The Inevitable Policy Response 2021

Balancing Forecasting and Aligning – For Asset Managers

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https://www.linkedin.com/company/inevitable-policy-response
PRI commissioned the Inevitable Policy Response in 2018 to advance the industry’s knowledge of climate transition risk, and to support investors’ efforts to incorporate climate risk into their portfolio assessments.

A research partnership led by Energy Transition Advisers and Vivid Economics conducts the initiative’s policy research and scenario modelling and includes 2Dii, Carbon Tracker Initiative, Climate Bonds Initiative, Planet Tracker and Quinbrook Infrastructure Partners.

The consortium was given the mandate to bring leading analytic tools and an independent perspective to assess the drivers of likely policy action, and the implications on the market.
Who supports the Inevitable Policy Response?

**Strategic partners** consisting of leading financial institutions have joined the IPR in 2021 to provide more in-depth industry input, to further strengthen its relevance to the financial industry.

**Core philanthropic support** since IPR began in 2018. IPR is funded in part by the Gordon and Betty Moore Foundation through The Finance Hub, which was created to advance sustainable finance and the ClimateWorks Foundation striving to innovate and accelerate climate solutions at scale.
How the IPR supports Asset Managers

- Provide clarity around “climate scenario” choices
- Shed insight into 1.5 degree alignment vs. maximising returns
- Detail the economic and sector-level implications
- Offer insight into product and portfolio challenges
- Provide guidance towards engagement and stewardship issues

All IPR resources are publicly available on the PRI website at:
https://www.unpri.org/sustainability-issues/climate-change/inevitable-policy-response
The pressure on institutional investors is at an all time high
The Inevitable Policy Response: Investor Brief for Asset Managers

The structure of the IPR framework

Drivers of policy
- Extreme weather events
- Uninsurable world
- New climate research
- Impacts on security
- Civil society action
- Influence shifting
- Cheaper renewable energy
- Financial regulator warnings on stability
- New geopolitics of energy

IPR Policy Forecast
A high-conviction policy-based forecast of forceful policy response to climate change and implications for energy, agriculture and land use

IPR Scenarios

IPR 1.8°C Forecast Policy Scenario (FPS)
A fully integrated climate scenario modelling the impact of the forecasted policies on the real economy up to 2050, tracing detailed effects on all emitting sectors

IPR 1.5°C RPS Scenario
A ‘1.5°C Required Policy Scenario’ (1.5°C RPS) building on the IEA NZE by deepening analysis on policy, land use, emerging economies, NETs and value drivers. This can be used by those looking to align to 1.5°C

IPR value drivers
A set of publicly available outputs from the FPS and 1.5°C RPS that offer significant granularity at the sector and country level allowing investors to assess their own climate risk

Note: IPR analyses transition risk only, not physical risk

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IPR Policy Forecast Drivers Process

**Core Drivers**

- **Cheaper renewable energy**
- **Influence shifting**
- **General geopolitics of energy**
- **Financial regulator actions**
- **Uninsurable world**

**Disruptive unpredictable risks**

- **Covid 19**
- **Ukraine**

**Drives pro-active climate policy supplemented by:**

- **Extreme weather events**
- **Impacts on security**
- **Civil society action**
- **New climate research**
Russia Ukraine War - Implications for IPR Forecasts

For IPR Forecasts we see four overarching themes at this stage:

1) Reinforcement of medium (3-5 Years?) and long-term term IPR renewable energy and Green Hydrogen policies and sector forecasts

2) Short term (1-2 years) energy supply crisis for EU with many uncertainties and sourcing of Fossil Fuel supplies outside of Russia

3) For the IPR 1.8°C Forecast Policy Scenario this means that the fossil fuel sector supply dynamics will need reassessing eg split between piped natural gas and LNG, geography of origin etc

4) But we do not see any divergence from trend in demand side sectors, if anything an eventual acceleration towards more green outcomes

Note that one potential outcome is an “all of the above” where fossil fuels remain longer in the system as security back up (low-capacity utilisation) and the cost is borne in effect as an energy security cost.
Investor Implications for the new geo-politics

• Strong reinforcement of IPR medium term renewables forecasts with good upside – implications for renewable infrastructure and transitioning companies
• Russian exposed debt, sovereign and corporate, requires urgent analysis whilst ratings agencies calculate impact
• Net Zero aligners will miss out on fossil fuel short term boom
• Net Zero alignment even lower probability
• No divergence from trend in demand side sectors, if anything, an acceleration towards more green outcomes.
• Non aligners need to beware Capex expansion will be justified in the short term but will increase stranded asset risk
• Engagement - will O&G companies use windfall for transition?
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** policy forecast

9-10 indicates **increasing evidence for acceleration** in policy forecast

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

<table>
<thead>
<tr>
<th>Scale</th>
<th>Details</th>
<th>Impact on policy forecast</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>Evidence for significant deceleration in policy forecast</td>
<td>Potential for 10+ year downgrade</td>
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<tr>
<td>1</td>
<td>Evidence for large deceleration in policy forecast</td>
<td>Potential for 10-year downgrade</td>
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<tr>
<td>2</td>
<td>Evidence for moderate deceleration policy forecast</td>
<td>Potential for 5-year downgrade</td>
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<td>3</td>
<td>Evidence for small deceleration in policy forecast</td>
<td>Potential for &lt;5-year downgrade</td>
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<tr>
<td>4</td>
<td>Some evidence for marginal deceleration in policy forecast</td>
<td>Monitor developments</td>
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<tr>
<td>5</td>
<td>Confirmatory (reinforces and increases probability of 1.8°C FPS)</td>
<td>Does not change forecast</td>
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<tr>
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<td>Potential for 10-year upgrade</td>
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<tr>
<td>10</td>
<td>Evidence for significant acceleration in policy forecast</td>
<td>Potential for 10+ year upgrade</td>
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* 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.
Between COP 26 and June 2022, majority of energy/land policy & technology developments mostly show confirmation of IPR Forecasts

Greater likelihood of 2.3°C IEA STEPS* scenario

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<th>Brazil</th>
<th>Indonesia</th>
<th>Canada</th>
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1.5°C IPR FPS

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<th>Moderate deceleration</th>
<th>Small deceleration</th>
<th>Marginal deceleration</th>
<th>Confirmatory (increased probability of 1.8°C FPS)</th>
<th>Marginal acceleration</th>
<th>Small acceleration</th>
<th>Moderate acceleration</th>
<th>Large acceleration</th>
<th>Significant acceleration</th>
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Greater likelihood of 1.5°C IPR RPS scenario

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
Climate transition presents challenges and investment opportunities for Asset Managers

**Likely outcomes:**
- Reduce emissions at the portfolio level
- Questionable impact in real world without re-allocation of capital to low carbon assets
- Return loss if RPS 1.5 policies do not materialise
- Possible unintended consequences of divestment

