



ENVIRONMENTAL & CLIMATE-RELATED RISKS

Our credentials



1. Overview of Avantage Reply France

Subject matter expert consulting and a strong european footprint



- European management consulting firm founded in 2004
- Subject matter expert support for ALM department, Finance and Risk functions
- Combines business, regulatory and quantitative skills



- Expert and methodological support on strategic risk management and processes, governance and steering, modeling and stress testing and climate-related challenges
- Strike force of 120 French-speaking consultants, part of 300 specialized consultants of Avantage Reply workforce
- 7000 employees of the Reply group covering technological, IT and innovation competencies



- Major player at European level through our presence in the largest European countries (including UK)
- Strong benchmarking capabilities and overview of market best practices
- Our teams support Deputy CEOs, CROs and CFOs from the design of target framework to the operational implementation at group or entity level.



***More than 10 fully integrated European offices:
A pan-European experience available for our clients***



2. Overview of our service offer

Our expertise

| | Strategy and governance | Steering | Modeling | Regulatory |
|---------|--|---|---|--|
| Finance | Business model assessment | ICAAP | P&L Modeling and Stress tests | <ul style="list-style-type: none"> Regulatory watch Regulatory strategy Remediation Project management |
| | Capital management governance | Capital allocation policy | Business / Capital modeling | |
| | Solvency stress testing governance | TLAC/MREL | Resolution modeling | |
| Risk | Risk governance | Material risk assessment | Pillar 1 models design and validation | |
| | Model risk management | Risk appetite | Model risk tiering and scoring | |
| | Regulatory strategy | Recovery plan | Pillar 2 models and risk stress tests | |
| ALM | ALM governance | ILAAP | ALM risk metrics | |
| | ALM strategy (including hedging) | IRRBB | ALM models | |
| | Fund transfer pricing | Contingency plan | Liquidity stress tests | |
| Climate | Business model assessment and sensitivity analysis | E&C risk driver analysis and materiality assessment | Environmental and Climate risk models (credit, op...) | |
| | Environmental and Climate risk governance | Green weighting factor | Credit quality index | |
| | Board/Senior management training and SME support | Carbon risk assessment | Environmental and Climate risk stress tests | |
| | | | | SREP/TRIM |
| | | | | BRRD |
| | | | | CRR/CRD 4 |
| | | | | CRR2/CRD 5 |
| | | | | Guidelines EBA/BCE... |



3. Our key capabilities on Environmental and Climate risks

Subject matter expert support on the following themes

Business & Risk Strategy

Integrating climate-related risks into business model assessment, risk strategy (RAF) and strategic steering processes (ICAAP, ILAAP, recovery plan)

Governance

Designing and implementing a climate risk management governance framework

Risk Identification

Integrating climate risks into the material risk identification processes (e.g. as driver of traditional risk categories, carbon asset risk assessment framework...)

Risk Measurement

Integrating climate risks into existing risk metrics (e.g. "climate quality index" into credit risk models, green/brown scorecard approach into portfolio exposure metrics...)

Stress Testing & Scenario Analysis

Design and implementing a climate risk stress testing exercise or scenario analysis (e.g. interpreting and applying prescribed methodologies, calibrating scenarios with bank's risks and business drivers, adjusting models...)

Supervisory compliance

Gap analysis or action plan to design a climate risk management framework in line with supervisory expectations and market best practices (e.g. climate-related self assessment tool: a scorecard approach for a proper integration of climate risks into ERM)

**SERVICE
OFFER**



4.1 Detailed credentials - Climate risks material identification

Subject & Client

- Large French bank
- The client was looking to conduct **its first climate risk mapping and materiality assessment**

Context & Objectives

- In order to meet the qualitative requirements of the ECB but also to strengthen its internal process for identifying material risks, the client requested external support from Avantage Reply **in order to build its first mapping of climate material risks.**
- Note that the climate risk map has been designed in such a way as to describe transition risks and physical risk as **"Risk drivers"** that can influence the main risk categories identified in the group risk map.

