Risk for Commercial Banks

Physical Risk

National: **10%** of the value of **mortgage exposures** in England is on properties in flood-risk zones

Global: Some UK banks have **large direct exposure** to vulnerable regions, such as South-East Asia

Risks of climate change due to extreme weather conditions

Market	Increased macro risk (economic growth, employment and inflation) due to severe weather conditions	Downgrades on sovereign ratings impacting securities on balance sheets
Operational	Extreme weather impacting business continuity i.e branch networks, infrastructure.	Greater price volatility in energy, water and insurance costs; disruptions in operations.
Credit	Acute weather events causing creditors to lose revenue and fail to repay; leading to greater PD & LGD.	A client's agricultural business is impacted by shifting seasons, leading to lower revenue; increases the credit risk of the company

Transition Risk

National: Loan exposure to emission-intensive sectors amounts to **70%** of largest UK banks' CET1[1] Capital.

Global: **15%** of the value of a representative global market portfolio could be at risk.[2]

Risk of transitioning to a new zero carbon emission world

Market	Widespread correction in financial markets/assets as the financial risk from climate change are re-evaluated.	Will make it difficult for banks to manager carbon-intensive investment exposures, increasing losses and liquidity issues.
Operational	Shifting sentiment of customer and increased scrutiny by stakeholder on banks' stance on sustainability.	Increased pressure to focus operations that contribute towards a sustainable economy.
Credit	Potential credit exposures to companies with business models that are not aligned with a 2°C scenario	These clients have a higher risk of reduced corporate earnings and business disruption from transition (Energy, Transport and Agriculture)

Source: Discussion paper – "The 2021 biennial exploratory scenario on the financial risks from climate change", Bank of England (December 2019)

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Bank Of England’s 2021 Biennial Exploratory Scenario

TESTING RESILIENCE OF INDIVIDUAL FIRMS AND FINANCIAL SYSTEM TO FINANCIAL RISKS FROM CLIMATE CHANGE

WHO United Kingdom’s (UK) largest banks and insurers.

WHAT Assess vulnerability of *individual* counterparties’ business models to climate-related risks.

HOW Perform bottom-up, counterparty-level modelling of financial risks related to **three climate scenarios** (e.g. early/late/no-policy action, provided by Bank of England), over **30 years** (i.e. up to 2050, in steps of five years) including both **transition** and **physical** risks.

WHY Sizing risks (loan book, trading book, investment portfolios) and responses.

Indicative Scenario Variables

Climate-related Variables		Macro-financial Variables	
Physical Variables	**Transition Variables**	**Macroeconomic Variables**	**Financial Market Variables**
• Global and regional temperature pathways • Frequency and severity of specific perils in regions with material exposure (e.g. UK floods, subsidence and freeze) • Longevity • Agricultural productivity	• Carbon price • Emission pathways (aggregate, by world region and sector) • Commodity and energy prices (incl. renewables) by fuel type • Energy mix	• Real GDP (Aggregate and decomposed by sector) • Unemployment • Inflation • Central bank rates • Corporate profits • Household income • Residential and commercial property prices	• Government bond yields for major economies • Corporate bond yields for major economies (investment grade and high yield) • Equity indices • Exchange rates • Bank rates

Source: “Discussion Paper - The 2021 biennial exploratory scenario on the financial risks from climate change”, Bank of England (December 2019). For illustrative purposes only

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TCFD Recommendations for Banks

Figure 1: TCFD recommendations for banks to disclose on climate-related risks and opportunities

