STUDY TO ASSESS THE RISKS AND VULNERABILITIES OF TOURISM TO CLIMATE CHANGE IN VALENCIA

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### GOesg Assessment Methodology (Planning)

Summary of the <u>Global Planning/Policies</u> evaluation conducted, and evolution of the scenarios as per IPCC criteria (accelerated 2037, 2050).

| <b>RISK FAMILIES</b>                                  | CURRENT SCENARIO RCP 2.6 (2023) | SCENARIO RCP 4.5 (2037) | EXTREME SCENARIO RCP 8.5 (2050) |
|---|---------------------------------|-------------------------|---------------------------------|
| FM-01: SCARCITY OF WATER<br>RESOURCES                 | HIGH MANAGED RISK               | SEVERE RISK             | CATASTROPHIC RISK               |
| FM-02: LOSS OF THERMAL<br>COMFORT                     | LATENT RISK UNDER CONTROL       | HIGH MANAGED RISK       | SEVERE RISK                     |
| FM-03: ADVERSE WEATHER<br>PHENOMENA                   | MEDIUM MANAGED RISK             | HIGH MANAGED RISK       | SEVERE RISK                     |
| FM-04: LOSS OF<br>BIODIVERSITY. LAND<br>ENVIRONMENT   | LATENT RISK UNDER CONTROL       | ACCEPTABLE MANAGED RISK | HIGH MANAGED RISK               |
| FM-05: ENVIRONMENTAL<br>DEGRADATION                   | ACCEPTABLE MANAGED RISK         | MEDIUM MANAGED RISK     | SEVERE RISK                     |
| FM-06: LOSS OF<br>BIODIVERSITY. MARINE<br>ENVIRONMENT | SEVERE RISK                     | VERY SEVERE RISK        | CATASTROPHIC RISK               |
| FM-07: SEALEVEL RISE                                  | LATENT RISK UNDER CONTROL       | MEDIUM MANAGED RISK     | VERY SEVERE RISK                |
| FM-08: DEMOGRAPHIC AND<br>SOCIAL CHALLENGES           | ACCEPTABLE MANAGED RISK         | SEVERE RISK             | VERY SEVERE RISK                |

## GOesg Assessment Methodology (Adaptation)

Summary of the evaluation done for the <u>Adaptation/Resilience</u> involving the Risk Groups of each Family and the current moment. It is evaluated as will be seen in the breakdown of trends

| RISK FAMILIES                                   | RISK GROUPS  | ESG SCORE               |
|---|--|-------------------------|
|   | Water stress- scarcity   | NEUTRAL TO LOW (B)      |
| The of scancity of water recourses              | Water stress- Difficult to access  | NEUTRAL TO LOW (B)      |
| FIN-01: SCARCITY OF WATER RESOURCES             | Drought - Limit consumption "uses"   | NEUTRAL TO LOW (B)      |
|   | Extreme drought - Limit human consumption  | MODERATELY NEGATIVE (C) |
|   | Extreme Temperatures - Mobility Risk   | POSITIVE (A)            |
|   | Extreme temperatures - Inhabitability of spaces and<br>structures  | POSITIVE (A)            |
| FMI-02: LOSS OF THERMAL COMFORT                 | Extreme Temperatures - Direct risk to human health   | POSITIVE (A)            |
|   | Extreme temperatures - Increased risks of pathogens<br>and diseases  | POSITIVE (A)            |
|   | Floods - Mobility  | NEUTRAL TO LOW (B)      |
|   | Floods - Isolation and risks to life   | POSITIVE (A)            |
| FM-03: ADVERSE WEATHER PHENOMENA                | Cyclonic storm. Winds and snowfall - Mobility  | POSITIVE (A)            |
|   | Cyclonic storm. Winds and snowfall - Isolation and<br>risks to life  | POSITIVE (A)            |
|   | Environmental fires  | POSITIVE (A)            |
| FM-04: LOSS OF BIODIVERSITY. LAND ENVIRONMENT   | Loss of natural areas and native species (flora)   | NEUTRAL TO LOW (B)      |
|   | Invasive species and pests (fauna)   | POSITIVE (A)            |
|   | Loss of ecological flows in river environments   | NEUTRAL TO LOW (B)      |
|   | Desertification of the surrounding environment   | POSITIVE (A)            |
| FM-05: ENVIRONMENTAL DEGRADATION                | Territorial planning - Energy transition   | NEUTRAL TO LOW (B)      |
|   | Territorial planning - Flood zones   | POSITIVE (A)            |
|   | Territorial planning - Protected areas   | NEUTRAL TO LOW (B)      |
|   | Increase in pathogens and animal species (e.g.<br>jellyfish) due to increase in water layer temperature  | HIGHLY NEGATIVE (D)     |
|   | Increase in pathogens and animal species (e.g.<br>jellyfish) due to lack of water quality and effluent<br>control                              | POSITIVE (A)            |
| FM-06: LOSS OF BIODIVERSITY. MARINE ENVIRONMENT | Loss of biodiversity due to the management of<br>maritime traffic to account for changing routes due<br>to climate issues                      | POSITIVE (A)            |
|   | Loss of biodiversity due to the management of<br>maritime traffic to account for changing routes of<br>migratory species due to climate issues | POSITIVE (A)            |
|   | Pounding seas and tides  | POSITIVE (A)            |
| FM-07: SEALEVEL RISE                            | Effects on man-made structures - Infrastructure<br>lifespan  | NEUTRAL TO LOW (B)      |
|   | Waterspouts and climate risks with effects on marine<br>environments. Extraordinary risks from extreme<br>climate change                       | NEUTRAL TO LOW (B)      |
|   | Migration and desertion of near/rural environments   | MODERATELY NEGATIVE (C) |
|   | Competitiveness of the economic model of the<br>environment. Local and circular economy  | POSITIVE (A)            |
| FM-08: DEMOGRAPHIC AND SOCIAL CHALLENGES        | Uncertainty in policies to adapt to climate change   | MODERATELY NEGATIVE (C) |
|   | Uncertainty in the compatibility of economic<br>activities   | NEUTRAL TO LOW (B)      |
|   |  |                         |

