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# Climate Change and Asset Allocation – how investors are managing climate risk

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## The participants in the Mercer Climate Change Scenarios – Strategic Asset Allocation study (2011)



MARYLAND  
STATE RETIREMENT  
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Investment  
Management  
Corporation



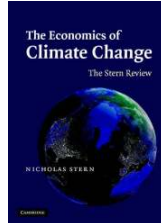
## A natural evolution: climate scenarios for capital markets



The United Nations Intergovernmental Panel on Climate Change (1990-2014)

### Six 'emissions marker scenarios'

- Assesses scientific, technical and socio-economic information concerning climate change, its potential effects, and options for adaptation and mitigation
- Involves thousands of authors from dozens of countries



The Stern Review on the Economics of Climate Change (2006)

### Two climate change scenarios (baseline based on IPCC 'A2')

- Examines the evidence on the economic impacts of climate change itself, and explores the economics of stabilizing greenhouse gases in the atmosphere
- Advocates as urgent priorities for international cooperation: broadly similar global carbon price signals and using carbon finance to accelerate action in developing countries



Climate Change Scenarios – Implications for Strategic Asset Allocation (2011)

### Four scenarios (including one based on Stern)

- Attempts to build on prior studies to explore the impact of climate scenarios on markets through asset class and regional analysis
- Undertaken by Mercer, climate change experts and some of the world's largest asset owners

## The 4 Scenarios

### Regional Divergence

- Uneven progress on cutting emissions, with strong leadership in some regions and others lagging behind
- Currently most likely scenario
- Cost of carbon \$110/tCO<sub>2</sub>e globally
- 50 Gt CO<sub>2</sub>e emissions per year in 2030



- Comprehensive global framework to cut emissions quickly and deeply
- Market anticipates the policy measures, smooth adjustment
- Cost of carbon \$110/tCO<sub>2</sub>e globally
- 30 Gt CO<sub>2</sub>e emissions per year in 2030



### Stern Action

### Delayed Action

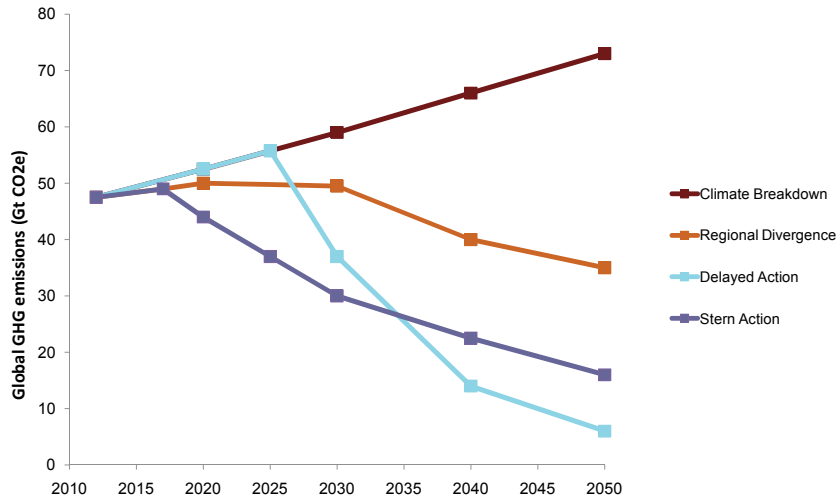
- 'Business as usual' until 2020
- Bad news about rapid climate change triggers a global policy 'shock', rapidly driving up the cost of fossil fuels
- Cost of carbon \$15/tCO<sub>2</sub>e to 2020, then dramatic rise to \$220/tCO<sub>2</sub>e
- 50 Gt CO<sub>2</sub>e emissions per year in 2030



- Continued reliance on fossil fuels and high emissions of carbon
- Little transformation to a low carbon economy, increases physical 'impact' risks
- Cost of carbon \$15/tCO<sub>2</sub>e limited to EU ETS
- 63 Gt CO<sub>2</sub>e emissions per year in 2030

