The Inevitable Policy Response 2021

Forecasting and Aligning

Julian Poulter,
Head of Investor Relations, IPR
Partner, Energy Transition Advisers
https://www.linkedin.com/in/julian-poulter-98b7581/

December 2021
Consortium Partners

This report was prepared by Vivid Economics and Energy Transition Advisors, who bear sole responsibility for any views expressed, which do not necessarily reflect those of the sponsors or other consortium members. The authors are solely responsible for any errors.

This project was commissioned by the PRI with support from:
Leading financial institutions joined the IPR as Strategic Partners in 2021 to provide more in-depth industry input, and to further strengthen its relevance to the financial industry.

Core philanthropic support since IPR began in 2018. The 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.
Contents

• What is IPR?
• What is in IPR FPS and 1.5C RPS that underpins investor actions?
• FPS and 1.5C RPS Emission Pathways
• Investor Landscape
• IPR Value Drivers
• IPR and PACTA
• Using IPR Value Drivers to assess opportunities
• IPR Across the Investment Chain
• Asset Owners
• Asset Managers
• Service Providers
IPR is a consortium of organizations focused on developing decision-supporting forecasts around the transition to a low-carbon economy. It develops both central forecasts around the transition as well as forecasts around the nature of a potential policy ratchet. Its work is predicated on the idea that the transition is inevitable and that forecasts are a crucial complement to previous approaches to developing climate goal optimizations without a comment on likelihood.
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 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
What is in IPR FPS and RPS that underpins investor actions?
IPR FPS 2021: Total CO₂ emissions (on a production basis) reach near zero in OECD countries, though remain substantial in non-OECD countries

- In OECD countries, emissions reductions are rapid due to 2050 net zero targets.
- Total (energy and land) CO₂ emissions countries fall from around 12 Gt in 2020 to 9 in 2030 and near zero in 2050, with virtually no international offsets required.

- In non-OECD countries, emissions reductions are slower due to rapid growth in energy demand, later net zero targets in China, India and Brazil, and lack of net zero targets elsewhere.
- Total CO₂ emissions rise in the 2020s and fall back to 2020 levels of 30 Gt by 2030, before declining substantially and falling to 8 Gt in 2050.
### Example key sector analysis - Global coal phase out

#### Phase out of existing unabated coal

<table>
<thead>
<tr>
<th>Region</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>Timeline</th>
<th>2040</th>
<th>2045</th>
<th>2050</th>
<th>2055</th>
<th>2060</th>
<th>annual reduction*</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU</td>
<td>RPS</td>
<td></td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10% 5%</td>
</tr>
<tr>
<td>BRA</td>
<td></td>
<td></td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7%   4%</td>
</tr>
<tr>
<td>CAN</td>
<td>RPS</td>
<td></td>
<td></td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20% 10%</td>
</tr>
<tr>
<td>CHI</td>
<td></td>
<td></td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7%   4%</td>
</tr>
<tr>
<td>CSA</td>
<td></td>
<td></td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7%   4%</td>
</tr>
<tr>
<td>EEU</td>
<td>RPS</td>
<td></td>
<td></td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10% 5%</td>
</tr>
<tr>
<td>EURA</td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4%   3%</td>
</tr>
<tr>
<td>GCC</td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4%   3%</td>
</tr>
<tr>
<td>IND</td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4%   3%</td>
</tr>
<tr>
<td>INDO</td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4%   3%</td>
</tr>
<tr>
<td>JAP</td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7%   4%</td>
</tr>
<tr>
<td>MENA</td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4%   3%</td>
</tr>
<tr>
<td>RU</td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4%   3%</td>
</tr>
<tr>
<td>SA</td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4%   3%</td>
</tr>
<tr>
<td>SAF</td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7%   5%</td>
</tr>
<tr>
<td>SEA0</td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4%   3%</td>
</tr>
<tr>
<td>SK</td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7%   4%</td>
</tr>
<tr>
<td>SSA</td>
<td></td>
<td>RPS</td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4%   3%</td>
</tr>
<tr>
<td>UK</td>
<td></td>
<td></td>
<td></td>
<td>Both</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20% 20%</td>
</tr>
<tr>
<td>USA</td>
<td>RPS</td>
<td></td>
<td></td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10%  7%</td>
</tr>
<tr>
<td>WEU</td>
<td>RPS</td>
<td></td>
<td></td>
<td>FPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10%  5%</td>
</tr>
</tbody>
</table>

