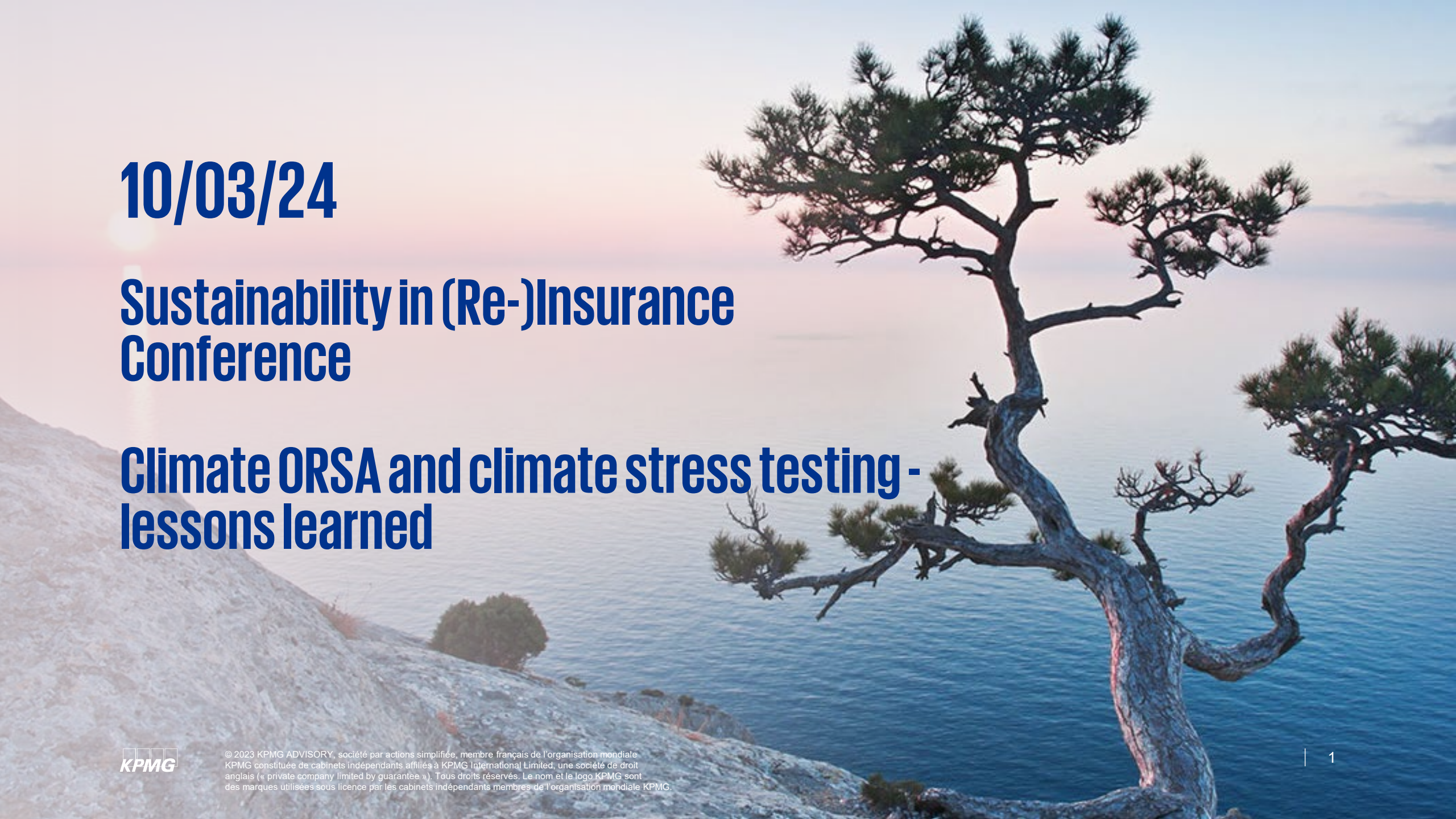
10/03/24

Sustainability in (Re-)Insurance Conference

Climate ORSA and climate stress testing - lessons learned



01

Climate ORSA

Materiality analysis

The risks are considered to be **materials**, in the context of Solvency II, when **ignoring risk could influence decision - making** or in the judgment of the users of the information.

