2⁰ Scenario Analysis

Background Information

This document explains the general modelling principles, data sources, global parameters and caveats of the scenario analysis tool. This will allow you to generate an understanding of the methodology, key features and parameters of the analysis and help you to understand the analysis results. A detailed description of the result interpretation, modelling principles and data used as well as a paper that presents the methodology and the underlying equations can be found in the [Publications](#) section (Paris Agreement Capital Transition Assessment Background Briefing and The alignment of global equity and corporate bonds markets with the Paris Agreement – A new accounting framework).

Modelling Principles

The following briefly summarizes the key modelling principles:

- The model calculates the expected benchmark exposure for each technology in the specific asset class by taking the current exposure in the respective asset class and geography and adding the trend line as defined in the scenario (e.g. the IEA´s 2°C compatible sustainable development scenario). The build-out percentages take a simple "fair share principle" under which the companies in the investable universe are assumed to adjust production capacity in line with the scenario, consistent with their market share;

- The model assesses the scenario alignment of financial portfolios with a 5-year time horizon/forecast period. The time horizon is limited to the time horizon of capital expenditure planning for which data can be tracked at a meaningful level. While this time horizon may differ across sectors, a homogenous time horizon is taken to allow for the comparability of results;

- The model applies traditional financial accounting principles, notably where possible the equity share principle (e.g. 1% ownership of a company assumes 1% ownership of assets). Where data is not available, the majority owner is allocated 100% of the ownership.

Global Parameters

The scenario analysis uses a general methodological framework which compares the technology build out plans with climate scenarios as explained above. While this core methodology is set, there are several parameters that can be set to answer specific research questions. The model parameters that can be set include:

- **Scenario** to compare the portfolio against that reflects a specific decarbonization transition pathway and technology beliefs as accurately as possible;

- **Accounting principle** (or Allocation Method) used to allocate build out plans to the portfolio, which determines whether the assessment is of the portfolio's contribution *toward* the transition (ownership approach) or the portfolio's *exposure* to transition risk (portfolio weight approach);

- **Scenario geography** to show the portfolio's regionally specific alignment based on location of physical assets, highlighting the most relevant regions to act on;

- **Equity market** to show the portfolio's regionally specific alignment based on company domiciles, highlighting how geographic investment mandates impact alignment results;

- **Benchmark portfolio** to either assess the portfolio's current build out plans against its own scenario-compatible targets (referred to as the "Aligned Portfolio"), or to compare the portfolio to a specific benchmark such as an asset class appropriate market portfolio under a scenario-compatible decarbonization pathway ("Aligned Benchmark");
- **Peer group** to compare the portfolio to a set of the most relevant peers available (given data availability restrictions).

Scenario

Scenarios represent potential technologies pathways to reach e.g. climate targets. While being based on the best available scientific research, there remain uncertainties around the outcomes. Furthermore, different scenarios / pathways can lead towards the same climate target depending on technology beliefs and preferences, as well as economic, social and other assumptions, etc.

The most prominent climate technology pathways providers are the IPCC scenario community (i.a. IIASA, PIK) as well as the International Energy Agency (IEA). There are also several other organizations that publish technology roadmaps. Some of which are available in this tool, namely Bloomberg New Energy Finance (BNEF) and GreenPeace (GP). The table below gives an overview of available scenarios in this tool, sector and regionality coverage, the connected global warming in centigrade as well as the key characteristics of the scenarios.

Table 1: Scenario Overview

Scenario Provider	Scenario Name	Sector	Regions	Key Characteristics
IEA	Sustainable Development Scenario (2°C)	Power, Fossil Fuels, Automotive	All*	Combines climate and social targets Limiting global warming to 2°C above pre-industrial levels
IEA	Beyond 2 Degree Scenario (1.75°C)	Power, Automotive	Global, OECD, non-OECD*	Limiting global warming to 1.75°C above pre-industrial levels
IEA	RTS/NPS (reference/new policies)	Power, Fossil Fuels, Automotive	All*	Pathway if all new policies come into place in an effective manner
IEA	CPS (current policies)	Power, Fossil Fuels, Automotive	All*	Business as usual case without any changes in policies
Greenpeace	Energy [R]evolution (2°C)	Power	All except Europe	
Bloomberg	BNEF (reference scenario)	Power	Global, North America, Europe	
SBTI	SBTI (2°C)	Steel, Aviation, Shipping, Cement	Global only	
IIASA**	Range of scenarios	All sectors	All regions	

