



# National Bank of Belgium

## Insurance Stress Test 2022 Cyber Underwriting

### Technical Specifications v1.1

Version	Date	Major changes
V0.1	April 2022	Pre-launch Version
V1.1	2 May 2022	§136 d corrected to take into account of corrections in the shocks to swaps in the technical information
V1.2	16 May 2022	§43 UFR is 3.45% (as in § 133) Footnote 14 – Added the 2 missing NACE codes to be aligned with the technical information
V1.3	24 May 2022	Modified footnote 16

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## Abbreviations

0	Baseline scenario
BE	Best Estimate
BS	Balance Sheet
CBS	Constrained Balance Sheet
D&A	Deduction and Aggregation
EA	Euro Area
ECB	European Central Bank
ESRB	European Systemic Risk Board
EU	European Union
FBS	Fixed Balance Sheet
LACDT	Loss Absorbing Capacity of Deferred Taxes
LACTP	Loss Absorbing Capacity of Technical Provisions
LLP	Last Liquid Point
LTG	Long-Term Guarantee
MA	Matching Adjustment
NCAs	National Competent Authorities
OF	Own Funds
ORSA	Own Risk and Solvency Assessment
QRT	Quantitative Reporting Templates
REIT	Real Estate Investment Trust
RFR	Risk Free Rate
RMBS	Residential Mortgage-Backed Security
SCR	Solvency Capital Requirement
SF	Standard Formula
ST	Stress Test
TP	Technical Provisions
TS	Technical Specifications
UFR	Ultimate Forward Rate
USP	Undertaking Specific Parameters
VA	Volatility Adjustment

# 1 Background

1. The NBB Insurance Stress Test 2022 – cyber underwriting has been developed by the National Bank of Belgium. The development and calibration of the scenarios of this stress test will be further detailed in section 1.1 Background to the Cyber Underwriting stress-test. The overall objective is assessing the financial resilience of the Belgian insurance industry against adverse cyber risks of their policyholders they insure. This stress test measures the impact of 3 different cyber underwriting scenarios that could have an impact on the entire insurance sector.
2. Stress testing aims to identify vulnerabilities of the financial system and to assess the potential impact of risks on the stability of the financial system in general and the insurance sector more specifically. Stress testing also helps to identify those undertakings that may pose a risk to the stability of the financial system or the insurance sector. The NBB can, after the analysis of the stress test results, issue recommendations to be implemented by the insurance undertakings in order to contribute to the stability of the financial system.
3. The NBB provides additional guidance on the use of stress tests in its Communication NBB\_2017\_06 on the stress test framework for the insurance sector. The framework makes a distinction between microprudential stress tests that are specific to the undertaking (e.g. stress tests for the purpose of the ORSA) and stress tests which are initiated by the NBB and can have either a microprudential objective (e.g. focus on a specific exposure which is present only in a few undertakings) or a macroprudential objective.
4. The design and features of these NBB stress tests are flexible and depend on the objective of the exercise. However, to limit the impact on the undertakings, the NBB stress tests will leverage – to the extent possible – on the experience built during previous (EIOPA/NBB) stress tests. Under normal circumstances, there should be a yearly stress test initiated by either EIOPA and/or the NBB. The NBB stress tests for insurance are based on articles 322 and 467 of the law of 13 March 2016 on the legal status and supervision of insurance or reinsurance companies.
5. For 2022, the NBB will initiate its own stress test exercise. For the NBB stress test, two scenarios are foreseen. The first one will be based on a Low Yield scenario while the second one will be based on a cyber underwriting scenario. This latter scenario is divided in 3 sub-scenarios:
  - Business Blackout: Cyber only
  - Ransomware Attack: Cyber only
  - Cloud Outage leading to bursting of tech bubble: Combination of a cyber underwriting scenario and financial market shocks

## 1.1 Background to the Cyber Underwriting stress-test

6. In an ever more digital world, new technologies are used to innovate, but can also lead to emerging risks such as cyber risk. The observed number of ransomware attacks is increasing and even more so since the COVID-19 crisis during which a surge in attacks was observed with often a multitude of undertakings being targeted and as well as public infrastructure.
7. In this context, the Bank has already sent out a survey on cyber risk in 2020 focusing on both cyber operational and underwriting risks. In the first case, the

Bank wanted to have more information on the cyber risk that insurance undertakings have themselves due to the executions of their operations and the digital technologies they use. Secondly, the Bank wanted to understand better the cyber risk that undertaking underwrite which can have a financial impact due to cyber attacks on the policyholders they insure.

8. Special attention points in the context of cyber underwriting risk are silent cyber risk and accumulation risk. Silent cyber risk is the risk which is implicitly covered by a policy because cyber is not explicitly excluded. The risk is that undertakings don't manage these silent coverages and do not adequately consider these elements in their pricing structure. Next to this element, accumulation risk is also an element which warrants more attention were a multitude of insurance claims might be triggered due to a single cyber incident (e.g. a cyber attack on a cloud service provider leading to an outage).
9. To have a more precise and quantitative view of these elements, the Bank decided to develop a cyber underwriting stress-test with a particular focus on silent cyber and accumulation risk.
10. The Bank consulted a multitude of experts on the topic ranging from other supervisors to (re)insurance undertakings, brokers, model vendors, consultants and academics to construct the cyber underwriting scenarios.
11. The focus was on different types of cyber threats to have a more complete view of the financial resilience of undertakings to cyber risk. A first scenario considers a black-out scenario on the electricity sector leading to a national blackout. Secondly, a global ransomware attack is envisaged where a multitude of businesses are interrupted. Thirdly, a cyber attack on a cloud service provider is analysed leading to a loss in confidence in the technology sector by the financial markets and a resulting impact on stock prices and credit spreads with also a contagion to the wider economy.
12. To calibrate the stress-test scenarios, the Bank considered the available historical data as well as existing scenarios for the different cyber threats.
13. The National Bank of Belgium is aware that the different cyber insurers in the market have different levels of experience. To this end, particular care was taken to ensure that undertakings have additional operational guidance to perform the stress test. The scenarios will be defined based on a specific macro-level cyber incident. However, for the undertakings with less claims experience additional, optional assumptions at a micro-level are provided to guide them through the calculations. More experienced undertakings have the option of deviating from these additional assumptions if they judge that they do not adequately reflect their risk profile.

## 2 Overview

14. This section explains the structure, the different building blocks of the exercise, and the interrelations among them allowing a better understanding of the choices made in the design of each of the components separately.
15. Scope, scenarios and disclosure are treated in detail in sections 3, 5, and 6 respectively.

### 2.1 Objective

16. The NBB stress test exercises have not been characterised by a pass-fail nature, i.e. any potential weakness emerged in the post-stress position of the

participants never automatically triggered actions to strengthen the financial position of the insurers. The information collected and produced under the stress test process were utilised in an aggregated way to issue recommendations to the insurance industry and in an individual way to enrich the understanding of vulnerabilities at the level of the individual undertakings.

17. The objective(s) of the 2022 ST is primarily to assess the resilience of the participants to the adverse scenario(s), by providing information on the ability of these insurers to withstand severe shocks.
18. This microprudential-oriented approach allows recommendations to be made to the sector for companies to take remedial action, if necessary, to improve their resilience.
19. The aggregated outcome of the stress test scenarios will also be used to assess market-wide risks and trends. By aggregating the impact for individual entities, market-wide developments can be inferred; hence, this assessment can be used for evaluating potential vulnerabilities of the insurance sector as a whole.
20. The 2022 ST enhances the macroprudential dimension of the framework complementing the standard fixed balance sheet (FBS) approach with a constrained balance (CBS) sheet approach where participants are allowed to apply reactive management actions in the calculation of their post-stress position.
21. The additional approach allows the assessment of the resilience of the insurance sector by a different perspective and through the aggregation of the impacts of the reactive management action provides an overview of potential spillovers to other markets generated or amplified by the insurance sector against the prescribed scenario.

