Risk Screening for Water Use

Galp's Integrated Water Risk Assessment

December 2021

Strategy and Sustainability

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Acronyms and Abbreviations

GMI	Galp Operations in African countries
SV	Seasonal Variability
WBCSD	World Business Council for Sustainable Development
WRI	World Resources Institute

1. Introduction

Water is an essential natural resource for the operation of all industrial activities. The current trends of population growth and consequent urbanization and industrialization have resulted in this resource being increasingly subject to numerous pressures - locally, regionally and globally -, which threaten its sustainability.

In that sense, companies are increasingly concerned with assessing the future availability of water in the areas where they operate and in determining the risks and impacts inherent in the use of water in their activities. In recent years, various tools and methodologies have been developed to help companies respond to this challenge.

The Strategy and Sustainability Department at Galp, whilst aware of the need to highlight these topics in its corporate activities, has drawn up and published strategic plans and support studies related with potential impacts of its operations, demonstrating its permanent concern with this theme.

Galp is currently using the WRI Aqueduct Water Tool. The WRI Aqueduct Water Tool was developed with the support of the Aqueduct Alliance, a coalition of companies, governments and foundations at the cutting edge of water stewardship. This tool map water risks such as floods, droughts, and stress, using open-source, peer reviewed data. It is used to identify and evaluate water risks around the world. It has the advantage of being available online, free of charge, and useful for companies to assess and disclose the use of water and qualitative risks associated with it, in terms of availability and access to water.

The application of the tool presented can be interesting as a first approach to the dissemination of the use of water in Galp and to a risk assessment. However, for the proper management of risks associated with water quality and availability, it is necessary to complement the results obtained in the application of this tool with studies and specific instruments of operational management of the risks and impacts to the facilities at a local scale.

2. Scope and Limitations

At Galp, any scarcity or uncertainty related with resources, in particular water, both in the present and in the future, represents an operational and strategic concern. In this sense, the knowledge of the risks associated with the use of water in the various regions where it operates or holds a stake is fundamental to the sustainable growth of the Company.

The present document has been prepared with the purpose of presenting the risks associated with water resources, in all locations where Galp operates, through the results obtained from the application of the WRI Aqueduct Water Tool. Thus, the scope of the study extends to all facilities in which Galp operates or holds a stake, except for the Commercial Retail department. In total, 85 sites were analysed according to the Company's activities.

Table 1 - Galp sites considered in the Water Risk Assessment

Activities	No. of sites
Biofuel units	3
Exploration & Production	31
Renewable Energy Sources	23
Storage Facilities & Terminals	25
Refining	1
Cogeneration Units	2
Total	**85**

All sites were introduced in the WRI Aqueduct Water Tool and the water risks were analysed considering the defined scales for each indicator.

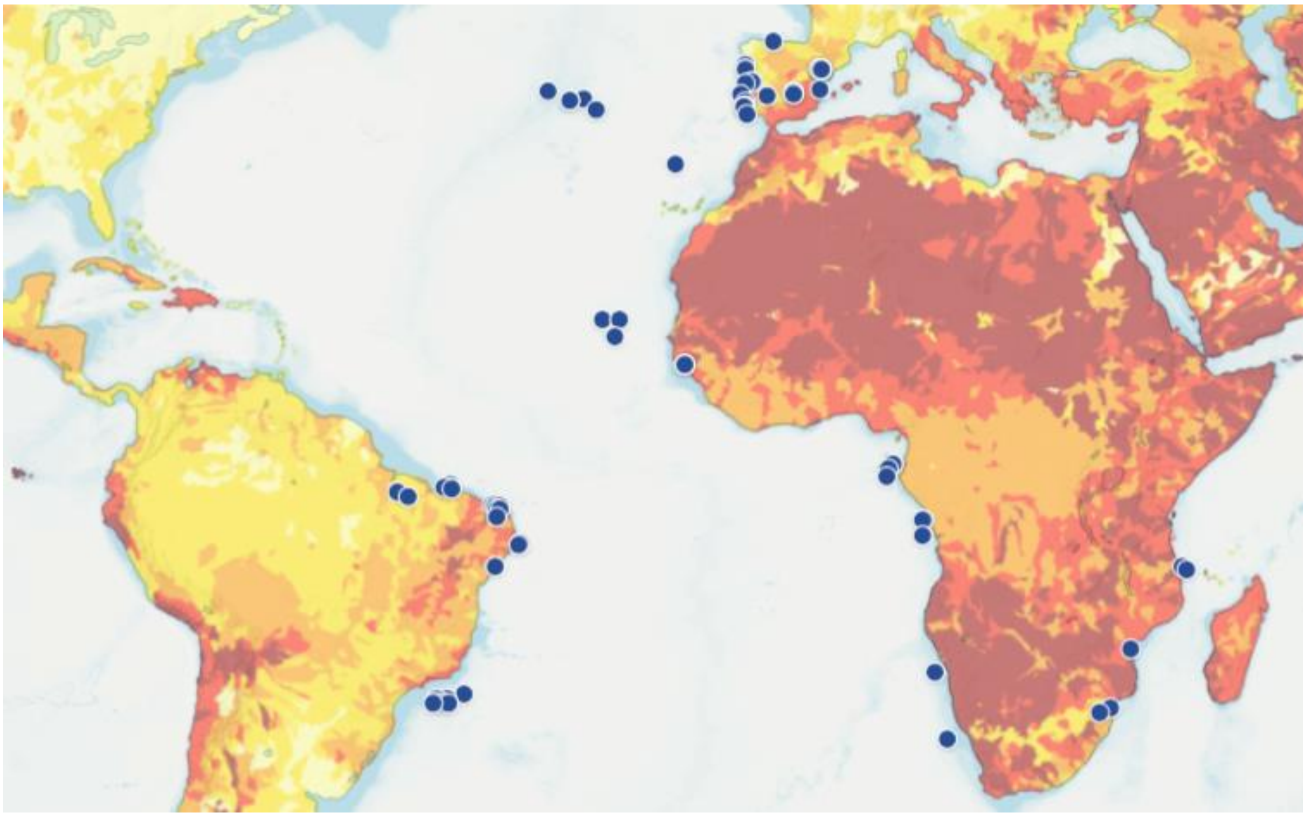

Figure 1 - Overall water risks WRI Aqueduct Tool print

The list of sites under consideration can be consulted in detail in Annex I, as well as the respective coordinates used in the application of the WRI Aqueduct Water Tool.