*depending on the sector, i.e. Automotive is a global sector and thus only global values are available

**will be added in the short future

Accounting Principle

Two different accounting principles can be applied to "allocate" production and capacity build out plans to a portfolio:

- Portfolio Weight approach. This approach calculates the portfolios technology exposures based on the weighting of each position within the portfolio. The technology exposure is presented in weighted technology share (i.e. percentage values). The weighting of the technology share is done by the weight of the company in the portfolio;

- Ownership approach. This approach calculates the technology exposure based on the portfolios ownership in companies. The technology exposure is presented in absolute values (e.g. oil production in barrels of oils per day). The ownership approach is not available for corporate bond portfolios mainly for the following reasons:

  - **Characteristic of bonds.** Bond and other credit instruments are financing instruments rather than ownership instruments. Thus, using an ownership approach per se is counter-intuitive;

  - **High volatility of results.** For credit portfolios the ownership approach would lead to highly volatile results as the total debt outstanding as well as other potential denominators for the ownership calculation frequently change due to companies issuing new debt on a regular basis;

  - **Counter-intuitive twist: more debt, less risk.** The ownership approach would lead to a decrease in ownership share by the investor when a company issues more debt. While this makes sense, it would also lead to a decreased risk exposure for brown technologies (the portfolio would be less exposed to brown technologies and thus be less exposed to risks). However, in reality the risk would increase with higher debt. This is not a problem for equity as the outstanding shares do not change frequently, and the ownership as well as risk really decreases/increases with the percentage of shares a portfolio owns;

  - The **production intensity (prod/$) can significantly differ** between companies as their financing mix (debt vs equity) differs. It has been seen that single companies can significantly drive the portfolio level results despite low portfolio weighting.

Scenario Geography

The scenario geography is based on the asset location (i.e. production location) and allows a deep dive into the regionality of the production, technology mix and scenario alignment of your portfolio. While the benchmarking of the production is always done at the most granular regional level that is available to realize the most accurate scenario analysis, the scenario geography selection allows you to deep-dive into regional differences within your portfolio. The available options are:

- Global
- OECD
- Non-OECD
- North America
- Asia & Pacific
- Europe

The regional granularity of the scenarios differs for each sector: the automotive sector, for example, only has one target as it is a global sector; whereas the power sector in some scenarios has regional breakdown up to the country level. An indication of which geographies are available for which sector can be found in Table 1: Scenario Overview.

Equity Market

The equity market selection determines the investible universe in terms of company domicile you are comparing yourself to. The selection options are

- **Global market.** This selection represents the results of all companies within the global market in your portfolio, in other words your entire portfolio is assessed;

- **Developed market.** Only companies listed in the universe of countries of the MSCI World are assessed in this case. The filter is also applied to the market and peer results. More information about the countries included in the MSCI World can be found here: https://www.msci.com/world;

- **Emerging market.** Only companies listed in the universe of countries of the MSCI Emerging Markets are assessed in this case. This filter is also applied to the market and peer results. More information about the countries included in the MSCI Emerging Markets can be found here: https://www.msci.com/emerging-markets;
This selection is only available for equity portfolios (or the equity part of your portfolio).

Benchmark Portfolio

The Benchmark portfolio parameter sets the starting point of the benchmark and thus sets the focus of the analysis. There are two options:

- **Aligned Market.** Uses the current financial market (i.e. the listed developed market) exposure to technologies scaled to the portfolio size as the starting point and thus compares your portfolio against the market under a scenario compatible transition. It thus includes the current existing gap of your portfolios investments compared to the market;

- **Your Aligned Portfolio.** For this selection your current portfolio technology exposure is used as starting point of the analysis. i.e. this analysis only focusses on the forward-looking production plans of the portfolio and compares the aggregated capex plans of all portfolios positions with the scenario technology build-out rates.

  In both cases the forward-looking scenario build-out rates are applied to the technology exposure starting point to calculate the forward-looking alignment.

Peer Group

Peer groups are used to compare your portfolio to a group of other existing portfolios. Currently the top 100 funds in monetary terms (AUM) from the MorningStar fund database are used as comparison for the following three regions: Global, Europe and United States.

In addition to these peer groups benchmarks, a PRI peer group analysis is offered, which will enable interested PRI signatories to anonymously compare their PACTA results against other PRI members. PRI signatories can join the voluntary PRI peer group by ticking the respective box "I want to join the PRI peer group" at tool.transitionmonitor.com/participate. 2°ii will reach out to the interested signatories early 2019 with further information about this peer analysis.