**Desired and likely outcome:**
- Reduce emissions at the portfolio level but less than RPS
- Maximisation of risk and return
- Real world emission reduction aligning with policy materialisation
IPR Value Add

<table>
<thead>
<tr>
<th>Characteristics of Scenarios</th>
<th>IPR</th>
<th>Most “aligned” Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td>A high conviction policy-based forecast with realistic constraints</td>
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<tr>
<td>Transparent</td>
<td>✔</td>
<td></td>
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<tr>
<td>Applicable to TCFD reporting</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Complete forecast includes macroeconomic, energy and land use models</td>
<td>✔</td>
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<td>Covers all regions of the world</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Fully integrating land-use</td>
<td>✔</td>
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<tr>
<td>Built for investors with investor input</td>
<td>✔</td>
<td></td>
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<tr>
<td>Usable for stress testing</td>
<td>✔</td>
<td>✔</td>
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</table>
Policy methodology for the IPR 1.8C FPS 2021 vs 1.5C RPS

<table>
<thead>
<tr>
<th>Key Differences</th>
<th>1.8°C FPS</th>
<th>1.5°C RPS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carbon Prices</strong></td>
<td>Forecasted timeframe, varying by region</td>
<td>Similar to FPS: Extremely rapid transition required for RPS will be challenging to achieve through carbon pricing mechanisms, beyond what is already expected in the IPR FPS 2021</td>
</tr>
<tr>
<td><strong>Policy Drivers</strong></td>
<td>Based on realistic forecasts, within political reality as well as technology and consumer changes</td>
<td>More interventionist top down policies: Performance standards (bans) and/or more direct subsidies</td>
</tr>
<tr>
<td><strong>Announcements</strong></td>
<td>By 2025 Paris Ratchet</td>
<td>ASAP; by 2023 Paris Stocktake</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td>In line with political reality</td>
<td>Immediately upon announcement</td>
</tr>
</tbody>
</table>
Scenario market in terms of emissions outcomes in energy related sectors

- Note strong COVID bounce backs for both IPR FPS and IPR RPS
- Delay on NGFS DDT (Disorderly Delayed Transition) is beyond IPR inflection point
- Neither IEA nor NGFS include full land use emissions or sequestration potential

* Data on IEA CO2 pathways are published in 5-year intervals ** IPR FPS 2019 was modelled in 5-year increments

Note: IEA scenario data based on May 2021 Net Zero Emissions report; in WEO2021, IEA APC is renamed Announced Pledges Scenario (APS), with a slightly modified emissions pathway
Forecasted scenario ambitious but still leaves 30% (8 GtCO₂) gap, relative to IPR 1.5°C Required Policy Scenario, primarily due to timing of policy implementation.
Policies with the greatest 2020-2050 Gt reduction between IPR 1.5°C RPS and IPR 1.8°C FPS 2021

<table>
<thead>
<tr>
<th>Rank</th>
<th>Policy</th>
<th>Country</th>
<th>IPR 1.5°C RPS vs IPR 1.8°C FPS (2021 Gt reduction)</th>
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<tbody>
<tr>
<td>1</td>
<td>Coal phase out</td>
<td>China</td>
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<tr>
<td>2</td>
<td>End deforestation and NBS</td>
<td>Sub-Saharan Africa, South East Asia and Latin America</td>
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<td>100% clean industry</td>
<td>China</td>
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Note: Emissions reduction are approximate and include some additional sector-specific CO₂ reduction such as energy efficiency
### Example of differences between 1.8°C FPS and 1.5°C RPS in key sector – Unabated Coal

**Phase out of existing unabated coal**

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<td>USA</td>
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<td>RPS</td>
<td>FPS</td>
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<td>7%</td>
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<tr>
<td>WEU</td>
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<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td>10%</td>
<td>5%</td>
</tr>
</tbody>
</table>

*annual reduction*  

* reduction in coal generation as a share of 2020 levels
### Example of differences between 1.8°C FPS & 1.5°C RPS in key issue – Deforestation

<table>
<thead>
<tr>
<th>End of deforestation</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>Change in forest cover 2020-2050 (m ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU</td>
<td>FPSRS</td>
<td>FPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 3, IPR 1.5°C RPS: 3</td>
</tr>
<tr>
<td>BRA</td>
<td>RPS</td>
<td>FPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 12, IPR 1.5°C RPS: 16</td>
</tr>
<tr>
<td>CAN</td>
<td>FPSRS</td>
<td>RPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 1, IPR 1.5°C RPS: 1</td>
</tr>
<tr>
<td>CHI</td>
<td>RPS</td>
<td>FPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 92, IPR 1.5°C RPS: 92</td>
</tr>
<tr>
<td>CSA</td>
<td>RPS</td>
<td>FPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 10, IPR 1.5°C RPS: 14</td>
</tr>
<tr>
<td>EEU</td>
<td>FPSRS</td>
<td>RPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 4, IPR 1.5°C RPS: 4</td>
</tr>
<tr>
<td>EURA</td>
<td>RPS</td>
<td>FPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 1, IPR 1.5°C RPS: 2</td>
</tr>
<tr>
<td>GCC</td>
<td>FPSRS</td>
<td>RPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 0, IPR 1.5°C RPS: 0</td>
</tr>
<tr>
<td>IND</td>
<td>RPS</td>
<td>FPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 13, IPR 1.5°C RPS: 13</td>
</tr>
<tr>
<td>INDO</td>
<td>RPS</td>
<td>FPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 7, IPR 1.5°C RPS: 6</td>
</tr>
<tr>
<td>JAP</td>
<td>FPSRS</td>
<td>RPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 0, IPR 1.5°C RPS: 0</td>
</tr>
<tr>
<td>MENA</td>
<td>RPS</td>
<td>FPS</td>
<td>FPS</td>
<td>IPR FPS 2021: -1, IPR 1.5°C RPS: 1</td>
</tr>
<tr>
<td>RU</td>
<td>RPS</td>
<td>FPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 1, IPR 1.5°C RPS: 2</td>
</tr>
<tr>
<td>SA</td>
<td>FPSRS</td>
<td>RPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 0, IPR 1.5°C RPS: 0</td>
</tr>
<tr>
<td>SAF</td>
<td>RPS</td>
<td>FPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 0, IPR 1.5°C RPS: 1</td>
</tr>
<tr>
<td>SEAO</td>
<td>FPSRS</td>
<td>RPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 3, IPR 1.5°C RPS: 11</td>
</tr>
<tr>
<td>SK</td>
<td>FPSRS</td>
<td>RPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 0, IPR 1.5°C RPS: 0</td>
</tr>
<tr>
<td>SSA</td>
<td>RPS</td>
<td>FPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 0, IPR 1.5°C RPS: 15</td>
</tr>
<tr>
<td>UK</td>
<td>FPSRS</td>
<td>RPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 1, IPR 1.5°C RPS: 1</td>
</tr>
<tr>
<td>USA</td>
<td>FPSRS</td>
<td>RPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 17, IPR 1.5°C RPS: 17</td>
</tr>
<tr>
<td>WEU</td>
<td>RPS</td>
<td>FPS</td>
<td>FPS</td>
<td>IPR FPS 2021: 11, IPR 1.5°C RPS: 12</td>
</tr>
</tbody>
</table>