01 Define the business context

- Identification of climate risks that may affect the entity based on its **business lines and activities**, such as, for example, the risk of floods in home insurance.
- Breakdown of the Entity's business according to the **geographies where it is located**.
- Detect and compare the **temporal horizon** both climate risks and each of the Entity's business.
- Identify **strategies of the** entity that can be seen **affected** due to climate change.

02 Identify the impacts

- Analysis of the **impacts** caused by different climate risks, differentiating between **transition and physical risks**, about the business. The breakdown of this analysis will be as established in the previous point (context): business line, geography, etc.
- Identification of impacts on **traditional risks**(e.g. subscription) and in the different elements of **economic balance**.

03 Establish the materiality

- The materiality must be established for each of the existing climate risks, taking into account both parts of the balance sheet. To carry out this assessment you must carry out an **interrelation between the two previous steps**.
- To define and value materiality, 3 axes must be considered, the **impact** (taking into account the size of the company's exposure), the **temporal horizon** and the **probability** that this risk occurs. A matrix will be created.
- Said materiality must have a quantification, at least, at a high level.

Scenario design

For those that have been considered material risks in the previous stage, the **elaboration of scenarios** in order to subsequently quantify its impact.

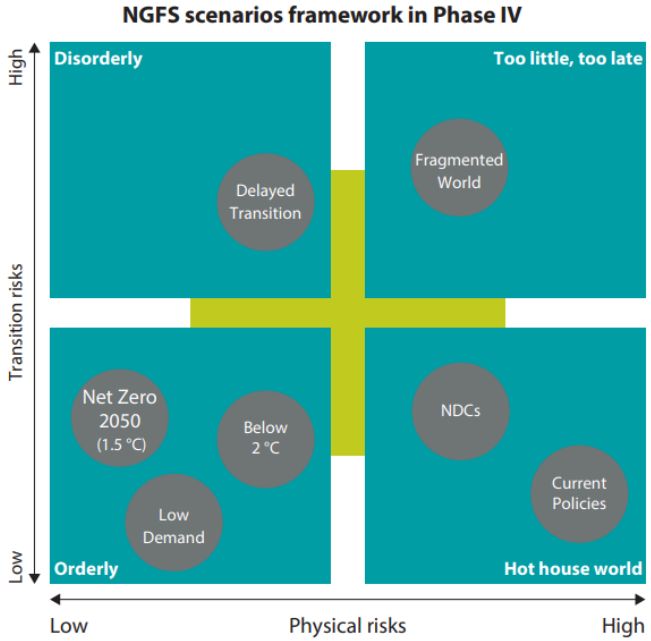
Definition of scenarios

- **At least two scenarios have to be considered** long term: global warming > 2ºC and <1.5ºC.
- Different process for defining scenarios for physical and transition risks.
  - **Transition risk**:
    1. **Define scenarios** at high level.
    2. **Define the parameters** of each scenario
    3. Set the **ambition** of each scenario, since each scenario is associated with different probabilities of achieving a series of objectives
    4. **Choose speed** of each scenario (for example, a slow transition may increase your risks)
  - **Physical risk**: there are established scenarios (**CPRs and SSPs**) that Entities can use to develop scenarios.
- The scenarios must be considered both **short and long term.**

Transformation from scenario to risk/s

- Once the scenarios are established, **calculations and simulations** in order to quantify the climate risks affected.
- As in the definition, when establishing a process of transforming the scenarios to quantify the risk due to climate change, it must be **differentiate between transition risks and physical risk.**
- Exist **multitude of tools on the market** to assess climate risks such as NGFS (transition), GHG (physical), Peseta IV, Catastrophic models..., where depending on the type of risk it is preferable to use one model or another.

NGFS scenarii



Disordely

Delayed Transition assumes annual emissions do not decrease until 2030. Strong policies are needed to limit warming to below °2C. Negative emissions are limited.

Too-little too-late

Fragmented World assumes a delayed and divergent climate policy response among countries globally, leading to high physical and transition risks. Countries with net zero targets achieve them only partially (80% of the target), while the other countries follow current policies.

NEW

Orderly

Net Zero 2050 limits global warming to 1.5 °C through stringent climate policies and innovation, reaching global net zero CO_2 emissions around 2050.*

Below 2 °C gradually increases the stringency of climate policies, giving a 67% chance of limiting global warming to below 2 °C.