Approach retained

- Analysis of the existing risk mapping framework and proposal of the envisaged approach
- The approach taken has been broken down **into five sub-components:**
 1. Constitution of an inventory of risk drivers of transition and physical risk (taxonomy, definition)
 2. Construction of a list of macroeconomic and/or microeconomic channels aimed at propagating one or more climate risk drivers **around two axes:**
 - i. Detailed description of the transmission channel (ex: asset valuation)
 - ii. Description of the influencing factor of this channel (geographical location of assets, etc.)
 3. Assessment and description of the impact of the transmission channels **around the following 4 axes:**
 - i. Assessment of the impact of the transmission channel (ex: credit quality)
 - ii. Description of the impact and potential materialization of the transmission channel
 - iii. Putting into perspective the classic risk impacted by the transmission channel
 - iv. Description of the potentially influenced risk indicator
 4. Ranking and rationale of the impact of the channel on the group's risk mapping
 5. When possible, conduct a quantitative assessment of the level of materiality (stress tests...) and/or qualitative (green/brown scoring)

Benefits

- initial mapping and materiality assessment of these climate risk drivers per classical risk category
- Integration of climate drivers (channels) within risk mapping and more generally within the Group's risk management framework.



4.2 Detailed credentials - Physical risk scoring methodology

Subject & Client

- Large French bank
- The client was looking to **design and implement a physical risk scoring methodology**

Context & Objectives

- In order to better integrate climate risk dimension into risk management processes, the client requested external support from Avantage Reply **in order to design and implement a physical risk scoring approach for portfolio analysis and risk measurement purposes**
- In this context, the methodology retained aimed to assess **the physical risk of the bank's portfolio under two key criterias (climatic hazards and sectoral vulnerability)**

Approach retained

- Analysis of existing literature published by regulatory authorities, public organizations, NGOs
- Identification of climate hazards data (chronic, acute) to represent exposure to physical risk for:
 - i. Different RCP climate scenarios (Representative Concentration Pathways) from the IPCC
 - ii. Time horizons (2025 to 2100 per 5-year time step)
- Definition of a score per climate hazard to assess risks related to geographical areas within the portfolio
- Definition of a vulnerability matrix to discriminate sectors risks per employment area within a portfolio
- Tactical tool implementation (R tool) to compute physical risk scores
- Definition and implementation of KPIs and risk metrics to monitor the evolution of the physical risk the banks portfolios including:
 - i. Breakdown of EAD and RWA by score and by hazard
 - ii. Weighted score in RWA by hazard and sector analysis
 - iii. Sensivity analysis (collateral valuation and LGD haircut)

Benefits

- First internal methodology to assess physical risk within bank's portfolios
- Incorporation of physical risk assessment within bank's risk management framework



4.3 Detailed credentials – Transition risk measurement

Subject & Client

- Large French bank
- The client was looking to **establish a transition risk assessment methodology**

Context & Objectives

- In order to better integrate climate risk dimension into strategic risk processes, the client requested external support from Avantage Reply **in order to design and implement a transition risk assessment methodology for portfolio analysis and risk measurement purposes**
- In this context, the methodology retained aimed to **combine transition scenario analysis and multi-factor carbon analysis in order to design a green/brown scoring approach.**

Approach retained

- Analysis of existing literature and review of market practices in terms transition risk metrics
- In order to assess bank portfolios' vulnerabilities to transition risks, the approach retained consists to:
 - i. Analyze and map banks' portfolio (loans ,investments) on a sector-by-sector basis (in accordance with the NACE European standard).
 - ii. Flag each sector - by portfolio (investments, loans) - as green or brown, depending on a set of assumptions and criterias through scenario analysis allowing to :
 - a. Allocate 5 different color flag by sector (green , green - , brown-, brown ,red) through several scenarios released by various European regulators (ECB, ACPR in France, DNB in the Netherlands) reflecting a different view of the level and the speed in terms of transition but also its own assumptions (e.g.: carbon prices trend) which resulted in different impacts on sectors accordingly
 - b. Assess the sensitivity to each sector over different time horizons (short term, medium term, long term) to capture an overall trend by sector over time.
 - iii. The analysis has been enriched by considering the realized greenhouse gas emissions levels of counterparties. An expert judgment was proposed in order to flag the counterparties at risk in both portfolios, based on the so-called scope 3 emissions in order to distinguish the dark green and the dark brown.
- In the end, the RWA and EAD distribution by sector - in accordance with both the green/brown view and the dark green / dark brown view allowing "at risk" assessment - was provided by portfolio for several points in time.
- Global and sectoral concentration indicators have also been constructed for monitoring purposes in the risk management policy

