respACT
austrian business council
for sustainable development

Bundesministerium
Klimaschutz, Umwelt,
Energie, Mobilität,
Innovation und Technologie

RespACT Workshop

Climate Risk Assessment in Financial Decisions

15th of May, 14:00-15:30

FutureWise
Partners

About Me

Master in Business Administration and in Sciences, CFA Charterholder, Master in International and European law

Certificate in ESG Investing from CFA institute, **GRI** Certified Sustainability Professional,

20y of Investment Banking advising large corporate firms on their financial strategy

Member of RespACT and of United Nations Global Compact Working from the Climate Lab in Spittelau

10y of experience managing projects and companies on behalf of large financial institutions (Civil Society, women and migrant livelihood)

Living in Vienna since 2020, mother of two lovely twin girls aged 20, aiming for a triathlon this summer.

With over 20 years in investment banking and a deep focus on sustainable strategies, I, together with my partners at Futurewise Partners, bring a blend of finance and climate expertise to guide large corporates in aligning financial strategies with sustainability goals.

Our Agenda

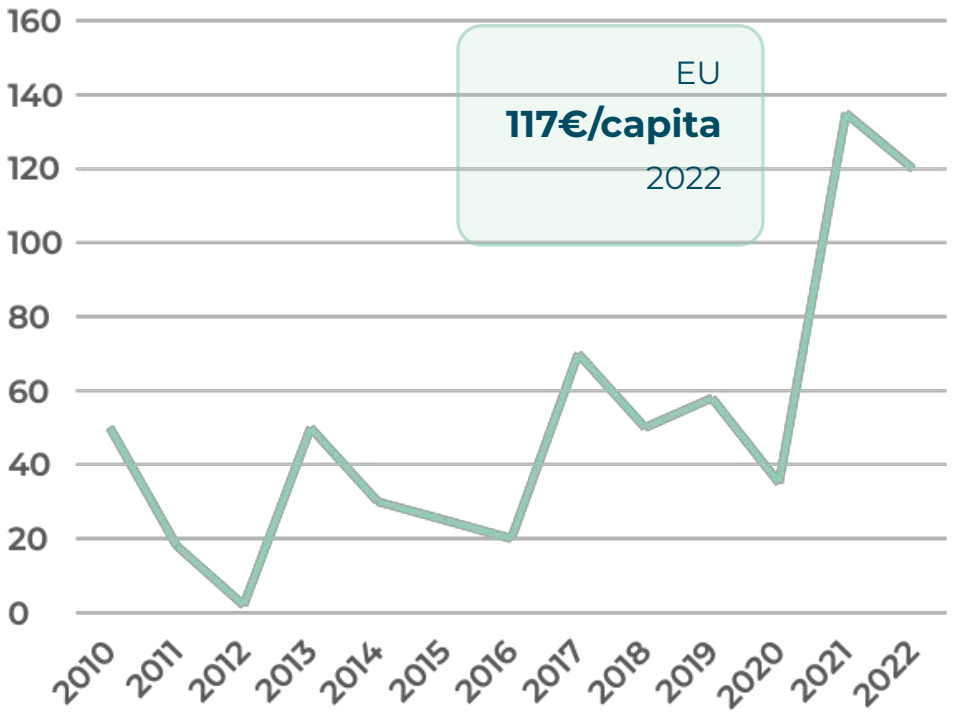
1. Context
2. Understanding How Climate Related Risks Impact Financials
3. Regulatory Framework
4. Scenario Analysis
5. Integrating Risks into Financial Planning
6. Case studies: Examples of a Business Implementing Climate Risk Assessment

1. Climate Can Be A Risk

CONTEXT

Climate related economic losses

Euro per capita



2021 floods in Belgium, Germany, and the Netherlands: **EUR 44 billion**

Supply chain disruption due to Covid in Europe**: EUR 22bn**

Regulatory changes on the rise with over **30 new climate laws** passed globally in the past 2 years

Initiatives to strengthen carbon pricing

But also an opportunity

> ***In the last five years, the number of clean steel factories in the EU has grown from zero to 38***

> ***We are now attracting more investment in clean hydrogen than the US and China combined.***

2023 State of the Union Address by President von der Leyen

2. Risks

RISK

What is risk?

“Risk is the possibility of something bad happening. Risk involves uncertainty about the effects/implications of an activity with respect to something that humans value, often focusing on negative, undesirable consequences.”

- Wikipedia

2. Risks

RISK

What is risk?

“Risk comes from not knowing what you’re doing.”