*reduction in coal generation as a share of 2020 levels*
## Ending deforestation by 2025 in 1.5°C RPS will require immediate policy action

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

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

### End of deforestation

<table>
<thead>
<tr>
<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>FPSRPS</td>
<td>FPS</td>
<td>IPR FPS 2021 3</td>
</tr>
<tr>
<td>BRA</td>
<td>RPS</td>
<td>FPS</td>
<td>12</td>
</tr>
<tr>
<td>CAN</td>
<td>FPSRPS</td>
<td>FPS</td>
<td>1</td>
</tr>
<tr>
<td>CHI</td>
<td>RPS</td>
<td>FPS</td>
<td>92</td>
</tr>
<tr>
<td>CSA</td>
<td>RPS</td>
<td>FPS</td>
<td>10</td>
</tr>
<tr>
<td>EFU</td>
<td>FPSRPS</td>
<td>FPS</td>
<td>4</td>
</tr>
<tr>
<td>EURA</td>
<td>RPS</td>
<td>FPS</td>
<td>1</td>
</tr>
<tr>
<td>GCC</td>
<td>FPSRPS</td>
<td>FPS</td>
<td>0</td>
</tr>
<tr>
<td>IND</td>
<td>RPS</td>
<td>FPS</td>
<td>13</td>
</tr>
<tr>
<td>INDO</td>
<td>RPS</td>
<td>FPS</td>
<td>2</td>
</tr>
<tr>
<td>JAP</td>
<td>FPSRPS</td>
<td>FPS</td>
<td>0</td>
</tr>
<tr>
<td>MENA</td>
<td>RPS</td>
<td>FPS</td>
<td>-1</td>
</tr>
<tr>
<td>RU</td>
<td>RPS</td>
<td>FPS</td>
<td>1</td>
</tr>
<tr>
<td>SA</td>
<td>FPSRPS</td>
<td>FPS</td>
<td>0</td>
</tr>
<tr>
<td>SAF</td>
<td>RPS</td>
<td>FPS</td>
<td>0</td>
</tr>
<tr>
<td>SEAO</td>
<td>RPS</td>
<td>FPS</td>
<td>3</td>
</tr>
<tr>
<td>SK</td>
<td>FPSRPS</td>
<td>FPS</td>
<td>0</td>
</tr>
<tr>
<td>SSA</td>
<td>RPS</td>
<td>FPS</td>
<td>0</td>
</tr>
<tr>
<td>UK</td>
<td>FPSRPS</td>
<td>FPS</td>
<td>1</td>
</tr>
<tr>
<td>USA</td>
<td>FPSRPS</td>
<td>FPS</td>
<td>17</td>
</tr>
<tr>
<td>WEU</td>
<td>RPS</td>
<td>FPS</td>
<td>11</td>
</tr>
</tbody>
</table>

**Carbon pricing and NDC commitments combine to stop net deforestation by 2030**
IPR FPS and 1.5°C RPS Emissions pathways
IPR FPS 2021 total (energy and land) CO$_2$ emissions fall from around 40 Gt in 2020 to 8 Gt in 2050, with the land sector becoming a net carbon sink before 2050.

- Total CO$_2$ emissions fall from around 40 Gt in 2020 to 8 Gt in 2100.
- This fall is driven by reduction in emissions across both energy and land.
- Energy sector emissions fall from around 34 Gt CO$_2$ in 2020 to 9 Gt CO$_2$ in 2100.
- Land sector emissions fall from around 6 Gt CO$_2$ in 2020 to zero in 2045.
- Beyond 2045 the land sector becomes a net carbon sink and removes around 1 Gt CO$_2$ per year by 2050.
**IPR FPS 2021 energy related CO₂ emissions vs IEA APC and IEA SDS**

- Between 2020 and 2030, energy-related CO₂ emissions fall only slightly, as new policies begin to take effect.
- By 2035 emissions are comparable to the IEA Announced Pledges Case (APC).
- Over this period emissions are well above those in IEA Sustainable Development Scenario (SDS), which represents immediate climate action.
- From around 2035, emissions fall well below APC levels as more ambitious IPR 2021 forecast policies take effect.
- By around 2045, emissions are line with those in IEA SDS.

