The Inevitable Policy Response

Preparing financial markets for climate-related policy/regulatory risks
Financial markets are underprepared for climate-related policy risks

A forceful policy response to climate change within the near term is not priced into today’s markets.

Yet it is inevitable that governments will be forced to act more decisively than they have so far, leaving 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 have built a pioneering forecast of the financial impact of this Inevitable Policy Response (IPR), including a Forecast Policy Scenario:

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

Policy

- Border Tax Adjustments
- GHG reduction policy
- Net Zero Targets

Ongoing New climate research

Global warming report, an 'ear-splitting wake-up call' warns UN chief

Impacts on security

The effects of a changing climate are a national security issue.

- US Dept. of Defense

Cheaper renewable energy

FINANCIAL TIMES

Europe 'watershed' as green energy set to overpower coal

- 03/06/2019

Uninsurable World

Munich RE

“Climate change could make insurance too expensive for most people”

WE MEAN BUSINESS

“Climate change risks outweigh opportunities for P&C (re)insurers”

Pressure from leading investors and business

Activist shareholders make history in anti-lobby resolution at Origin AGM

Regulator influences and warnings on stability

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.
Additional, less predictable but equally high impact triggers

- Extreme weather events
- Civil society action & young voters
- US Leadership

“Hurricane Dorian Was Worthy of a Category 6 Rating”
The setting: current policies fail to get even close 2°C let alone the Paris Agreement ambition of well-below 2°C

Source: Climate Action Tracker, Dec 2018 update

Current policies incl. baseline IEA STEPS and NDCs 2.7 – 3.5°C

2°C consistent
1.5°C consistent

Global yearly CO₂e emissions
Investors acknowledge that there will be a policy response, and that it will be delayed and disruptive.

59% of institutional investors expect a delayed, forceful and disruptive policy response to climate change.

Source: BNY Mellon Investment Management and CREATE-Research

Is climate change a risk or opportunity?

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Risk and opportunity</td>
<td>57%</td>
</tr>
<tr>
<td>Risk only</td>
<td>36%</td>
</tr>
<tr>
<td>Opportunity only</td>
<td>7%</td>
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<2% of PRI signatories are “strategic” in their assessment and reporting of climate risk.

Source: UN PRI September 2019
The Paris Agreement’s “ratchet mechanism” increases the likelihood that governments will strengthen policy by 2025.

- **2020**: Countries communicate their updated or 2nd round of climate pledges.
- **2023**: Global stocktake on climate, mitigation and finance.
- **2025**: Countries submit their 3rd round of climate pledges (NDCs).
- **2028**: Second global stocktake.

*Policy announcements are expected to accelerate in 2023-2025.*
The most likely policy levers to secure an accelerated and ‘just’ transition are starting to emerge

<table>
<thead>
<tr>
<th>Coal phase-out</th>
<th>ICE sales bans</th>
<th>Carbon pricing</th>
<th>CCS and industry decarbonisation</th>
</tr>
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<tbody>
<tr>
<td>The UK has committed to phase out unabated coal use by 2025, and support for a just transition is starting to emerge</td>
<td>All new cars to be emissions-free in the Netherlands by 2030, and other countries have announced intentions</td>
<td>57 carbon pricing initiatives around the world cover 20% of global emissions and discussion of BCAs</td>
<td>Only two large scale CCS power projects in operation at the end of 2018, and no proven policies ready for ensuring scale-up</td>
</tr>
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<table>
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<th>Zero-carbon power</th>
<th>Energy efficiency</th>
<th>Land use-based greenhouse gas removal</th>
<th>Agriculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuclear, hydro, solar PV, wind and other renewables represented 36% of electricity generation globally in 2018</td>
<td>A coalition of 8 European cities have pledged to completely decarbonise their existing building stocks by 2050</td>
<td>National and bilateral payment systems trialled and planned to support nature-based solutions, including re/afforestation and bioenergy production</td>
<td>Historic rates of agricultural improvement very high, and large investment in agricultural technologies and infrastructure remains a priority</td>
</tr>
</tbody>
</table>
Our forecast of an Inevitable Policy Response is based on a robust and strategic analytic process.
Our forecast of an Inevitable Policy Response provides an alternative to the IEA as a business planning case for investors, corporates & regulators to consider.

Global energy-related CO₂ emissions, GtCO₂

- **2023-2025 Paris Ratchet**
- **Baseline (IEA STEPS & NDCs)**
  - c.2.7 – 3.5°C

Policy impacts flowing into economies and financial markets

**IEA SDS**

**IPR: Forecast Policy Scenario (FPS)**
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

Board oversight of climate risks

Assess IPR implications for portfolio risk

Engage policymakers to act now

Prepare companies, investment chain and portfolio for IPR
IPR 2025 is the first step to an eventual 1.5C outcome
Reaching a 1.5 degrees outcome is a far bigger challenge - Further policy action will be needed
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 including a second policy ratchet.
  - However, in the interim they should proceed with realistic and transparent forecasts.
  - IPR FPS is a realistic start towards 1.5°C – more action will be needed.