	Governance	Strategy	Risk Management	Metrics & Targets
DISCLOSURES RECOMMENDED FOR ALL COMPANIES	a. Describe the board's oversight of climate-related risks and opportunities	a. Describe the climate-related risks and opportunities the organisation has identified over the short, medium and long term.	a. Describe the organisation's processes for identifying and assessing climate-related risks.	a. Disclose the metrics used by the organisation to assess climate-related risks and opportunities in line with its strategy and risk management process.
	b. Describe the management's role in assessing and managing climate-related risks and opportunities	b. Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	b. Describe the organisation's processes for managing climate-related risks.	b. Disclose scope 1, scope 2, and scope 3 GHG emissions and the related risks.
		c. Describe the resilience of the organisation's strategy, taking into consideration different climate related scenarios, including a two degree or lower scenario.	c. Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organisation's overall risk management.	c. Describe the targets used by the organisation to manage climate-related risks and opportunities and performance against targets.
SUPPLEMENTAL DISCLOSURES RECOMMENDED FOR BANKS		Banks should describe significant concentrations of credit exposure to carbon-related assets. Additionally, banks should consider disclosing their (physical and transition) climate-related risks in their lending and other financial intermediary business activities.	Banks should consider characterizing their climate-related risks in the context of traditional banking industry risk categories, such as credit risk, market risk, liquidity risk, and operational risk. Banks should also consider describing any risk classification frameworks used (e.g., the Enhanced Disclosure Task Force's framework for defining "Top and Emerging Risks").	Banks should provide the metrics used to assess the impact of (physical and transition) climate-related risks on their lending and other financial intermediary business activities in the short, medium, and long term. Metrics provided may relate to credit exposure, equity, and debt holdings, or trading positions, broken down by: Industry; Geography; Credit quality (e.g., investment grade or non-investment grade, internal rating system); Average tenor. Banks should also provide the amount and percentage of carbon-related assets relative to total assets, as well as the amount of lending and other financing connected with climate-related opportunities.

Source: Banks TCFD Reporting – "How can Banks Apply a Quantative Lens on Climate Risk Exposure ", Truscost, part of S&P Global Market Intelligence (December 2018)

We have a range of data sets to support TCFD integration & reporting:

Carbon footprinting

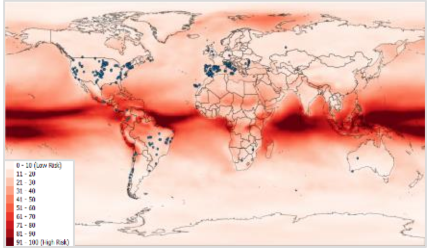
Coal exposure

Energy transition

Fossil fuel reserves

Physical risk

- ✓ 7 Climate hazards
- ✓ 15,000+ companies
- ✓ 500,000+ assets



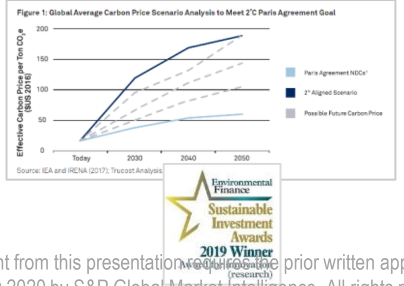
Transition risk

Carbon Earnings at Risk

- ✓ 44 jurisdictions
- ✓ 15,000+ companies
- ✓ 44 jurisdictions

2 Degrees Alignment

- ✓ Sector-specific pathways
- ✓ 1,300+ companies
- ✓ Science-Based Targets



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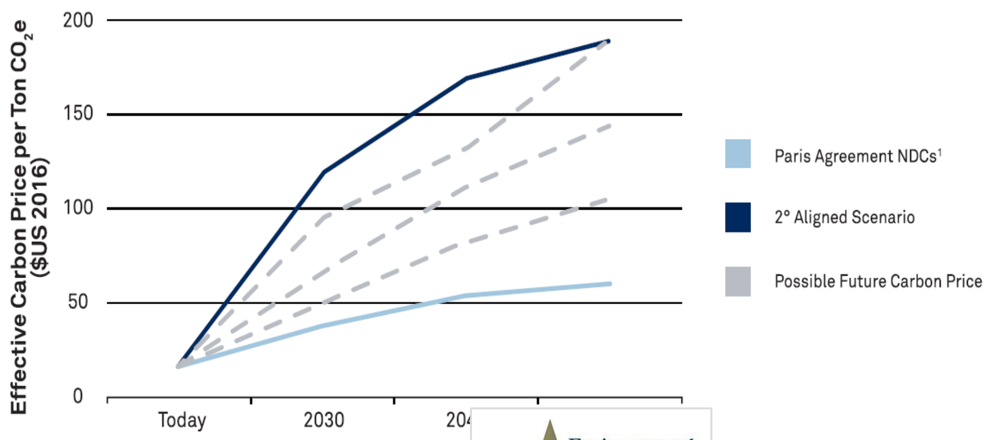
Scenario Analysis: Carbon Earnings at Risk

Focus on the impact of carbon pricing policies on companies' balance sheets.