## 2.2 Structure

22. The structure of the 2022 ST aims at assessing the capital position (Own Funds - OF, Solvency Capital Requirement - SCR) of the participants. Table 1 presents the structure of the exercise.

**Table 1- Structure of the exercise**

Scenario	Composition	Reactive management actions
<b>Business Blackout</b>	Cyber only	FBS
<b>Ransomware Attack</b>	Cyber only	FBS
<b>Cloud Outage leading to bursting of tech bubble</b>	Combination of cyber and financial market shocks	FBS and CBS (optional, under conditions)

## 2.3 Approach

23. The stress test relies on the Solvency II framework as common ground for the assessment of the resilience of the insurance industry against adverse developments. Solvency II offers common and shared principles for the evaluation and reporting of the balance sheets and solvency positions (SCR and OF), which ensures the comparability of the baseline positions and serve as guidance for recalculating the post-stress capital positions.
24. In the context of the stress test, the calculation of the post-stress capital positions should be distinguished under two different assumptions:

- a) Fixed balance sheet (FBS) - Post-stress positions should be calculated considering only the embedded management actions .
  - b) Constrained balance sheet (CBS) - The fixed balance sheet assumption is, within specific boundaries, relaxed allowing for the application of plausible and realistic reactive management actions.
25. Results will be collected through ad-hoc templates containing information to be used for analysis and validation. The templates rely, to the maximum extent possible, on the regular QRT reporting.
26. For the assessment of the capital position, as a general principle, the templates are kept aligned to the regular Solvency II reporting where possible.

## 2.4 Disclosure

27. The NBB will not disclose individual undertaking results of the NBB stress test exercise. All public communication will be based on anonymised and/or aggregated data. The format and content of the communication will depend on the results of the stress test and the type of messages that the NBB would like to convey to the participants and other stakeholders.
28. The undertakings participating in the stress test cannot disclose, discuss, or comment on any of their individual results.

## 3 Scope

29. Consistent with the objectives and the requirements that the 2022 insurance stress test implies, this exercise targets Belgian solo insurers. The selection of the participating entities was based on:
- size;
  - risk profile;
  - relevance of the scenario for the business model of the insurer.

For the cyber underwriting scenarios, both elements of affirmative and silent cyber were considered when assessing the relevance for the individual insurer.

30. The companies that are required to take part in this stress test were invited by official invitation letter.

## 4 Methodology

31. The reference date is 31 December 2021. The base case is the pre-stress financial situation of the participant at the reference date and should be fully aligned with the 2021 annual Solvency II reporting. The pre- and post-stress valuations have to be done at the specified reference date according to the Solvency II framework and the current technical specifications.

32. Market shocks are assumed to be applied as one-off shocks to the balance sheet at the reference date. Cyber underwriting scenarios are expected to influence certain balance sheet items (e.g. best estimate, reinsurance recoverables etc.) and can also be considered to have an instantaneous impact. To properly reflect the narrative and to ensure its homogeneous application, participants are requested to apply the shocks following a specific sequence when calculating their post-stress balance sheet and solvency position:

- Step 1. Calculation of cyber underwriting scenarios.

- Step 2. Application of market shocks;

## 4.1 Application of stresses

33. Shocks and scenarios prescribed shall be applied to the entire in-force business at the reference date with the highest possible accuracy in terms of recalculation of the post-stress position and in terms of granularity:
- The post-stress figures shall be generated coherently with the model(s) applied by the participating entities for Solvency II valuation purposes. The use of (partial) internal models and undertaking specific parameters (USPs) should have been approved by the supervisor at reference date.<sup>1</sup>
  - The look-through approach should be applied when calculating the impact of the scenarios (e.g. for Collective Investment Undertakings).<sup>2</sup>
34. For the cyber underwriting scenarios, the undertaking is requested to calculate an ultimate claims cost in line with the scenario description and to consider this in the Best Estimate.
35. Other elements which are expected to be impacted such as the SCR, the Risk Margin, the reinsurance recoverables etc. should be calculated consistently with the evolution of the Best Estimate.
36. If the participant cedes a material part of its insurance business, it is expected that the expected credit loss for the calculation of the reinsurance recoverable considers the possible impact of material claims on the credit quality of the reinsurer (e.g. on the Probability of Default and Loss-Given-Default assumptions). If the cession is less material, the undertaking can make simplifying assumptions and keep the credit quality constant.
37. The value of the participations held by the insurance undertaking shall be stressed according to the shocks prescribed to the stock prices.
38. Potential simplifications in the approach to the calculation of the post-stress position and on the perimeter of application of the shocks (e.g. portfolios, entities) can be applied upon discussion with the NBB and in line with the principles prescribed in section 4.2.
39. In principle, no recalculation of the baseline is expected. The recalculation of the baseline position will be requested only in exceptional circumstances. This would apply where there has been a change in the undertaking's structure and/or valuation model that would materially affect the regulatory financial position and the outcome of the Stress Test exercise (e.g. a change in the risk model used for the calculation of the SCR — standard formula, undertaking-specific parameters or (partial)internal models — and major model changes). Any potential recalculation of the baseline will be assessed and discussed on a case-by-case basis prior the submission of the results.<sup>3</sup>

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<sup>1</sup> In case of model changes occurred between the calculation of the baseline and the stressed scenarios, participating entities are requested to liaise with the NBB. Furthermore, only models used for the regular QRT submission are allowed.

<sup>2</sup> Any residual 'collective investments undertakings' (i.e. for those for which look-through was not feasible) should be shocked according to the asset shocks most closely resembling the collective investment undertakings. The application of the shocks depends on specific assets included in the balance sheet items.

<sup>3</sup> For the treatment of the recalculation of baseline please refer to section 2.3.1 of the Methodological principle for insurance stress testing (EIOPA-BoS\_19/568).



40. As mentioned, the Solvency II framework is taken as common ground for the exercise, hence, as LTG measures represent an integral element of the Solvency II framework, they will be included in the analysis of the 2022 ST. Participating entities are requested to apply any LTG and Transitional measures they used at reference date.
41. Calibration of the LTG measures should be assumed to be unchanged with respect to the baseline if not specified differently. However, if the shocks prescribed under the stress scenario trigger a material change in the LTG measures, their values are recalibrated in accordance with the following methodology. In detail:
- the impact, in absolute terms, of the transitional measure on the Technical Provisions should be calculated in the pre-stress scenario and then kept constant in the post-stress scenario;
  - the transitional measure on the risk-free interest rates should be re-evaluated under the stressed scenarios and applied consistently with the baseline case;
  - transitional measures on equity shall be applied consistently with the baseline scenario;
  - matching adjustments should be re-evaluated under stressed scenarios and applied consistently with the baseline case;
  - recalculated VAs are provided under the stress scenario;
  - a symmetric adjustment mechanism for the equity risk charge under the stressed scenario is provided under the stress scenario.
42. The impact of the LTG and Transitional measures on the post-stress technical provisions, basic OF, eligible OF and SCR has to be calculated and reported.
43. The consistency with the Solvency II framework is guaranteed also in the calibration of the Ultimate Forward Rate which will remain unchanged with respect to the value used in 2022 for the calculation of the regular Solvency II position (3.45% for Euro, other currencies are treated accordingly)<sup>4</sup>. This approach is in line with the microprudential objective of the 2022 Stress Test exercise and its strive to an increased transparency (e.g. individual public disclosure of the results). Please note that no recalculation of the baseline is triggered by the change of the UFR between the baseline and the post-stress situation.