**Deforestation of natural forest halted through strong and effective command and control policy**

**Countries/regions like CAN, GCC, JAP, SA, SK, UK have virtually zero net deforestation**

**Carbon pricing and NDC commitments combine to stop net deforestation by 2030. Biggest changes need to occur in BRZ, CSA, INDO, SEAO, SSA**
Achieving 1.5°C with less aggressive action on fossil CO₂ emissions would require substantially more negative emissions technologies (NETs)

Cumulative CO₂ reduction between IPR FPS 2021 and IPR 1.5°C RPS, 2020-2100

Achieving required emissions reduction purely though NETs would require additional negative emissions of 4.5 GtCO₂ per year in the 2040s, rising to 9 Gt per year between 2050 and 2100.
Twin forces in the food & ag revolution – decline in ruminant meat and emergence of Nature-based Solutions (NbS) as CO2 removal strategies

- 30% decline in ruminant meat from 2030 to 2050 due to shifts in consumer behavior and some policy support for health and environmental reasons
- Alternative meat reaches 28% market share by 2050, as taste/price parity is achieved in all markets

- Demand for verifiable sequestration drives carbon markets (voluntary, followed by regulatory), supporting an explosion in commercial NbS solutions
- Greatest sequestration expected in China (1.4 Gt), India (0.5 Gt), Sub-Saharan Africa (0.5 Gt), and Brazil (0.4 Gt)
The Inevitable Policy Response: Investor Brief for Asset Managers

The Value Drivers Database Explained

The IPR Value Drivers Database is the largest and most comprehensive in the world enabling direct input into investor valuation models

- Data summary:
  - All major jurisdictions covered
  - Annualised data
  - Emissions by GHG type
  - Investment by technology type by jurisdiction by sector
  - Power Demand by fuel type by jurisdiction
  - All major sectors covered
  - Huge Land Use component
  - Price data derived
  - Macro-economic assumptions
- Designed in collaboration with IPR Strategic Partners and Research Consortium Partners
- Will facilitate opportunity to build new wave of product
- Hundreds of thousands of data points

- **Jurisdiction:** 21 world regions including 12 G20 countries
- **Countries:** Australia, Brazil, Canada, China, India, Indonesia, Japan, Russia, South Africa, South Korea, United Kingdom, United States
- **Composite regions:** Central and South America, Eastern Europe, Eurasia, Gulf co-operation Council; Middle East and North Africa, South Asia, South East Asia and Oceania, Sub-Saharan Africa, Western Europe
The Inevitable Policy Response: Investor Brief for Asset Managers

IPR FPS 2021 – examples of broad capital shift opportunities

Capital investment - electricity generation (WORLD)

Capital investment: new heating systems

Capital investment: new Trucks (USA)
GDP impact: Global

• The majority of negative final impacts are significantly mitigated by 2050 (see the pink line)
• The next 10 years appear to be crucial to cut emissions but also for economic cost to erupt
• FPS’s carbon tax and abatement shocks could have a mild impact in the global economy by 2030 (less than 1.5%)
• This is partly offset by carbon revenue recycling back into the economy (through a combination of debt repayment, transfers, or government investments)

Source: NIGEM based on IPR inputs
Note: Delta is calculated as the relative % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Dynamics of the investment chain

**Asset Owners**
- Board approval for thematic strategy
- Asset Re-allocation
- Manager selection criteria
  - Forward looking mandate structures
  - Passive/ active split
  - Service provider alignment-consultants
  - Recycle capital
  - Engagement base case

**Asset Managers / Internal AO Portfolio Teams**
- Build product e.g., Indices / ETFs
- Engage with companies
- Engage with policymakers
  - Underweight high carbon exposures
  - Reward strong transitioning companies
  - Seek low carbon pure-plays e.g., infra / PE/ small caps
  - Service provider alignment

**New Product**

**Demand for product**

**Incentives to price reality**

**Asset Consulting Support**
Key role of service providers

- **Investment Consultants / OCIOs:**
  - Asset Owners should assess their investment consultants’ climate capacity
  - Investment consultants are critical to developing strategies for climate transition
  - Barriers: perception of “risky advice” and going against traditional SAA approaches

- **Ratings Agencies** – Can integrate IPR into ratings analysis (Fitch already doing so)

- **Data providers** – Can build new offerings integrating IPR public data

- **Index Providers** – Can create new benchmarks and semi-passive product

- **Proxy advisers** – Can make voting recommendation based on IPR realism
IAR Climate transition integration

START

A

Align with 1.5°C → IPR 1.5°C RPS

B

Maximise risk and return through the transition → IPR 1.8°C FPS

C

BAU: The market will efficiently price the transition

Align portfolio with Science Based Targets by 2025 / 2030

Divestment

Issue Net Zero Aligned AM Mandates

Possible early divestment

Take pragmatic approach to short term (IPR RPS)

Design Interfaces and data conversion requirements for accepting External Value Drivers

Interface IPR Value Drivers

Conduct valuation analysis through IPR Value Drivers interface

Do nothing

ASSET MANAGERS

Integrate forecast returns into Strategic Asset Allocation & Manager Selection

Implement portfolio investment strategy

ASSET MANAGERS

Possible early divestment

Integrate forecasts to adjust existing strategies and/or develop new products

Interface IPR Value Drivers
Climate transition presents asset managers with fundamental organisational challenges

- **CEO**: Brand implications, in-/out flows, messaging, major engagement issues
- **Executive**: Jurisdictional impacts, organisational strategy, client / solution strategies, risk
- **Portfolio Teams**: Product, portfolio strategies, asset class issues, "buying into" and truly integrating ESG
- **ESG-RI Team**: Cross team co-ordination, communication and collaboration climate thought leadership
- **Investment Research**: Economic research, macro assumptions
- **Analysts / Investment specialists**: Company transition analysis, valuation analytics
Asset Manager issues between Net Zero, a realistic forecast and execution

- Clients choose mandates and benchmarks – it's not your fault!
- If engagement only, how serious are you prepared to get?
- Do active managers really want to divest to meet short term targets?
- Which companies have the best transition plans such that they emerge stronger? Little time to transition to Net Zero for exposed companies!
- Can you renegotiate incentives that allow you to position a low carbon portfolio early, even risking short term underperformance?
Climate transition theme demands sector and asset class matrix analysis

**Public Markets**
- IT
- Health
- Consumer Discretionary
- Financials
- Comms services
- Industrials
- Energy
- Real Estate
- Utilities
- Materials

**Private Markets**
- IT
- Health
- Consumer Discretionary
- Financials
- Comms services
- Industrials
- Energy
- Real Estate
- Utilities
- Materials

**Equities**
- Corporate Fixed Income
- Sovereign Fixed Income

**Infrastructure**
- Real Estate
- Private Equity

*Note: Not market cap weighted and not all sectors have presence in each asset class*
The portfolio carbon switch by asset class

**Before**

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

**After** (including companies in transition)

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

**Re-allocate & recycle**

- IPR benchmarks/
  Active selection
- Corporate FI Green
  Tilt
- Sovereign FI Green
  Tilt
- Value Add Allocation
- Green Building Stds
- New Tech, LBO,
  MBO

**$ allocation**

- Relatively Unexposed
- Green Assets
- High Carbon Assets
Asset Allocation – do we have barriers to investing in emerging markets where the decarbonization opportunities are?