* 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.
Relative to the IPR FPS 2021, total CO₂ emissions (land and energy) in the IPR 1.5°C RPS decline rapidly, and are below zero by 2050

- IPR 1.5°C RPS cumulative CO₂ emissions are around 30% below IPR FPS 2021 levels between 2020 and 50
- IPR 1.5°C RPS emissions fall around 35% between 2020 and 2030, compared to 13% under the IPR FPS 2021
- By 2030 IPR 1.5°C RPS emissions are 8 GtCO₂ lower than IPR FPS 2021, and are below zero by 2050
Many investors are looking to decarbonise their portfolios based on emissions reductions. For 1.5°C aligning investors, the table shows how in the Required Policy Scenario (RPS) much emissions fall in the energy and combined energy and land use sectors from the 2020 base year every 5 years.

Note that 1.5°C RPS includes a bounce back from 2020 depressed Covid19 levels. We suggest that 2030 is considered target to achieve as soon as possible for 1.5°C alignment.

<table>
<thead>
<tr>
<th>Year</th>
<th>Change since 2020</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>
</tr>
<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>
Our analysis allows us to pinpoint the actions needed in key sectors to achieve an outcome consistent with 1.5°C

- We assume carbon prices to be similar to IPR FPS 2021 levels, as the extremely rapid transition required to achieve IPR 1.5°C RPS will be challenging to achieve through carbon pricing mechanisms beyond what is already expected in the IPR FPS 2021
- Instead, what drives the additional impact of the IPR 1.5°C RPS is performance standards (bans) or more direct subsidies driven by policymakers
- These further policies would need to be announced as quickly as possible, certainly by the 2023 Paris stocktake
- Implementation is required immediately upon announcement
Investor Landscape
The transition is well underway! Investment Performance since IPR launched at PRI In Person in 2018
Type of investment approach in relation to climate change

From a portfolio perspective, we can categorise approaches into four groups:

1. **The price takers** – happy to roll the dice in the market and *hope for the best*. Broad passive benchmarks unlikely to optimise risks and opportunities.

2. **The stress-testers** (e.g., NGFS, RPS, NZE) – prepared to look at the risks of temperature-constrained scenarios but mostly seeing low probability for anything that might impact their portfolio short to medium term. Sometimes driven by regulatory compliance. *Evidence suggests often little action as a result so far.*

3. **The aligners** (e.g., NZAoA) – committed to long-term targets such as the Paris Agreement and Net Zero by 2050. There are a small numbers of these “leaders” *but as yet few have fully aligned*. Some funds approaching this initially via fossil fuel *divestment*.

4. **The forecasters** – active investors looking for risks and opportunities who are open to a higher probability scenario like IPR’s Forecast Policy Scenario, and mitigating at an early stage. These are what might be termed the main stream investors who need an economic/regulatory reason to act, but if they do so, *could shift large amounts of capital*

In practice, many investors are employing some or all of these together!
# How IPR fits each investment approach

<table>
<thead>
<tr>
<th></th>
<th>IPR FPS</th>
<th>1.5°C RPS</th>
</tr>
</thead>
</table>
| **Passive Equity Investment for broad benchmark** | • Engagement only strategy  
• Difficulty in finding upside opportunities is leading investors to other asset classes  
• Changing to FPS – like benchmark | • Engagement only strategy  
• Could find upside opportunities in other asset classes  
• Change to an RPS benchmark |
| **Stress Testers**   | • Still a significant departure from BAU                               | • Severe outcomes. Allocated low probability for many investors. Significant portfolio shifts rare |
| **Net Zero Alignment** | • Can use FPS as a realistic step towards the ambition.  
• Mitigation against IPR will lower portfolio emissions  
• Maintains risk-return focus | • Interim 2025 and 2030 targets rely on policy settings for return  
• Risks of underperformance if policy doesn’t materialise  
• Relies heavily on company engagement if there are regulatory or internal barriers to active management  
• Major loss of diversification and associated increase in concentration risk  
• Criteria for divestment may not capture transitioning companies |
| **IPR Forecasting**  | • Looking to maximise risk-return and opportunities  
• Doing portfolio construction  
• Not limited by tracking error / broad benchmarks | n/a |
The IPR value Drivers
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:
  o All major jurisdictions covered
  o Annualised data
  o Emissions by GHG type
  o Investment by technology type by jurisdiction by sector
  o Power Demand by fuel type by jurisdiction
  o All major sectors covered
  o Huge Land Use component
  o Price data derived
  o Macro-economic assumptions