Low Demand assumes that significant behavioural changes – reducing energy demand – in addition to (shadow) carbon price and technology induced efforts, would mitigate pressure on the economic system to reach global net zero CO_2 emissions around 2050.*

NEW

Hot house world

Nationally Determined Contributions (NDCs) includes all pledged targets even if not yet backed up by implemented effective policies.

Current Policies assumes that only currently implemented policies are preserved, leading to high physical risks.

Source: NGFS

EIOPA requires at least a < 1.5°C scenario and a >2°C scenario to be considered for a climate ORSA.

The Too-little too-late and the Hot house world scenarios are >2°C scenarios.

02

ACPR 2023 climate stress-test

Long term and short term scenarios

The ACPR communicated the roadmap and hypothèses and data for the 2023 climate stress-test. Its objective was to assess physical and transition climate risks on (r)insurers balance sheet and solvency for short and long term scenarios.

Long term scenarios

A **3 separate climate and financial trajectories:**

- *Orderly transition*: 2°C global warming (RCP 4.5) with progressive economical adaptation
- *Disorderly transition*: 2°C global warming (RCP 4.5) with late and acute economical adaptation
- *Baseline*: no physical nor transition climate risk

B **Products/Risks under scope**: Savings, Pensions, Life, Protection, Health, P&C (personal lines)

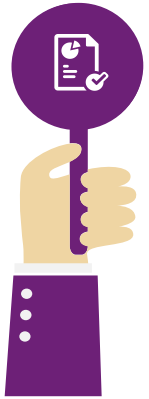
C **Economical trajectories**: impact on macroeconomical variables and on investments by sector of activity

D **Dynamical balance sheet with management actions** for both investments and insurance business lines

E **First test for an inassurability threshold for P&C**

Objective : Impacts on balance sheet, P&L and Solvency II Ivestment valuation by 5-year steps until 2050. No assessment of impact on the solvency ratio..

Short term scenario



A **One sole scenario** with physical risks restricted and located and a degraded economical trajectory

B **Products/Risks under socpe:** P&C, Health, Protection; physical impacts focused on a specific geographical zone (downstream of the Dam of Serre-Ponçon)

C **Economical trajectories**: Global economical impact and sectoral impacts

D **Static balance sheet with no management action**

Objective : Impact on balance sheet, P&L and S2 ratio until 2027 → comparable in some ways to a classical ORSA stress scenario

Challenges to perform a complete climate stress-test

Several challenges had to be addressed to perform the 2023 climate stress-test, even for actors that participated to the previous 2020 stress-test.

Hypotheses and investment rules

- Convert macroeconomical data in relevant input for ORSA tools
- Define indexes for reinvestment rules
- Complete or extrapolate some hypothèses
- Define what (or how to implement) is a static balance sheet at a horizon of 30 years

Data quality and projection tools

- ORSA projection tools and ESGs had to be adapted to be able to manage investment split by sector of activity and not only by asset classes
- Sector of activity are identified by 4-digit NACE code that is not always available, used or made reliable in investment databases (e.g. GICS or BICS code may be used instead)
- How to consider companies operating on several sectors of activity?

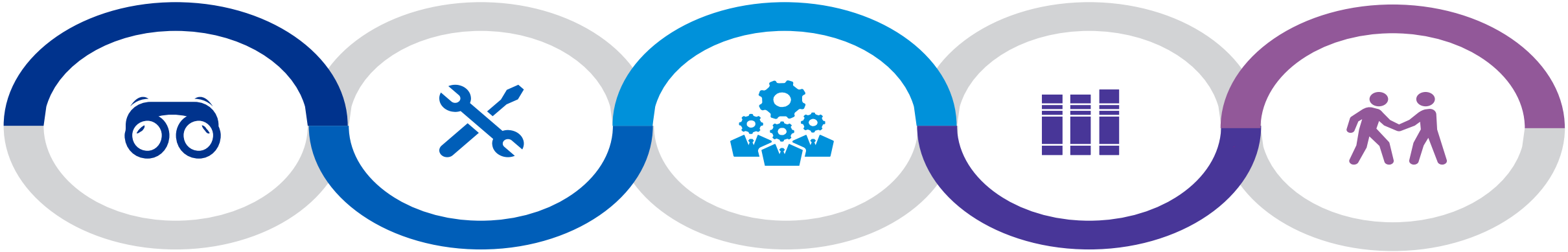
Investments

- Inflation: asset classes not impacted by a shock should follow inflation
- Real estate: how to consider real estate funds?
- Look-through: with or without lookthrough? What kind of look-through?
- Static balance-sheet: how to manage the case of instruments reaching maturity (ST and LT)?
- Management actions for a LT horizon