- Warren Buffett

2. Business and Financial Risks

RISK

Business and Financial Risks

- Business Risk - Reduced demand for our products
- Business Risk - high employee turnover
- Non business risk: Inflation
- Financial Risk - Market Risk: High interest rates for our refinancing
- Financial Risk - credit risk: higher requirements from bank for (re)financing of credit
- Financial Risk - Liquidity Risk:Not being paid on time to pay staff

We try to anticipate everything that could go wrong in order to be able to reduce or eliminate that risk: Risk management

2. Climate - Related Risks

RISK

Climate Risk and Opportunities

Sources: Recommendations of the Task Force on Climate-related Financial Disclosures - Final Report

2. Identify climate related Hazard: Acute Physical Risk

RISK

Acute: heat wave, wildfire, cyclones, hurricanes, or floods, drought, avalanche

Hailstorms 2021

Snow in 2024

Flooding 2013

2. Identify climate related Hazard - Acute Physical Risk

RISK

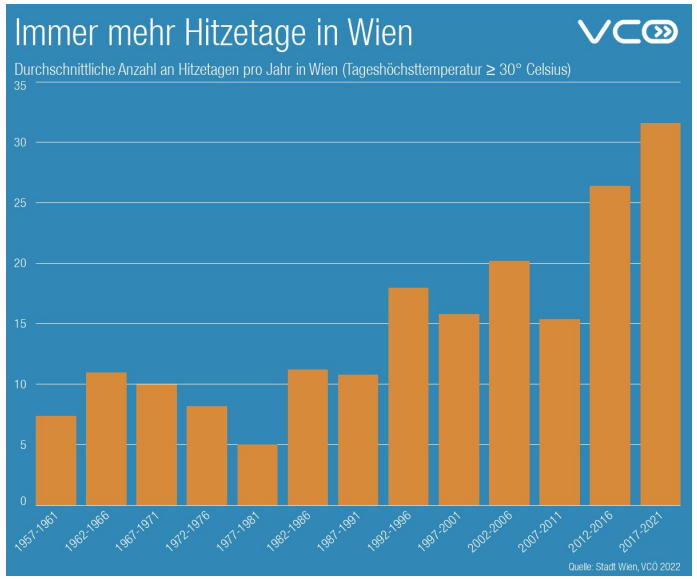
Acute: Impact on Businesses

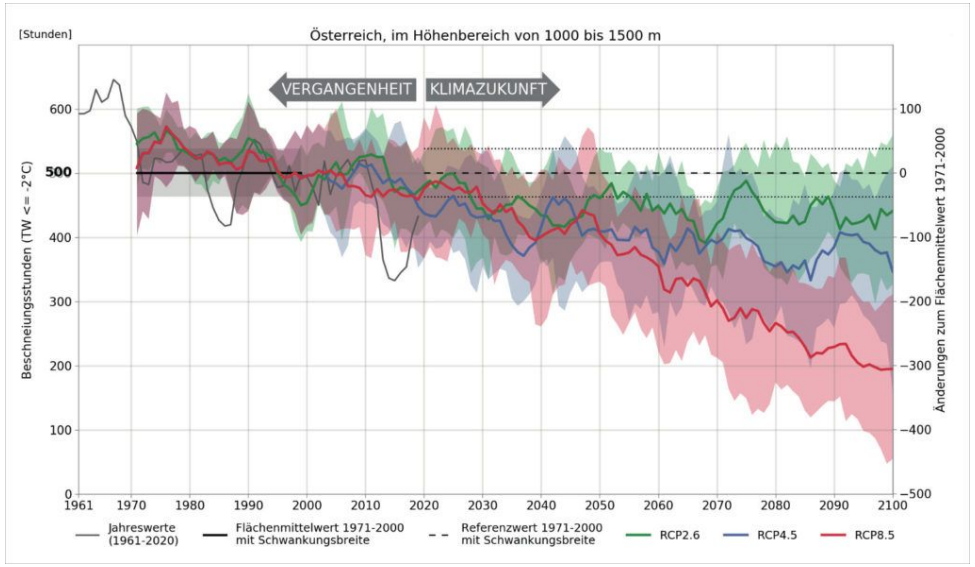
- Damages to infrastructures and assets: equipment, inventory
- Bad crops => increase in food prices
- operations and supply chains disruptions, power line, transport
- Increase in insurance costs
- Etc

2. Identify climate related Hazard - Chronic Physical Risk

RISK

Chronic: Gradual changes: temperature increase, Altered Rainfall Patterns (think electricity), changing wind patterns, soil erosion, etc



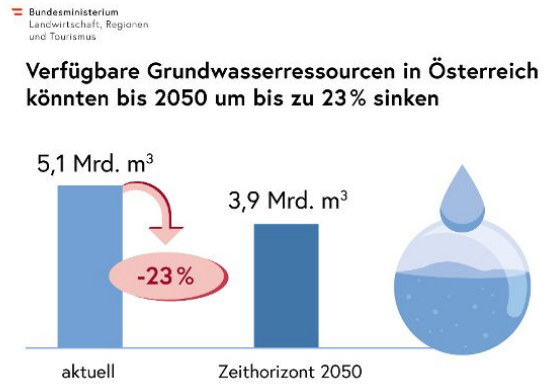


2. Identify climate related Hazard - Chronic Physical Risk

RISK

Chronic: Impact on Businesses

- Energy impact from hydropower
- Water scarcity => food price? cooling of power plant
- Workforce productivity
- air conditioning utility bill and effect on CO2