• Unique data
• Designed in collaboration with IPR Strategic Partners and research partners
• Will facilitate opportunity to build new wave of product
• Hundreds of thousands of data points
Integration of IPR FPS Value Drivers

Value Drivers Database

- Energy Demand by Fuel Type
- Generation Mix by Jurisdiction
- Emissions by Sector
- Commodity Prices
- Temperature Outcome
- Transport Demand
- Land Use Metrics

Investor Analysis

- Which Jurisdictions best in transition?
- Which sectors have most opportunity?
- Which companies set for transition?
- Which asset classes hold opportunities?
- Which companies mispriced right now?
- Getting exposure to Land Use
- Act now or be a price-taker?
Example Use of Value Drivers

Value Drivers Database

- Sector Analysis
  - Build Indices
  - Drive active portfolio design
- Classify low carbon opportunities by asset class
  - Build ETFs
  - Re-allocate to PE / Infra / real assets?
- Drive company analysis
  - Company selection / weighting
The Inevitable Policy Response: Investor Brief

IPR and Sector Analysis – Example process from IPR 2019

Company outputs from the Forecast Policy Scenario modelling

Outcomes for companies are 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
IPR and Sector Analysis – Example use of value drivers from IPR 2019

**Equity impacts of the Inevitable Policy Response**

**Sectoral:** 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.

Further detail on losing sectors provided in slide 24.

* 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).
IPR and Sector Analysis – Example use of value drivers from IPR 2019

**Equity impacts 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
Example use of value drivers into asset class analysis

Strategic Asset Allocation: However, the big opportunities are by tilting portfolios towards greener options within asset classes – especially in green infrastructure.
Value Driver Lifecycle – Company Level Example

- **Company A Transition Plan**
  - **Eg Fossil Fuel Demand Curves**
  - **Eg Price curves**

- **Company A – O&G**
  - **Eg Energy demand**
  - **EgCO2 prices**
  - **Eg Renewable capex**

- **Company B Transition Plan**

- **Investor Analysis**
  - **Credible?**
  - **Implementable?**
  - **Likely?**
  - **Profitable?**

- **Investor Analysis inc FPS value drivers**

- **Company B – Utility**
  - **Eg Renewable capex**

- **FPS Expected EBIT**

- **Select/ re-weight successful company**

- **De-elect/ re-weight unsuccessful company**

---

**Example Value Drivers Used**

- **FPS Expected EBIT**

- **$EBIT**
  - **2020**
  - **2025**
  - **2030**

---

**Investor Analysis**

- **Pre FPS**
  - **Credible?**
  - **Implementable?**
  - **Likely?**
  - **Profitable?**

---

**Company A**

- **O&G**

**Company B**

- **Utility**

---

**Value Driver Database**
PACTA and the new Transition Disruption Metric

TDM based in the FPS (Forecast Policy Scenario) scenario developed by IPR
PACTA Transition Disruption Metric (TDM)

- The TDM metric is complementary to the PACTA alignment model. If an investor wants to mitigate the policy risk would need to move ahead of the FPS-IPR scenario.

- The metric measures the adjustments needed in the portfolio from year 6 to 10 (2026 - 2030) relative to portfolio's pace in the first 5 years (2021-2025), in order to be in line with the FPS scenario by the end of 2030.

- The higher the number, the higher the likely portfolio disruption in the medium-term.

- If investors want a smooth transition to the scenario, they should start adjusting or engaging with companies at a faster or slower pace according to their results.

- The metric creates a quantitative measurement of potential disruption based on how far the portfolio lags / leads the FPS scenario in the first 5 years. The indicator will be available at technology, and portfolio level, subject to scenario and data availability.
Transition Disruption Metric

Visual representation of the TDM*

- **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.