- Note this is only in terms of scope 1 &2 emissions as OECD “export” emissions to emerging markets through supply chains
- Non-OECD needs substantial investment from OECD to transition
- Potential Sovereign Debt Implications
Key philosophies challenged by the climate transition

• **Fiduciary duty**
  - Restriction on ignoring risk adjusted return maximisation?
  - Licence to act proactively on climate strategy

• **Agency responsibility**
  - Who is responsible for establishing a climate strategy?

Some may consider others such as EMH (Efficient Market Hypothesis) or MPT (Markowitz)
Human issues for asset managers to manage and consider

- Culture
- Behaviours
- Incentives
- Career Risk

Informational barriers to taking action on climate change:
- Data, tools, metrics, scientific evidence, knowledge

Behavioural barriers to taking action on climate change:
- Cognitive biases, psychological underpinnings
Whole system view - from asset allocation to company analysis and stock selection

Example Challenge: How do you deal with a utility in transition that might be the most emissions intensive company in its country but also the largest investor in clean energy?

Challenges for Product Development / Integration
- Possible divestment
- Select hold price
- Add to manager mandate universe
- New transition benchmarks
- Active Transition selection funds

Optimal Carbon Risks / opportunities strategy

Asset Owners
- Traditional SAA start point
- Overlay IPR assumptions
- Flexible portfolio Approach
- High/low carbon Taxonomy
- High/low carbon asset split

Asset Managers
- Manager SELECTION
- 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
The implications of company transition challenge

Drivers of Transition

- Policy
- Shareholder Engagement / Management Incentives
- Reputation

Company X

A: Resist Transition
B: Decision to transition
C: Decision to wind down

Produce Transition Strategy

Transition Options

- Merge/MBO / LBO
- Sell Assets
- De-list
- Enter new markets
- Buy assets from PE / Infrastructure
- Restructure capital base
- Issue Transition / Green Bonds

Investor Due-Diligence
Is the transition strategy credible?
Does the transition strategy occur quickly enough?
Do we trust the company to execute the strategy?
Using IPR 1.8°C FPS 2021
### Opportunities matrix in key sectors

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Equities</th>
<th>Debt</th>
<th>Private Capital</th>
<th>Infrastructure &amp; Energy</th>
<th>Real Assets / NBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCS (carbon capture &amp; storage)</td>
<td>Through Oil, Gas, Industrials</td>
<td>Unlisted FF inc coal, sovereign debt, municipal debt</td>
<td>Commercializing technologies</td>
<td>Retrofit for unlisted coal</td>
<td>As part of BECCS (Bioenergy w/CCS) development</td>
</tr>
<tr>
<td>EV</td>
<td>Leading auto transitioners</td>
<td>Leading auto transitioners</td>
<td>Batteries, smart car, smart charging</td>
<td>Charging infra, smart grid</td>
<td>N/A</td>
</tr>
<tr>
<td>Renewables</td>
<td>For listed utilities</td>
<td>For unlisted utilities</td>
<td>New technologies, smart grid, balancing</td>
<td>New builds</td>
<td>N/A</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>Listed utilities/ Industrials 2030s</td>
<td>Early, late-stage debt &amp; transition debt</td>
<td>Development stage PE through to commercialization</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Clean Industrials</td>
<td>Leading low carbon industrials</td>
<td>Leading low carbon industrials</td>
<td>New technology</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*Note: This does not suggest that all opportunities have only positive environmental or social impact*
# Opportunities matrix in land use, the ‘Elephant' in emissions abatement

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Equities</th>
<th>Debt</th>
<th>Private Capital</th>
<th>Infrastructure &amp; Energy</th>
<th>Real Assets / NbS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Forest Conservation and Reforestation</strong></td>
<td>• Food &amp; Ag transitioning away from meat &amp; industrial ag</td>
<td>• Food &amp; Ag transitioning away from meat &amp; industrial ag</td>
<td>• Technology supporting scaling of conservation and reforestation</td>
<td>Forest conservation &amp; reforestation within infra and energy projects</td>
<td>• Forestry asset class with high sustainability performance</td>
</tr>
<tr>
<td><strong>Improved Land Management</strong></td>
<td>• Timberland REITS • Agribusiness companies</td>
<td>• Timberland REITS financing • Agribusiness companies financing</td>
<td>• Ag Tech: support scaling of improved land management and soil carbon management</td>
<td>N/A</td>
<td>• Forestry asset class with high sustainability performance</td>
</tr>
<tr>
<td><strong>Food Production Innovation &amp; Technology</strong></td>
<td>Alt. protein directly or via incumbents investing in such at scale</td>
<td>Commercialisation</td>
<td>Alt. protein for human and animal consumption</td>
<td>N/A</td>
<td>Reallocate unused pasture and grazing land toward climate-positive forestry and climate-positive agriculture</td>
</tr>
</tbody>
</table>
Visual representation of the TDM*

- If we align with 1.5 deg and we underperform, what happens?

- **Full mitigation (0):** The portfolio is ahead of the FPS scenario pathway.
- **Managed mitigation (from 0 to 1):** Residual disruption consistent with the effort in years 1 to 5. Over 1, suggests that the portfolio needs to accelerate the transition relative to its current capital stock evolution projections, but this acceleration is in line with historical growth rates of the sector.
- **Managed disruption (1 to 2):** is in line with the FPS acceleration which involves some disruption that is still manageable.
- **Unmanaged or high disruption (over 2):** An unmanaged or high disruption suggests the portfolio is already lagging the FPS scenario benchmark and will involve significant unmanaged disruption over the next decade if/when the FPS scenario materializes.

Period of analysis: 10 years
Start year of analysis: 2021

* This visual representation should be considered as an example given that the metric is under construction and may have slight variations.