For each site, the Baseline data 2021 was analysed considering the following indicators:

- Overall Water Risk
- Physical Water Quantity Risks
    - Water Stress (Baseline)
    - Water Depletion
    - Groundwater Table Decline
    - Interannual Variability
    - Seasonal Variability (Baseline)
    - Drought Risk
    - Riverine flood Risk
    - Coastal flood Risk
- Physical Water Quality Risk
    - Untreated Connected Wastewater
    - Coastal Eutrophication Potential
- Regulatory and Reputational Risk
    - Unimproved/no drinking water
    - Unimproved/no sanitation
    - Peak RepRisk Country ESG Risk Index

The weightings considered for each indicator are defined in the WRI Aqueduct Water Tool, as shown below.

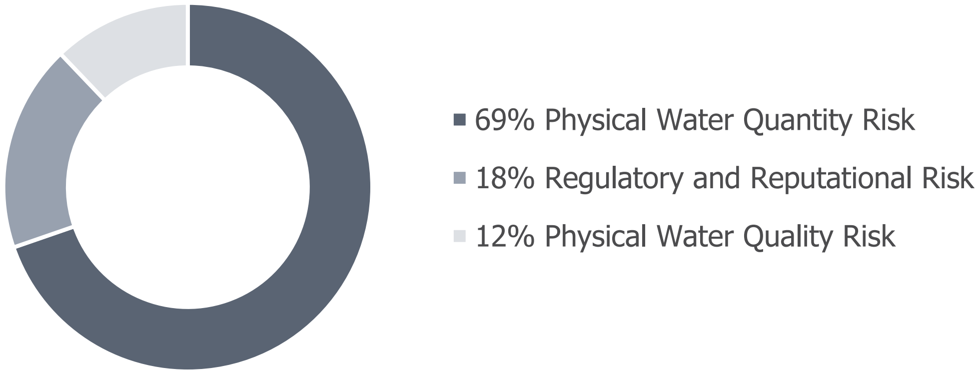

Figure 2 - Overall Water Risk weighings composition

In addition, Future Scenarios for 2030, in the Business as usual and Optimistic approaches, were analysed considering the following indicators:

- Water Stress
- Seasonal Variability
- Water Supply
- Water Demand

The meaning of all these indicators can be better understood by reading the corresponding definitions available in the Glossary.

Offshore Exploration & Production blocks, 28 out of the 31, were only considered for the purpose of assessing eventual risks for the corresponding geographical land areas that are associated with or near them. It should be noted that in the most of offshore blocks, the freshwater consumption is represented by a small portion of the total amount of water used in upstream activities. This fresh water has human supply as the main purpose, representing no significant volume for the activity, which main use/consumption comes from saltwater. Since saltwater, not classed as scarce, is predominantly used, the risks associated with these facilities are negligible. Regarding this water risk analysis, these sites shall be included in the "No Data" category.

3. Results and Discussion

In this chapter the results obtained per activity of Galp are presented, also taking into account the countries where these activities are in place. Subsequently, for each one, there are specific indicators, detailed in the 2. Scope and Limitations section of this report, for the baseline 2021 approach.

Biofuel units

In the biofuel's activity, it is analysed a production plant of second-generation biofuels - Enerfuel (Portugal) - and two fields with crop plantations for the production of biofuels (Brazil).

Overall water risk

The overall water risk is different for each site. In Portugal the overall water risk is high, falling to medium-high and low-medium in the crop plantations in Brazil.

Table 2 - Biofuel units Overall water risk

Name	Overall Water Risk
Biofuels - Palma crops (TailândiaPará)	Low - Medium (1-2)
Biofuels - Palma crops (Tomé-açuPará)	Medium - High (2-3)
Biofuels - Enerfuel (2nd Generation biofuel plant)	High (3-4)

Physical Water Quantity Risks

In Portugal, the physical water quantity risk is extremely high, mainly due to the extremely high water stress and high water depletion verified in this region.

In Brazil, both sites have low physical water quantity risks, contributed by the low water stress, water depletion and coastal flood risk and the low-medium drought risk. The seasonal variability is higher in Brazil than in Portugal with medium-high and low medium values, respectively.

Physical Water Quality Risks

In Portugal the physical water quality risk is low-medium, a consequence balance of the low untreated connected wastewater and high coastal eutrophication potential indicators.

The tendency is opposite in Brazil, with a medium-high physical water quality risk, result of a medium-high untreated connected wastewater and low coastal eutrophication potential.

Regulatory and Reputational Risk

The Biofuel units in Brazil have an extremely high regulatory and reputational risk due to the extremely high level of unimproved/ no sanitation and high levels of unimproved/no drinking water.

In Portugal the regulatory and reputational risk is low as all indicators of sanitation and drinking water are low risk.

Exploration & Production

In the Exploration & Production activity, as previously referred, only the onshore sites have water risk data. Therefore, the results presented are only referring to the 3 onshore sites, as the 28 offshore sites are labelled as no data. The list of offshore sites can be consulted in detail in Annex I.

Overall Water Risk

The overall water risk in Brazil sites is high in Rabo Branco and extremely high in Rovuma and Sanhaçu.

Table 3 - Exploration & Production onshore sites Overall water risk

Name	Overall Water Risk
EP - Rabo Branco (onshore) (SEAL-T-412429) [1]	High (3-4)
EP - LNG Plant (Rovuma - onshore)	Extremely High (4-5)
EP - Sanhaçu (onshore) (POT-T-436479480)	Extremely High (4-5)

[1] Asset sold in 2020

Physical Water Quantity Risks

Both Rabo Branco and Rovuma sites have high physical water quantity risk. Rabo Branco is characterized by low-medium water depletion, interannual variability, seasonal variability and coastal flood risk, medium drought risk and medium-high water stress and riverine flood risk. Rovuma has low-medium water stress, water depletion, drought risk, counting with medium-high seasonal variability and extremely high interannual variability, riverine flood risk and coastal flood risk.

Sanhaçu has an extremely high physical water quantity risk, mainly due to the high water stress and coastal flood risk and medium-high water depletion, interannual and seasonal variability.

Physical Water Quality Risks

When it comes to physical water quality risks, Rabo Branco and Sanhaçu are classified as medium-high risk. Rovuma has an extremely high physical water quality risk mainly due to the extremely high untreated connected wastewater indicator.