See: [https://2degrees-investing.org/resource/pacta/](https://2degrees-investing.org/resource/pacta/)

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

* Period of analysis: 10 years
  Start year of analysis: 2021
Using IPR Value Drivers to assess opportunities
IPR FPS 2021 - Example Capital Shift Opportunities

**Capital investment - electricity generation (WORLD)**

- Hydrogen
- Offshore wind
- Onshore wind
- Solar
- Hydro
- Nuclear
- Biomass CCS
- Biomass
- Natural gas CCS

**Capital investment: new heating systems**

- Hydrogen
- Heat pump
- Resistive
- Biomass
- District heat
- Oil
- Natural gas
- Coal

**FPS NBS cumulative CAPEX investment**

**Capital investment: new Trucks (USA)**

- H2
- BEV
- PHEV
- ICE
## Opportunities Matrix – For active investors

<table>
<thead>
<tr>
<th>Sectors/Technologies</th>
<th>Equities</th>
<th>FI</th>
<th>PE</th>
<th>Infra</th>
<th>NBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCS</td>
<td>Through Oil and Gas, Industrials</td>
<td>Huge unlisted FF inc. coal, sovereign debt, municipal debt</td>
<td>Commercialising technologies</td>
<td>Retrofit for unlisted coal</td>
<td>As part of BECCS 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 and transition debt</td>
<td>Development stage PE through to commercialising</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>
## Getting Exposure to the Land Use Elephant

<table>
<thead>
<tr>
<th></th>
<th>Forest Conservation and Reforestation</th>
<th>Improved Land Management</th>
<th>Food Production Innovation &amp; Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equities</strong></td>
<td>• Deforestation-free commodities and supply chains</td>
<td>• Improved performance in Timberland REITS</td>
<td>• As retail adoption emerges</td>
</tr>
<tr>
<td></td>
<td>• Deforestation-free agribusiness</td>
<td>• Improved performance in agribusiness companies</td>
<td></td>
</tr>
<tr>
<td><strong>Debt</strong></td>
<td>• Deforestation-free commodities and supply chains</td>
<td>• Financing for improved performance in Timberland REITS</td>
<td>• Commercialisation</td>
</tr>
<tr>
<td></td>
<td>• Deforestation-free agribusiness</td>
<td>• Financing for improved performance in agribusiness companies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reforestation / afforestation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>**Infrastructure &amp;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Energy</strong></td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Real Assets</strong></td>
<td>• Reallocate to forestry asset class with high sustainability performance</td>
<td>• Reallocate to forestry asset class with high sustainability performance</td>
<td>• Reallocate unused pasture and grazing land toward climate-positive forestry and climate-positive agriculture</td>
</tr>
<tr>
<td></td>
<td>• Opportunities to invest in carbon markets integrated with forestry investment</td>
<td>• Reallocate to agriculture with high sustainability performance</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Opportunities to invest in forest and soil carbon markets integrated with forestry and agricultural investment</td>
<td></td>
</tr>
<tr>
<td><strong>PE</strong></td>
<td>• Investment in technology supporting scaling of conservation and reforestation</td>
<td>• Investment in technology supporting scaling of improved land management and soil carbon management</td>
<td>• Significant opportunities across the value chain</td>
</tr>
</tbody>
</table>
Highlighting FPS opportunities to 2030 – The Core Investor Timeframe

- Developed country deepest decarbonisation to 2030 represents biggest opportunities
- Early positioning by investors from 2025 in developing and emerging economies to take advantage of opportunities
- Stronger forecasts in industrials implying leadership opportunities in steel and cement
- Investor Gas transition story opportunity not born out by FPS post 2025
- Investors should beware unlisted coal debt with possible sovereign / local debt implications
- Continued strong opportunities in solar and wind (particularly US and China) – within Infra / PE or will utility balance sheets be the opportunity.