Key features of our CEaR solution:

- ✓ 15,000+ companies covered
- ✓ 3 scenarios affecting 44 carbon pricing jurisdictions.
- ✓ Results in $-value showing impact on EBIT and EBITDA

Figure 1: Global Average Carbon Price Scenario Analysis to Meet 2˚C Paris Agreement Goal



Source: IEA and IRENA (2017); Trucost Analysis. Data as

Environmental Finance
Sustainable Investment Awards
2019 Winner
Award for innovation (research)

Content pertaining to the Trucost product.
Trucost was awarded an Award for Innovation (research) at the Sustainable Investment Awards 2019

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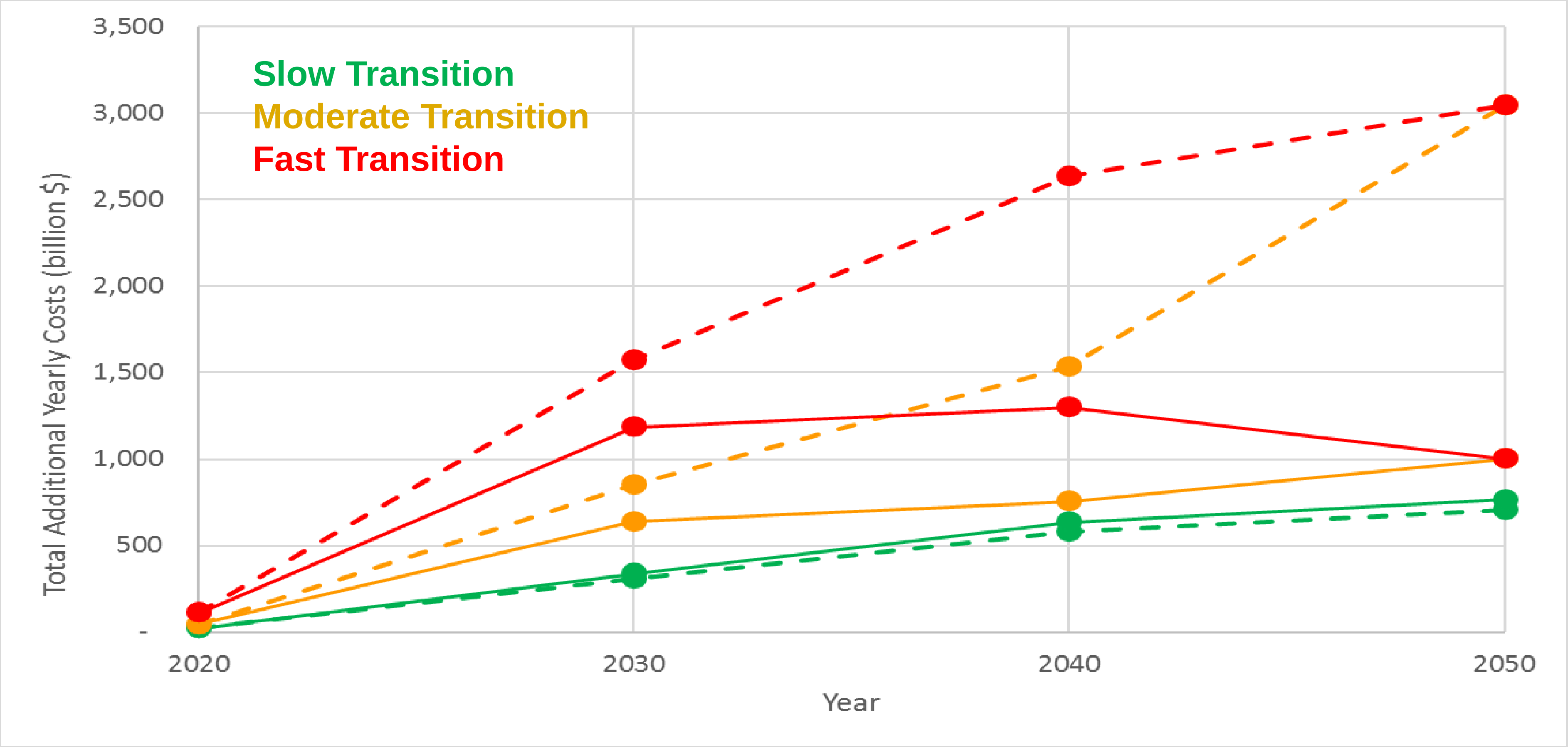
Estimated Carbon Earnings At Risk For Public Firms, Globally