2. Understanding How Climate Related Risks Impact Financials - Transition Risk

RISK

Transition risks: Risks related to the transition to a lower-carbon economy

Technology

*Write-offs and early retirement of existing assets

* Increase in R&D costs

Litigation

*increased insurance premiums

*fines

Reputation

*delayed planning approvals

*Reduction in capital availability

Market

*Reduced demand due to shift in consumer preferences

*shifts in energy costs

2. Understanding How Climate Related Risks Impact Financials - OPPORTUNITIES

RISK

Transition opportunities: efforts to **mitigate and adapt** to climate change, such as

- resource efficiencies and cost savings,
- adoption of low-emission energy sources,
- development of new products and services,
- access to new markets, and
- building resilience along the supply chain.

How Climate Related Risks Impact Financials

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	Revenues	Opex	Assets	Funding cost
Physical Risk				
Acute: Increased severity of extreme weather events such as cyclones and floods	Reduced revenue from decreased production capacity (e.g., transport difficulties, supply chain interruptions)	Increased insurance premiums and potential for reduced availability of insurance on assets in “high-risk” locations	Write-offs and early retirement of existing assets (e.g., damage to property and assets in “high-risk” locations)	Increased capital costs (e.g., damage to facilities)
Chronic - Rising mean temperatures	Changing of consumer behaviour (for example tourism choice)	reduction of productivity from increased workforce problems (health, safety, absenteeism) due to higher temperature. Increased operating costs (e.g., inadequate water supply, air conditioning)	assets exposed to higher temperature get retired more quickly	Collateral depreciation

How Climate Related Risks Impact Financials

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	Revenues	Opex	Assets	Funding cost
Transition risks				
Policy: Enhanced emissions-reporting obligations		Higher compliance costs Higher litigation insurance premium increased pricing of GHG emissions	stranded assets if too polluting	higher costs of funding for polluting companies
Technology Substitution of existing products and services with lower emissions options	Reduced demand for some products and services (traditional cars)	Costs to adopt/deploy new practices and processes	Write-offs and early retirement of existing assets	Collateral depreciation
Market	Decrease in demand due to higher price or delay in delivery	Increased production price Increased cost of raw materials		
Reputation: Increased stakeholder concern	Shifts in consumer preferences	need to review supply chain and governance		Reduction in capital availability

Process so far

1. Identification of climate risks
2. Mapping of which assets are exposed to which risks

How can we estimate these risks (and plan for them).

3.

Risk assessment - Regulatory Framework

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CLIMATE RELATED RISK

2017: TCFD - Task Force on Climate-related Financial Disclosures

2021-2022 : ISSB - International Sustainability Standards Board (IFRS Foundation)
(International Financial Reporting Standards)

IFRS S1 and IFRS S2: Reporting of sustainability-related **financial disclosures** and of any climate-related risks that an entity could be exposed to, including climate-related transitions risks, physical risks, as well as climate-related opportunities available to the entity

31.07.2023: European Sustainability Reporting Standards (ESRS)

The identification of risks and opportunities that affect or could reasonably be expected to affect the undertaking financial position, financial performance, cash flows, access to finance or cost of capital over the short-, medium- or long-term

3.

Risk assessment - Regulatory Framework

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SCENARIO ANALYSIS

2017: TCFD - Task Force on Climate-related Financial Disclosures

In a world of uncertainty, **scenarios** are intended to explore alternatives that may significantly alter the basis for "business-as-usual" assumptions.

2021-2022 : ISSB - International Sustainability Standards Board (IFRS Foundation)
(International Financial Reporting Standards)

Use of an approach that is **commensurate with the company's circumstances** and a consideration of all reasonable and supportable information that is available at the reporting date **without undue cost or effort**

31.07.2023: European Sustainability Reporting Standards (ESRS)

(c) the results of the resilience analysis including the results from the **use of scenario analysis**.
The identification of climate-related hazards and the assessment of exposure and sensitivity are informed by **high emissions climate scenarios**, which may, for example, be based on **IPCC SSP5-8.5,** (...) or **NGFS (Network for Greening the Financial System)** climate scenarios with high physical risk such as "Hot house world" or "Too little, too late".