**Very significant opportunities in Land Use – especially forestry**
IPR Across the Investment Chain
Interaction between Net Zero targets and a realistic forecast

- IPR FPS can become the 2020-2030 stepping stone for AOA investors.
- As acknowledged by AoA, targets can be challenging for portfolio teams to implement. Aligners canvass carbon foot printing and emission targets which have in themselves been challenged.
- Some fiduciary investors struggle with implications of large scale divestment, which may be too blunt an instrument for some investors and ignores company transition planning.
- Building a portfolio around IPR FPS mitigation will reduce emissions suiting climate aware investors not fully convinced by RPS at this stage.
- Switching listed equity to real assets is the most impactful real world effect and is accomplished in IPR FPS through thematic capital recycling across asset classes.
- There is the associated issue that portfolio action eg divestment may not translate through to real world actions to reduce emissions hence the importance of exploring linkages between Net Zero and IPR-FPS.
The Inevitable Policy Response: Investor Brief

IPR Investor Integration

Forecasting pathway

- Absorb IPR
  - Prefer to align with 1.5C RPS
  - Report base case via TCFD

FPS Active Opportunities

- Agree with IPR FPS Assumptions
- Move to Full Adoption
- Take Value Drivers
- New Product
  - Conduct PACTA Technology Alignment
  - Build in-house outputs for own assumptions or modify IPR (use service provider if necessary)

FPS

- Take Value Drivers

RPS

- Modify Assumptions

NZ Aligning pathway

- Greater dispersion of returns under 1.5C RPS
  - Implies faster reduction of FF exposure

Asset Owners

- Actively Integrate to portfolio construction approach

Asset Managers / Internal AO Portfolio Teams

New Product

- Move to Full Adoption
- Take Value Drivers

- Agree with IPR FPS Assumptions
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 Indices/ETFs
- Engage with companies
- Engage with policymakers
- Underweight high carbon exposures
- Reward Strong transitioning companies
- Seek low carbon pure-plays eg infra/PE/small caps
- Service provider alignment
From Asset Allocation to Company Analysis

Asset Owners

Asset Managers

The challenge for Product Development

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?
Companies in Transition - The Challenge for Product Development

- As companies go into transition it is a challenge to then decide if they are in effect going to be low carbon and so should be considered as eligible for low carbon investment. Possible approaches include:
  - Credible Net Zero targets e.g. via SBTi
  - Bottom up company analysis which is extremely complex
- Capacity and knowledge takes time to build and is scarce in the market
- Asset Owners sometimes slow to recognise need for new product
- Track record unavailable for new product
- Tracking error barriers exist in some asset owners
- Index providers will take time to create new benchmarks
Macro-economic Capital Market Assumptions issues for investors

• GDP, Inflation and interest rates are important for both asset owners and asset managers
• IPR FPS does not forecast significant GDP reductions. Indeed FPS cannot be realistic with large GDP losses as we do not believe governments will create recessionary policies to solve climate change
• We believe that central banks and governments will stimulate to counter any depressionary policy outcomes
• The tension that central banks face in setting interest rates will be between fighting the inflationary and recessionary pressures of the transition, especially in the next decade
• Our macroeconomic analysis indicates that the relatively modest magnitude of inflationary/recessionary pressures means central banks can manage successfully and generally keep interest rates a bit lower in the near term (to fight recessionary pressure) while pushing interest rates back up to then fight inflationary pressure
FPS results 2030: Climate change transition would produce mild negative impacts in most economies over the next decade

Impacts by 2030:
- 20 out of 21 countries/regions experience lower GDP in FPS compared to the baseline.
- For the majority of economies by 2030 the carbon tax and the abatement shocks have a negative impact on the economy compared to the baseline whilst the fiscal shock has an offsetting impact.
- Inflation is slightly higher in the FPS compared to the baseline for 2/3 of the economies
- All countries would see higher nominal long term interest rates in FPS compared to baseline. This is the result of inflationary pressures and increments in real interest rates in FPS compared to baseline.
- Most developing countries/regions see further depreciation (compared to baseline) in their exchange rates under FPS with limited impact through exports and GDP.
- Most economies would see minimal unemployment rate differences between FPS and baseline.
IPR – macroeconomic impact value drivers:

- GDP
- Inflation rate
- Fossil Fuel Prices
- Long term interest rate
- Policy Interest Rate
- Unemployment rate
- Real personal disposable income
- Private sector investment
- Government investment
- Government debt
- House prices
- Effective exchange rate
GDP impacts: Global