Benefits

- Innovative approach to portfolio analysis consistent with green/brown concepts
- Integration of green/brown concept through dedicated key risk indicators and Group's risk management framework



4.4 Detailed credentials – Climate risk stress tests

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|---------------------------------|--|
| Subject & Client | <ul style="list-style-type: none">• Large French bank• The client was looking to integrate climate risks in the internal stress testing annual exercise and into strategic processes such as the ICAAP and the Recovery Plan. |
| Context & Objectives | <ul style="list-style-type: none">• In order to better integrate climate risk dimension into strategic risk processes but also in line with ECB's expectations on "Climate-related and environmental risks", the client has requested external support from Avantage Reply to design and implement climate-related baseline and adverse stress test scenarios for both the internal capital adequacy process (ICAAP) and the recovery plan (BRRD).• As part of the 2022 ECB Climate Risk Stress Test (CST), the client wanted to take advantage of the data collection process and quantify for the first time, the impact in capital of the short-term transition and physical risk scenarios. |
| Approach retained | <ul style="list-style-type: none">• Preliminary review and analysis of the methodological approaches and results of the more recent top-down supervisory climate risk stress tests exercises including : DNB (2018), ACPR/BdF (2020) and ECB (2021).• Detailed review and gap analysis of the data requirements, the methodological note and scenarios of the 2022 ECB Climate Risk Stress Test• For market, credit and operational risks and according to the scenarios proposed by the different stress tests exercises mentioned above, methodological specifications were drafted, including also the data requirements specification.• Regarding credit risk modelling, three different approaches were designed and implemented :<ol style="list-style-type: none">i. For transition risk : for each sector defined under the scope, a climate credit index factor was estimated, calculated from a transitional vulnerability factor (TVF) that was impacted by the sector corresponding Gross Value Added shock (measure of the value of goods and services produced by each sector of an economy). This shock corresponds to the estimated economic impact by sector of the transition to the low-carbon economy (provided by the different scenarios). This index is used as a parameter to stress the Merton Model, and therefore simulate the impact in the PD of borrowers and estimate the credit cost of risk.ii. For physical risk (acute risks) : impact of extreme climate events into property values and thus on the Loan-to-Value ratios, on the LGD and finally, on the cost of risk.iii. For physical risk (chronic risks) : impact of incremental climate changes into sector's productivity, reflected in the GVA. The chocs in the GVA are then integrated into the Merton Model to estimate the impact in the PD of borrowers and the cost of risk.• Regarding market risk modelling, the approach retained consists in applying market risk shocks per asset class to equity and derivatives positions |
| Benefits | <ul style="list-style-type: none">• The first impacts in P&L and solvency were estimated, contributing to the first quantitative assessment exercise performed in the bank for climate-related risks' materiality evaluation and capital adequacy• The climate risk internal stress test framework was designed (objectives, scenarios, scope and technical modelling and data requirements).• Based on the best emerging practices, the technical methodological specification of transition and physical risks integration into classic financial risks was finalized (market, credit and operational risks). The first in-house tools to quantify the impact of climate-related risks into classical risks were developed . |



4.5 Detailed credentials – Climate risks' integration into RAF

Subject & Client

- Large french bank
- The client was looking to integrate **climate risk dimension into its Risk Appetite Framework and its Risk Management Policy**