Regulatory and Reputational Risk

The Rabo Branco and Sanhaçu units in Brazil have a high regulatory and reputational risk due to the extremely high level of unimproved/ no sanitation and medium-high levels of unimproved/no drinking water. Rovuma has an extremely high regulatory and reputational risk due to the extremely high levels of unimproved/ no sanitation and unimproved/no drinking water.

Renewable Energy Sources

Overall Water Risks

From the 23 Renewable sites, 15 of them have a low Overall Water Risk, consequence of Low-Medium Physical Water Quantity Risks and Low Physical Water Quality and Regulatory and Reputational Risks. The results presented are referred to the remaining 8 renewable sites with low-medium, medium-high and high overall water risks. The list of the remaining sites can be consulted in Annex I.

Table 4 - Renewable energy sites with higher Overall water risk

Name	Overall Water Risk
RNW - Parque Eólico de Vale Grande	Low - Medium (1-2)
RNW - Vestinveste	Low - Medium (1-2)
RNW - Alcazar 1	Medium - High (2-3)
RNW - Alcazar 2	Medium - High (2-3)
RNW - FV Ictio Manzanares Solar	Medium - High (2-3)
RNW - Valdecarro	Medium - High (2-3)
RNW - Valdivieso	Medium - High (2-3)
RNW – ParkAlgar [2]	High (3-4)

[2] Parkalgar is a PV plant, located in Algarve, that results from a partnership between Galp and Efacec and Galp doesn't consolidate this site

Physical Water Quantity Risk

The Physical Water Quantity Risk varies according to the solar parks' locations. In Portugal, where 3 of the 8 higher risk sites are located, the parks in centre Portugal, in the Coimbra province, Parque Eólico de Vale Grande and Ventinveste have a high Physical Water Quantity Risk and the park in south of Portugal, in the Faro province has an extremely high Physical Water Quantity Risk, as this region has high water stress and water depletion.

In Spain, where the other 5 solar parks are located, Alcazar 1, Alcazar 2, FV Ictio Manzanares Solar, Valdecarro and Valdivieso, the Physical Water Quantity Risk is extremely high as they are located in the Castila-La Mancha province where water stress is extremely high and water depletion is high.

Physical Water Quality Risk

Considering that these 8 solar parks are located in Portugal and Spain, the Physical Water Quality Risk is low for all of them, except ParkAlgar, located in the Faro province, where this risk is low-medium. The untreated connected wastewater indicator is low for all 8 sites and the coastal eutrophication potential is low-medium for all Spain sites, medium-high for the 2 centre Portugal sites and high for the south Portugal site, in the Faro province.

Regulatory and Reputational Risk

Once more, and taking into account that these 8 sites are located in Portugal and Spain, the regulatory and reputational risk is low, a consequence of the low evaluation for the unimproved/ no drinking water and unimproved/ no sanitation indicators.

Storage Facilities & Terminals

Overall Water Risk

From the 25 Storage facilities and terminals, 11 of them have a low-medium Overall Water Risk, consequence of high Physical Water Quantity Risks, from being located in Portugal and Spain.
The results presented are referred to the remaining 14 sites with medium-high, high and extremely high Overall Water Risks. The list of the remaining sites can be consulted in detail in Annex I.

Table 5 - Storage facilities & terminals with medium, high and extremely high Overall water risk

Name	Overall Water Risk
GMI - CLC	Medium - High (2-3)
GMI - Park of LPG (Casamance)	Medium - High (2-3)
GMI - Parque de Boloia	Medium - High (2-3)
Parques - Mérida	Medium - High (2-3)
GMI - FUEL Park of Matsapha	High (3-4)
GMI - Park of Beira	High (3-4)
GMI - Park of LPG	High (3-4)
Parques - Bancas de Sines	High (3-4)
Parques - Mitrena	High (3-4)
Parques - Sigás	High (3-4)
Parques - Sines Terminal	High (3-4)
GMI - Park of S. Vicente Island	Extremely High (4-5)
GMI - Park of Sal Island	Extremely High (4-5)
GMI - Park of Santiago Island	Extremely High (4-5)

Physical Water Quantity Risk

In Guinea-Bissau, where GMI-CLC, Park of LPG and Parque de Boloia are located, and in Mozambique, where Park of Beira and Park of LPG are located, the Physical Water Quantity Risk is medium-high, as water stress and water depletion are low.
In Eswatini, where the Fuel Park of Matsapha is located, the Physical Water Quantity Risk is high, as a reflection on high riverine flood risk and medium-high seasonal variability.
The storage facilities located in Portugal - Parque Bancas de Sines, Mitrena, Sigás and Sines Terminal - and in Spain, Mérida, have an extremely high Physical Water Quantity Risk. In Portugal, all the sites are located in areas with extremely high water stress and high water depletion, with a medium-high interannual variability and drought risk. The storage facility in Spain is located in an area of high

water stress, medium-high water depletion, with a medium-high interannual variability and drought risk.
The storage facilities located in Cape Verde, Park of S.Vicente Island, Park of Sal Island and Park of Santiago Island, don't present data for Physical Water Quantity Risk.

Physical Water Quality Risk

The Physical Water Quality Risk is lower for sites located in Europe than it is for sites located in Africa. All storage facilities in Portugal have a low-medium Physical Water Quality Risk, with high coastal eutrophication potential. The storage facility in Spain has a low Physical Water Quality Risk, with low-medium coastal eutrophication potential. All these sites have a low untreated connected wastewater value as they are located in areas with sewerage system and treated to at least a primary treatment level.
In Africa, the storage facilities located in Guinea-Bissau, Eswatini and Mozambique present a high Physical Water Quality Risk with extremely high untreated connected wastewater values. The 3 sites located in Cape Verde have an extremely high Physical Water Quality Risk, with low to no wastewater collected.

Regulatory and Reputational Risk

The Regulatory and Reputational Risk is lower for sites located in more developed countries, namely Portugal, Spain and Cape Verde. In Portugal and Spain the Regulatory and Reputational Risk is low, increasing to low-medium in Cape Verde.
The risk gets extremely high in Guinea-Bissau, Eswatini and Mozambique, mainly due to the high, in Guinea-Bissau, and extremely high, in Eswatini and Mozambique, unimproved/no drinking water and extremely high unimproved/no sanitation, in all 3 areas.

Refining

Overall Water Risk

Since the Sines Refinery is located in the southern area of Portugal, where Physical Water Quantity Risks are extremely high, the Overall Water Risk is considered as high.