Source: NIGEM based on Vivid Economics inputs

- Most negative impacts are significantly mitigated by 2050 (see dark blue line for the cumulative FPS impact)
- FPS’s carbon tax shocks and abatement shocks will have mild impact in the global economy by 2030
- This is offset by the fiscal shock were governments can recycle carbon revenues back into the economy

- The IPR 2021 Global final impact is less severe when compared to the IPR 2019 impact, which reached -1.8% of GDP by 2050
- IPR impact in 2019 was a gradual decline of GDP with a trough by 2050, unlike in IPR 2021 where GDP troughs around 2030
Inflation rate impacts: OECD

- Inflation rate in OECD countries is expected to be higher in FPS compared to the baseline until 2033, year after which inflation rate in FPS is lower than in BAU.

Source: NIGEM based on Vivid Economics inputs
Inflation rate impacts: Non-OECD

- Inflation rate in Non-OECD countries is expected to be higher in FPS compared to the baseline until 2032, year after which inflation rate in FPS is lower than in BAU

Source: NIGEM based on Vivid Economics inputs
Asset Owners
The Inevitable Policy Response: Investor Brief

How does IPR help the governance of asset owners to drive capital shift?

- IPR creates a framework for response to the risks and opportunities
- With so many variables and uncertainties in the energy transition, clarity via a more likely scenario is key
- Significant risk-return advantages for successful navigation by active investors
- IPR FPS 2021 creates a material risk-based approach based on “reality” rather than climate targets
- Credible, long term framework, liked by regulators and peer investors for its realism
- Flows into portfolio construction and manager selection
Asset allocators serious about climate must take a thematic approach

- Climate transition risks and opportunities need to be understood across traditional asset classes
- Huge difference in expected return between sector winners and losers
- Flexible portfolio construction approaches required - Many opportunities emerging in PE, Infra and real asset classes.
- Asset Owners should question traditional Strategic Asset Allocation process, often advised by Consultants.
- Asset Manager selection key
- Asset Owners must incentivize and reward Asset Managers constructing new products to meet these demands.
- Optimisers based on Modern Portfolio Theory are frequently used. The problem is that they tend to take historic returns and historic risk (measured by Standard Deviation of returns) which does not suit a forward-looking structural change like IPR. Risk is not just volatility.
Link between engagement and a Portfolio construction emphasis

- Passive investors on broad benchmarks can engage companies using IPR FPS 2021 to make their strategies reflect the energy transition. Resulting company transition plans can be assessed through an IPR lens.

- Rewarding and incentivizing companies with credible transition strategies. Using forward looking company plans to assess valuation will become key.

- If an investor doesn’t see the necessary transition in companies by the forecast acceleration, then taking portfolio action makes sense for risk reasons.

- For some asset owners, capital recycling into low carbon assets across asset classes themselves might seem more attractive than betting on high carbon companies acting fast enough, particularly with only a short time to a major acceleration.
The portfolio carbon switch by asset class

Before

Public Markets
- MSCI Equities
- Corporate Fixed Income
- Sovereign Fixed Income

Private Markets
- Infrastructure
- Real Estate
- Private Equity

After (including companies in transition)

Public Markets
- MSCI Equities
- Corporate Fixed Income
- Sovereign Fixed Income

Private Markets
- Infrastructure
- Real Estate
- Private Equity

Re-allocate & recycle

$$ allocation

Relatively Unexposed  Green Assets  High Carbon Assets
The Inevitable Policy Response: Investor Brief

The big decision for asset owners – divestment?

- Divestment only looks at risks, not opportunities
- Where to recycle this capital to from divested sectors?
- Company transitions makes this more complex
Maximising thematic climate risk approaches across asset classes