See: [https://2degrees-investing.org/resource/pacta/](https://2degrees-investing.org/resource/pacta/)
Using IPR 1.5°C RPS 2021
Aggressive emission reductions required under IPR 1.5°C RPS target one third reduction by 2030

<table>
<thead>
<tr>
<th>Year</th>
<th>Changes required from 2020 under IPR 1.5°C RPS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Energy</td>
</tr>
<tr>
<td>2020</td>
<td>Base Year</td>
</tr>
<tr>
<td>2025</td>
<td>-1%</td>
</tr>
<tr>
<td>2030</td>
<td>-27%</td>
</tr>
<tr>
<td>2035</td>
<td>-53%</td>
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<tr>
<td>2040</td>
<td>-73%</td>
</tr>
<tr>
<td>2045</td>
<td>-88%</td>
</tr>
<tr>
<td>2050</td>
<td>-96%</td>
</tr>
</tbody>
</table>
Asset Managers – Converting IPR into valuation analysis

(Drawing examples from IPR 2019 analysis)
The asset model draws on results from IPR Phase I to generate financial impacts of the IPR 1.8°C Forecast Policy Scenario across various asset classes, starting with equities.

**Why?**
- Key Messages driving the IPR specification and its communication

**What & when**
- Forecast specification defining and justifying the critical characteristics of the IPR and of comparator alternative scenarios

**How?**
- Macro-economic modelling of IPR impacts on overall economic system
- Energy system modelling
- Land use system modelling
- Asset-level value stream modelling estimating implications bottom-up using asset-level data across major asset classes

Phase I results release

Phase II results release

This phase focuses on equity results

Source: Vivid Economics
Examples from 2019 Strategic Asset Allocation analysis

Green* and high carbon* indices for Corporate Bonds, Private equity, Real Estate, Equities, and Infrastructure are constructed by applying sector weights to the 90th and 10th percentile of companies (in terms of valuation change in FPS). Sovereign debt Green / high carbon impacts are from 10Y debt from Canada and the Netherlands. Real Estate Green assumes carbon neutral building with no carbon costs, whereas high carbon is average buildings with no abatement.
Equities
Key Findings: 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.
How do we think about the ‘impacts’ of the Inevitable Policy Response?

1. **Current valuations**
   - Current equity valuations are based on expectations of future company performance. We assume these expectations are consistent with a scenario where current NDCs* as reflected in the IEA NPS (now STEPs) are achieved.

2. **The IPR Forecast Policy Scenario (FPS)**
   - The IPR FPS was developed to show the macro and sector level impacts of a specific set of policy forecasts taking affect around the time of the 2025 Paris Agreement ‘ratchet’. These generate impacts to company profits going forward due to changes in demand, prices and costs for companies.

3. **Impacts**
   - We then define ‘impacts’ as the implied changes in valuation in terms of market capitalisation if investors repriced immediately on the basis of these expected cash flow changes **

Notes: *NDCs refer to countries’ nationally determined contributions to the Paris Agreement. **Immediately is our default assumption in this report but we set sensitivities around delayed repricing in 2025 as well.

Source: Vivid Economics
To arrive at a quantitative estimate, the approach estimates annual impacts on profits from 2020 to 2050 and discounts these back to the present.

Notes: Current valuation is assumed to be the NPV of projected profits to 2050 based on a ‘business as usual’ policy scenario where countries implement their stated policies (or NDCs), akin to what is represented in the IEA STEPS (formerly NPS). While in reality, different equities may be valued based on different expectations of a future climate pathway, this assumption is necessary to provide ‘value at risk’ figures relative to a baseline.

Source: Vivid Economics
The Inevitable Policy Response: Investor Brief for Asset Managers

The 1.8°C Forecast Policy Scenario starts impacting equity valuations in 2025, but repricing could occur any time from now to 2025.

The FPS starts materially diverging from the reference scenario in 2025.

Repricing in 2020

The starting assumption is that repricing occurs today, under which impacts are discounted from 2020-2050 to NPV.

Repricing in 2025

This report also conducted sensitivity analysis around a 2025 repricing, presented in later slides.
The value streams capture the dynamics of the transition, which affects production costs directly through carbon pricing and indirectly through demand changes.

The demand destruction value stream captures the impact of the contraction in demand for high emissions products due to climate policy (such as ICEs and fossil fuels).

These impacts will depend on a company’s sensitivity to falling commodity prices and margins, which will be tied to production horizons and cost structures.

The demand creation value stream captures the effects of increasing demand for low emissions products or inputs (such as EVs, copper and renewable energy equipment). These impacts will depend on a company’s current and future share of green markets, and the extent of overall market growth.

Cost and competition captures the carbon costs companies face directly from Scope 1 emissions, and indirectly through power prices.

Impacts will depend on a company’s emissions intensity, abatement opportunities and capacity to pass through costs to consumers, relative to competitors.*

Notes: * The cost pass through and competition elements also apply to costs from demand destruction and demand creation models.
Source: Vivid Economics
The Inevitable Policy Response: Investor Brief for Asset Managers

2019 Example: the impact on the current value of the world index was modest in percentage terms, although it implies that US$1.6 trillion (over half of UK GDP) would be wiped off the index.

Note: Carbon revenues are government revenues from carbon pricing (see State and Trends of Carbon Pricing 2019, World Bank). Detail on timing of repricing can be found in the Technical Annex. Source: Vivid Economics Net Zero Toolkit
The bottom 10% of companies face significant demand destruction and suffer from carbon costs.

The top 10% of companies experience significant demand creation and benefit from a carbon cost advantage.

Source: Vivid Economics Net Zero Toolkit

Note: For further within sector analysis, see Annex.

Source: Vivid Economics Net Zero Toolkit
### 2019 Sectoral Example: Overall index-level impacts are small in percentage terms since the majority of companies in the index are in sectors with low exposure to climate policy

<table>
<thead>
<tr>
<th>RBICS Level 1 sectors</th>
<th>Share of index</th>
<th>Change in valuation under PPS (weighted mean impacts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrials</td>
<td>7%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Technology</td>
<td>19%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Healthcare</td>
<td>10%</td>
<td>-0.2%</td>
</tr>
<tr>
<td>Finance</td>
<td>23%</td>
<td>-0.3%</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>5%</td>
<td>-0.5%</td>
</tr>
<tr>
<td>Business Services</td>
<td>1%</td>
<td>-1.3%</td>
</tr>
<tr>
<td>Consumer Non-Cyclicals</td>
<td>12%</td>
<td>-1.9%</td>
</tr>
<tr>
<td>Consumer Services</td>
<td>3%</td>
<td>-2.0%</td>
</tr>
<tr>
<td>Energy</td>
<td>7%</td>
<td>-3.1%</td>
</tr>
<tr>
<td>iShares MSCI ACWI ETF</td>
<td>100%</td>
<td>-3.7%</td>
</tr>
<tr>
<td>Utilities</td>
<td>3%</td>
<td>-4.1%</td>
</tr>
<tr>
<td>Non-Energy Materials</td>
<td>5%</td>
<td>-5.2%</td>
</tr>
<tr>
<td>Consumer Cyclicals</td>
<td>5%</td>
<td>-32.7%</td>
</tr>
</tbody>
</table>

* Finance sector impacts do not include impacts on financial holdings. ** Consumer Non-Cyclicals include Agriculture. This sector is explored further in the sector insights section. *** Consumer Cyclicals include Automobiles (see sector results for further detail).