Without further action, our forecast tells us 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
    - Focus on land based options in next decade such as ending deforestation and Afforestation
    - Longer term Direct Air Capture
  - More aggressive agricultural practices
    - Dietary change leading to less beef usage
  - AI and autonomous vehicles
  - Hydrogen and bioenergy
  - Consumer preferences
  - Low-carbon materials
Forecast Policy Scenario (FPS) Key Results
Headline takeaways for investors

Deep and rapid changes in the energy system
- Oil to peak in 2026-28
- Thermal coal virtually non-existent by 2040
- Renewables generating approximately half of all electricity in 2030

Transport electrified inside 20 years
- ICE sales bans, supported by falling cost of EVs, drive rapid deployment of ultra-low emissions vehicles
- Making up almost 70% of passenger vehicles by 2040

Major changes in land use
- Deforestation virtually eliminated by 2030, with pressures on supply chains
- Large opportunities to invest in nature-based solutions

Rapid reductions in carbon emissions, but not enough to hit 1.5°C
- > 60% fall in global CO₂ emissions by 2050
- New innovative policy and industrial solutions, not yet proven or achieved at scale, are needed to achieve 1.5°C
Coal demand is at its peak and will decline rapidly by 2025

Driven by relative costs and policy, demand for coal for electricity generation declines by 23% per year from 2025 to 2040

- Coal is almost completely phased out of the electricity sector by 2040
- In the 2030s demand for coal in industry decreases significantly
- Electricity, gas and hydrogen replace coal across industry sectors

Note: ‘Other’ coal use includes energy used in the energy industry, use in agriculture and losses
Renewable generation grows quickly and supersedes fossil fuels by 2030

Renewables replace virtually all fossil fuels in electricity generation by 2050
- Solar and wind alone will generate approximately 2/3 of all electricity in 2050
- IPR FPS has 72% renewable generation in 2040, more than in the IEA SDS, IEA STEPS, and BNEF NEO
- Coal is phased out by 2050 while gas retains a minor role.
- Slow development of CCS is a barrier to use of biomass as a negative emissions technology as are land use constraints
- Overall, nuclear does not grow to replace fossil fuels or renewables given cost and societal issues
Oil demand peaks 2026-28 and falls rapidly as transport uses alternative fuels

Oil demand peaks between 2026-28 driven by improving ICE efficiency and early uptake of electric vehicles

- Oil demand from transport decreases by around 70%, while total oil demand decreases around 50% 2025-2050
- Road transport oil demand peaks in 2025, while oil demand in aviation and shipping and as a feedstock for petrochemicals remains significant through to 2050

Note: ‘Other’ oil use includes energy used during oil extraction and refining, feedstock for petrochemicals, and use in agriculture
Electrification, hydrogen and CCS contribute to the progressive decarbonisation of industry

- Coal-to-gas switching – proven, economical and non-disruptive – accelerates as a near-term solution to reducing industrial emissions
- Electrification, hydrogen, and CCS contribute in medium to long term with the carbon price forecasts playing an important role
- Fuel mix changes proceed at a pace consistent with economics of emerging technologies, and long plant lifecycles
Deforestation continues until mitigation policies phase into the land sector, and afforestation and reforestation efforts ramp up substantially. 

Note: 'Total Forest Land' is defined here as dense, high-carbon stock forest land only.

Deforestation practically eliminated by 2030, as domestic climate policies fully implemented, and international payments increasingly introduced:

- Rapid re/afforestation to meet feasible NDC land use targets in coming decade
- Re/afforestation is driven by emerging payment systems – national and international – and impact of increasing prices in carbon markets
- World meets the Bonn Challenge of 350 Mha of land restoration, but well after 2030 target
- Re/afforestation occurs largely in tropical regions: Brazil, Latin America, China and Southeast Asia

Re/afforestation to 2050 draws almost $800 billion in offsets financing
Land competition induces substantial investment in yield-enhancing technologies

- Aggregate global productivity increases by 58% between 2020 and 2050
- Much of this is driven by baseline catch-up improvements in developing country agricultural systems (e.g. irrigation)
- Further productivity gains are achieved thanks to policy and price incentives
- Increasing public and private support for R&D and agricultural extension
- Global estimates for yield enhancing investments total more than $20 trillion from 2015 to 2050
Bioenergy crops represent 65 EJ annually by 2050, with the bulk coming from 2nd generation crops

- Bioenergy crops supply nearly 65 EJ annually by 2050 – consistent with studies showing 100-125 EJ in 2100 of bioenergy as the sustainable limit
- But environmental sustainability and land competition constrain bioenergy production
- Consistent with literature estimates of 100-125 EJ in 2100 of bioenergy as the sustainable limit
- Bioenergy production increases across the globe, although relatively sooner in China, North America and Europe
Portfolio and Equity Market Findings
Key Findings Equity Markets: Disruption at the Sector and Company level

Overall, risk to financial markets is significant, but appears manageable with the iShares MSCI ACWI ETF fall by a noncyclical 3.1% or $1.6trn.