Context & Objectives

- In order to better integrate climate risk dimension into strategic risk processes, the client requested external support from Avantage Reply **in order to design and calibrate climate risk metrics to be integrated into the RAF and the Risk Management Policy**
- In this context, the main objective was **to introduce a restricted number of climate-related risks** to be put into observation in the short term before integrating them definitively into these processes

Approach retained

- Sharing elements of emerging market practices with al list of KPIs and KRIs covering Climate-related and ESG risks
- Discussions and interactions of the potential adequacy of a restricted number or metrics to bank's business model including:
 - i. Dedicated metrics on lending to sectors and geographic areas that are highly exposed to climate-related or ESG risks
 - ii. Metrics that consider the alignment of the bank's exposure to low-carbon transition scenarios
 - iii. Green weighting/scoring metrics
- Possible pathways to design these climate-related and ESG risks metrics (relevance, data availability and granularity, methodology, scenario analysis..)
- Implementation and analysis of these metrics (e.g green/brown scoring approach) under different scenarios and difference carbon criterias
- Back testing of these metrics on several cut-off dates to assess the robustness and the stability over the time
- Submission of the set of metrics for internal validation and review (Executive and board committees)
- Integration of these climate-related and ESG risks metrics into annual Risk appetite and risk management processes

Benefits

- First set of climate-related metrics integrated in the Risk Appetite Framework and the Risk Management Policy
- Executive and management committees' approval and positive feedbacks for this first step



4.6 Detailed credentials – Climate risks' integration into ICAAP

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|----------------------|--|
| Subject & Client | <ul style="list-style-type: none">• Large French bank• The client was looking to integrate climate risk dimension into its ICAAP |
| Context & Objectives | <ul style="list-style-type: none">• In order to better integrate climate risk dimension into strategic risk processes, the client requested external support from Avantage Reply in order to incorporate climate risk drivers into key ICAAP's building blocks and through risk quantification and stress testing methodologies for the economic and normative approaches• In this context, the main objective was to propose an approach ensuring a proper integration of climate risk dimensions under both qualitative statements and quantitative analysis/assessment on key ICAAP building's blocks. |
| Approach retained | <ul style="list-style-type: none">• Sharing elements of emerging market practices regarding possible methodologies and approaches for economic and normative approaches• Proposal for a transversal approach to integrate the climate risk components on the key blocks of the ICAAP:<ol style="list-style-type: none">i. Business strategy and governance: bank's strategic initiatives in the context of financing the ecological and energy transition and the organization of internal governanceii. Risk management framework (incl. Risk ID & RAF): incorporation of transition/ physical risk drivers into risk mapping and through KRI and more generally within the RMFiii. Risk quantification methodologies & stress testing: description for the risk quantification methodologies for climate-related risks for each ICAAP methodology perspectiveiv. Capital management : incorporation of transition/ physical risk drivers into capital planning and capital allocation policy• Specification and implementation of risk quantification methodologies for climate-related and ESG risks under the economic perspective:<ol style="list-style-type: none">i. Credit default risk (effects of transition risk on asset quality) and credit concentration risk (effects of transition risk on single-name/sectorial concentration notably carbon footprint, asset lifespan...);ii. Position risk (effects of physical or transition risk on market prices);iii. Operational risk (probability-based approach on physical risk events)iv. Strategic and business risk (effects of physical or transition risk on client behavior or shortfall in terms of sectorial income)• Assess the impact of climate-related and ESG risks on the capital adequacy from a normative and economic perspective (i.e. assess the potential effects of climate-related and ESG risks on regulatory capital ratios going forward and on the economic value) |
| Benefits | <ul style="list-style-type: none">• Successful work on quantification and climatic stress to assess impacts in terms of provisions and RWA• Incorporation of climate components into key blocks of the ICAAP• Executive and management committees' approval and positive feedbacks for this first step |



4.7 Detailed credentials – Climate risks' integration into ILAAP

Subject & Client

- Large French bank
- The client was looking to **integrate climate risk dimension into its ILAAP**