Source: Vivid Economics Net Zero Toolkit
2019 Sectoral Example: Within-sector variation can be significant, particularly for the four most impacted sectors in the index: Energy, Consumer Cyclicals, Non-Energy Materials and Utilities.
2019 Sectoral Example: Zooming in on the sectors with the most negative impacts on average and special interest sectors, it is clear that subsectors can experience considerably different impacts.

<table>
<thead>
<tr>
<th>RBICS Level 2 sectors*</th>
<th>Agriculture</th>
<th>Food Production</th>
<th>Water Utilities</th>
<th>Energy Utilities</th>
<th>Manufactured Products</th>
<th>Chemical, Plastic and Rubber Materials</th>
<th>Mining and Mineral Products</th>
<th>Consumer Goods</th>
<th>Consumer Retail</th>
<th>Miscellaneous Retail</th>
<th>Consumer Vehicles and Parts</th>
<th>Downstream and Midstream Energy</th>
<th>Integrated Oil and Gas Exploration and Production</th>
<th>Upstream Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of sector</td>
<td>N/A</td>
<td>N/A</td>
<td>5%</td>
<td>95%</td>
<td>12%</td>
<td>41%</td>
<td>47%</td>
<td>28%</td>
<td>26%</td>
<td>7%</td>
<td>39%</td>
<td>15%</td>
<td>57%</td>
<td>28%</td>
</tr>
<tr>
<td>Change in valuation</td>
<td>-0.9%</td>
<td>-1.5%</td>
<td>-2.4%</td>
<td>-3.8%</td>
<td>-5.6%</td>
<td>-5.4%</td>
<td>0.0%</td>
<td>-0.4%</td>
<td>-4.9%</td>
<td>-12.4%</td>
<td>-28.9%</td>
<td>-31.3%</td>
<td>-37.7%</td>
<td></td>
</tr>
</tbody>
</table>

* The special interest sectors are contained Consumer Non-Cyclicals. Agriculture is a Level 3 subsector, Food production a Level 4 subsector. Sector shares are not available as results for the ‘Agriculture’ sector are based on oversampling of companies – there are very few agriculture companies in the index.

** Utilities sector broken down to RBICS level 3 to provide further detail. *** Upstream energy includes coal mining and oil and gas exploration and production.
2019 Example - Fossil fuels: The majority of impacts on fossil fuels come from squeezed profit margins from falling prices, rather than reductions in the quantity produced.

Notes: The error bar on the left graph indicates the 10th and 90th percentiles of impact in the sector. Value of the dot is weighted average impact. *The energy sector includes upstream, downstream and midstream sectors and cover oil, gas and coal production.

Source: Vivid Economics Net Zero Toolkit
Example outcomes for companies driven by the IPR Forecast Policy levers*, particularly the coal and ICE phase-out, carbon pricing and zero-carbon power

<table>
<thead>
<tr>
<th>Company (anonymised)</th>
<th>Description</th>
<th>Coal phase-out</th>
<th>ICE sales bans</th>
<th>Carbon pricing</th>
<th>CCS and industry decarbonisation</th>
<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>A</td>
<td>Utility (primarily renewable generation)</td>
<td>✔️</td>
<td>(✔️)</td>
<td>✔️</td>
<td>x</td>
<td>✔️</td>
<td>(✔️)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>B</td>
<td>Utility (primarily coal generation)</td>
<td>✔️</td>
<td>(✔️)</td>
<td>✔️</td>
<td>x</td>
<td>✔️</td>
<td>(✔️)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>C</td>
<td>Integrated Oil &amp; Gas</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>(✔️)</td>
<td>(✔️)</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

Note: Further information on the IPR Forecast Policy Levers can be found on the PRI website.
Source: Vivid Economics analysis
Utilities with more renewable generation gain at the expense of emissions intensive fossil fuel generators, and oil & gas suffer predominantly from falling demand

<table>
<thead>
<tr>
<th>Company (anonymised)</th>
<th>Description</th>
<th>Company emissions intensity / market intensity*</th>
<th>Current valuation</th>
<th>Demand destruction</th>
<th>Demand creation</th>
<th>Carbon costs</th>
<th>Total FPS impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Utility (primarily renewable generation)</td>
<td>0.31</td>
<td>100%</td>
<td>-0.1%</td>
<td>0.4%</td>
<td>40.9%</td>
<td>41.3%</td>
</tr>
<tr>
<td>B</td>
<td>Utility (primarily coal generation)</td>
<td>3.71</td>
<td>100%</td>
<td>0.0%</td>
<td>2.7%</td>
<td>-62.5%</td>
<td>-61.5%</td>
</tr>
<tr>
<td>C</td>
<td>Integrated Oil &amp; Gas</td>
<td>0.39</td>
<td>100%</td>
<td>-27.2%</td>
<td>3.2%</td>
<td>3.6%</td>
<td>-22.2%</td>
</tr>
</tbody>
</table>

Note: * This is the emissions intensity (Scope 1 + Scope 2) of the company divided by the average emissions intensity of the market.
Source: Vivid Economics analysis
Corporate Debt
Key Findings: Corporate debt impacts are modest as most issued bonds mature before the FPS kicks in, which presents a realignment opportunity for investors

Overall impacts for corporate debt are modest with the bonds currently issued by companies in the iShares MSCI ACWI falling only 0.03% in value under FPS This is significantly less than the 3.1% impact on the iShares MSCI ACWI equity index.

As with equities, there is within and across sector variation for corporate bonds. However, impacts and hence across sector variation is muted due to the relatively secured gradual payout structure of bonds.

High rated bonds have modest impacts under the FPS as policy is unlikely to tip them into bankruptcy. However, low rated bonds can be very exposed to the FPS as policy can push them into insolvency.

The median time to maturity of bonds issued by iShares MSCI ACWI companies is 5 years and most of current exposures are therefore paid out before the FPS comes in post 2025. However, value impacts increase with maturity so longer dated bonds are exposed.

Current holdings
Investors should conduct additional due diligence on longer dated and low rated bonds to assess their climate exposure.

Future bond issuance
Investors should gradually reduce their exposure to “dirty” sectors and companies by not buying their newly issued bonds.
Changes in company fundamentals arising from the FPS affect default risk and as a result corporate bond valuations.