## 4.2 Simplifications and approximations

44. In the recalculation of the post-stress balance sheet simplifications / approximations can be allowed within the limits and the provisions described in this section.
45. The use of simplifications for the post-stress Solvency II balance sheet and capital position shall be implemented after a discussion with the NBB. This should take place as early as possible after the start of the calculation phase so that the NBB can assess how the insurance undertaking will incorporate these simplifications in order to limit or avoid exchanges related to their use, after

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<sup>4</sup> For additional information please refer to: Technical information relating to risk-free interest rate (RFR) term structures is used for the calculation of the technical provisions for (re)insurance obligations. Available at: [https://www.eiopa.europa.eu/tools-and-data/risk-free-interest-rate-term-structures\\_en](https://www.eiopa.europa.eu/tools-and-data/risk-free-interest-rate-term-structures_en).

the final results have been submitted. During this discussion, the participating entities should demonstrate how they intend to respect the principles below on the basis of the applied simplifications.

46. All approximations and simplifications used for the calculation of the post-stress results (that go beyond those used for the pre-stress calculations) should be clearly identified, and detailed (e.g. why is this simplification needed? What is the exact simplification and how is it applied?). The participants should also be able to give a quantitative or at least qualitative indication of the materiality of the deviations created by the use of the simplification. This information should allow the NBB to judge the suitability of each of the simplifications and will be evaluated on a case by case basis (ref. to pre-validation activity in section 8). This refers in particular to the following aspects.

Perimeter of application for the shocks<sup>5</sup>: NBB stress test exercises are based on the SII framework and hence on a full balance sheet approach. Participants are expected to re-evaluate their balance sheet items against the provided yield curve and the specific shocks (if any). In principle, shocks should be applied to the entire business in-force, hence to the full balance sheet (assets and liabilities), and to each element of the solvency position. However, based on relevance and materiality criteria, participants can be allowed to reduce the perimeter of application of the shocks to a subset of their activities, using a scaling approach for the remaining part. The post-stress values of the part of the business excluded in line with the above-mentioned criteria should be scaled according to the change in the corresponding items calculated for the business being treated.

This is only allowed if the remaining part is marginally impacted by the prescribed shocks and if non-vulnerability to the shock is demonstrated. Beside the element of the relevance, the exclusion of part of the in-force business is subject to a materiality criterion. To avoid large approximations in the post-stress position, participants are allowed to apply a simplified treatment to only a portion of the business that is not material in terms of the pre-stress value of:

- Own Funds;
- SCR.

In case participants want to exclude specific asset classes or specific liability portfolios, the scaling approach should be applied and the templates should be filled in accordingly.

The approach chosen has to be discussed with the NCAs during the pre-validation phase.

47. Calculation of specific balance sheet items:

- Best Estimates: in case the best estimate is calculated via regression techniques<sup>6</sup> the parameters used in the baseline scenario can be kept constant also for the estimations in the post-stress scenario. Companies should be able to provide credible quantitative or qualitative arguments that

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<sup>5</sup> For the perimeter related simplifications please refer to section 5.4.1 of the Methodological principle for insurance stress testing (EIOPA-BoS\_19/568).

<sup>6</sup> For the regression technique related simplifications please refer to section 5.4.3 of the Methodological principle for insurance stress testing (EIOPA-BoS\_19/568).

the approximations are appropriate with regard to the quality of the results. This dialogue should happen at an early stage of the 2022 ST process.

- Risk margin<sup>7</sup>: SII allows different methodologies for this calculation based on a hierarchy of four methods going from the full computation to the scaling approach (calculating the risk margin as a percentage of the best estimates). To ensure comparability with the baseline, the post-stress risk margin should be computed, as a default option, using the same method used for the calculation of the 2021 balance sheet. As a simplification participants are allowed to recalculate the post-stress risk margin using a more simplified method, namely dropping one notch down in the hierarchy of methods provided in EIOPA guideline 61<sup>8</sup> with respect to the method used in the baseline calculation;

#### 4.2.1 SCR recalculation

48. Given the complexity of the post-stress SCR calculation and the innovation brought by the treatment of the post-stress management actions, additional methodological assumptions and potential allowances for simplifications are envisaged.
49. It should be re-emphasized that this insurance stress test is not a pass-or-fail exercise; hence the recalculation of SCR ratios after stress is not intended to be used as a basis to impose any additional capital requirement.
50. The post-stress SCR shall be calculated following the same approach used for the calculation of the regular Solvency II submission and specifically the submission of the 2021 year-end reporting used as a reference for this exercise.
51. Conscious of the complexity of the SCR recalculation, participants are allowed to apply the simplifications and/or approximations previously described in line with the relevance of the risk drivers. Given that the prescribed shocks of a scenario may not materially affect each and every risk factor, the recalculation of the SCR could exclude certain risk factors (SCR submodules) that are assumed not to change materially following the shocks.
52. All the simplifications and approximations shall be subject to the conditions prescribed for the recalculation of the balance sheet position.

#### 4.2.2 DTA, DTL and LAC DT recalculation

53. Participants are expected to fully recalculate deferred tax assets/liabilities and LACDT using the method already applied in the baseline.<sup>9</sup>
54. In the case that an undertaking would not pursue a full recalculation, it is allowed either to set the post-stress LACDT at zero or to approximate it with reference to the value of post-stress net DTL, namely:
  - if the post-stress net DTL is greater than zero, then participants are allowed to apply a reduction in LACDT by this amount in the calculation of the post-stress SCR;

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<sup>7</sup> For the post-stress risk margin related simplifications please refer to section 5.4.5 of the Methodological principle for insurance stress testing (EIOPA-BoS\_19/568).

<sup>8</sup> EIOPA, 2015, 'Guidelines on valuation of technical provisions' (guideline 61). Available at: [https://www.eiopa.europa.eu/content/guidelines-valuation-technical-provisions\\_en](https://www.eiopa.europa.eu/content/guidelines-valuation-technical-provisions_en).

<sup>9</sup> For the LACDT please refer to section 5.4.2 of the Methodological principle for insurance stress testing (EIOPA-BoS\_19/568)

- if the post-stress net DTL is negative, than this reduction can be set to zero.

This approach is formalised in the following equation:

$$LACDT_{\text{post-stress}} = \max(0, \text{net DTL}_{\text{post-stress}})$$

55. In the case that an undertaking would pursue a full recalculation, the future profits, sustaining the eventual DTA and or LACDT, will be capped to the pre-stress situation.

This approach is formalised in the following equation:

$$LACDT_{\text{post-stress}} - \text{NET DTA}_{\text{post-stress}} \leq LACDT_{\text{Baseline}} - \text{NET DTA}_{\text{Baseline}}$$

56. If undertakings have carried out a full recalculation leading to the situation where  $LACDT_{\text{post-stress}} > \max(0, \text{net DTL}_{\text{post-stress}})$ , they should be able to provide evidence to support their approach. This should be explained in detail in the questionnaire (see reporting template).