Source: S&P Global Market Intelligence (As of May, 31 2019). For illustrative purposes only.

Continuous lines assume a progressive reduction of carbon emissions.[1]
Dashed lines assume carbon emissions remain at current levels.

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[1] Under the slow transition, the emission reduction starts after 2050.

Measuring Physical Risk Exposure for Companies, Assets & Portfolios

Our physical risk tool evaluates risks posed by climate-related hazards on physical assets and companies.

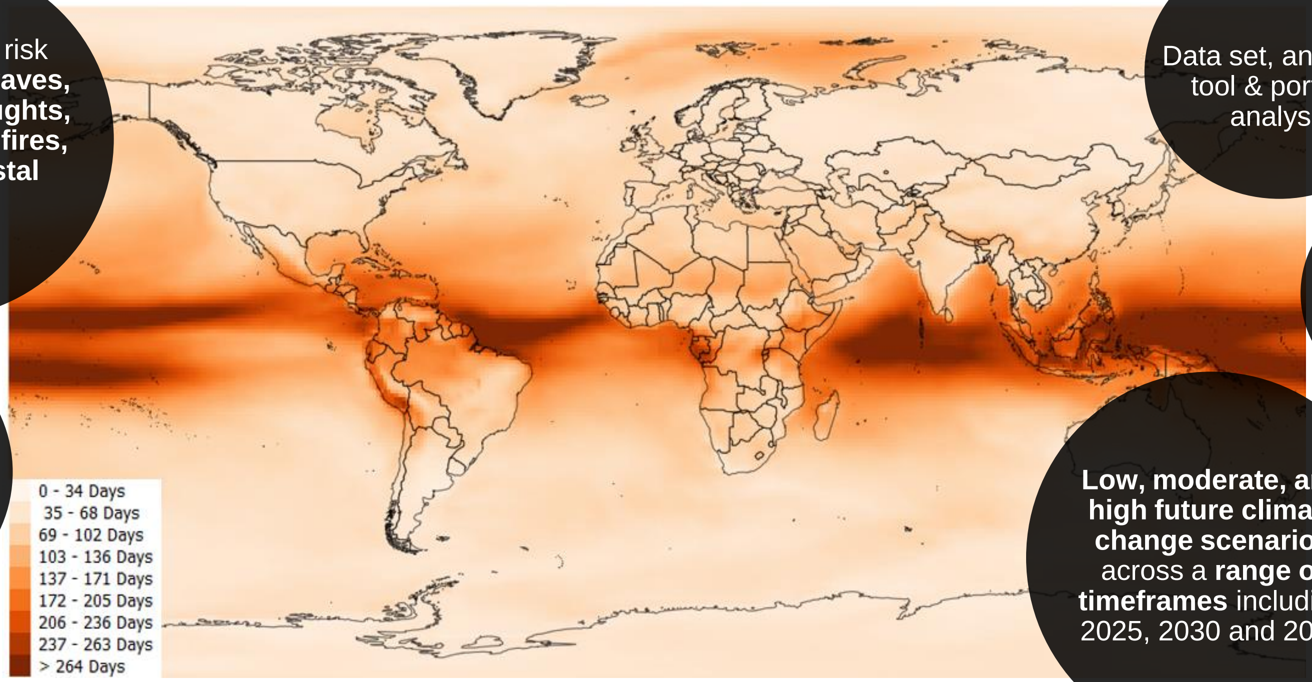
Seven physical risk indicators: **heatwaves, coldwaves, droughts, hurricanes, wildfires, river and coastal flooding**