P&C

- Geolocation of risks may have to be improved (e.g multi-site risks) and some data may not be in actuarial databases (e.g some contractual caracteristics)
- How to take into account reinsurance (premium and coverage), esp. For LT scenarios?
- How to take into account the potential impacts of prevention?
- What are the relevant management actions?

Summary of results (based on ACPR report)



Impact on claims

Short Term:

- **Total NAT CAT sinistrality increased by** 141% in 2025 vs 2022
- **Increase on health claims:** +13% between 2025 and 2020

Long Term:

- **Total NAT CAT sinistrality increased by** 105% in 2050 vs 2022
- **Protection sinistrality increased by** 89% in 2050 compared to 2022 in the worts-case scenario

Uninsurabilty Risk

Short Term:

- **Potential limits for some reinsurers** to cover specific perils
- Risk of seeing a rupture in the insurance coverage for high risk zones

Long Term:

- Uninsurabiity risk is geographically differentiated and increase with time **making mitigation strategies necessary to reduce that risk**

Reinsurance

Short Term:

- Participants consider that reinsurers can cover perils until 2025 without major difficulty, even considering the challenges associated with the scenario

Long Term:

- The increase of climate risks and the geographical differentiation of those risks drive reinsurers towards a continuous and proactive adaptation of their strategies to prevent future un(re)insurability

Investments

Short Term:

- The balance sheet value can lower by -12% in 2027
- The S2 ratio can lower by 60pts between 2022 and 2027 from 230% to 170%
- Financial shocks in 2025 lower own funds by -28% compared to the baseline scenario

Long Term :

- Depreciation of -3.5% of asset value in 2050 compared to the baseline for the delayed transition scenario.

Next points of focus

- Uninsurability requires further analysis
- Risk transfer requires a specific focus the more so considering the geolocation of physical risks
- The NGFS is developing scenarios to take into account the climate-nature nexus in stress-testing

03

Tools

KlimaData

Historical climate data and projections

Rainfall
- ✓ Total rainfall volume
- ✓ Snowfall
- ✓ ...

Wind
- ✓ Surface speed
- ✓ Wind gust speed
- ✓ ...

Temperatures
- ✓ Maximal surface temperatures
- ✓ Minimal surface temperatures
- ✓ Infrared radiation incident on surface
- ✓ isible radiation incident the surface
- ✓ ...

Impact data and projections

Hydrological data
- ✓ SWI (Soil Water Index)
- ✓ SWE (Snow Water Equivalence)

Geological data
- ✓ Soil data: type, coastline, cavities, etc...
- ✓ Exposure indicators : flood, subsidence...

Meteorological fire index
- ✓ Dryness index for living vegetation
- ✓ Meteorological fire index
- ✓ Outbreak index maximum propagation

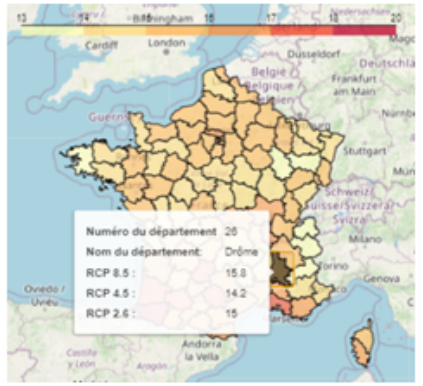
Technical and pmollution risks
- ✓ High risk chemical facilities
- ✓ Nuclear facilities
- ✓ Polluted sites

API

Customized to your needs

Selection of data and models
- ✓ Selection of data based on perils and selected scenarion
- ✓ Data preprocessing and adaptation to client database, incl. granularity and location
- ✓ Visualization of impact of selected models on exposure to perils and « Test & Learn » visualization

Interactive Visualization



2026 mean temperatures (3 scénarios)

Physical risks exposure assessment

1. Cartography & visualization of exposure to climate perils
2. Estimation of indicators of exposure to climate perils based on selected models
3. Visualization of portfolio exposure

KLIM tool

Thanks to the KLIM tool, which has data and information from official sources, as well as the scenarios mentioned before, the Company will need to collect **only business information** which in the qualitative analysis has been concluded as **material**.