TOTAL ESG SCORE: NEUTRAL TO LOW (B)



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### Comparison of notable data Planning vs Adaptation



The Water Scarcity risk family will exhibit a considerable negative trend in terms of its impact on tourism activity in scenario RCP 8.5 (2050)

| RISK FAMILIES                         | CURRENT SCENARIO RCP 2.6 (2023) | SCENARIO RCP 4.5 (2037) | EXTREME SCENARIO RCP 8.5 (2050) |
|---------------------------------------|---------------------------------|-------------------------|---------------------------------|
| FM-01: SCARCITY OF<br>WATER RESOURCES | HIGH MANAGED RISK               | SEVERE RISK             | CATASTROPHIC RISK               |

To date, the capacity to respond in terms of Resilience is guaranteed, unless there are restrictions on human consumption, which would significantly affect tourism activity; fortunately, the management of the complete water cycle in the city of Valencia represents the highest water efficiency with real measurement in Europe, which allows a scenario that fully leverages the available water resources.

| RISK FAMILIES         | RISK GROUPS                               | ESG SCORE               |
|-----------------------|---|-------------------------|
|                       | Water stress- scarcity                    | NEUTRAL TO LOW (B)      |
|                       | Water stress- Difficult to access         | NEUTRAL TO LOW (B)      |
| FM-01: WATER SCARCITY | Drought - Limit consumption "uses"        | NEUTRAL TO LOW (B)      |
|                       | Extreme drought - Limit human consumption | MODERATELY NEGATIVE (C) |



The Loss of Thermal Comfort risk family, due to the special characteristics of the environment of the city of Valencia, is currently a Latent Risk under Control, meaning it is very important to maintain policies in the city that allow preserving this natural space, and that thus address scenario RCP 8.5 (2050)

| RISK FAMILIES                     | CURRENT SCENARIO RCP 2.6 (2023) | SCENARIO RCP 4.5 (2037) | EXTREME SCENARIO RCP 8.5 (2050) |
|-----------------------------------|---------------------------------|-------------------------|---------------------------------|
| FM-02: LOSS OF THERMAL<br>COMFORT | LATENT RISK UNDER CONTROL       | HIGH MANAGED RISK       | SEVERE RISK                     |

For this reason, when evaluating the current Resilience of the city to cope with this Climate Risk and its effect on Tourism, as long as the Natural Heritage of the environment is kept intact, it is obvious that Valencia will be strengthened as a Tourist Destination; even so, the trend must be constantly monitored and controlled if scenario RCP 8.5 (2050) occurs.

| <b>RISK FAMILIES</b>           | RISK GROUPS   | ESG SCORE    |
|--------------------------------|---|--------------|
|                                | Extreme Temperatures - Mobility Risk                                | POSITIVE (A) |
|                                | Extreme temperatures - Inhabitability of spaces and<br>structures   | POSITIVE (A) |
| FM-02: LOSS OF THERMAL COMFORT | Extreme Temperatures - Direct risk to human health                  | POSITIVE (A) |
|                                | Extreme temperatures - Increased risks of pathogens and<br>diseases | POSITIVE (A) |



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### Comparison of notable data Planning vs Adaptation