Over 500,000 assets from S&P's proprietary databases

Data set, analytical tool & portfolio analysis

15,000+ listed companies

Low, moderate, and high future climate change scenarios across a **range of timeframes** including 2025, 2030 and 2050



Heatwave days per annum under a high climate change scenario

Source Trucost 2019, for illustrative purposes

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Quantifying Financed Emissions for Corporate Lending

- Company disclosed emissions data
- Bottom-up emissions modelling based on company business activities and revenues
- Top-down emissions modelling based on region-sector averages

Carbon-Revenue Intensity

	World	OECD	EMEA	APAC	ROW
ALL SECTORS	**955**	**1,016**	**828**	**852**	**1,126**
Consumer Discrectionary	325	445	365	214	274
Consumer Staples	599	591	405	765	635
Energy	2,904	2,922	3,382	2,156	3,156
Financials	38	74	23	28	27
Health Care	167	128	132	235	174
Industrials	687	750	879	556	561
Information Technology	50	26	28	33	111
Materials	2,194	1,934	1,477	2,486	2,878
Real Estate	156	153	159	148	162
Telecommunication Services	111	200	150	72	21
Utilities	3,281	3,951	2,107	2,679	4,388

Source Trucost 2019, for illustrative purposes

- Allocate emissions to the bank based on the ratio between the lender's loan exposure and the enterprise value of the company

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Climate-Linked Credit Risk Stress Testing Framework

Entity's current creditworthiness

Physical Risk Impact

Transition Risk Impact

Macro-Economic Impact

Creditworthiness Change

- Entity-level analysis
- Aggregate analysis

Image for illustrative purposes only.

Climate Variable → **Intermediate Drivers** → **Financial Impact** → **Credit Risk Assessment**

Climate Variable: E.g. carbon tax, temperature pathway

Intermediate Drivers: Earnings at risk or sector-specific (e.g. for Oil & Gas: oil price and production, costs capital expenditures

Credit Risk Assessment: Fundamentals and/or market-driven credit risk models.

Complementary approaches

	Fundamentals Analysis	Market Valuation Analysis
	Conditioning full financial statement on drivers	*Conditioning market capitalization on earnings at risk*
PROS	Ingrained in banks' processes Detailed / in-depth sector-specific analysis Public and private companies	Compact set of variables / fast Comparable framework for all sectors Can be expanded to private companies / SMEs
CONS	Time consuming/not easily scalable to Small and Medium Enterprises (SMEs) Extrapolation over long-time horizons	Not as detailed as fundamentals analysis Extrapolation over long-time horizons

COMPLEMENTARY USE CASES: EXAMPLES

Carbon-intensive sectors - stress testing
In-depth scenario analysis (largest exposures)