### 4.3 Management actions

57. Consistently with the micro- and macro-prudential objectives of the stress test, under Scenario 3 - Cloud outage leading to a burst of the tech bubble, participants are requested to calculate their post-stress capital position under two assumptions:

- Fixed balance sheet (microprudential dimension);
- Constrained balance sheet (macroprudential dimension).

58. While all the other elements remain the same under both assumptions, the use of the management actions is treated differently as specified below.

59. **Fixed balance sheet:** In order to achieve a level playing field and to ensure that the results after stress reflect the instantaneous nature of the shocks, participating entities should not take into account measures, actions or risk mitigating strategies that rely on taking future actions after the reference date (e.g de-risking strategies and any future action taken in the context of a recovery plan). In this simulation, only the embedded management actions should be considered and the reactive post-stress management actions should not be applied.<sup>10</sup>

60. **Constrained balance sheet:** The inclusion of the reactive management actions implies the relaxation of the fixed balance sheet assumption towards a constrained balance sheet approach. In this context, reactive management actions, within specific boundaries, should be taken into account in the calculation of the financial situation (e.g. de-risking strategies and any future action taken in the context of a recovery plan).<sup>11</sup> In case a participant opt to apply reactive management actions these shall be discussed with the NBB.

61. Any already planned and approved distribution of dividends has to be included in the fixed BS approach, and it can only be relaxed in the constrained BS approach.

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<sup>10</sup> For a thorough treatment of the classification and use of the management action please refer to section 2.3.3 of the Methodological principle for insurance stress testing (EIOPA-BoS\_19/568).

<sup>11</sup> Reassessment of the "foreseeable dividends or other foreseeable distributions" under stressed scenario is included in the allowed actions.

62. The reactive management actions applied by the participants shall be appropriate and plausible and their assessment should form a central component of the pre-validation and validation process. Reactive post-stress management actions need to be realistic and proportionate and take account of the time needed to implement them and any expenses arising from them.<sup>12</sup> Companies should be able to provide credible explanations on whether and how the post-stress management action could actually be implemented under the adverse conditions of the stress scenario, also taking into account any potential secondary consequences (e.g. availability of assets on the market and potential drop in prices against widespread selling). Against this, an external recapitalisation, even if included in the recovery plan of the participant, is unlikely to be implemented in the stressed scenario and, in any case, the cost of this action should reflect the distressed market and economic conditions implied in the narrative.
63. The applied reactive management actions should be part of the governance framework adopted by the insurance undertaking (e.g. risk management plans, investment strategies, recovery plans) and not specifically defined and implemented in scope of this specific stress test exercise.
64. The applied management actions shall be clearly documented qualitatively through the specific questionnaire (ref. to qualitative questionnaire) and quantitatively providing information on the size of the actions and on their marginal impacts to the post stress balance sheet, solvency positions (ref. to reporting templates).
65. Reactive management actions, if applied, should be accompanied by a thorough explanation on their application process, plausibility and impacts. If a participant considers that reactive management actions are not necessary, the exercise can be limited to the fixed-balance sheet assumption. In this respect, if the company's SCR ratio falls below its risk appetite, it is expected that reactive management actions will be implemented in order to possibly restore the situation, at least partially.

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<sup>12</sup> Management actions should have an effect over a time horizon of 1 year, in line with the SCR estimation.

## 5 Cyber Underwriting Scenario

### 5.1 Scenario 1 - Business Blackout

#### Event definition

66. A threat actor makes use of vulnerabilities in the Belgian electricity sector and grid systems leading to a power outage.
67. The electricity load shedding plan (i.e. *afschakelplan voor elektriciteit* or *plan de délestage de l'électricité*) is activated leading to a load shedding and shutting down power across the 8 Belgian areas<sup>13</sup> and even the areas outside of the scope of the load shedding plan during 14h.
68. In the coming hours electricity is gradually restored across the different areas. After 4 hours, 50% of businesses and families have regained power. After 16 hours, 75% of business and families are restored and after 24h the entire country has regained power.
69. On average, businesses and families have been confronted with 17 hours of power outage.
70. Given the complexity of the cyber attack, it is suspected that it occurred by a state-backed threat actor. However, since this cannot be proven, war exclusion clauses are not triggered.

#### Underwriting risk assumptions

##### General, required assumptions

71. The business black-out scenario is inspired by the Belgian energy grid. However, we would ask participants to apply the scenario to the jurisdiction with the largest exposure for cyber underwriting.
72. It can be considered that all businesses and families in this jurisdiction suffer from the power outage as well as all suppliers and critical vendors covered by coverages for Contingent Business Interruption.
73. Businesses and families experience on average 17 hours of power outage. For the purpose of this exercise, it can be considered that the power outage starts at 8h.

##### Additional, optional assumptions

74. Undertakings with less claims experience in cyber insurance, can opt to additionally use the assumptions below. Undertakings can however choose to deviate from the hypotheses below if they judge that their claims experience differs from these assumptions.

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<sup>13</sup> For more information, see here: <https://economie.fgov.be/nl/themas/energie/bevoorradingzekerheid/elektriciteitsschaarste/afschakelplan/tot-welke-schijf-behoort-mijn>

75. Businesses observe, on average, crisis service costs of 60.000 EUR and recovery expense costs of 40.000 EUR per infected policyholder. The crisis service costs include elements such as IT forensics, notification etc.
76. For the remaining products and coverages, the undertakings can make use of average ultimate claims costs per policyholder for the policies which are triggered by the blackout scenario.

## Impacted policyholders and products

77. To further guide the undertakings to calculate the claims costs, the stress test participants can find hereafter a list of possible products and policyholders which are impacted by the business blackout scenario.
78. Both affirmative and silent cyber risk should be considered when assessing the impact of the scenario. Only products and policies for which cyber is explicitly excluded should not be considered in the scenario.
79. Power generation and distribution companies:
  - a. Property damage
  - b. Business Interruption
  - c. Incident Response Cost
  - d. Regulatory Fines
  - e. Professional Indemnity (*RC professionnelle* or *BA beroep*)
  - f. Director's and Officer's Liability (*RC dirigeant* or *Bestuurders-aansprakelijkheid*)
80. Companies which suffer a power loss can possibly have insurance claims for the following products and coverages:
  - a. Property damage (e.g. due to spoiled goods)
  - b. Business interruption (*Bedrijfsschade* or *Pertes d'exploitation*)
  - c. Professional Indemnity (*RC professionnelle* or *BA beroep*)
  - d. Medical Malpractice (*RC médicale* or *Medische aansprakelijkheid*)
  - e. Director's and Officer's Liability (*RC dirigeant* or *Bestuurders-aansprakelijkheid*)
81. Companies which are indirectly impacted can possibly have insurance claims for the following products and coverages:
  - a. Contingent Business interruption
  - b. Third Party Liability (e.g. Director's and Officer's liability)
  - c. Credit insurance (e.g. due to business interruption leading to defaults)
82. Companies delivering inadequate technical services or costs (e.g. which allowed for the vulnerability leading to a cyber attack)
  - a. Professional Indemnity (*RC professionnelle* or *BA beroep*)
  - b. Product Liability (*RC après livraison / produit* or *BA na levering / product*)
  - c. Public Liability (*RC exploitation* or *BA uitbating*)

- 83. Home owners
  - a. Property damage (e.g. due to spoiled goods)
- 84. Specialty insurance
  - a. Event cancellation
- 85. Additional insurance claims might be triggered such as motor, transport, worker's compensation and medical expense claims due to car accidents triggered by not functioning traffic light. However, given the greater complexity and uncertainty at estimating these indirect claims, such claims do not need to be considered by the stress test participants.