The risk family of Adverse Weather Phenomena and its effect on tourism activity has a negative connotation due to the increased risks of cut-off lows or Cold Drops in scenario RCP 8.5 (2050)

| <b>RISK FAMILIES</b>                | CURRENT SCENARIO RCP 2.6 (2023) | SCENARIO RCP 4.5 (2037) | EXTREME SCENARIO RCP 8.5 (2050) |
|-------------------------------------|---------------------------------|-------------------------|---------------------------------|
| FM-03: ADVERSE WEATHER<br>PHENOMENA | MEDIUM MANAGED RISK             | HIGH MANAGED RISK       | SEVERE RISK                     |

Today, the ability to respond in terms of Resilience is under control, except for the problems involving mobility caused by these climatological phenomena, although the trend is negative for the reasons analyzed in the Planning, meaning the city should further implement Nature-Based Solutions that also contribute positively to the capture of CO2 emissions.

| RISK FAMILIES                    | RISK GROUPS   | ESG SCORE          |
|----------------------------------|---|--------------------|
|                                  | Floods - Mobility   | NEUTRAL TO LOW (B) |
|                                  | Floods - Isolation and risks to life                                | POSITIVE (A)       |
| FM-03: ADVERSE WEATHER PHENOMENA | Cyclonic storm. Winds and snowfall - Mobility                       | POSITIVE (A)       |
|                                  | Cyclonic storm. Winds and snowfall - Isolation<br>and risks to life | POSITIVE (A)       |



The Loss of Terrestrial Biodiversity risk family and its effect on tourism activity is under control due to the natural idiosyncrasy of the environment of Valencia, even in scenario RCP 8.5 (2050).

| <b>RISK FAMILIES</b>                                | CURRENT SCENARIO RCP 2.6 (2023) | SCENARIO RCP 4.5 (2037) | EXTREME SCENARIO RCP 8.5 (2050) |
|---|---------------------------------|-------------------------|---------------------------------|
| FM-04: LOSS OF<br>BIODIVERSITY. LAND<br>ENVIRONMENT | LATENT RISK UNDER CONTROL       | ACCEPTABLE MANAGED RISK | HIGH MANAGED RISK               |

However, this Natural Heritage that upholds this positive conception in the preservation of biodiversity must be reinforced in Loss of Natural Spaces and Native Species (flora) and Loss of Ecological Flows in River Environments risk groups.

| <b>RISK FAMILIES</b>                         | RISK GROUPS                                      | ESG SCORE          |
|--|--|--------------------|
|  | Environmental fires                              | POSITIVE (A)       |
| M-04: LOSS OF BIODIVERSITY. LAND ENVIRONMENT | Loss of natural areas and native species (flora) | NEUTRAL TO LOW (B) |
|  | Invasive species and pests (fauna)               | POSITIVE (A)       |
|  | Loss of ecological flows in river environments   | NEUTRAL TO LOW (B) |

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### Comparison of notable data Planning vs Adaptation



The <u>Degradation of the Natural Environment</u> risk family will have a negative trend due to the apparent need to degrade the natural environment to meet the needs of the energy transition; either that or said transition will have to take place outside the city environment to safely face scenario RCP 8.5 (2050)

| RISK FAMILIES                       | CURRENT SCENARIO RCP 2.6 (2023) | SCENARIO RCP 4.5 (2037) | EXTREME SCENARIO RCP 8.5 (2050) |
|-------------------------------------|---------------------------------|-------------------------|---------------------------------|
| FM-05: ENVIRONMENTAL<br>DEGRADATION | ACCEPTABLE MANAGED RISK         | MEDIUM MANAGED RISK     | SEVERE RISK                     |

This aspect is apparent when the **Resilience** is evaluated under its 4 Risk Groups, which reveals two problems inherent to the available physical space, marked on the one hand by the natural heritage of the Albufera and Valencia's farmland, and by the critical structural hydraulic works carried out in the 20th century as a result of the floods of 1957, meaning the main challenge to face scenario RCP 8.5 (2050) is that of where to physically locate renewable energy projects in order to undertake the unavoidable energy transition.

| RISK FAMILIES                     | RISK GROUPS                                    | ESG SCORE          |
|-----------------------------------|--|--------------------|
|                                   | Desertification of the surrounding environment | POSITIVE (A)       |
|                                   | Territorial planning - Energy transition       | NEUTRAL TO LOW (B) |
| FIN-05: ENVIRONMENTAL DEGRADATION | Territorial planning - Flood zones             | POSITIVE (A)       |
|                                   | Territorial planning - Protected areas         | NEUTRAL TO LOW (B) |
|                                   |  |                    |
|                                   |  |                    |

The <u>Loss of Marine Biodiversity</u> risk family is, together with the Water Scarcity family, the risk that most affects tourism, in this case due to a concept of loss of Mediterranean identity, since the Mediterranean Sea is one of the most affected by climate change, and the tourists that visit Valencia are inexorably drawn by the sea.

| <b>RISK FAMILIES</b>                                  | CURRENT SCENARIO RCP 2.6 (2023) | SCENARIO RCP 4.5 (2037) | EXTREME SCENARIO RCP 8.5 (2050) |
|---|---------------------------------|-------------------------|---------------------------------|
| FM-06: LOSS OF<br>BIODIVERSITY. MARINE<br>ENVIRONMENT | SEVERE RISK                     | VERY SEVERE RISK        | CATASTROPHIC RISK               |

It is a serious risk currently because there is a precedent very close by in the Mar Menor, and because Resilience is very limited in response to increasing temperatures in the Mediterranean Sea, which in the summer of 2022 exceeded an average temperature of 32°.