4. Scenario Analysis: “Fast” overview

- Macro economic: GDP, employment rate
- Demography: Population growth, immigration, education, urbanisation
- Market and technology shift
- Political movements across the world => trade flow
- Rate of adoption of policies

4. Scenario Analysis

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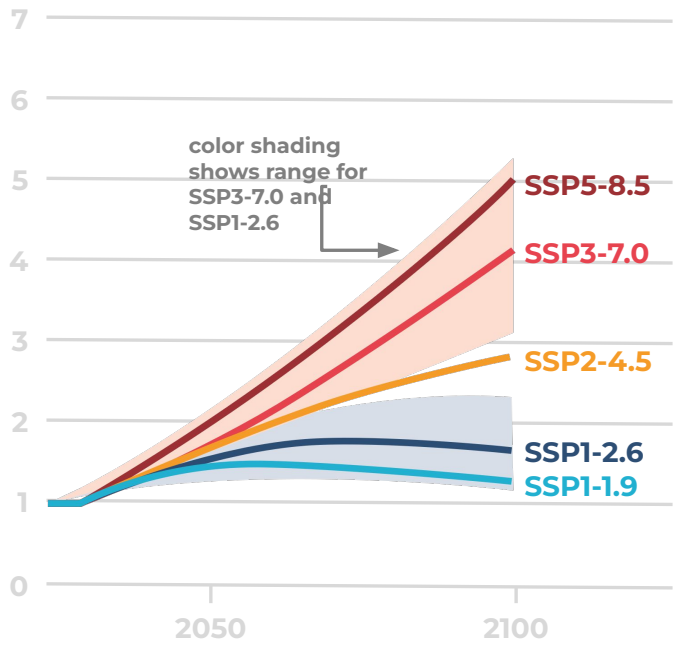
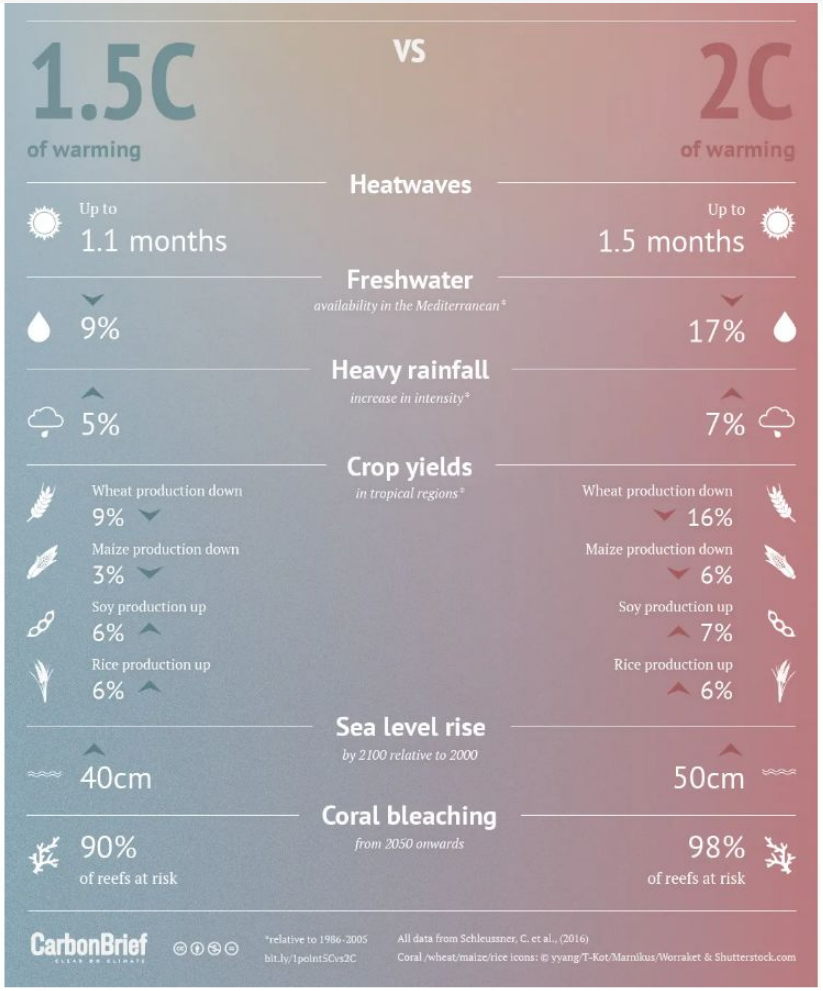
IPPC: United Nations Intergovernmental Panel on Climate Change

- Series of reports which assess the available scientific information on climate change.
- March 2023 Final synthesis of the 6th assessment report
- Approved by governments
- Modelled **scenarios** and **pathways** are used to explore future emissions, climate change, related impacts and risks, and possible mitigation and adaptation strategies and are based on a range of assumptions, including socio-economic variables
- These are quantitative projections and are neither predictions nor forecasts

Temperature for SSP-based scenarios of 21st century and C1-C8 at 2100



4. Small reminder why it matters



CarbonBrief

4. Shared Socioeconomic Paths

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SSP are scenarios of projected socioeconomic global changes up to 2100. They describe different pathways that might be taken by societal development in terms of population growth, economic development, and technological progress

SSP

SSP5: Fossil-Fuel - taking the highway

- Energy-intensive lifestyle, reliant on fossil fuels.
- Technological solutions to environmental problems are favored
- high levels of consumption and waste

SSP1: Sustainability - Taking the Green Road

- Emphasis on well-being.
- Increasing commitment to achieving development goals
- Inequality is reduced.
- Consumption oriented toward low material growth and lower resource and energy intensity

SSP2: Middle of the road

- Historical patterns
- Inequality in growth and development

SSP3: Regional rivalry (A Rocky Road)

- Increase nationalism
- Concern about competitiveness and security
- Less cooperation
- Slow economic development
- Environmental issues are managed at the national or regional level without global cooperation.