### Climate Breakdown

## Scenarios compared: carbon emissions



Sources: Vivid Economics and Grantham Research Institute, based on Bowen and Ranger (2009), IEA (2007; 2009) and Enkvist, Naucler et al. 2007

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Identifying the factors:  
The TIP model

## Quantifying the risk factors

For the “quantitative return drivers” create a matrix using a factor model similar to Fung and Hsieh (2002)

$$R_{i,t} - RFR_t = \beta_i + \sum \beta_{i,j} \times F_{j,t} + \varepsilon_{i,t}$$

$R_{i,t}$  = the return for asset  $i$  at time  $t$  (synchronised for private equity / real estate)

$RFR_t$  = the risk free rate (nominal 3 month treasury-bills)

$F_{j,t}$  = the return for factor  $j$  at time  $t$

$\beta_1$  = the asset class unique premium (roll yield, alpha or illiquidity). A full multivariate model splits  $\beta_1$  into a set of different betas

$\beta_2$  = sensitivity to unexpected inflation premium (“real asset” premium)

$\beta_3$  = sensitivity to equity premium (S&P 500 – 3 month t-bills)

$\beta_4$  = sensitivity to small cap premium (Russell 2000 – S&P 500)

$\beta_5$  = sensitivity to term premium (Barclays Government bond index – 3 month t-bills)

$\beta_6$  = sensitivity to credit spread premium (Barclays high yield - Government)

$\varepsilon_{i,t}$  = the unexplained portion (error term, or residual)

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## Asset class sensitivity to TIP factors

|                            | Listed Equities |        |                    |                       | Fixed Income |        |                  | Commod            |            | RE       | Private Equity |        |                       | Infra          |                       |
|----------------------------|-----------------|--------|--------------------|-----------------------|--------------|--------|------------------|-------------------|------------|----------|----------------|--------|-----------------------|----------------|-----------------------|
|                            | Global equity   | EME    | Sustainable equity | Efficiency/renewables | Global fixed | EMD    | Inv grade credit | Agricultural Land | Timberland | Unlisted | LBO            | VC     | Efficiency/renewables | Core, unlisted | Efficiency/renewables |
| <b>Sensitivity</b>         | L               | M      | H                  | VH                    | L            | M      | L                | H                 | H          | H        | M              | H      | VH                    | H              | VH                    |
| <b>Regional Divergence</b> | Yellow          | Yellow | Green              | Green                 | Yellow       | Yellow | Yellow           | Yellow            | Yellow     | Yellow   | Yellow         | Yellow | Green                 | Yellow         | Green                 |
| <b>Delayed Action</b>      | Red             | Red    | Green              | Green                 | Yellow       | Red    | Red              | Yellow            | Green      | Red      | Red            | Red    | Green                 | Red            | Green                 |
| <b>Stern Action</b>        | Green           | Green  | Green              | Green                 | Yellow       | Green  | Green            | Green             | Green      | Green    | Green          | Green  | Green                 | Green          | Green                 |
| <b>Climate Breakdown</b>   | Yellow          | Red    | Red                | Red                   | Yellow       | Red    | Yellow           | Red               | Red        | Red      | Yellow         | Yellow | Red                   | Red            | Red                   |

Source: Mercer

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## Example: Real Estate sensitivity to climate change factor risks

| Climate Change Risk Factors        | Real estate Core Unlisted |
|------------------------------------|---------------------------|
| Technology                         | High                      |
| Impacts                            | Low to Moderate           |
| Policy                             | High                      |
| Overall climate change sensitivity | High                      |

### Observations:

- **Technology:** The largest carbon saving potential over the next few decades is actually from retro-fitting rather than new build (in particular installing better insulation to reduce heating and cooling needs).
- **Impacts:** The main changes anticipated are in demand for heating and cooling as well as protection against intense precipitation and flooding (both coastal storm surges and fluvial). Little variation is expected given that the impacts tend to occur outside of the 2050 timeframe.
- **Policy:** An estimate from McKinsey shows emissions abatement potential in the building sector of 28% reduction in greenhouse gas emissions per year by 2030. Furthermore, the IPCC report that net cost additions to achieve stabilised CO2 levels by 2050 will be 7% of total building costs worldwide.