This includes downside demand and cost exposure of $2.1trn (or a 4% fall in share values) offset by about $0.5trn from green demand creation.

If repricing occurs in 2025, when the policy forecasts start to affect cash flows of companies, the impact further rises to -4.5%.

Increased volatility is also likely with a more event-driven price adjustment so the impact could be more significant.

The most disruption is seen at sector and company level, with some big winners and losers.

Some primary sectors will be pure losers or winners – mean company valuations in the energy sector fall by 33%.

Within other sectors there is large variation across companies, for example, 80% of impacts in the Utilities sector lie between -62% to 41% of current valuation.

Non-OECD domiciled companies are more negatively affected on average – although in some regions (like China) this may reflect the lack of listed vehicles.

Nevertheless, at a country domicile level there is significant dispersion of results – for example, in the United States.

Many companies likely to succeed in the green upside are not listed in the common indices.

Passive investors are therefore unlikely to be as exposed to the upside as the downside of the Inevitable Policy Response.
Sectoral: Within-sector variation can be significant, particularly for the four most impacted sectors in the index: Energy, Consumer Cyclicals, Non-Energy Materials and Utilities.

The four most impacted sectors also exhibit the greatest range in impacts.

Notes: Error bars indicate the 10th and 90th percentiles of impact within each sector. Sectors: RBICS level 1.
Source: Vivid Economics Net Zero Toolkit
Asset Allocation: the big opportunities are by tilting portfolios towards greener options within asset classes – especially in green infrastructure.

See separate presentation with quantitative results.
Actions for investors

- Draw on IPR in investor implementation of the TCFD recommendations on forward-looking risk assessment and climate scenario analysis alongside 1.5deg Paris aligned scenarios

- Asset owner actions:
  - Prepare for IPR-FPS as a likely central business case
  - Implement a more flexible and thematic portfolio construction approach that can maximize the opportunities and minimize the risks
  - Incorporate IPR into manager selection, appointment and monitoring
  - Engage service providers on IPR, including in appropriate indices and proxy voting recommendations
  - Continue to advocate and engage for earlier and more ambitious climate action to minimize the disruption from a disorderly transition and from physical impacts resulting from global mean temperatures exceeding 1.5°C
  - Integrate company transition analysis into engagement and portfolio construction

- Passive investors use IPR in stewardship and consider benchmarks informed by IPR
- All investors: draw on IPR to engage exposed sectors to transition
Asset Owner Service Provider Tasks

Ensure asset consultant can support forward SAA & flexible thematic portfolio construction approach

Adjust investable universe for managers including incentive calculations

Re-set manager selection criteria and design mandates towards risk AND low carbon upside

Drive asset managers towards forward looking IPR like assumptions

Set new benchmarks eg time orientation

Remove investment constraints eg tracking error

Drive Managers to develop new product

Set urgent voting guidelines on company transition

IPR Market Repricing Point

Volatility Phase

Policy Implementation phase

2020

2025
Asset Owner Thematic Strategy

 Tradition al SAA Start Point

 Overlay IPR Assumptions

 Flexible Portfolio Approach

 High / low carbon asset split

 High / low carbon Taxonomy

 High-Carbon Companies with no transition plan

 Companies / assets with credible transitions

 IPR consistent green companies

 Possible divestment

 Select hold price

 Add to manager mandate universe

 New transition benchmarks

 Active Transition selection funds
KEY CONCLUSIONS: Asset Allocation and Capital Recycling - illustrative impact

Before
- MSCI Equities
- Corporate Fixed Income
- Sovereign Fixed Income
- Infrastructure
- Real Estate
- Private Equity

Nominal allocation proportions

$\$allocation

Re-allocate and Recycle

After
- MSCI Equities
- Corporate Fixed Income
- Sovereign Fixed Income
- Infrastructure
- Real Estate
- Private Equity

{This includes companies in transition}

IPR benchmarks/Active selection
- Corporate FI Green Tilt
- Sovereign FI Green Tilt

Green Assets
High Carbon Assets
Relatively unexposed
Consortium partners

PRI Principles for Responsible Investment
vivid economics
Energy Transition Advisors (ETA)

20 Investing Initiative
Carbon Tracker
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Thank you
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