SSP4: Inequality (A Road Divided)

- Increasing inequalities
- Urban elite
- Technological changes failing to address broader societal challenges

4. SSP-Shared Socioeconomic Paths

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SSP

	SSP1: Sustainability – Taking the Green Road	SSP2: Middle of the Road	SSP3: Regional Rivalry – A Rocky Road	SSP4: Inequality – A Road Divided	SSP5: Fossil-fueled Development – Taking the Highway
Population Growth	Slow down	Moderate	High (low education)	Variable	Peaks mid century then declines
Economic Development	Reduced inequality	Moderate, uneven development	Fragmented and uneven	Highly unequal - small elite	Strong, free market
Technological Advancements	Rapid development (green energy)	Steady but uneven	Slow, limited in clean energy technologies	Only accessible to the wealthy	High
Energy Consumption	Shift towards renewable	Balanced mix of fossil fuels and renewable	Reliance on fossil field, low efficiency	Use of fossil field by the wealth	Dominated by fossil fuels
Land Use	Effective	Moderate changes	Increase in deforestation	Environmental degradation	Intensive
Governance and Policy	Strong	Moderate	Weak global institutions	Strong in developed areas	Market oriented

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How Do You See The Future

Take some time and share how do you see the future?
What would you see as a realistic scenario?

4. Representative Concentration Pathways

RCP

RCPs are scenarios to project the future effects of greenhouse gases based on different levels of emissions and concentrations in the atmosphere.

They are generally based on:

- **level of emissions,**
- **adoption rate of low carbon technologies,**
- **use of Carbon Capture and storage (CCS)**
- **mitigation policies**

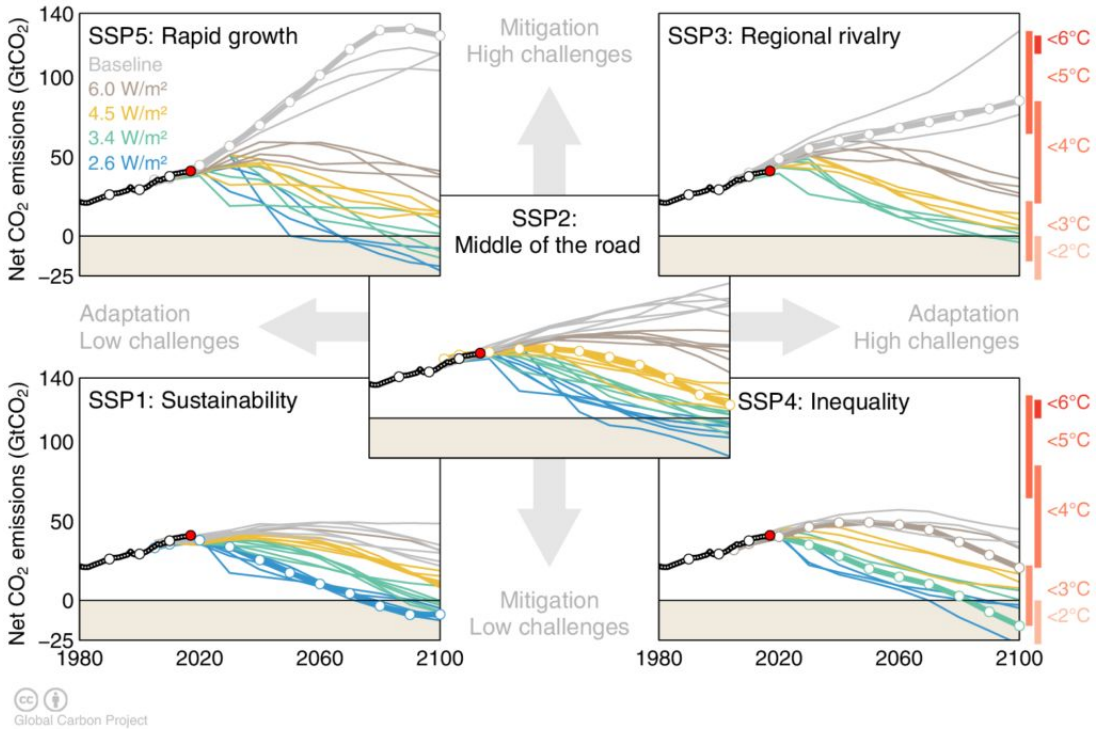
RCP 2.6: pathway that aims to limit radiative forcing to 2.6 watts per square meter (W/m^2) by the year 2100 => global average temperature increase is likely to be limited to **below 2°C** above pre-industrial levels by 2100