Table 6 - Refining Overall water risk

Name	Overall Water Risk
Refining - Sines	High (3-4)

Physical Water Quantity Risk

The Physical Water Quantity Risk in the Sines province of Portugal is extremely high, consequence of and extremely high water stress, high water depletion and medium-high interannual variability and drought risk.

Physical Water Quality Risk

The Physical Water Quality Risk in the area is low-medium, mainly as a result of a high coastal eutrophication potential, as the refinery is located near the coastline.

Regulatory and Reputational Risk

Taking into account that the refinery is located in Portugal, where unimproved/no drinking water and unimproved/ no sanitation indicators are low, the Regulatory and Reputational Risk is low.

Cogeneration Units

Overall Water Risk

For both Cogeneration Units, located in Portugal, the Overall Water Risk is low-medium, mainly contributed by high Physical Water Quantity Risks.

Table 7 - Cogeneration Units Overall water risk

Name	Overall Water Risk
Cogeneration Unit - Agroger	Low - Medium (1-2)
Cogeneration Unit - Carriço	Low - Medium (1-2)

Physical Water Quantity Risk

Even though the 2 cogeneration units are located in different provinces of Portugal – Agroger in Lisboa and Carriço in Leiria – the Physical Water Quantity Risk is high for both sites.
Both cogeneration units are located in areas that present a medium-high water stress, medium drought risk and low-medium water depletion, coastal flood risk and interannual and seasonal variability.

Physical Water Quality Risk

Both sites have the same evaluation, with a low Physical Water Quality Risk, a result of a low untreated connected wastewater value and medium-high coastal eutrophication potential, as both are located along the Portuguese coastline.

Regulatory and Reputational Risk

The Regulatory and Reputational Risk in Portugal is low, where unimproved/no drinking water and unimproved/ no sanitation indicators are low.

4. Conclusions

Through the analysis performed to the Galp sites with the WRI Aqueduct Water Tool and taking into account what was presented throughout the document, around 33% of Galp's sites had No Data for water risk analysis, which correspond to the offshore Exploration & Production sites.
Considering the remaining sites with data collected, and when looking at Overall Water Risks, it is clear that more than 70% of the sites have a medium-high risk or lower. Only 28% of the sites are located in areas with high water stress, with high or extremely high Overall Water Risks. These 16 sites are storage facilities and a renewable plant located in the southern region of Portugal, storage facilities in Cape Verde, Eswatini and Mozambique, Exploration & Production onshore sites in Brazil and Cape Verde and a biofuel unit and refinery located in Sines, Portugal.

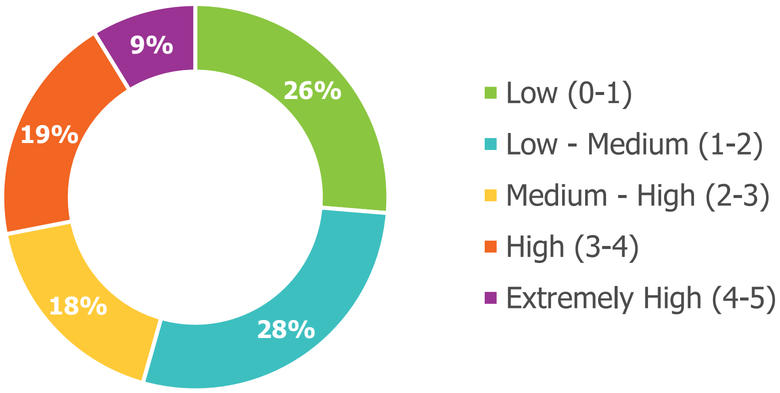

Figure 3 - Overall Water Risks distribution

Taking into account the indicators defined in the WRI Aqueduct Water Tool, that compose the Overall Water Risk Indicator, it is possible to conclude that the Physical Water Quantity Risk is the one with higher percentage of sites in water stressed areas.
Around 55% of Galp sites are located in areas with high or extremely high Physical Water Quantity Risk. These sites are mainly located in Portugal and Spain in areas with high or extremely high water stress and water depletion.

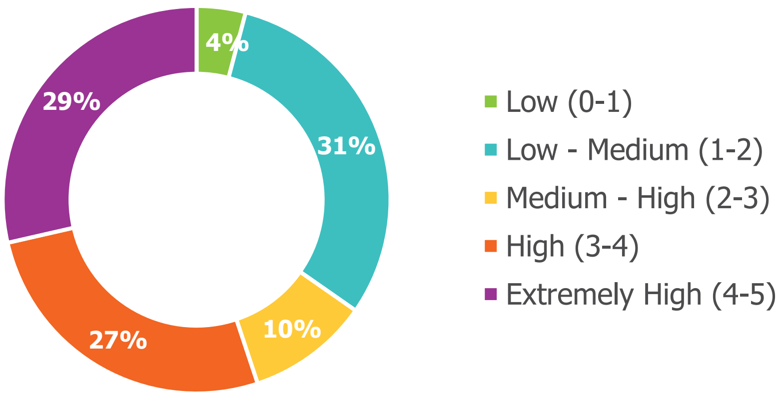

Figure 4 - Physical Water Quantity Risks distribution

When looking at the Physical Water Quality Risk, the 19% of sites located in areas with high and extremely high risk, are mainly in African countries, them being Guinea-Bissau, Mozambique, Eswatine and Cape Verde. This high risk is mainly due to the extremely high values of untreated connected wastewater verified in these countries. Opposite situation is verified in Portugal and Spain, where all the 31 low risk sites are located, reflecting the high percentage of domestic wastewater that is connected through a sewerage system and treated to at least a primary treatment level.

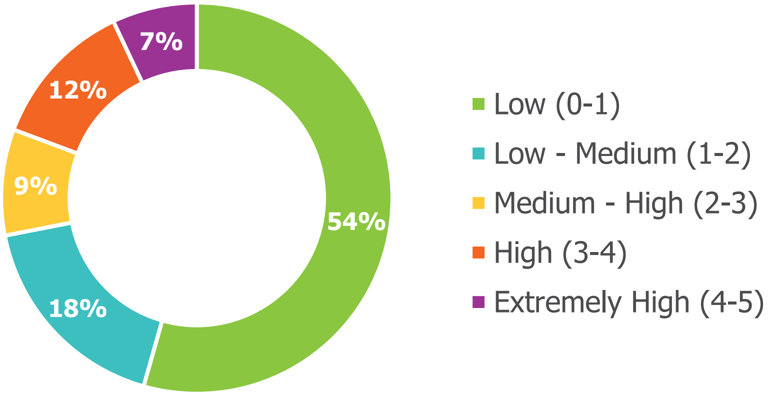

Figure 5 - Physical Water Quality Risks distribution

The sites with high and extremely high Regulatory and Reputational Risks also sum up 19%, with a higher number of sites with extremely high risk [9 sites]. African countries like Guinea-Bissau, Eswatini and Mozambique and Brazil, present a low percentage of population served by safe drinking water and improved sanitation, therefore being exposed to higher Regulatory and Reputational Risk. All 38 sites with low Regulatory and Reputational Risk [54%] are located in Portugal and Spain reflecting the high percentage of population with access to safe drinking water and improved sanitation.

