LOCATING XDI ANALYSIS IN TCFD LEADING PRACTICE

XDI | CROSS DEPENDENCY INITIATIVE

ELEMENTS OF PHYSICAL RISK ASSESSMENT	GUIDANCE AND RECOMMENDATIONS	WHAT XDI DELIVERS
Hazards	Storms, extreme rainfall, extreme heat, heatwave, flood, drought and wildfire, variability in precipitation and temperature, water stress, sea-level rise, land degradation (IIGCC 2020a). Heat stress, extreme rainfall, drought, cyclones, rising sea levels, wildfire and other industry-relevant and/or locally specific climate hazards across the corporate value chain (EBRD 2018).	XDI modelling incorporates eight climate hazards: coastal inundation (sea level rise), riverine flooding and pluvial flooding (extreme rainfall), extreme heat, wind (storms), soil contraction (effect of drought), freeze/thaw (effect of temperature) and forest fire.
Timeframes	Short and medium term: 2020-2040 (IIGCC 2020a, EBRD 2018). For this time frame, the EBRD recommends probabilistic risk analysis. Longer term: 2040-2100 (IIGCC 2020a, EBRD 2018). For this time frame, the EBRD recommends scenario-based analysis. The BOE's biennial exploratory scenario will model 2020-2050 but for the "no policy action" scenario, physical impacts in 2050 will represent expected physical impacts in 2080 (BOE 2019b).	The analysis is probabilistic from 2020 to 2100 for multiple climate scenarios ranging from "no policy action" (RCP8.5) through to "extreme policy action" (RCP2.6). Results can be presented in different decadal time steps (e.g. 2030, 2050 and 2100) depending on client requirements.
Scale	Location (country or city) of key supplier facilities and critical business facilities with evaluation of their importance (EBRD 2018). Asset-level data and assessment with attention to downscaling limitations of models (IIGCC 2020a, CISL 2019).	XDI works at address and site level, data is aggregated from suburbs to national as required. Regional Climate Models (RCMs) include local topology and land surface information to provide spatial resolutions to between 5 and 50km square resolution. Further hazard layer context includes local weather data, elevation data, vegetation maps and wind zones with resolutions between 5 and 250 metres
Scenarios	**Most guidance for physical risk assessment recommend use of 2°C and 4°C pathways** (CISL 2019, IIGCC 2020a). Consistent with IIGCC recommendation, the TCFD 2019 Status report indicates that RCPs 2.6 and RCP8.5 are commonly being used as best and worst case 2°C scenario and 4°C scenarios respectively.	XDI can model comparative effects of RCP2.6 and RCP8.5 and can also include RCP4.5 as a moderate mitigation pathway (which still results in average warming over 2°C).
Direct and indirect physical climate impacts	**Direct and first-order:** damage and loss of real assets, disruption to value chains, supply chain costs, lost hours of staff (IIGCC 2020a, EBRD 2018). **Indirect and second-order:** Insurance costs, energy costs, regulatory change, legal liabilities, market changes, borrowing costs, social licence (IIGCC 2020a, EBRD 2018).	**Direct and first-order:** damage and loss of real assets, lost hours of staff, customer impact. **Indirect and second-order:** insurance premiums.

ELEMENTS OF PHYSICAL RISK ASSESSMENT	GUIDANCE AND RECOMMENDATIONS	WHAT XDI DELIVERS
Metrics and outputs	**Data:** Most guidance recommended climate data overlaid with business data, within a socio-economic and regulatory context. **Recent and historic impacts:** EBRD recommends firms estimate current costs of extreme weather events, including days of business interruptions and associated costs, costs of repairs or upgrades, fixed-asset impairment, supply chain disruptions and lost revenues. **Average Annual Loss** (CISL 2019, BOE 2019b, EBRD 2018) **Number of sites and business lines** exposed to relevant climate impacts (EBRD 2019) **Value-At-Risk** (EDRB 2018) Identification of **critical thresholds** (IIGCC 2020a)	Climate data overlaid with business asset data. Outputs include: **Average Annual Loss** **Total Technical Insurance Premium** (TTIP), (total annual cost of damage assuming all hazards are insured) **Percentage of Value-at-Risk** (VAR%), (TTIP as a percentage of the replacement cost of the property) **Number of High Risk Properties** (HRP#), (property assets where the VAR is greater than 1%) **Percentage of High-Risk Properties** (HRP%), (HRP# expressed as a percentage of all properties in the LGA) **Failure Probability** **Productivity Loss**
Adaptation measures	Inclusion of asset-level and broader adaptation options in model (CISL 2019, BOE 2019b, IIGCC 2020a) including planned improvements, retrofits, relocations, or other changes to facilities.	Analysis of available adaptation measures at the address and locality scale and how they change risk profile. Evaluation of net risk exposure after adaptation applied.
Strategy, policy and advocacy	Supply-chain risk management strategy incl. engagement with suppliers on strategy (EBRD 2018). Engagement with local or national governments and local stakeholders on local climate resilience (EBRD 2018).	Cross dependency analysis identifies shared risk with upstream infrastructure including road access, water and power supply.

References

Taskforce on Climate-related Financial Disclosure: The 2017 Final Report from the Task Force for Climate-related Financial Disclosure (TCFD 2017)

European Bank for Reconstruction and Development (EBRD): *Advancing TCFD guidance on physical climate risks and opportunities* (EBRD 2018)

Cambridge Institute for Sustainability Leadership (CISL): *Physical risk framework Understanding the impacts of climate change on real estate lending and investment portfolios.* (CISL 2019).

TCFS 2019 Status Report 2019: (TCFD 2019).

Institutional Investor Group on Climate Change (IIGCC): *Understanding physical climate risks and opportunities – a guide for investors* (IIGCC 2020)

Bank of England (BOE): Discussion paper for the 2021 *Biennial Exploratory Scenario* (BES) on the financial risks from climate change. (BOE 2019b).