Changes in cash flows impact default risk, as companies ability to service their debt change.

Changes in default risk are translated into adjusted bond prices, using standard fixed income security valuation techniques.

Impacts differ depending on current credit ratings (default probabilities) and duration (time to maturity and payout structure).

Cash flow changes

FPS decarbonization policies impact company performance as outlined in the equities analysis.

Effects vary across companies depending on characteristics such as sectors.
Overall impacts are modest relative to equities as most issued bonds pay out before impacts kick in – the majority of analysed bonds have a maturity under 5 years.

This is largely because **58% of bonds issued by MSCI ACWI companies have a maturity of less than 5 years**.

*Equity is based on the iShares MSCI ACWI ETF, Issued corporate bonds** represents bonds issued by companies within the iShares MSCI ACWI ETF

Source: Vivid Economics (Net-zero toolkit)
However, as with equities, within-sector variation can be significant, particularly for: energy, non-energy Materials and utilities

Notes: Error bars indicate the 10th and 90th percentiles of impact within each sector. Sectors: RBICS level 1. Issued corporate bonds* represents bonds issued by companies within the iShares MSCI ACWI ETF Source: Vivid Economics (Net-Zero Toolkit)
Beyond company fundamental, discussed in the equities release, variation in impacts can be explained by differences credit ratings and maturities*

*Due to the lack of availability of long dated corporate bonds >10y the impacts on 30y debt is assessed through "hypothetical" bonds. Overall market of corporate bonds >10y is very small.

Source: Vivid Economics (Net-Zero Toolkit)
Sovereign Debt
Key Findings: Sovereign bonds tend to rally under the 1.8C FPS as increases in risk premia are offset by central banks cutting interest rates in response to the policy shock.

**Sovereign bonds rally** for most countries under the FPS as increases in credit risk are dominated by lower interest rates.

For example, an average tenor US bond* is expected to increase in price by 0.01% under the FPS.

**Central bank response is critical**
Value adjustments depend heavily on how central banks respond to the FPS and investors should monitor how this develops.

**Interest rates fall** as central banks respond to a growing output gap driven by the FPS.

**Inflation rise** but the decrease in real interest rates dominates.

**Increasing debt issuance** drives up debt/GDP ratios and therefore credit risk premia.

In most cases the fall in nominal risk-free interest rates dominates causing bond yields to fall except for countries already running large debt/GDP, for example, Canada.

**Bonds with longer maturity experience larger price changes** as coupon payments occur further into the FPS.

**Reduce exposure to some countries**
Investors should reduce exposure to longer dated bonds issued by fossil fuel exporting countries with high debt/GDP ratios.

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*Average tenor US bond is 6 years to maturity*
The Inevitable Policy Response: Investor Brief for Asset Managers

The sovereign bond methodology captures the dynamics of transition, by modelling changes bond risk factors through changes in macroeconomic variables and policy

- **The Taylor rule in the macroeconomic model (G-Cubed)** used in this analysis leads to lower interest rates as central banks optimise over lower output vs higher inflation, induced by carbon pricing policies.

- **The diagram above depicts the generic impacts of the FPS on sovereign bond risk factors, but these vary by country.**
  - Current macroeconomic conditions and FPS impacts differ by country, therefore policy response (fiscal and monetary) differ by country as well.
Macroeconomic shocks and policy responses change nominal interest rates and credit risk premia which lead to a repricing of sovereign bonds.

Policy makers respond to macroeconomic shocks:
- **Central banks adjust interest rates** based on the trade-off between growth and inflation.
- **Governments** change fiscal policies and might therefore take on more debt.

Effects vary across countries depending on national characteristics such as sector split.

Markets reprice sovereign bonds as:
- **Credit risk premia change** as governments take on more debt.
- **Nominal interest rates change** as inflation and monetary policy adjust.

Repricing differs depending on duration and starting point.

Macroeconomic modelling for the IPR FPS was conducted using G-Cubed, a multi-country, multi-sector intertemporal general equilibrium model of the global economy.
2019 Example - In isolation, bond prices can fall significantly from rising debt/GDP as the sovereign default risk premia increases

Australia: Fall in 30-year bond prices is modest as current debt levels are lower relative to Canada

Canada: A sharp rise in debt levels, increases the already large debt/GDP ratio causing a significant fall in bond prices.

Source: Vivid Economics (Net-Zero Toolkit)
2019 Example - Full valuation impacts vary significantly across countries and by maturity, with longer-dated bonds having larger impacts, but most bonds rally under FPS

“Fully” repriced sovereign bond impacts: including risk premia and nominal interest rates (which are dependent on future central bank policy)

For bonds with tenors of 5 years or less, there is no impact as FPS scenario impacts materialise after 2025.

Current (04/02/2020) yields are taken from Thomson Reuters.

Source: Vivid Economics (Net-Zero Toolkit)
2019 Example - Higher credit risk can drive bond value reductions, but this is only for a small subset of highly exposed and leveraged countries such as Canada.

For bonds with tenors of 5 years or less, there is no impact as FPS scenario impacts materialise after 2025.

Current (04/02/2020) yields are taken from Thomson Reuters.

Source: Vivid Economics (Net-Zero Toolkit)
Real Estate
The Inevitable Policy Response: Investor Brief for Asset Managers

Key Findings: Real estate is almost as exposed as equities with impacts concentrated in commercial real estate and regions with high emissions intensity

-2.5%

The impairment for investable real estate is 2.5% of current value under the FPS - equivalent to $2.8 tn.

This is smaller than the expected 3.1% reduction in equity values

Risks are concentrated in commercial real estate, where energy use is higher per dollar invested leading to 7.5% global impact, relative to 1.1% in the residential sector.

Regions with low emissions efficiency and low property values are most impacted.

The impacts above assume 100% of the cost burden is on property owners. The value impairment is much smaller at 0.3% if energy costs are passed through to tenants.

The Inevitable Policy Response: Investor Brief for Asset Managers

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The impacts above assume 100% of the cost burden is on property owners. The value impairment is much smaller at 0.3% if energy costs are passed through to tenants.

Reduction exposure
Investors should reduce exposure to lower value properties with bad energy performance as these will require significant abatement investment which can undermine their value proposition.