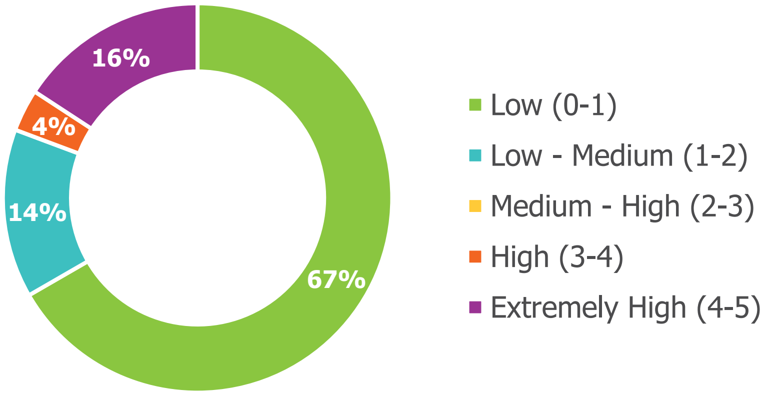

Figure 6 - Regulatory and Reputational Risks distribution

Taking all this in consideration it can roughly be concluded that the main issue in sites located in Portugal and Spain is the higher Physical Water Quantity Risk and, in African countries and Brazil, the higher values of Physical Water Quality and Regulatory and Reputational Risks.

5. 2030 Scenarios

Two future scenarios were analysed, for 2030 timeframe, considering a Business as Usual and an Optimistic approach. For each approach, four indicators were analysed for each Galp site, them being Water Stress, Seasonal Variability, Water Supply and Water Demand.

In the analysis presented below, only the sites with data [41 out of the 85] were considered. The remaining 44 sites don’t have data available in the WRI Tool, and represent mainly offshore Exploration & Production sites, Cape Verde and Guinea-Bissau storage facilities and some storage facilities located in Portugal.

Water Stress

The Water Stress indicator consists of the competition for water resources that is evaluated by the future 2030 ratio of demand for water by human society divided by available water.

This is evaluated on a scale of decrease and increase when comparing to the 2021 baseline, presented below.