## 5.2 Scenario 2 - Ransomware Attack

### Event definition

- 86. A state-backed actor exploits a vulnerability in a worldwide used mail server to perform a remote code execution (RCE) to deliver a ransomware attack. In the following days the ransomware is spread across the world. The threat actor encrypts the files of the infected enterprises to motivate them to pay the ransom.
- 87. Even though the threat actor is state-backed, this cannot be proven and therefore the war exclusion clauses are not triggered.
- 88. Undertakings which have developed back-up and incident response plans with recent back-ups of their software and data opt to not to pay the ransom and to restore their data and software themselves. Other undertakings opt to pay the ransom, but typically are not able to decrypt the data and are forced to restore the data and software from a back-up nonetheless.
- 89. Due to the ransomware attack, business of the victims is interrupted for 22 days. Furthermore victims suffer from cyber extortion, incident response costs and costs restoring access.

### Underwriting risk assumptions

#### General, required assumptions

- 90. The ransomware spreads across the world and infects 10% of the policyholders of the participating entities.
- 91. Similarly, it can be assumed that the ransomware attack triggers 10% of the coverages for Contingent Business Interruption.
- 92. Businesses experience on average 22 days of business interruption and pay an average ransom amount of 300.000 EUR per infected policyholder.
- 93. For businesses with back-up and incident response plans this business interruption is lower at 14 days on average. They typically also choose not to pay the ransom amount.



### Additional, optional assumptions

94. Undertakings with less claims experience in cyber insurance, can opt to additionally use the assumptions below. Undertakings can however choose to deviate from the hypotheses below if they judge that their claims experience differs from these assumptions.
95. Business experience on average crisis service costs of 60.000 EUR and recovery expense costs of 40.000 EUR per infected policyholder. The crisis service costs include elements such as IT forensics, notification etc.
96. Businesses choose to pay the ransom in 93% of cases.
97. Furthermore, the revenue loss for Business Interruption can be estimated per economic sector as followed:

Economic sector (NACE code)	Revenue loss Ransomware
A - AGRICULTURE, FORESTRY AND FISHING	15%
B - MINING AND QUARRYING	
D - ELECTRICITY, GAS, STEAM AND AIR CONDITIONING SUPPLY	
J - INFORMATION AND COMMUNICATION	
O - PUBLIC ADMINISTRATION AND DEFENCE; COMPULSORY SOCIAL SECURITY	
S - OTHER SERVICE ACTIVITIES	20%
E - WATER SUPPLY; SEWERAGE, WASTE MANAGEMENT AND REMEDIATION ACTIVITIES	
F - CONSTRUCTION	
N - ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES	
T - ACTIVITIES OF HOUSEHOLDS AS EMPLOYERS	
U - ACTIVITIES OF EXTRATERRITORIAL ORGANISATIONS AND BODIES	25%
C - MANUFACTURING	
G - WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES	
H - TRANSPORTATION AND STORAGE	
I - ACCOMMODATION AND FOOD SERVICE ACTIVITIES	
K - FINANCIAL AND INSURANCE ACTIVITIES	
L - REAL ESTATE ACTIVITIES	
M - PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES	
P - EDUCATION	
Q - HUMAN HEALTH AND SOCIAL WORK ACTIVITIES	
R - ARTS, ENTERTAINMENT AND RECREATION	

98. For the remaining products and coverages, the undertakings can make use of average ultimate claims costs per policyholder for the policies which are triggered by the ransomware attack scenario.

### Impacted policyholders and products

99. To further guide the undertakings to calculate the claims costs, the undertakings can find hereafter a list of possible products and policyholders which are impacted by the ransomware attack scenario.
100. Both affirmative and silent cyber risk should be considered when assessing the impact of the scenario. Only products and policies for which cyber is explicitly excluded should not be considered in the scenario.
101. Companies which are directly impacted can possibly have insurance claims for the following products and coverages:
- Business interruption (*Bedrijfsschade* of *Pertes d'exploitation*)
  - Cyber extortion
  - Data and Software Loss
  - Crisis service costs

- e. Recovery expense costs
  - f. Professional Indemnity (*RC professionnelle* or *BA beroep*)
  - g. Medical Malpractice (*RC médicale* or *Medische aansprakelijkheid*)
  - h. Director's and Officer's Liability (*RC dirigeant* or *Bestuurders-aansprakelijkheid*)
102. Companies which are indirectly impacted can possibly have insurance claims for the following products and coverages:
- a. Contingent Business interruption
  - b. Third Party Liability (e.g. Director's and Officer's Liability)
  - c. Credit insurance (e.g. due to business interruption leading to defaults)
103. Companies delivering inadequate technical services or costs (e.g. which allowed for the vulnerability leading to a cyber attack)
- a. Professional Indemnity (*RC professionnelle* or *BA beroep*)
  - b. Product Liability (*RC après livraison / produit* or *BA na levering / product*)
  - c. Public Liability (*RC exploitation* or *BA uitbating*)

## 5.3 Scenario 3 - Cloud outage leading to a burst of the tech bubble

### Event definition

104. A global cloud service provider experiences a significant increase in storage resources. To reduce resource usage, a reconfiguration is made which introduces a vulnerability in the blob service.
105. This misconfiguration goes undetected and in the following weeks a cyber attack on the cloud service provider leads due to misconfiguration to a catastrophic failure across all data centres.
106. The Platform and Software providers which make use of the cloud infrastructure are impacted and also observe an outage.
107. All enterprises making use of the cloud services have their business interrupted to the extent that it depends on these services.
108. Site Reliability Engineers detected the failure, made configuration changes and manually reduced the traffic levels to recover from the catastrophic failure. After three days, the cloud services are restored.
109. After five additional days, the platform and service providers recover and are fully operational again.
110. Businesses experience on average 22 days of business interruption after restoration of the cloud services.
111. For businesses with back-up and incident response plans this average business interruption is lower at 14 days.
112. Due to the longer term nature of the cloud outage, the financial markets lose confidence in this global IT service provider leading to a strong decrease

in its stock price and an increase in corporate spreads and leading to a burst of the bubble for the technology and other cloud dependent sectors.

113. This financial downturn leads also impacts other economic sectors albeit to a lesser extent. This will be described more in detail in the section on the financial market shocks.

## Underwriting risk assumptions

### General, required assumptions

114. The largest cloud service provider in the insurance portfolio has an outage which lasts 3 days across all data centres.
115. Platform and software providers are interrupted for 8 days in total.
116. Businesses experience on average 25 days of business interruption.
117. For businesses with back-up and incident response plans this average business interruption is lower at 17 days of business interruption.
118. Cloud-dependant sectors show a decrease of their stock prices of around -56% in Europe, -71% in the UK and -68% in the US. The claims costs for Director's and Officer's Liability should be consistent with this decrease.