The work carried out by the Oceanogràfic Foundation and the Azul Marino Foundation, among others, is paving the way for modern technologies to provide Resilience to address, with reasonable assurances, the displacement of species due to climate change, avoiding physical damage due to collisions with marine vessels and other risks inherent in these behavioral changes.

| RISK FAMILIES  | RISK GROUPS   | ESG SCORE           |
|--|---|---------------------|
| FM-06: LOSS OF<br>IODIVERSITY. MARINE<br>ENVIRONMENT | increase in pathogens and animal species (e.g. jellyfish) due to increase in water layer temperature  | HIGHLY NEGATIVE (D) |
|  | increase in pathogens and animal species (e.g. jellyfish) due to lack of water<br>quality and effluent control                              | POSITIVE (A)        |
|  | Loss of biodiversity due to the management of maritime traffic to account for<br>changing routes due to climate issues                      | POSITIVE (A)        |
|  | Loss of biodiversity due to the management of maritime traffic to account for<br>changing routes of migratory species due to climate issues | POSITIVE (A)        |
|  | changing routes of migratory species due to climate issues  |                     |

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> **02.** "Planning" Assessment

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### Comparison of notable data Planning vs Adaptation



The Sea Temperature Rise risk family evaluates the physical risks that an increase in sea temperature has on land infrastructures and their effect on tourism activity in scenario RCP 8.5 (2050).

| RISK FAMILIES        | CURRENT SCENARIO RCP 2.6 (2023) | SCENARIO RCP 4.5 (2037) | EXTREME SCENARIO RCP 8.5 (2050) |
|----------------------|---------------------------------|-------------------------|---------------------------------|
| FM-07: SEALEVEL RISE | LATENT RISK UNDER CONTROL       | MEDIUM MANAGED RISK     | VERY SEVERE RISK                |

It is obvious and evident that the plans and studies carried out on sea level rise caused by climate change require studies and investments in civilian infrastructures that will protect the coastline. That notwithstanding, this study focuses on the direct effect on tourism activity from the point of view of which the **Resilience** of Valencia as a tourist destination can be considered adequate, although the trend is negative and the existing infrastructures will be insufficient to deal with scenario RCP 8.5 (2020).



The risk family of <u>Demographic and Social Challenges</u> from the standpoint of climate risks to tourism activity evaluates the contribution of the immediate environment to the mitigation of the physical risks of climate change, for example "abandonment of the natural environment" surrounding the city and its effects in scenario RCP 8.5 (2050).

| RISK FAMILIES                               | CURRENT SCENARIO RCP 2.6 (2023) | SCENARIO RCP 4.5 (2037) | EXTREME SCENARIO RCP 8.5 (2050) |
|---|---------------------------------|-------------------------|---------------------------------|
| FM-08: DEMOGRAPHIC AND<br>SOCIAL CHALLENGES | ACCEPTABLE MANAGED RISK         | SEVERE RISK             | VERY SEVERE RISK                |

In this sense, the **Resilience** of Valencia as a tourist destination starts to exhibit worrying symptoms of vulnerability to the Climate Risks brought about by Climate Change. For example, of the more than 10,000 hectares of farmland that surround the city of Valencia, 50% are no longer cultivated, with a considerable upward trend likely in coming years due to the lack of generational renewal. Initiatives such as the HortiGO2 project to invest in the fight against climate change by offering solutions to regenerate the natural environment and promoting sustainable agriculture as a carbon sink, have to contribute significantly to increasing Resilience if we are to deal with scenario RCP 8.5 with any certainty (2050)

| RISK FAMILIES                            | RISK GROUPS   | ESG SCORE               |
|--|---|-------------------------|
|  | Migration and desertion of near/rural environments                                      | MODERATELY NEGATIVE (C) |
|  | Competitiveness of the economic model of the<br>environment. Local and circular economy | POSITIVE (A)            |
| FM-08: DEMOGRAPHIC AND SOCIAL CHALLENGES | Uncertainty in policies to adapt to climate change                                      | MODERATELY NEGATIVE (C) |
|  | Uncertainty in the compatibility of economic<br>activities                              | NEUTRAL TO LOW (B)      |
|  |   |                         |

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