Standard Parameters used in the report & executive summary

The following settings for the global parameters are used in the reports that you can download:

Table 2: Standard global parameter settings in the reports

Scenario	Accounting Principle	Scenario Geography	Equity Market	Benchmark Portfolio	Peer Group
IEA - SDS (2°C)	PortfolioWeight	Global* *aggregated regional exposure	Global	Your Aligned Portfolio	Global Peers

Data Sources

The model sources, where possible, forward-looking asset - level data for key technologies (e.g. future production plans) in order to provide geography-specific assessments for climate relevant sectors mapped to the company level. It thus bypasses wherever possible backward-looking, corporate level reporting, although such reporting can be used for validating forward - looking parameters (e.g. GHG emissions). The analysis relies on the following data sources:

- **GlobalData**. Power plant data, including plants classified as active, announced, financed, partially active, permitting, temporarily shut down, under construction, under rehabilitation & modernization, and Oil and Gas production data and forecast until 2018 - 2023, as well as coal mining data;

- **WardsAuto/AutoForecastSolutions**. Light passenger duty vehicle including light trucks and BAU production forecasts 2018 - 2023;

- **RightShip**. Ship data, including ship type and carbon efficiency developed by Carbon War Room;

- **FlightGlobal**. Airplane data for passenger flights, cargo and combined aircrafts, including number of seats or tons transported, plane model, etc;

- **Other sectors databases**: PlantFacts (steel plant data, including status and type); CemNet and Global Cement Directory (cement plant databases); combined with EY´s emissions intensity model per plant by type;

- **Bloomberg**. Financial data with information about sector classification, share price, unique identifiers, etc.;

- **Morningstar**. Database on funds that are currently used for the peer comparison.

The following table gives an overview of the asset level data sources per sector as well as the analysis type that is possible due to data availability and sourcing date of the data.

The financial data and peer data is taken as of the 31.12.2017, thus your portfolio data should also be as of end of 2017.

Table 3. Asset level data used in the analysis: sources, analysis type due to data granularity and source date

Sector	Data Provider	Data Granularity /Analysis	Source Date
Automotive	WardsAuto/ AutoForecast Solutions	Scenario Analysis	31/12/2017
Aviation	FlightGlobal (FlightAscend)	Emission Intensity	31/07/2017
Cement	CemNet & Global Cement Directory	Emissions Intensity	30/06/2017
Coal	GlobalData	Scenario Analysis	28/02/2018
Power	GlobalData	Scenario Analysis	28/02/2018
Oil&Gas	GlobalData	Scenario Analysis	28/02/2018
Shipping	RightSHip	Emission Intensity	28/02/2018
Steel	PlantFacts	Emission Intensity	31/03/2017

Data Coverage

The coverage both in terms of production data covered by the asset level data bases as well as the coverage of financial instruments in the sector is presented in the following 3-pager.

Data Coverage for PACTA Model
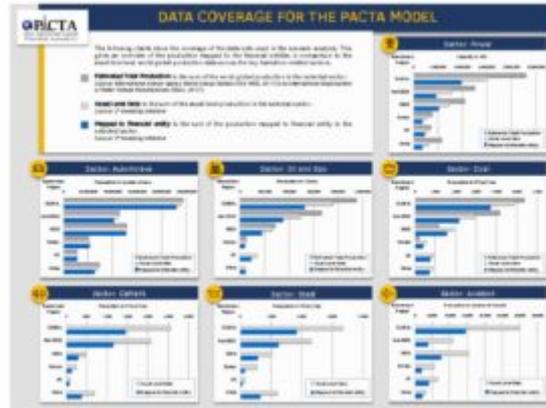
Caveats/Notes on Interpreting the Results

The following briefly highlights key caveats to the model and the results:

- The forward-looking data is based on current 'revealed' plans from companies and is subject to change. The estimates should thus not be interpreted as final predictions, but rather the current plans of companies if they don't change. Another way to interpret the results is the call for action with regard to the required change to align with the 2°C economic trend. Given the 5-year time horizon, there is a high degree of certainty that plans will still change in some way over time. Similarly, the participating financial institutions can of course alter their portfolio exposures over time. The analysis however seeks to be a point in time assessment of future exposures under current conditions.

- The model takes a diversified 'market portfolio' as a basis, focusing on key technologies reflected in the IEA roadmaps. By extension, thematic portfolios invested in breakthrough technologies and/or SRI portfolios with a range of environmental, social, and governmental considerations may not value these elements.