Seek the opportunities
Developing or acquiring low-carbon real estate, especially in markets with currently high emissions intensity, is likely to offer higher returns as climate policy is implemented.
As energy costs rise, differentiating factors will become increasingly important for individual investors. Factors which will affect property level impacts include:

- Physical characteristics: e.g. age, location, energy consumption by source, historic energy efficiency refurbishment expenditure*
- Sensitivity of demand to price changes (by building type)
- Building-level market value (current), discount rates used in current valuations

Note: figures assume constant scope 2 emissions intensity – any reduction in scope 2 emissions intensity will reduce carbon costs. *If none of the above: average CO₂ emissions (by building type)
Infrastructure
**2019 Example** - Large parts of global infrastructure is built for the high carbon economy and therefore exposed to the FPS

**The iShares Global Infrastructure index falls by -11%**, which is significantly larger than the impact to listed equity of -3.1%

**Infrastructure assets are typically investor specific**, but broad exposure can be understood through proxy infrastructure equity indices

**Infrastructure impacts are large** as the asset class is **more exposed to sectors that are significantly impacted from the FPS**, for example Utilities (-14%) and Energy (-29%). However, cleaner infrastructure assets provide potentially large opportunities for targeted investors

**Large potential benefits by tilting to cleaner infrastructure.** There is also need for **increased due diligence** on existing holdings particularly within sectors that are exposed to the FPS, for example Energy
Private Equity
2019 Example - Private equity is likely to capture more green upside through smaller cleantech companies

The impact to a proxy private equity portfolio based on a representative portfolio of small and mid-cap listed equities is -0.7% which is smaller than the impact to listed equity of -3.1%

Private equity assets are investor specific but broad exposure can be understood through the use of small and mid-caps as proxies

Private equity impacts are relatively small at the asset class level. The asset class is more exposed to cleantech companies in the industrials sector (relative to MSCI ACWI), which shows modest gains these are cancelled out by losses in energy

Large potential upside by investing in growing cleantech companies that have not matured to listed indexes that tend to contain more established firms. Investors also need to be cautious of “dirty” energy firms in the sector which experience losses
2019 Example - Private equity investment is disproportionately higher in industrial sectors which are more likely to benefit from cleantech growth, leading to a small overall impact.

As private equity is owner specific, there is limited data available.

This analysis constructs a private equity portfolio based on a representative portfolio of small and mid-cap listed equities, with firm size and sector exposure based on the average private equity holdings.

The private equity portfolio is more exposed to smaller cleantech companies in the industrials sector. Private equity is also more exposed to “cleaner” sectors for example consumer and business services (10%), relative to listed equity.
IPR role for investors in the climate landscape

**Investor Action**

- IPR
- TCFD/NGFS
- CA100+
- COP26
- Net Zero Alliances
- Divest / Invest

**Corporate Engagement**

- Can be used in engagement
  - CA100+ Focus: IPR gives a realistic forecast scenario – Aim for recognition

**Investment**

- IPR creates a realistic outlook for investors
  - IPR uses risk framework to drive capital “recycling” within portfolios

**Disclosure**

- Can be used as a reporting standard
  - IPR brings realism to TCFD scenarios – already being used in PRI reporting

**Policy Advocacy**

- Forecasts inform policymakers
  - IPR focuses policymakers on the inevitable

**Initiative**

- Investors
Progress to date

Thematic highlights

Clean energy shares jumped 142% in 2020, while oil shares fell

WilderHill New Energy Global Innovation Index (NEX) versus NYSE Arca Oil Index, full year 2020 (rebased)

The market value of clean energy ETFs jumped 10-fold in 2020

Dollar market cap and number of shares outstanding in nine global clean energy ETFs, full year 2020 (rebased)

Source: BloombergNEF. NEX is WilderHill New Energy Global Innovation Index.

Source: BloombergNEF. Dollar values are indexed to 100 on January 1, 2020.
Progress to date - Bloomberg
Bloomberg NEO data

Energy transition investment: carbon capture and storage

Just a few projects represent most of the investment in CCS since 2018

Global investment in CCS by sector

Investment by oil and gas companies has held up during the pandemic

Clean energy investment by oil and gas companies, 2015-2020

Source: BloombergNEF. Note: expenditure commitments considered only if recipient is announced.

Source: BloombergNEF, company disclosures. Note: analysis includes all completed deals, and estimated values for undisclosed deals. CCS data excludes non-commercial projects that have not disclosed investment values. Asset finance data may oversate investment by each company where project equity shares have not been disclosed.
Example risks: China power and investors – it's all about debt

- President Xi Jinping’s estimated $21 trillion carbon neutrality pledge
- Highly leveraged, dubious transition strategy but with the implicit Chinese government guarantee priced in to give solid ratings - (A+/Stable)
- The five biggest state-backed power firms have announced plans to develop about 305 gigawatts of new wind and solar capacity in the next five years, according to BloombergNEF, almost twice the amount it estimates the U.S. will install over the same period. At peak generation, the total being added would be about enough to power the whole of Japan

“2021 WILL BE A YEAR FOR RE-CALIBRATING ASSUMPTIONS ABOUT DEFAULT RISK FOR CHINESE SOEs. Fixed income investors learned some tough lessons in 2020 about the Chinese government’s newfound willingness to let SOEs default on debt obligations.” Source: IEEFA
The IPR Forecast Policy Scenario (FPS) forecasts higher policy ambition across eight policy levers

In March 2021, the IPR FPS update was informed by a rigorous evidence review and large-scale survey of country climate policy experts

<table>
<thead>
<tr>
<th>Carbon pricing</th>
<th>Coal phase-out</th>
<th>100% clean power</th>
<th>Zero emission vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon taxes</td>
<td>Prohibiting regulations</td>
<td>100% clean power targets</td>
<td>100% zero emission vehicle (ZEV) sales legislation</td>
</tr>
<tr>
<td>Emissions trading systems</td>
<td>Emissions performance standards</td>
<td>Renewables capacity auctions and other support policies</td>
<td>Manufacturer ZEV obligations</td>
</tr>
<tr>
<td>Border carbon adjustments</td>
<td>Electricity market reforms</td>
<td></td>
<td>ZEV consumer subsidies</td>
</tr>
</tbody>
</table>

- Carbon pricing
  - Carbon taxes
  - Emissions trading systems
  - Border carbon adjustments

- Coal phase-out
  - Prohibiting regulations
  - Emissions performance standards
  - Electricity market reforms

- 100% clean power
  - 100% clean power targets
  - Renewables capacity auctions and other support policies

- Zero emission vehicles
  - 100% zero emission vehicle (ZEV) sales legislation
  - Manufacturer ZEV obligations
  - ZEV consumer subsidies

- Low-carbon buildings
  - Prohibiting regulations for fossil fuel heating systems
  - Purchase subsidies for low-carbon heating systems
  - Thermal efficiency regulations for new build and retrofit
  - Minimum energy performance standards for new appliances

- Clean industry
  - Emissions performance standards for industrial plant
  - Subsidy for new or retrofit clean industrial processes

- Low-emissions agriculture
  - Methane or nitrous oxide emissions tax or cap-and-trade system
  - Subsidy for low-emissions agricultural practices and technologies
  - Farmer education and technical assistance programmes

- Forestry
  - Strong policy action against deforestation, such as monitoring and penalties, supported by consumer pressure
  - Incentives for reforestation and afforestation via domestic action and carbon markets

Source: IPR (2021)