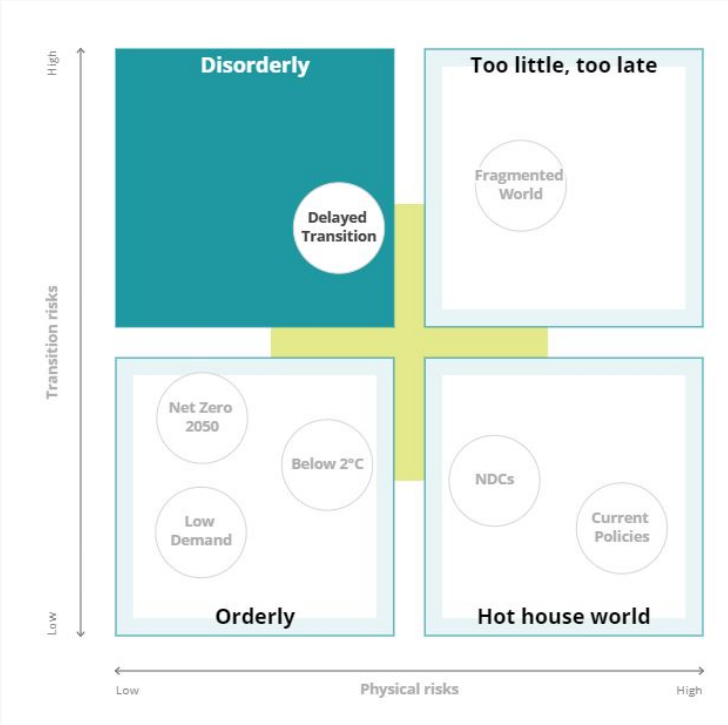
RCP 4.5 - GHG peak around 2040 leading to an increase of 1.**8° to 2.4°** by 2100

RCP 6 - GHG peak around 2080 leading to an increase of **2.2-3.2°** by 2100

RCP 8 - increase of **4-5°** by 2100

4. Tada ! Scenario Matrix Framework





Network for Greening the Financial System (NGFS): Physical risks representing the RCPs and transitions risks identified as policy reaction, technology change, carbon dioxide removal and regional policy variation

Scenarios or No Scenarios?

Function of (i) the degree of the entity's exposure to climate-related risks and opportunities;(ii) the skills, capabilities and resources available to the entity to conduct climate related scenario analysis

Just Beginning	Gaining Experience	Advanced Experience
Qualitative scenario **narratives** to help management explore the potential range of climate related implications, using a more focused boundary such as a critical business unit or specific commodity inputs	Scenarios and associated analysis using **quantitative information to illustrate potential pathways and outcomes**, ideally for the entity and its operations as a whole	Greater rigour and sophistication in the use of data sets and **mathematical models to support statistical analysis and quantitative, entity-specific outputs**

Process so far

1. Identification of climate risks
2. Mapping of which assets are exposed to which risks
3. Scenario analysis: identification of the scenarios and use narratives or climate model to assess impacts on assets

How do quantify financial impacts?

5. Integrating Risks In Financial Planning

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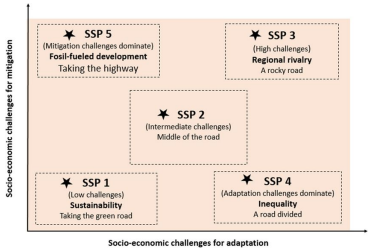
Identify Risk and Opportunities that have or may have financial effects	Climate Risk	Scenario development	Impact assessment	Quantify	Strategic integration
• Stakeholder consultation • Risk and opportunity analysis • Research • Threshold for reporting		Generally one low case (SSP1) and one high case (SSP5) 	• Financial performance • Operations • Funding strategy	Quantify financial implications on assets, liabilities, income, and expenditures	• Operational adjustment (supply chain, resource availability) • Mitigation strategies
Example: EV Battery **CO2 emissions, ethics supply chain and waste management**	**Physical risk:** resource scarcity for rare metals used in EV battery **Transition risks**: more collective ways of transport? Change in consumer behaviour	**SSP1:** stringent env. Regulations: increase in demand for EV **SSP3:** economic nationalism, disruption in supply chains,	**SSP1: r**evenues increase but increase in R&D **SSP3:** increase of costs due to supply chain disruptions	?	**SSP3:** local suppliers

5. Integrating Risks In Financial Planning

> ***Currently, there is no commonly accepted methodology to assess or measure how material physical risks and transition risks may affect the undertaking's future financial position, financial, performance and cash flows. Therefore, the disclosure of the financial effects (as required by paragraphs 64, 66 and 67) will depend on the undertaking's internal methodology and the exercise of significant judgement in determining the inputs, and assumptions needed to quantify their anticipated financial effects.***
>
> *ESRS E1 Disclosure Requirement E1-9 - AR68*

5. Integrating Risks In Financial Planning

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QUANTIFY

Asset Valuation

Physical Damage Costs: Estimate the cost of potential damage to physical assets (e.g., flooding of facilities, storm damage) under RCP 8.5

Insurance Costs: Changes in insurance premiums due to increased physical risks.