Context & Objectives

- In order to better integrate climate risk dimension into strategic risk processes, the client requested external support from Avantage Reply **in order to incorporate climate risk component into key ILAAP's building blocks and liquidity stress testing methodologies**
- In this context, the main objective was **to propose an approach ensuring a proper integration of climate risk dimensions under both qualitative statements and quantitative analysis/assessment on key ILAAP building's blocks.**

Approach retained

- Sharing elements of emerging market practices regarding the integration of climate risk dimension into the ILAAP
- Proposal for a transversal approach to integrate the climate risk components on the key building blocks of the ILAAP:
 - i. Business strategy and governance: bank's strategic initiatives in the context of financing the ecological and energy transition and the organization of internal governance
 - ii. Liquidity & Funding management : incorporation of transition/ physical risk drivers into funding mix and the funding plan
 - iii. Liquidity Risk management framework: incorporation of transition/ physical risk drivers into liquidity risk driver analysis and through dedicated KRI and more generally within the liquidity and funding management framework
 - iv. Liquidity stress testing: description for the quantification methodologies, liquidity scenarios liquidity impact considering climate-related risks
 - v. Contingency funding plan : integration of the climate risk dimension into the CFP
- Specification and implementation of risk quantification methodologies and stress testing approach to integrate climate-related risks:
 - i. Balance sheet and risk driver analysis
 - ii. Incorporation of transition and physical risk factors into liquidity risk drivers (HQLA buffer, outflows roll-over...)
 - iii. Scenario design and shocks calibration including transition and physical risk factors effect
- Impact analysis and liquidity adequacy

Benefits

- Successful work on quantification and climatic stress to assess impacts in terms of liquidity reserves and buffers
- Incorporation of climate components into key blocks of the ILAAP
- Executive and management committees' approval and positive feedbacks for this first step



4.8 Detailed credentials – ESG risk map and rating exercise

Subject & Client

- Large french bank
- The client was looking **to conduct a preliminary analysis to identify and to assess ESG vulnerability factors as well as an initial rating exercise for the main counterparties in the portfolio.**

Context & Objectives

- In order to better integrate ESG dimension into strategic and risk management processes, the client requested external support from Avantage Reply in order **to lay the first foundations for the simultaneous understanding of environmental, social and governance (ESG) risks.**
- It aimed to provide a detailed description of the factors making it possible to assess the vulnerabilities of exposure to these risks and establish a first rating initial exercise for the main counterparties in the portfolio.

Approach retained

- Sharing elements of emerging market practices ESG risks identification and assessment
- The first step of our analysis consists to identify and establish a map of ESG risk factors, indicators and metrics to assess the vulnerabilities of banks' portfolios to these risks:
 - i. A detailed list of 10 ESG risk factors and 22 indicators is defined as each indicator could be associated with one or more possible metrics
 - ii. This list is intended to be exhaustive so as to cover the entire portfolio, knowing that only some of these proposed metrics are to be retained by type of exposure (by sector of activity for example).
- The second step of the analysis has consisted in drawing up a synthetic overview of ESG rating approaches by reference agencies. Illustrate it through available ratings of the main portfolio concentrations.
 - i. The approaches of five specialized ESG rating agencies - Sustainalytics, MSCI, Refinitiv, S&P Global / RobecoSam and ISS ESG - as well as the available external ratings of a restrictive number of investments and financings are analyzed.
 - ii. In addition, the factors considered by the three credit rating agencies in the credit rating assignment process are analyzed.
- Specify the next steps in order to assess the ESG risks and opportunities of the portfolio and meet the appropriate expectations of stakeholders.

