Low-carbon Transition Scenarios: Exploring Scenario Analysis for Equity Valuations

Janice Noronha
PwC

Eli Angen
Ontario Teachers’ Pension Plan
Régime de retraite des enseignantes et des enseignants de l’Ontario

Jean-Philippe Renaut
Æquo Shareholder engagement services
Æquo - Services d’engagement actionnarial

Stephanie Maier
HSBC GAM

Scénarios de transition vers une économie à faible émission de carbone : analyse de scénarios pour l’évaluation des actions
Understanding the low carbon transition: implications for portfolio managers

Stephanie Maier
Director, Responsible Investment

April 2019

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The energy transition
Global flows of energy from fuel, to generation and end use

Source: Chevron, 2018
Building scenarios to explore uncertainty around future policy and technology
6 illustrative pathways

<table>
<thead>
<tr>
<th>Policy Timing</th>
<th>Future Technology Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Policy Action</td>
<td>Renewable Revolution</td>
</tr>
<tr>
<td>No further policy changes</td>
<td>Reduced costs for solar and wind energy</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>2020 Action</td>
<td>CCS Storm</td>
</tr>
<tr>
<td>At least a 50% chance of limiting warming to 2°C</td>
<td>Reduced costs for Carbon Capture and Storage</td>
</tr>
<tr>
<td></td>
<td>Efficiency Boost</td>
</tr>
<tr>
<td></td>
<td>Increases in energy productivity</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>2030 Action</td>
<td>EVs Unplugged</td>
</tr>
<tr>
<td>At least a 50% chance of limiting warming to 2°C</td>
<td>Larger than expected reduction in electric vehicle costs</td>
</tr>
<tr>
<td></td>
<td>Expanded scenarios</td>
</tr>
<tr>
<td>Below 2DS</td>
<td>Lack of coordination</td>
</tr>
<tr>
<td>Below 2 degrees compliant policy from 2020 onwards</td>
<td>2 degrees compliant policy from 2020 onwards headed by a subset of countries</td>
</tr>
</tbody>
</table>

Source: Vivid Economics/HSBC Global Asset Management “Low-carbon transition scenarios” report
# Overview of outputs

Carbon prices, fossil fuel demand and cleantech deployment rates are sensitive to scenario design assumptions.

<table>
<thead>
<tr>
<th>SCENARIO</th>
<th>CARBON PRICE</th>
<th>FOSSIL FUEL DEMAND</th>
<th>CLEANTECH DEPLOYMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average (US$/tCO₂)</td>
<td>Cumulative (Index: BAU=1)</td>
<td>Cumulative (Index: BAU=1)</td>
</tr>
<tr>
<td><strong>Business As Usual</strong></td>
<td>4</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Early Action</strong></td>
<td>104</td>
<td>0.7</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>Delayed Action</strong></td>
<td>155</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Renewable Revolution</strong></td>
<td>88</td>
<td>0.7</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>CCS Storm</strong></td>
<td>79</td>
<td>0.7</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>Efficiency Boost</strong></td>
<td>103</td>
<td>0.7</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>COMPARATOR SCENARIO</strong></td>
<td><strong>2016 WEO 450</strong></td>
<td><strong>109</strong></td>
<td><strong>0.7</strong></td>
</tr>
</tbody>
</table>

Source: HSBC Global Asset Management
Mechanisms for value creation & destruction
Equity level impacts

- Produced with Vivid Economics, using Imperial College London’s TIMES Integrated Assessment Model (TIAM), based on economic impacts from 2018-2050
- Uses a simple DCF (discounted cash flow) model, to estimate the performance of companies in the MSCI All Country World Index, across three value stream models

**Cost & competition model**
- direct carbon tax exposure
- abatement option(s)
- cost-pass-through to customers

**Demand destruction model**
- asset-stranding
- margin reductions

**Cleantech market model**
- market growth
- changes in relative market share

Inputs:
- Carbon emissions intensity
- Abatement potential
- Price sensitivity

Inputs:
- relative costs of extraction,
- timing of planned production, and
- coal, oil and gas production mix

Inputs:
- Current market share in green products
- Relative comparative advantage in IP revealed by patents

Source: Vivid Economics/HSBC Global Asset Management “Low-carbon transition scenarios” report

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Investor insights

- Across all scenarios - transition to limiting global warming to two degrees Celsius will have a considerable impact on net present value profits at both sector and equity level — in comparison with a world where there is no new policy action.
- Sector level impacts can be large e.g. coal loses 80% and renewable energy gains 70% under the same scenario.
- Pathway matters e.g. CCS is a key uncertainty, with some companies better off under high CCS relative to BAU.
- Intensity is not equal across sectors e.g. power and cement companies with the same emissions intensity face very different value.

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Portfolio Analysis

Scenario | Industry | Company | Risks |
---------|----------|---------|-------|
2°       | Retail   | All     | All   |

$0.6B     8.1%       $31.5M      3.4%

Total NPV | Risk Prob | Value at Risk | Avg % EBITDA
---------|-----------|--------------|-------------

Cost of capital: +0.05%

% EBITDA to IRR by Company

Annual Expected Financial Losses

Losses | Value at Risk
-------|--------------
Flooding impacts on buildings due to extreme rainfall | 1,100,030.00
Flooding impacts on key offshore ports | 5,674,653.00
Increase in building operating costs due to rising carbon prices | 7,260,612.00
Increase in purchasing costs due to rising carbon prices | 12,009,087.00
Increase in transportation costs due to rising carbon prices | 5,463,527.00
Total | 31,507,909.00