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## Opportunities in Infrastructure & Real Estate

- The long horizon and the “real” nature of infrastructure and real estate investments, increase the importance of climate-change risk factors
- Infrastructure:
  - Explore opportunities in energy, transport and water/waste, such as decentralized electricity & heat generation, additional fuel capacity storage; electrification of rail, electric cars and battery charging replacement points, underground reservoirs, and desalination plants
- Real Estate:
  - Focus should be on unlisted (direct) core assets. Due to the long lives of buildings and the large global stock of inefficient buildings, the largest carbon-saving potential over the next few decades will be from retrofitting (in particular installing better insulation to reduce heating and cooling needs), not from new buildings
  - Opportunities in energy & water efficiency management, heat pumps, and solar space & water heating in buildings


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**Actions institutional investor partners are now taking as a result of the project**

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**The Climate Risk Portfolio Analyser and report**

A tailored report assessing the sensitivity of a fund's asset allocation to climate risk is based on the investor's unique positioning, and includes the following:

- An overview of project, and detailed description of the 4 climate scenarios
- Discussion of the investment, region and asset class implications of each scenario
- Tailored assessment of the fund's asset allocation to the TIP™ factors
- Quantification of climate impact risk in each of the scenarios
- Peer comparison within the TIP™ framework analysis
- Recommendations reflecting the overall analysis, including
  - strategic investment opportunities
  - ongoing risk management processes, and
  - additional industry and policy recommendations
- Presentation and discussion of the results with the Fund's Board and/or Investment Committee

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## Impact: What are partners doing as a result of having participated in the project?

### Sharing the Results & Training

- Nearly all partners have completed or are currently updating the board and investment committees on the findings of the study.
- Over two-thirds of partners have already communicated the study's findings to members/beneficiaries or will do so in the next 6 months.

### Changes to Strategic Oversight

- The majority of partners still report being at the stage of sharing the report's findings internally and exploring including climate change in future risk management and/or SAA processes.
- Most partners report they are currently drafting plans for implementation and look to have produced more formal action plans in the next 6 months.

### Investments

- Several partners report that they are currently investigating "climate sensitive" asset classes or are currently reviewing specific asset classes for exposure to climate risks.
- Some partners report that since the launch of the report, they are looking to review existing/new mandates in the context of climate change considerations in risk management processes.

### Engagement

- The majority of partners engaged with companies and on public policy issues prior to the project. Since the launch of the report, several partners responded that they are working to integrate the report's findings into their engagement activities, drawing on the asset class and region-specific findings.

## Fund Partner #1 – focus: real estate and infrastructure assets and carbon audit of portfolio

- Implementing a climate change audit plan following review of the report by the Investment Committee.
  - Complement to current work to benchmark property assets
  - Reviewed top 20 infrastructure investments for physical impacts related to climate change scenarios;
  - Reviewed top 20 real estate investments for physical impacts related to climate change scenarios;
  - Undertaking a Carbon Audit to monitor fund risk and determine engagement targets.
  - Changes to strategic oversight by inclusion of the TIP risk factors in sector reviews and creation of a database based on the TIP risk factors for measuring climate risk.

## **Fund Partner #2 – focus: bonds, infrastructure, PE**

- Have disseminated the report within specific asset class teams and reference the report and plan implementation activities and communication via their upcoming annual report.
- Are reviewing existing/new mandates in the context of climate change considerations in risk management processes and the development of monitoring questions for managers.
- Exploring bonds, infrastructure and private equity as potential sources of exposure to climate sensitive assets.

## **Fund Partner #3 – focus: ‘climate sensitive assets’**

- Integrating the report findings into the investment strategy review.
- Currently investigating additional exposure to climate sensitive assets such as:
  - Infrastructure
  - Real estate
  - Private equity
  - Agricultural land
  - Timberland
  - Sustainable listed and unlisted assets.

## Further information

For further information on the  
**Climate Change Portfolio Analyser**  
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Thank you



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