### Additional, optional assumptions

119. Undertakings with less claims experience in cyber insurance, can opt to additionally use the assumptions below. Undertakings can however choose to deviate from the hypotheses below if they judge that their claims experience differs from these assumptions.
120. Business experience on average crisis service costs of 60.000 EUR and recovery expense costs of 40.000 EUR.
121. If the participant does not have detailed information on the cloud service providers their policyholders make use of, it can be assumed that the cloud service provider which suffers an outage, is used by 32% of its policyholders.
122. Similarly, it can be assumed that the outage of the cloud service provider triggers 32% of the coverages for Contingent Business Interruption.
123. Furthermore, the revenue loss for Business Interruption can be estimated per economic sector as followed:

Economic sector (NACE code)	Revenue loss Cloud outage
A - AGRICULTURE, FORESTRY AND FISHING	5%
B - MINING AND QUARRYING	
D - ELECTRICITY, GAS, STEAM AND AIR CONDITIONING SUPPLY	
C - MANUFACTURING	
H - TRANSPORTATION AND STORAGE	15%
I - ACCOMMODATION AND FOOD SERVICE ACTIVITIES	
J - INFORMATION AND COMMUNICATION	
O - PUBLIC ADMINISTRATION AND DEFENCE; COMPULSORY SOCIAL SECURITY	
R - ARTS, ENTERTAINMENT AND RECREATION	
S - OTHER SERVICE ACTIVITIES	
E - WATER SUPPLY; SEWERAGE, WASTE MANAGEMENT AND REMEDIATION ACTIVITIES	25%
F - CONSTRUCTION	
N - ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES	
T - ACTIVITIES OF HOUSEHOLDS AS EMPLOYERS	
U - ACTIVITIES OF EXTRATERRITORIAL ORGANISATIONS AND BODIES	
G - WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES	35%
L - REAL ESTATE ACTIVITIES	
M - PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES	
P - EDUCATION	
K - FINANCIAL AND INSURANCE ACTIVITIES	45%
Q - HUMAN HEALTH AND SOCIAL WORK ACTIVITIES	

124. For the remaining products and coverages, the undertakings can make use of average ultimate claims costs per policyholder for the policies which are triggered by the cloud outage scenario.

## Impacted policyholders and products

125. To further guide the undertakings to calculate the claims costs, the undertakings can find hereafter a list of possible products and policyholders which are impacted by the cloud outage scenario.

126. Both affirmative and silent cyber risk should be considered when assessing the impact of the scenario. Only products and policies for which cyber is explicitly excluded should not be considered in the scenario.

127. Companies which are directly impacted can possibly have insurance claims for the following products and coverages:

- a. Business interruption (*Bedrijfsschade* of *Pertes d'exploitation*)
- b. Data and Software Loss
- c. Crisis service costs
- d. Recovery expense costs
- e. Professional Indemnity (*RC professionnelle* or *BA beroep*)
- f. Medical Malpractice (*RC médicale* or *Medische aansprakelijkheid*)
- g. Director's and Officer's Liability (*RC dirigeant* or *Bestuurders-aansprakelijkheid*)

128. Companies which are indirectly impacted can possibly have insurance claims for the following products and coverages:

- a. Contingent Business interruption
- b. Third Party Liability (e.g. Director's and Officer's Liability)
- c. Credit insurance (e.g. due to business interruption leading to defaults)

129. Companies delivering inadequate technical services or costs

- a. Professional Indemnity (*RC professionnelle* or *BA beroep*)

- b. Product Liability (*RC après livraison / produit* or *BA na levering / product*)
- c. Public Liability (*RC exploitation* or *BA uitbating*)

## Market shocks

130. A detailed overview of the market stress parameters is contained in the Technical information document, which accompanies these technical specifications. The market stress parameters which are shocked are linked to the following risk drivers:

- swap rates (according to specific currency and maturities);
- sovereign bond yields;
- corporate bond and covered bond yields;
- equity prices;
- real estate prices (residential and office & commercial);
- residential mortgage-backed securities yields (RMBS);
- other assets prices (private equity, hedge funds, real estate investment trusts (REITs), commodities).

131. The key elements of the scenario and the shocks which should be applied, are as follows:

- Despite a low level of initial interest rates, the severity of the contraction in economic activity, both globally and in the EU, in the context of the cloud service failure, is causing a significant repricing of equity. Share prices of sectors sensitive to the cloud's<sup>14</sup> disruption fall sharply by 56% in the EU. Share prices of other, less affected sectors fall by 38% in the EU. Similarly, other assets are subject to severe revaluations. Across EU markets, price of private equities, hedge funds, real estate investment funds and commodities fall by an average of 38%, 38%, 43% and 34% respectively.
- The cloud service failure and its economic consequences also lead to significant corrections in real estate prices, especially in the commercial segment. Tighter financial conditions, depressed economic activity and a negative economic outlook, marked by an inversion of the yield curve, amplify the impact of the initial shock. As a result, commercial property prices are falling by 20% at EU level. Residential property prices are less impacted, falling by 7% in the EU.
- The worsening of economic prospects following the cloud outage is further reflected in a global decline in long-term risk-free interest rates from an already historically low level, with nominal short and long-term risk-free rates remaining below zero in the EU. This is reflected in the reduction of the swap rates across all tenors for all the major currencies.

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<sup>14</sup> Sectors sensitive to cloud outage are identified with the following NACE Codes:

- C21 - Manufacture of basic pharmaceutical products and pharmaceutical preparations
- C26 - Manufacture of computer, electronic and optical products
- I - Accommodation and food service activities
- J - Information & Publication
- K - Financial and insurance activities
- M - Professional, scientific and technical activities
- N - Administrative and support service activities

- The economic contraction also weakens countries' fiscal positions. Despite the low level of risk-free interest rates, a resurfacing of concerns about the sustainability of public debt amid weakening domestic demand leads to significant increases in credit risk premia on sovereign bonds, especially in high-spread economies. Across EU countries, ten-year sovereign bond yields increase by 21 basis points.
  - Corporate profitability is severely undermined by the outage, which leads to debt sustainability concerns and to widespread insolvencies of non-financial corporations. As a consequence, corporate bond yields in the EU increase on average between 71 and 322 basis points depending on sector and credit rating of the issuer.
132. Market shocks are assumed to represent one-off, instantaneous and simultaneous shifts in asset prices relative to their end-2021 levels.
133. Shocks to swaps are utilised to derive the EIOPA risk-free rate curves via the Smith-Wilson model according to the EIOPA methodology following parameters:
- a. Last liquid point (LLP) defined coherently with the LLP used for the definition of the EIOPA risk-free interest rate term structures (e.g. EUR=20Y; GBP=50Y; CHF=25Y);<sup>15</sup>
  - b. The ultimate forward rate (UFR) is set at 3.45% for EUR in line with the current Solvency II regulation;<sup>16</sup>
  - c. Credit risk adjustment is kept unchanged with respect to the baseline.
134. RFR term structures for most of the currencies to be used under the stressed scenario are provided in the technical information. Currencies not included in the list are not supposed to be stressed, therefore for these currencies baseline figures shall be used to reevaluate the technical provisions in the post stress situation.
135. Post-stress swap rates, provided in the technical information, shall be used as input to:
- Reevaluate post stress position of fixed income assets and other interest rate sensitive positions;
  - Reevaluate other asset classes (e.g. derivatives);
  - Swap shocks are also used to derive the RFR curves to be used in the Interest rate following the provisions of delegated regulation 2015/35.
136. Shocks to sovereign bonds refer to change in yields against the baseline. Therefore, in order to derive changes in the spreads the shocks applied to the swap rates shall be taken into account as follow:
- a. The level after shock of the Euro swap curves are provided by the following equation:  $SWAP_{Shock} = SWAP + Shock$ ;

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<sup>15</sup> Technical documentation of the methodology to derive EIOPA's risk-free interest rate term structures.