All sectors - stress testing
Quick scenario analysis, screening, monitoring

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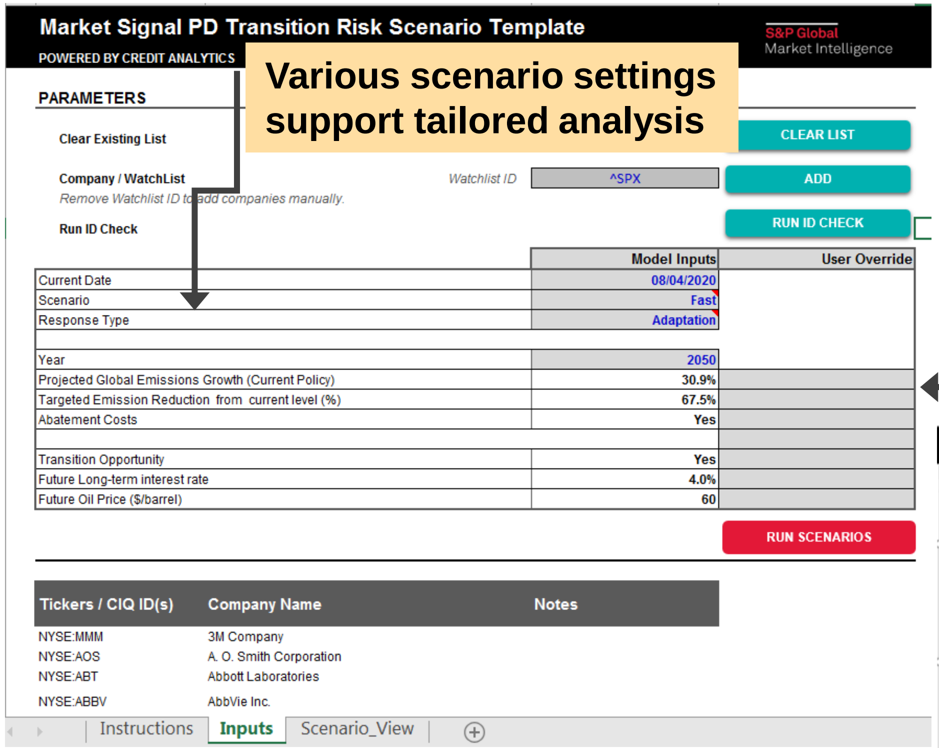
S&P Global Market Intelligence’s Climate-Linked Credit Analytics



Various scenario settings support tailored analysis

Enables pre-canned or user-defined scenarios

Portfolio insight into overall distribution of scenario outcomes

Comprehensive model outputs enable individual counterparty analysis

Detailed insight into model drivers

Company Name	Industry Group	Primary Industry	Country	Revenues ($ m)	Capex ($ m)	Scope1	Scope2	Total Emissions	Current carbon tax costs on current emission	Scope 1 Additional Carbon Tax Costs ($)	Scope 2 Additional Carbon Tax Costs ($)	Additional Carbon Tax Costs on current emissions levels ($m)	Abatement costs to reduce emissions (from current levels, or from BAU growth)	Additional Total Costs after reduction of emissions (if any)	Opportunity Share	Revenues Opportunity and growth/loss	Valuation Multiple	Current Market Cap	Future Market Cap	Credit score change (notches) - User Defined View
3M Company	Capital Goods	Industrial Conglomer	United States	32,136	0	4,609,951	1,824,293	6,434,244	0	278,097,862	96,803,765	375	0.00	324.29	0.47%	-4,160		85,708	40,730	0.00
A. O. Smith Cor	Capital Goods	Building Products	United States	2,993	64	88,384	52,055	140,438	0	5,340,946	2,632,444	8	0.00	6.90	0.19%	-400	12.15	6,516	2,432	1.00
Abbott Laborato	Health Care Equip	Health Care Equipme	United States	31,904	1,638	557,818	527,942	1,085,760	0	32,408,914	25,712,270	58	0.00	50.27	0.10%	-4,267	17.82	149,804	97,984	0.00
AbbVie Inc.	Pharmaceuticals, E	Biotechnology	United States	33,266	552	303,185	324,135	627,320	0	19,782,831	17,978,437	38	0.00	32.66	6.22%	-4,465	7.79	116,007	51,925	1.00
Abiomed, Inc.	Health Care Equip	Health Care Equipme	United States	841	42	17,679	15,233	32,911	0	1,205,981	840,101	2	0.00	1.77	0.00%	-112	26.52	7,042	5,674	0.00

Source: S&P Global Market Intelligence. For illustrative purposes only.