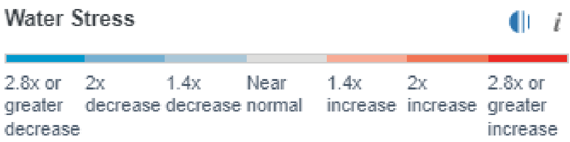

Figure 7 - Scale for water stress analysis WRI Aqueduct Tool

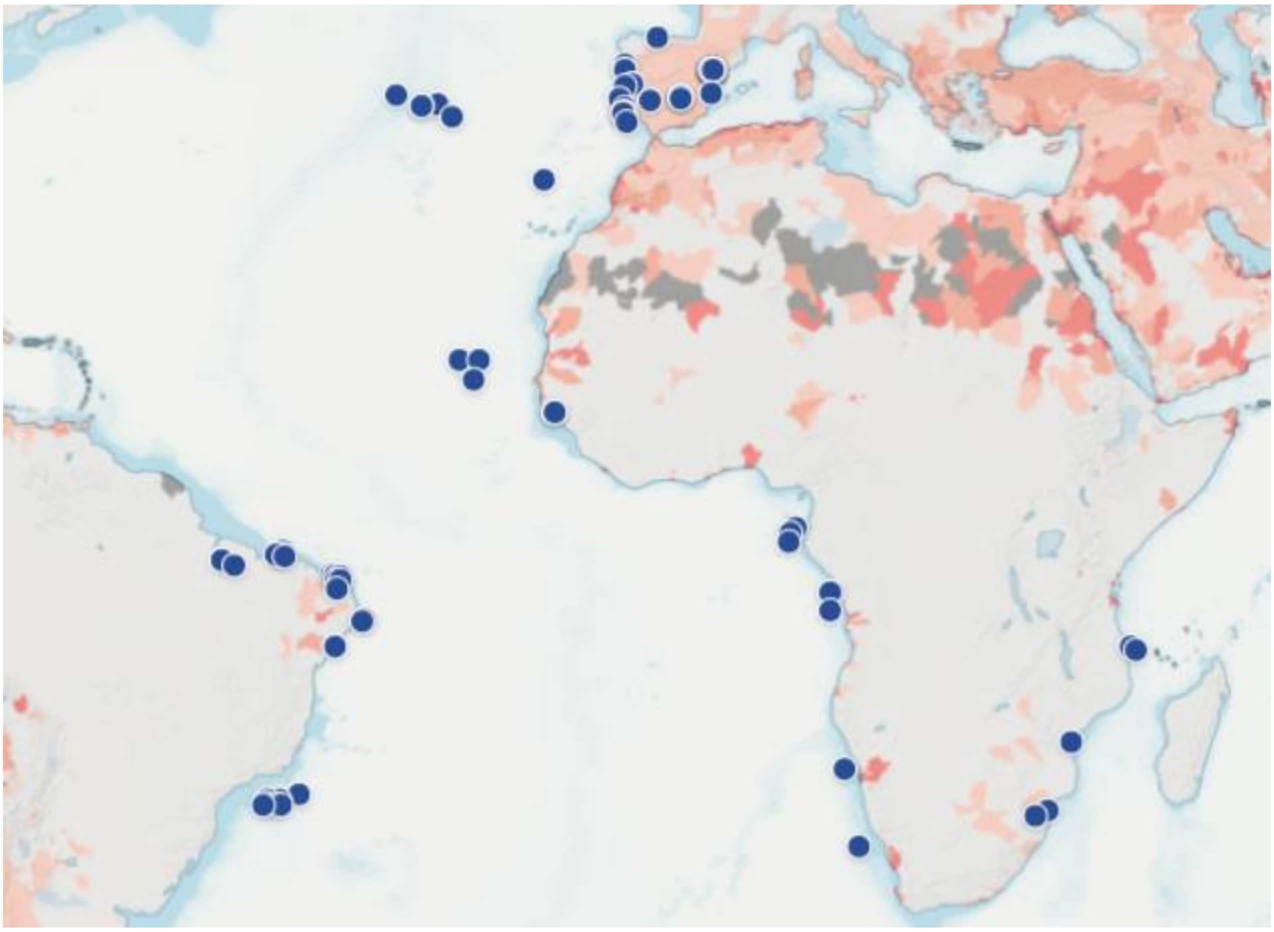

Figure 8 - Water Stress in Business as Usual scenario 2030, WRI Tool print

Business as Usual Approach

Considering the Business as Usual approach, in 2030, around 76% of the sites are located in areas where water stress will increase in 1.4x [30 sites] and 2.8x or greater [1 site]. This represents areas where renewable plants, cogeneration units and some storage facilities are located, mainly in Portugal and Spain. The Mozambique LPG Park and Eswatini Fuel Park are also located in areas where water stress will increase in 2.8x or greater and 1.4x respectively. The remaining 24% [10 sites] are located in areas where water stress is expected to remain near normal, in 2030.

Optimistic Approach

The optimistic approach on water stress reveals a possible decrease of sites located in areas increase of water stress, from 31 to 29, summing a total of 71% of the sites. According to the Optimistic approach, in 2030, 1 site will be located in an area where water stress is expected to increase in 2.8x or greater and 28 sites in areas with 1.4x increase in water stress. The main difference between the two approaches is the increase of sites located in areas where water stress is expected to remain near normal and the consequence decrease of sites where water stress is expected to increase. The number of sites located in areas where water stress is expected to decrease remains the same in both approaches, with zero sites.

Seasonal Variability

The Seasonal Variability is an indicator of the variability between months of the year. Increasing SV may indicate wetter wet months and drier dry months, and higher likelihood of droughts or wet periods.
This is evaluated on a scale of decrease and increase when comparing to the 2021 baseline, presented below.

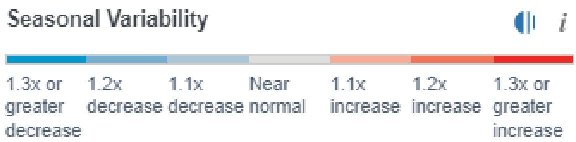

Figure 9 - Scale for seasonal variability analysis WRI Aqueduct Tool

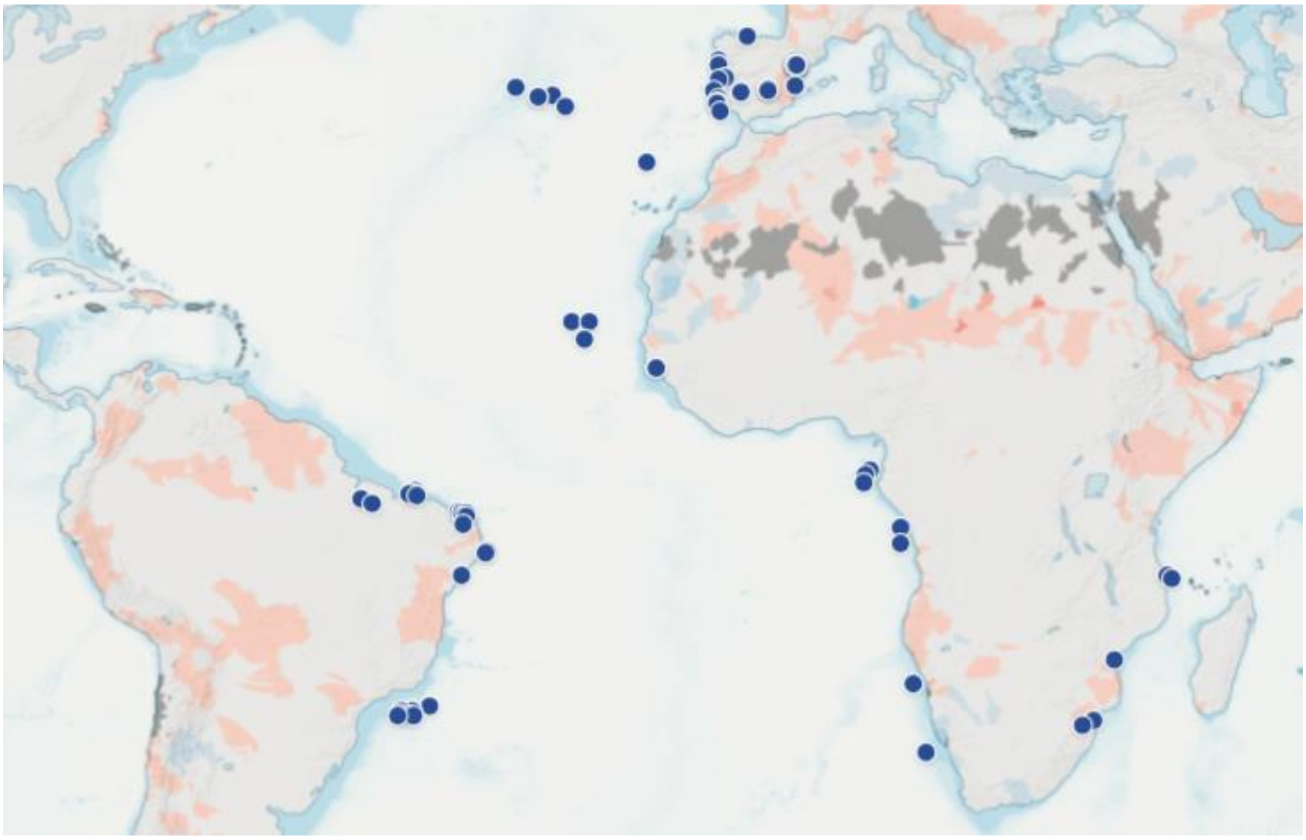

Figure 10 - Seasonal Variability in Business as Usual scenario 2030, WRI Tool print

Business as Usual Approach

Following the Business as Usual approach, in 2030, around 7% of the sites will be located in areas where seasonal variability (SV) is expected to increase in 1.1x. These 3 sites with increasing SV values are located in centre Portugal and in Mozambique. There is one site located in an area where a 1.1x decrease in seasonal variability is expected, it being the storage facility in the Madeira island, Portugal. The remaining 37 sites, which represent 90% of the universe with data, are expected to have seasonal variability values near normal.