Available at:

<https://eiopa.europa.eu/Publications/Standards/Technical%20Documentation%20%2831%20Jan%202018%29.pdf>

<sup>16</sup> Risk Free term structures with and without VA are provided for the most used currencies. For the currencies, which are not included in the stressed tables, the baseline term structure shall be used under every scenario. Convergence point is set at 40 years for EUR

- b. The yield level of a bond generally includes a credit spread on top of the swap curve. Therefore, the yield of a bond with a specific maturity can be expressed as  $Y_{Bond} = SWAP + CreditSpread_{Bond}$  (where the swap term equals the maturity of the bond);
- c. The shock levels for sovereign or corporate yields prescribed in the Technical Information file refer to a change in the respective yields (and not to a change in credit spreads). The change in credit spreads can also be derived from the Technical Information file by  $\Delta CreditSpread_{Bond} = \Delta Y_{Bond} - \Delta SWAP$
- d. In order to provide an illustrative example assume a pre-stress level of the 10 year swap rate of 1.0% and a Belgian 10 year sovereign bond priced with a credit spread of 10 bps are assumed. The yield of this bond before shock therefore amounts to 1.1%. According to the prescribed stresses, the shock on the 10 year swap rate implies a decrease of 120 bps (i.e.  $SWAP_{Shock} = -0.20\%$ ) and a yield increase for the sovereign bond of 23 bps (i.e. the yield after shock, it is  $1.1\% + 0.23 = 1.33\%$ ). Using the formula specified in c), the credit spread for this bond under stressed scenario is 153 bps (=  $133 \text{ bps} - (-20 \text{ bps})$ ), increased by 143 bps ( $153 \text{ bps} - 10 \text{ bps}$ ) with respect to the baseline.
137. Shocks to sovereign bonds and swaps are provided for selected maturities. Shocks to missing maturities should be derived:
- by interpolation (e.g. spline) for maturities that are not explicitly provided and that are not exceeding the last maturity provided with an explicit shock;
  - by keeping the shock constant for all maturities exceeding the last maturity provided with an explicit shock.
138. Sovereign bonds denominated in a currency other than the currency of the country of issuance should be shocked following one of the following approaches:
- In case a participant applies the shock to the yield as provided in the Technical Information the bond should be at first shocked according to the country shock and then, the resulting amount shall be transformed into the reporting currency by applying the exchange rate registered at the reference date. Example: "Country A" currency is EUR and it issues two bonds: "bond 1" denominated in EUR and "bond 2" denominated in USD. Both bonds shall be treated according to the shock prescribed to "Country A" and, where needed, converted in the reporting currency of the Group.
  - In case a participant prefers to derive from the shock to yield the credit spread component the shock to credit spread should be computed using the formula provided in par. 131.c where the shock to yield should be the one corresponding to the country of issuance and the shock to swap should be the one associated to the currency of denomination of the bond. The classification and stressing of Municipal/Local Authority bonds should be consistent with how they would be treated under the SII Standard Formula guidance.
139. No specific shock to yields is provided to bonds issued by EU or non-EU supranational institutions. The post stress value of these securities should be calculated only taking into account the change in the risk free rate.
140. Shocks to corporate bonds yields are provided in the Technical Information. Corporate bond holdings should be shocked according to type, credit

worthiness, and location of the issuer, namely distinguishing them in "sectors sensitive to cloud outage" / other<sup>17</sup>, rating (from AAA to CCC) and geographical areas<sup>18</sup>.

141. Shocks to yields should be applied homogeneously to all the maturities. Shocks to corporate bonds shall be applied as prescribed for the government bonds.
142. Additional specifications should be followed:
  - Bonds issued by corporations based in non-covered geographical areas shall be shocked according to the average shocks provided for larger geographical areas;
  - The shocks to CCC rating class shall also be applied to corporate bonds with lower ratings;
  - Unrated bonds shall be shocked according to the shocks prescribed to the BBB-rated bonds;
  - Covered bonds be treated with the shocks provided to the specific asset class.
143. The shocks to structured notes and collateralized securities shall be applied in line with the shocks to corporate bonds.
144. The shocks for equities are provided in terms of percentage changes in the stock prices per geographical area and should be applied to the SII value of the equity at the reference date.
145. Equities listed in geographical areas whose shocks are not prescribed shall be shocked according to the average shocks provided for larger geographical areas, e.g. EU, other advanced economies and emerging markets. In the case of equity of companies listed in more than one stock exchange, the average shock over all areas where the equity is listed shall be applied (only the areas for which a shock has been specified as a part of the scenario description should be taken into account). Symmetric adjustment for this scenario is set at -10%.
146. Stock indices should be treated according to geographical criteria.
147. The SII value of an unlisted equity at the reference date should be recalculated by applying the percent change in the listed equity prices per geographical area according to the geographical area where the parent company of the issuing entity is located. The same treatment prescribed for the listed company applies.
148. Own shares (held directly) and holdings in related undertakings, included participations should be treated as listed equities.
149. The technical information provides the shocks to office & commercial and residential real estates for different countries. Investments in real estates

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<sup>17</sup> Sectors sensitive to cloud outage are identified with the following NACE Codes:  
C21 - Manufacture of basic pharmaceutical products and pharmaceutical preparations  
C26 - Manufacture of computer, electronic and optical products  
I - Accommodation and food service activities  
J - Information & Publication  
K - Financial and insurance activities

<sup>18</sup> A reference list for "advances economies" and "emerging markets" can be retrieved from the IMF World Economic Outlook, October 2020 - statistical appendix - Report available at: <https://www.imf.org/-/media/Files/Publications/WEO/2020/October/English/StatApp.ashx>



located in countries that are not listed shall be shocked according to the average shocks provided to the closest geographical areas, e.g. EU, EA, other advanced economies and emerging markets.

150. Shocks to real estate should be also partially applied to the balance-sheet item "property plant & equipment held for own use". Specifically, commercial properties for own use (including offices) should be treated in line with the office & commercial real estate held for investment purposes and property for own use classified as residential should be treated with the shocks to residential real estate held for investment purpose. Equipment should be kept constant with respect to the baseline. Property other than for own use should be fully shocked according to the shocks provided to the area where they are located.<sup>19</sup>
151. Loans and mortgage portfolios (i.e. loans on mortgages to individuals and other loans and mortgages), should be revaluated according to the shocks provided to residential and mortgage backed securities - RMBS. The technical information provides shocks for geographical areas and credit ratings. Participating entities are expected to apply the appropriate yield increases (in bps) to their portfolios. In case the rating quality of the (different) portfolio(s) cannot be determined, a BBB rating quality has to be assumed.<sup>20</sup> For loans on policies no shocks should be applied.
152. Investment in infrastructure shall be shocked according to the underlying relevant asset class (i.e. using the provided shocks for corporate bonds, equity).
153. Shocks to RMBS should be used to estimate the post stress value of MPST, CLO, CMBS, ABS exposures.
154. The participating entities shall apply the shock to other asset as percentage of change in the baseline SII value according to the asset (private equity, hedge funds, commodities) and the geographical area (EU, global).

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<sup>19</sup> For rural estate exposures, the residential real estate shock should be applied.

<sup>20</sup> The rationale for this treatment is that when insurers are forced to sell their portfolio of mortgages in a stressed situation, change in RMBS is considered the best proxy for the stressed values.

## 6 Reporting Templates

155. The results must be transmitted electronically via the OneGate application of the NBB (domain CPA). The data can only be entered manually via *data entry*.