Benefits

- A first version of ESG risk map has been established
- An ESG vulnerability analysis and a first rating exercise for the most representative counterparties of the portfolio has been completed

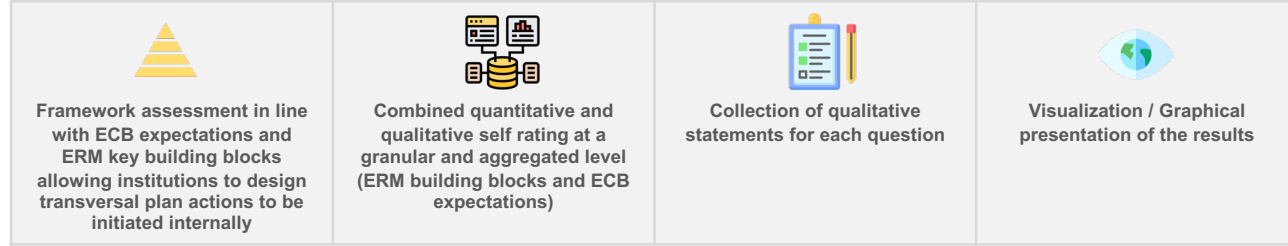


5. Our assets to support our clients

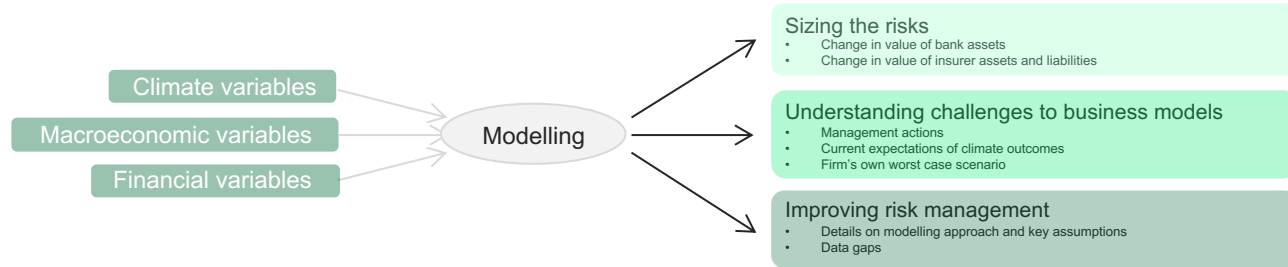
Key Avantage Reply Acceleration tools



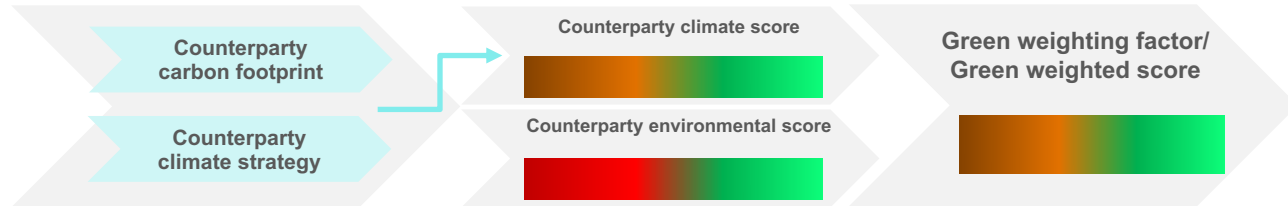
- Self-assessment tool for financial institutions to evaluate their capabilities in terms of environment and Climate-related risk management framework.
- Integration of climate dimensions at the highest level of the organization and the strategy



- Medium- and long-term view of the impact of environmental and climate risk on the Business model
- Multiples scenarios to transit to a lower carbon economy and to capture potential physical risk events
- Assumptions related to policy decisions and technology and business model adaptation



- Determine the color score/rating to each counterparty of the portfolios depending on its climate adaptation and mitigation strategy and its sensibility to key environments impacts (e.g. pollution, waste...)



Key contacts



Nathanael Sebbag

Partner

Head of Finance & Risk advisory
ESG & Climate risks service lead

n.sebbag@reply.com

Reply France

3 Rue du Faubourg Saint-Honoré

75008 Paris - France

tel +33 (0) 1 70 23 08 74

mob +33 (0) 6 29 47 16 10

www.reply.com