Optimistic Approach

According to the Optimistic approach, in 2030, more sites [61%] will be located in areas where seasonal variability is expected to increase 1.1x, when comparing with the Business as Usual approach. This difference is a result of the decrease of sites located in areas where SV is expected to remain near normal, from 37 to 14 sites. The increase of sites located in areas where SV is expected to increase 1.1x, from 3, in the Business as Usual approach, to 25, in the Optimistic approach, is related to sites located in southern Portugal and Spain, in the Guadiana, Ebro and Spain - Portugal, Atlantic Coast Major Basins.

Despite this increase, the Optimistic approach predicts 2 sites located in areas where SV is expected to decrease. In 2030, the storage facility in the Madeira island, Portugal will be located in an area with 1.2x decrease and the Eswatini Fuel Park will be located in an area with 1.1x decrease in seasonal variability of water supply.

Water Supply

The water supply indicator contemplates the total of blue water (renewable surface water) available. It is evaluated on a scale of decrease and increase when comparing to the 2021 baseline, presented below.

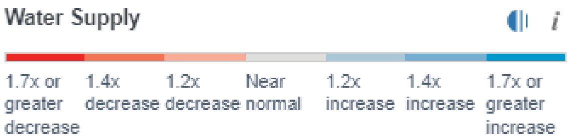

Figure 11 - Scale for water supply analysis WRI Aqueduct Tool

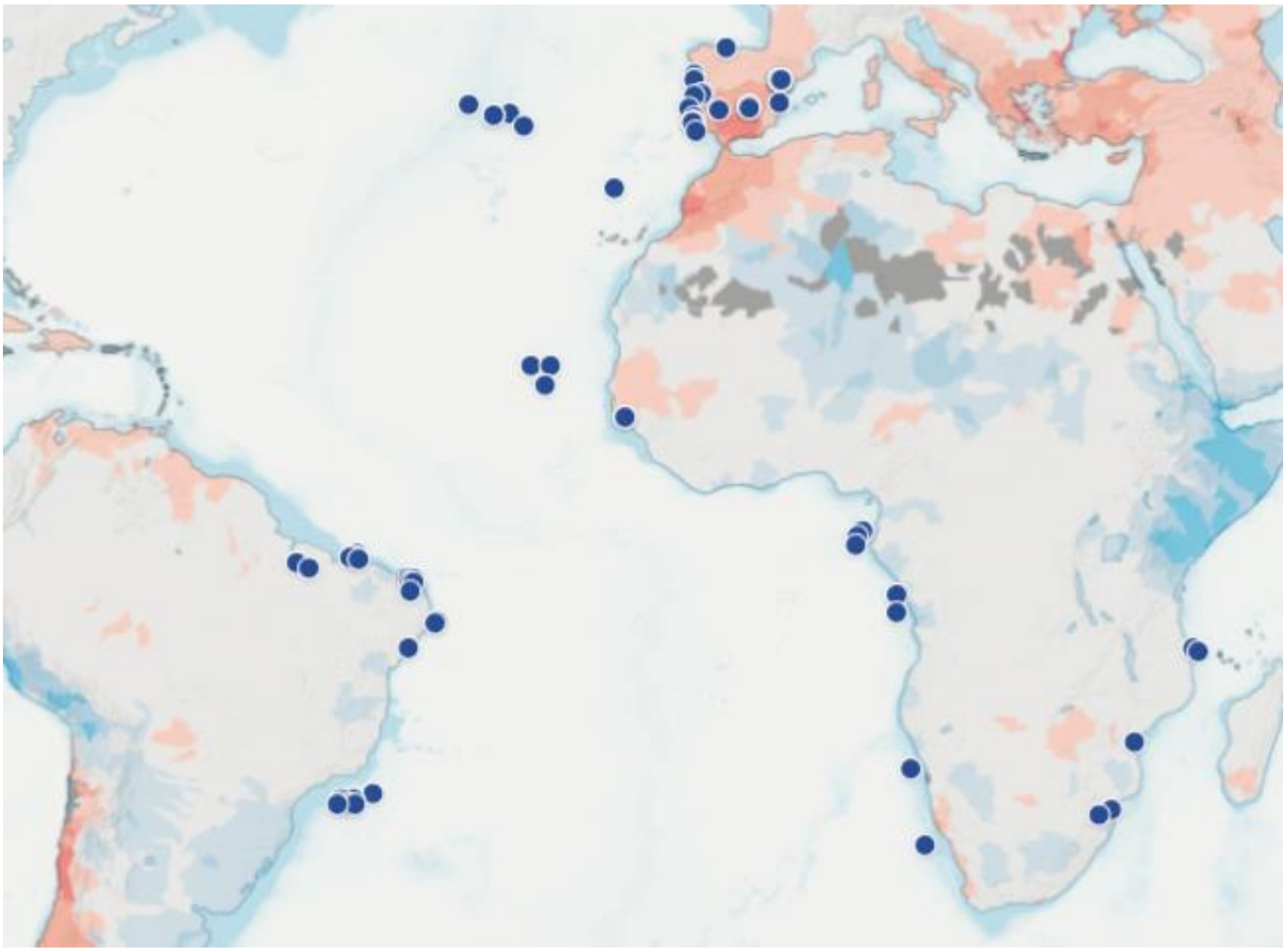

Figure 12 - Water Supply in Business as Usual scenario 2030, WRI Tool print

<u>Business as Usual approach</u>

Following the Business as Usual approach, in 2030, 80% of the sites will be located in areas where water supply is expected to have a 1.4x decrease [10 sites] and a 1.2x decrease [23]. These sites are located in Portugal and Spain, in the Guadiana, Ebro and Spain - Portugal, Atlantic Coast Major Basins and represent mainly renewable plants, cogeneration units, and storage facilities.

Around 17% of the sites [7] are expected to stay in areas where the water supply will remain near normal, them being Eswatini, northern Brazil and centre Mozambique. The LPG Park in Maputo, Mozambique is the only site located where water supply is expected to have a 1.2x increase.