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Consideration</th>
</tr>
</thead>
</table>
| Equities    | • New benchmarks around IPR. New ETFs incorporating IPR. Consider increase in active allocation. Engage with asset managers and companies. Ignore tracking error  
• Reduce equity allocation in favour of other asset classes  
• When to screen out energy stocks entirely  
• Reallocate significant passive equities to new benchmarks or active mandates with a transition theme.  
• Lower targets for sector and regional diversity – address barriers to emerging markets |
| Infrastructure| Allocate to value add buckets. Lower infrastructure index exposure. Engage with asset managers on clean indices |
| Private Equity | See large and creative deals around MBO/LBO for transitioning companies. Delist companies for transition? Bring new companies to market early. Structure PE mandates around IPR. Increase PE cleantech allocation e.g. energy, peak meat etc |
| Real Estate | Driver clean REITs, tilt unlisted towards green. |
| Real Assets | Forestry, nature based assets a huge opportunity. |
Asset Owner IPR Transition Tasks – Almost every core process impacted

- Agree governance around thematic climate approach
- Set urgent voting guidelines on company transition
- Re-set manager selection criteria and design mandates towards risk AND low carbon upside
- Ensure portfolio construction and SAA can support forward looking assumptions around the energy transition theme
- Set new benchmarks e.g. low carbon
- Drive Managers to develop new product
- Drive asset managers towards forward looking assumptions and incentivise them accordingly
- Engage regulators to remove barriers
Asset Managers
Asset Managers build analysis from the bottom up

- As discussed previously, identifying companies in credible transition is critical
The implications of company transition challenge

Drivers of Transition

- Policy
- Shareholder Engagement / Management Incentives
- Reputational

Company X

Resist Transition

A

B

Decision to transition

C

Decision to wind down

Produce Transition Strategy

Transition Options

Merge/MBO / LBO

- Sell Assets
- De-list
- 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?
Asset Manager Actions

- Asset managers can greatly increase capacity to design build product
- Asset Managers can design product to help Asset owners implement green and climate aware investment strategies – this moves forward the current asset class definitions and historic way of approaching SAA
- Asset Manager company engagement can drive the market faster, perhaps in partnership with their Asset Owner clients.
- Asset manager creativity and competition required to maximise the opportunities, arbitrage, first to market, etc.
Service Providers
What should Service Providers do?

- **Investment Consultants** – critical to showing asset owners how to create strategy for the transition. Barriers in consulting against perception of “risky advice”
- **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
- **Corporate consultants** – Can use IPR as the basis for company transition strategies
The information contained in this report is meant for the purposes of information only and is not intended to be investment, legal, tax or other advice, nor is it intended to be relied upon in making an investment or other decision. This report is provided with the understanding that the authors and publishers are not providing advice on legal, economic, investment or other professional issues and services. Unless expressly stated otherwise, the opinions, recommendations, findings, interpretations and conclusions expressed in this report are those of the various contributors to the report and do not necessarily represent the views of PRI Association or the signatories to the Principles for Responsible Investment. The inclusion of company examples does not in any way constitute an endorsement of these organisations by PRI Association or the signatories to the Principles for Responsible Investment. While we have endeavoured to ensure that the information contained in this report has been obtained from reliable and up-to-date sources, the changing nature of statistics, laws, rules and regulations may result in delays, omissions or inaccuracies in information contained in this report. PRI Association is not responsible for any errors or omissions, or for any decision made or action taken based on information contained in this report or for any loss or damage arising from or caused by such decision or action. All information in this report is provided “as-is”, with no guarantee of completeness, accuracy, timeliness or of the results obtained from the use of this information, and without warranty of any kind, expressed or implied.

Vivid Economics and Energy Transition Advisors are not investment advisers and makes no representation regarding the advisability of investing in any particular company, investment fund or other vehicle. The information contained in this research report does not constitute an offer to sell securities or the solicitation of an offer to buy, or recommendation for investment in, any securities within the United States or any other jurisdiction. This research report provides general information only. The information is not intended as financial advice, and decisions to invest should not be made in reliance on any of the statements set forth in this document. Vivid Economics and Energy Transition Advisors shall not be liable for any claims or losses of any nature in connection with information contained in this document, including but not limited to, lost profits or punitive or consequential damages. The information and opinions in this report constitute a judgement as at the date indicated and are subject to change without notice. The information may therefore not be accurate or current. The information and opinions contained in this report have been compiled or arrived at from sources believed to be reliable in good faith, but no representation or warranty, express or implied, is made by Vivid Economics or Energy Transition Advisors as to their accuracy, completeness or correctness and Vivid Economics and Energy Transition Advisors do also not warrant that the information is up to date.