Internal Information

Pasivo

Example:

- Non Life

Database of **historical claims** that contains: location, amount assured, cause of the claim, date of the claim

Año	N_poliza	Tipo_inmueb	C_Asegurado	Comunidad_Aut	Provincia	ID_siniestro	Fecha_siniestro	Causa_siniestro	Importe_siniestro
2022	5622039	5	411.563,00	Andalucía	Córdoba	15913	05/08/2022	Robo	80.000,00
2022	5185806	8	470.282,00	Comunidad de Ma	Madrid	17302	20/03/2022	Avería	200,00
2022	4157926	1	333.958,00	Comunidad de Ma	Madrid	16595	25/10/2022	Avería	150,00
2022	5945767	8	136.808,00	Comunidad Valen	Valencia	15708	05/09/2022	Tormenta	4.500,00
2022	4186582	8	146.596,00	Andalucía	Sevilla	16051	31/05/2022	Avería	45,00
2022	5238194	6	110.848,00	Castilla y León	Burgos	13877	09/05/2022	Avería	80,00
2022	4638208	2	113.626,00	Comunidad de Ma	Madrid	19940	22/02/2022	Avería	80,00
2022	4278360	6	188.478,00	Cataluña	Barcelona	18269	01/08/2022	Robo	6.000,00
2022	5986619	2	62.112,00	Comunidad de Ma	Madrid	10044	04/04/2022	Avería	50,00
2022	4476512	8	207.746,00	Comunidad de Ma	Madrid	17842	19/08/2022	Avería	100,00
2022	5465782	3	410.938,00	Comunidad Valen	Valencia	11880	03/05/2022	Avería	450,00
2022	5877651	3	190.386,00	Andalucía	Almería	18791	29/01/2022	Granizo	1.000,00
2022	4340588	6	88.948,00	Castilla y León	Soria	14911	26/05/2022	Avería	45,00
2022	5006686	6	355.340,00	Castilla-La Mancha	Toledo	13418	08/02/2022	Lluvia	600,00
2022	5536803	4	388.513,00	Comunidad de Ma	Madrid	19079	31/10/2022	Lluvia	400,00
2022	4530044	8	63.060,00	Andalucía	Sevilla	13949	16/04/2022	Avería	80,00
2022	5812506	1	67.354,00	Cataluña	Barcelona	12414	27/09/2022	Avería	120,00
2022	4615276	4	426.712,00	Cataluña	Barcelona	17011	02/10/2022	Robo	5.600,00
2022	4358820	1	480.208,00	Comunidad de Ma	Madrid	12709	09/08/2022	Avería	100,00
2022	5423443	3	314.308,00	Comunidad Valen	Valencia	18456	10/01/2022	Avería	250,00

External Information (KLIM tool)

The KLIM tool has all the data necessary to evaluate, relate and develop predictive statistical models, as well as the scenarios for each of the existing climate risks (considering the effect of the insurance syndicate: "Consorcio").

INFORMATION NECESSARY FOR THE CALCULATION BY THE COMPANY

Deaths
Database of **in force policies** with: **age, location, capital assured, duration**

Non Life
Database of **historical claims** with: **location, capital assured, cause of the accident, date of the claim**

Health
Database of **in force policies** with: **age, location, average cost**

Examples of application

Exposure assessment

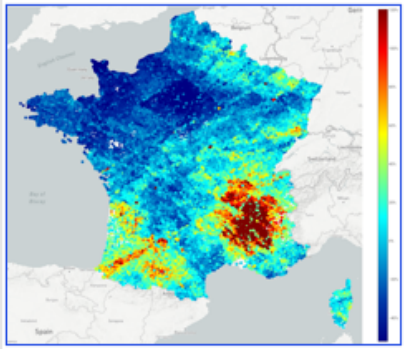
Target: build competitive pricing taking into account climate risk and its evolution