156. The set of templates to report the results under baseline and stressed scenarios are broadly based on the Solvency II QRT reporting. Guidance on the content of the templates can be retrieved from the Supervisory Reporting Annex II.

157. Participating entities shall fill in the reporting templates in the provided spreadsheet. The reporting templates are structured in three sections:

- a. Baseline scenario (pre-filled);
- b. Stress scenario;
- c. Stress scenario with reactive management actions (only applicable if reactive management actions are taken - see section 4.3)

158. The structure of the reporting templates is provided in Figure .

**Figure 5 - Scenarios reporting templates**

Description	Baseline (0)	Scenario without reactive management actions - Fixed Balance Sheet (FBS)	Scenario with reactive management actions - Constrained Balance Sheet (CBS)*
General information	<a href="#">Participant</a>		
Balance sheet reporting template as per QRT data for Groups	<a href="#">0.BS</a>	<a href="#">FBS.BS</a>	<a href="#">CBS.BS</a>
Impact of long term guarantees measures and transitionals as per QRT data for Groups	<a href="#">0.LTG</a>	<a href="#">FBS.LTG</a>	<a href="#">CBS.LTG</a>
Own funds as per QRT data for Groups	<a href="#">0.OF</a>	<a href="#">FBS.OF</a>	<a href="#">CBS.OF</a>
Calculation of Solvency Capital Requirement as per QRT data for Groups	<a href="#">0.SCR.SF</a>	<a href="#">FBS.SCR.SF</a>	<a href="#">CBS.SCR.SF</a>
Solvency Capital Requirement - for groups using the standard formula and partial internal model as per QRT data for Groups	<a href="#">0.SCR.PIM</a>	<a href="#">FBS.SCR.PIM</a>	<a href="#">CBS.SCR.PIM</a>
Solvency Capital Requirement - for groups on Full Internal Models as per QRT data for Groups	<a href="#">0.SCR.FIM</a>	<a href="#">FBS.SCR.FIM</a>	<a href="#">CBS.SCR.FIM</a>
Impact cyber scenarios per product and per economic sector	<a href="#">FBS.CYBER.IMPACT</a>		
Accumulation exposure cyber insurance per IT service provider	<a href="#">FBS.CYBER.ACC</a>		

\* CBS only for "Cloud outage leading to bursting of tech bubble"

159. Balance sheet ([0.BS, FBS.BS, CBS.BS])

The balance sheet fully replicates the QRT template (S.02.01). Solvency II figures shall be reported under the baseline, stress scenario and stress scenario with reactive management actions. The template shall be used to report balance sheet data of all the participating entities.

160. Impact of the long term guarantees measures and transitionals ([0.LTG, FBS.LTG, CBS.LTG])

The templates replicate the S.22.01 and require the application of the step-by-step approach on the impact of LTG and transitionals on technical provisions, basic and

eligible OF and SCR. The templates shall be filled according to the guidance provided by the log-file of the S.22.01.

161. Own Funds ([0.OF, FBS.OF, CBS.OF])

Information on the OF is collected under each scenario via template S.23.01.

162. Solvency Capital Requirement ([0.SCR.SF, FBS.SCR.SF, CBS.SCR.SF, 0.SCR.PIM, FBS.SCR.PIM, CBS.SCR.PIM, 0.SCR.FIM, FBS.SCR.FIM, CBS.SCR.FIM])

Information on capital requirement shall be provided according to the approach used by the participant in their regular reporting. Participants shall fill in only the template in line with the approach they regularly utilise to report the capital position. Participants calculating their SCR via standard formula or USP should fill-in templates [0.SCR.SF, FBS.SCR.SF, CBS.SCR.SF]. Participants calculating their SCR via partial internal model should fill-in templates [0.SCR.PIM, FBS.SCR.PIM, CBS.SCR.PIM. Participants calculating their SCR via full internal model should fill-in templates [0.SCR.FIM, FBS.SCR.FIM, CBS.SCR.FIM].

163. Cyber specific template ([FBS.CYBER.IMPACT, FBS.CYBER.ACC])

Information on the cyber scenario shall be provided by the participant on the exposure, number of policies, written premiums, gross and net claims split per product line and guarantee and per economic sector [FBS.CYBER.IMPACT]. The accumulation of exposures for cyber insurance shall be provided per IT service provider whose services are used by the policyholders [FBS.CYBER.ACC].

164. Please refer to Annex 1 for the exact list of templates to be submitted.

## 7 Questionnaire

165. The aim of this questionnaire is to provide additional insights into the drivers of the impact of the stress test.

166. The questionnaire also covers the use of simplifications and approximations for the calculation of the post stress figures, especially for the methodology and assumptions used for the cyber scenario and the post stress SCR calculation.

167. Distinct part of the questionnaire refers to the reactive management actions and it aims to provide the further insights and comprehensive understanding on the selection and application of the actions.

168. The questionnaire covers qualitative and quantitative information regarding the process and post-stress impact on the key metrics under the fixed balance sheet approach and the constrained balance sheet approach:

a. "I. Simplifications and approximations": This section focuses on information regarding potential deviations from regular reporting, along with relevant details.

b. "II. Reactive management actions": the section collects information on the identification and application of the reactive management actions enforced against the prescribed scenario. Participants are requested to identifying the management actions and their triggering shocks as well as on the underlying rationale for participating entities to select them. Finally, further information in terms of the internal governance to take and implement the actions is requested, accompanied with an estimation of time, steps and potential additional expenses

- c. **“III. Assessment and impact of the Stress Test”**: The information requested in this section relate to the impact of the stress on the:
- assets over liabilities;
  - eligible OF to meet the SCR;
  - SCR
  - Deffered taxes
  - LTG and Transitional measures

The participating entities are also invited to submit:

- their own overall assessment on the impact of the scenario
- information on the internal process run by participants to produce the results.

## 8 Timeline

169. The NBB Insurance Stress Test 2022 will be launched on 16 May 2022. The results will have to be submitted to the NBB no later than 12 August 2022.

170. Participating undertakings are kindly invited to an NBB **information session** covering all aspects of the NBB Insurance Stress Test 2022. This will take place on **19 April 2022 from 15:00 till 17:00** via online conference call. Each participant will receive an invitation email and the necessary information to log in. Please confirm your participation by sending an email to [ist@nbb.be](mailto:ist@nbb.be) with the name of the participants before **15 April 2022**.

171. The following table gives an overview of the detailed timeline of the NBB Insurance Stress Test 2022.

Date	Activity
19 April 2022	Pre-launch to participants: Transmission to the participants of technical specifications, technical information, and templates
19 April – 29 April 2022	Questions and Answers process
19 April 2022, 15h00	Online information session NBB
16 May 2022	Official launch of the NBB Insurance Stress Test 2022 (OneGate)
20 June – 1 July 2022	Discussion with undertakings concerning silent cyber risk
12 August 2022	Submission of the results
August/September 2022	Validation (resubmission) and analysis of the results
December 2022	Publication of NBB stress test results

172. For information purposes only, a mock spreadsheet containing all reporting templates is available on the NBB stress test webpage (NBB IST 2022 reporting templates). The reporting templates have been developed with the intention to

be as consistent as possible with the corresponding Solvency II QRTs and previous year's stress test templates.

173. After the submission of the results, a thorough validation will take undertaken by the NBB. Undertakings should be able to explain the main drivers behind the impact of a scenario on their balance sheet and solvency. The analysis of the results could lead to a request for further clarifications and/or resubmission of the results.