Depreciation and Write-offs: Accelerated depreciation or potential write-offs for assets that may become obsolete due to regulatory changes under RCP 2.6.

Operational Costs

Energy costs impact of higher energy prices or carbon pricing under RCP 2.6

Compliance Costs: costs associated with meeting new regulations, such as emissions caps or energy efficiency standards.

Revenue Impacts

Market Demand: analyse changes in market demand for greener products (RCP 2.6) or sales disruptions due to extreme weather (RCP 8.5)

Product Pricing: potential price adjustments for products to cover increased production costs

Cash flow projections: incorporating increased costs, potential revenue changes, and capital expenditures required for mitigation and adaptation.

Sensitivity analysis incorporating increased costs, potential revenue changes, and capital expenditures required for mitigation and adaptation.

6. Case Study - MONDi - Quantify

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Climate change-related risks and opportunities

Climate change-related risks		Estimated financial impact (€m)	Timeframe			Scenario sensitivity		
			Short	Medium	Long	1.5°C	2°C	BAU
Physical risks	1. Higher wood procurement costs	90–180			●	●●	●●●	●●●●
	2. Risk of flooding	15–85			●	●	●●	●●●●
	3. South African plantation yield loss	15–20			●	●	●●	●●●
	4. Chronic changes in precipitation	10–15			●	●	●●	●●●
Transition risks	5. Energy supply costs	60–150			●●●●●	●●●●	●●	
	6. GHG emissions regulatory changes (net impact)	30–85			●●●●●	●●●●	●●●	
	7. Asset impairment risk	10–30			●●●●	●●●	●	
Total climate change-related risks		230–565						
Climate change-related opportunities								
1. Changing customer behaviour		120–240			●●●●●	●●●●	●●	
2. Reduced operating costs through energy efficiency		15–25			●●●●●	●●●●	●●	
3. Sale of by-products		15–20			●●●●●	●●●●	●	
Total climate change-related opportunities		150–285						

Anticipated onset of risk or opportunity

Estimated full impact of risk or opportunity

●●●●● ●●●● ●●● High likelihood

●● ● Low likelihood

6. Case Study - MONDi - Mitigate

2. Risk of flooding **Timeframe:** Long term	Our mills are often located close to rivers which provide the water needed for our operations. Climate change may increase the frequency and extent of flooding events through surface water flooding (e.g. after extreme rainfall or rapid snow melting) or flooding of low-lying coastal regions (due to sea level rise) which may cause damage to our operations. While taking into account the investments we have made at our operations to mitigate the potential impact of flooding, our risk quantification considers mill downtime due to wider local infrastructure damage in the event of a significant flooding event.	Our operations regularly review their flood prevention plans, collaborate with governments and hydropower energy providers in the regions where we operate and invest in flood protection solutions where necessary. Our current flooding assessments show the measures implemented are generally sufficient to mitigate this risk to an acceptable level, with only a few additional measures required such as the elevation of motors and vulnerable equipment, additional pumps and water-level sensors. Our geographic diversification enables operational flexibility to meet customer orders if flooding were to occur at a mill.	15-85

Sustainability in decision making - Mondi

> The reporting of positive and negative impacts on environmental parameters and sustainability targets is required as part of the capital investment decision making process in relation to any investment over €500,000.
>
> We have included environmental metrics related to GHG emissions, waste to landfill, and air- and water-related emissions in the decision-making framework.
>
> We also factor future environmental costs, such as internal region-specific carbon prices, into our investment decision-making process.

6. Case Study

Mayr-Melnhof Holz is one of the leading timber-processing companies in Europe, a major producer of glued laminated timber, and a driving force in the advance of cross-laminated timber

Climate Risk → **Scenario Development**

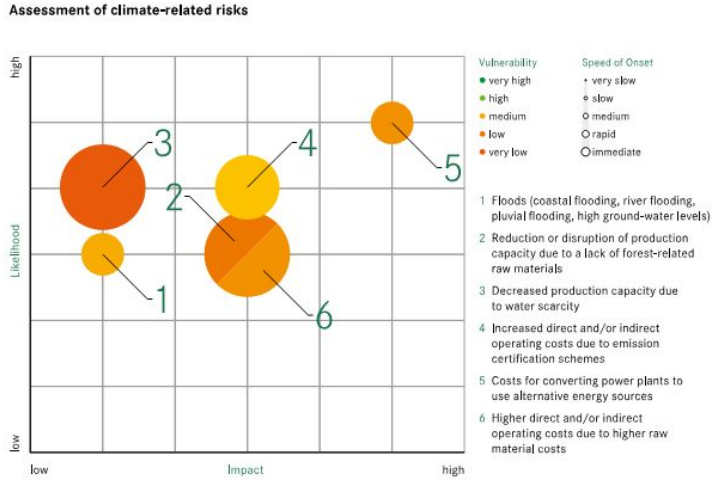
Physical Risks:

- ***Flooding and water scarcity****: future assessed by RCP scenarios; damage to infrastructure and downtime of production in case of flooding*
- *period of drought leading to water scarcity and in reduction of production capacity*
- *Calamity related forest situation => reduction of certified wood quantities in European purchasing areas*

Transition risks*:*

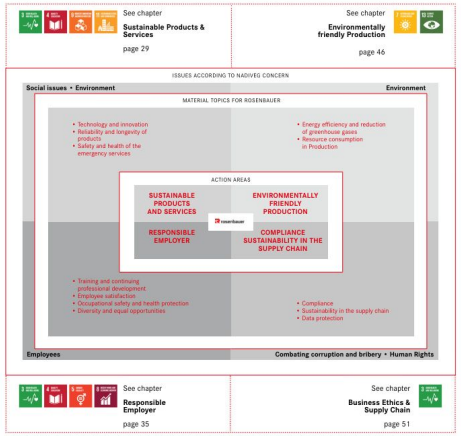
- *increased indirect and/or direct operating costs due to emission certification schemes and due to increase raw material costs*
- *unavailability of natural gas=> costs for conversion of power plants*

use of climate scenarios provided by IIASA - International Institute for Applied System Analysis and integrated into the IPPC.



6. Case Study

Rosenbauer is the world's leading manufacturer of systems for firefighting and disaster protection. The company develops and produces vehicles, fire extinguishing systems, equipment and digital solutions for professional, industrial, plant and volunteer fire services, and systems for preventive firefighting. With revenues of € 1,064.5 million and around 4,300 employees (as of December 31, 2023), the Group is the world's largest firefighting technology provider. 5 plants in Austria.

Identify Risk and Opportunities that have or may have financial effects	Climate Risk	Scenario development	Quantify	Strategic integration
	***Transition risk**: rising carbon prices in the EU ETS + rising costs for energy and material purchasing* ***Physical Risks:*** • *Water scarcity at locations (required for product testing)* • *Impact on production: rising temperature in the summer is bad for employees and can cause technical malfunctions*	*how summer temperatures in regions in which Rosenbauer does business might develop* RCP2.6: strict climate politics resulting in rapid and sharp reductions in GHG RCP 8.5: worst case scenario, unbroken increase in GHG and a sharp rise in global warming to 4°	*Investment costs (CAPEX) for new air conditioning/ cooling systems for plants* *+ increased electricity consumption*	*discussion with suppliers to evaluate how to best prepare for future climate developments to increase their resilience* *Retrofit of plants with additional cooling systems* *Closing the waterloop*

In Conclusion - Why Should You Care

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Informed strategic decision and investments

Drive efficiency and innovation (estimation of carbon tax)

Enhance stakeholder engagement

Affect cost and revenue in the future and hence valuation and VAR

Q&A - Discussion Time

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Any questions or sharing

How do you feel with this content, do you feel it is worth doing the exercise even if you do not need to report? Any other advantages you will see doing it? Anyone already doing it?

Last sharing

Any left question?

We would be glad to support you in your sustainability journey

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Appendices

Quadrant	Scenario	Physical risk: End of century (peak) warming – model average	Transition risk: Policy reaction	Transition risk: Technology change	Transition risk: Carbon dioxide removal [-]	Transition risk: Regional policy variation [+]
Orderly	Low Demand NEW	1.4 °C (1.6 °C)	Immediate	Fast change	Medium use	Medium variation
	Net Zero 2050	1.4 °C (1.6 °C)	Immediate	Fast change	Medium-high use	Medium variation
	Below 2 °C	1.7 °C (1.8 °C)	Immediate and smooth	Moderate change	Medium use	Low variation
Disorderly	Delayed Transition	1.7 °C (1.8 °C)	Delayed	Slow/Fast change	Medium use	High variation
Hot house world	Nationally Determined Contributions (NDCs)	2.4 °C (2.4 °C)	NDCs	Slow change	Low use	Medium variation
	Current Policies	2.9 °C (2.9 °C)	None – current policies	Slow change	Low use	Low variation
Too-little-too-late	Fragmented World NEW	2.3 °C (2.3 °C)	Delayed and Fragmented	Slow/Fragmented change	Low-medium use	High variation

Colour coding indicates whether the characteristic makes the scenario more or less severe from a macro-financial risk perspective [^]

- Lower risk
- Moderate risk
- Higher risk

- The impact of CDR on transition risk is twofold: on the one hand, low levels of CDR imply an increase in transition costs, as reductions in gross emissions should be obtained in a different way; on the other hand, high reliance on CDR is also a risk if the technology does not become more widely available in the coming years.