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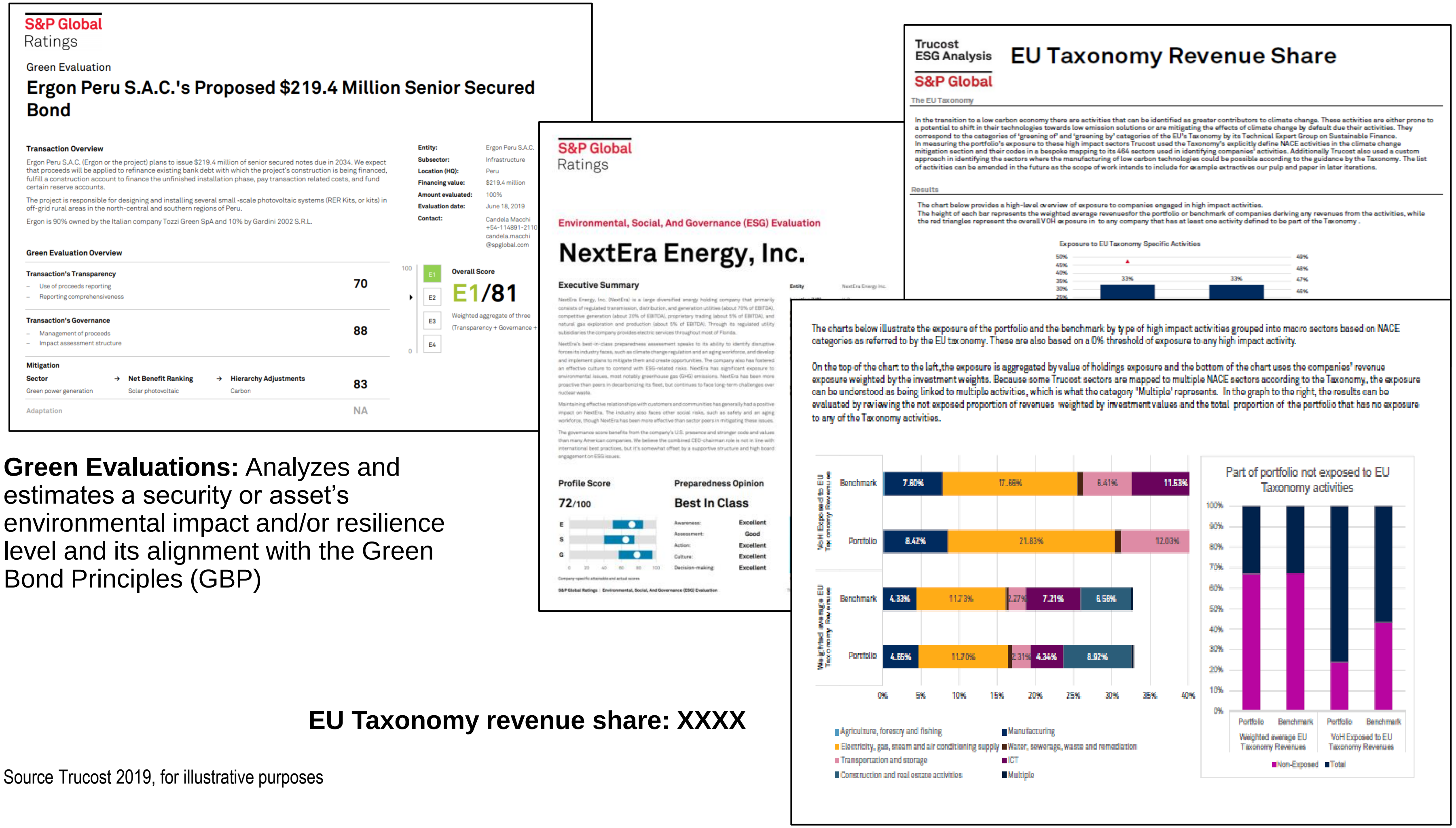
Green Financing:
Green Evaluations & EU Taxonomy Data Set



Green Evaluations: Analyzes and estimates a security or asset's environmental impact and/or resilience level and its alignment with the Green Bond Principles (GBP)

EU Taxonomy revenue share: XXXX

Source Trucost 2019, for illustrative purposes

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