for key regions / countries);
  - Infrastructure and PE impacts (based on assumptions on representative portfolios).
- Implications for strategic asset allocations will then be derived from these results.

## Project partners

The views expressed in this report are the sole responsibility of the Vivid / Energy Transition Advisers and do not necessarily reflect those of the sponsors or other consortium members. The authors are solely responsible for any errors.



## Thank you