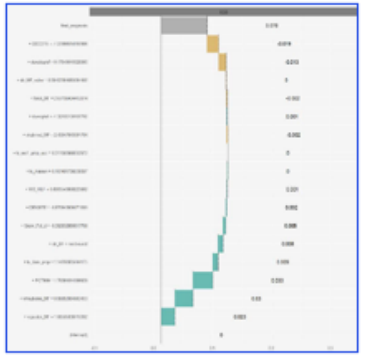
Steps:

- Build contract database
- Build climate database
- Implement pricing model on joined databases
- Monitor and manage pricing

Results:

- Detailed exposure estimate by peril and precise zoning
- Better segmentation and pricing management





Climate stress testing

✓ **Target:** estimate the impact of physical and transition risks on investment and insurance portofolios, at mid- and long-term, following several climate scenarios

✓ **Steps:**

- Assess scenarios parameters and inputs
- Prepare data and adapt ORSA projection tools
- Project portfolios long-term for each scenario
- Analyze results and derive conclusions (e.g. on climate risk management)

✓ **Results:**

- Adapted ORSA projection tools for long-term projections using climate scenarios
- Climate stress-testing methodology
- Assessment of exposure of portfolios

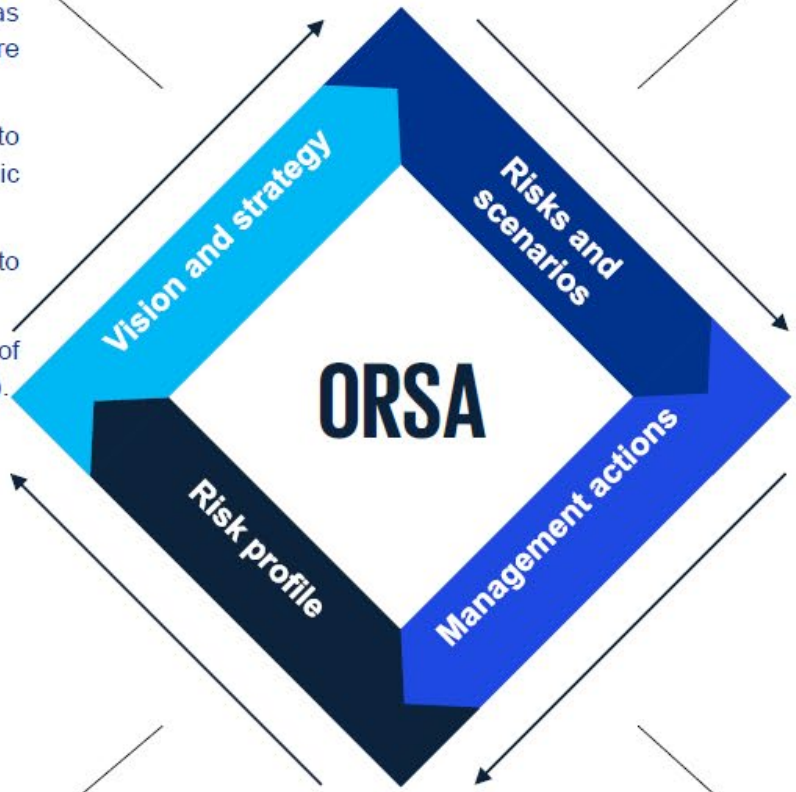
04

Conclusion

An approach to prepare a climate ORSA

The analyzes and work mentioned above are necessary in order to finally capture in the ORSA the evaluation and analysis of the climate risk scenarios.

- **Materiality analysis** of climate risks, as well as **conclusion and justification** of those that are not material.
- **Risk analysis** of climate change in relation to **business opportunities** in the strategic trajectory of the Entity.
- Development and detail of the **impacts** both to **short, medium and long term**.
- Identify and develop **impacts on processes** of the Entity affected by climate risks (e.g.pricing).



- **Identification of risks** of climate change as risks that are **not addressed in the standard formula and alternative considerations** to control these risks.
- **Inclusion of climate change risks in scenario analysis**– both short and long term – in which the extent to which the company is at risk is analyzed and how the entity would be able to absorb the impacts of climate change (worse cases).

- **Definition of climate change risk**, distinguishing these between transition and physical, and main risks that impact the Entity in a particular way.
- **Establish the main KPIs and the risk appetite or risk profile** of the company in relation to the different risks due to climate change. .

- **Proposal and analysis of corrective measures** to address the risks of climate change.
- **Action plan for impacts on processes and traditional risks** communities affected by climate risks. .

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