Optimistic approach

Looking into the optimistic approach results, it is clear that, despite not having sites located in areas where water supply will increase, the distribution of sites in areas where a decrease is verified is less severe. The number of sites in areas where water supply is expected to decrease is still 33, however only 1 is in a 1.4x decrease area, and the remaining 32 are in areas with a 1.2x decrease. The remaining 8 sites are located in areas where the water supply is expected to remain near normal levels.

Water Demand

Water Demand is considered as water withdrawals. This is evaluated on a scale of decrease and increase when comparing to the 2021 baseline, presented below.

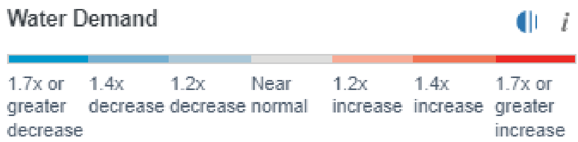

Figure 13 - Scale for water demand analysis WRI Aqueduct Tool

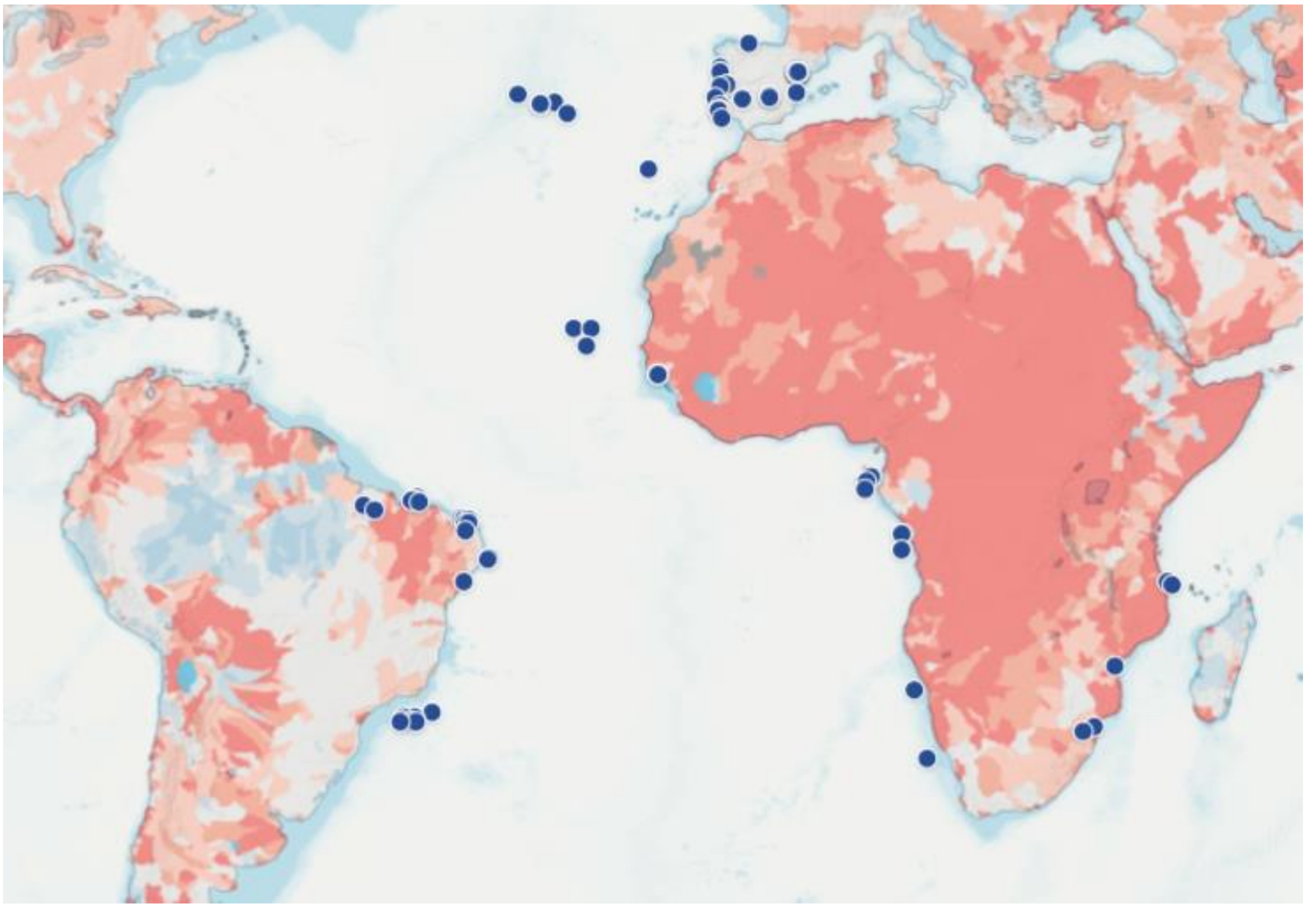

Figure 14 - Water Demand in Business as Usual scenario 2030, WRI Tool print

Business as Usual approach

According to this approach, in 2030, 22% of Galp’s sites will be located in areas where water demand is expected to have a 1.2x increase [5 sites], 1.4x increase [2 sites] and 1.7x or greater increase [2 sites]. These 9 sites are mainly located in northern Brazil, Mozambique, Eswatini and Sines province in Portugal. Around 71% of the sites, which represent a total of 29 sites, are in areas where water demand is expected to remain near normal levels. The remaining 3 sites are expected to be in areas with a 1.2x decrease in water demand, them being Madeira Island and Porto, in Portugal and the Asturias province in northern Spain.

Optimistic approach

Considering an optimistic approach, despite not reducing the number of sites located in areas where water demand will increase, the distribution is less severe. The number of sites in areas where water demand is expected to increase is now 10, with a slightly less severe distribution in areas with 1.2x increase [7 sites], 1.4x increase [1 site] and 1.7x or greater increase [2 sites]. The sites where water demand is expected to decrease are the same as the Business as Usual approach and, the remaining 28 sites [68%] are located in areas where water demand is expected to remain near normal levels.
Overall, a substantial increase in water demand in developing nations is verified. This outcome is a reflection of rapid urbanization and population growth in these countries.

Glossary

Coastal Eutrophication Potential: Coastal eutrophication potential (CEP) measures the potential for riverine loadings of nitrogen (N), phosphorus (P), and silica (Si) to stimulate harmful algal blooms in coastal waters. The CEP indicator is a useful metric to map where anthropogenic activities produce enough point-source and nonpoint-source pollution to potentially degrade the environment. When N and P are discharged in excess over Si with respect to diatoms, a major type of algae, undesirable algal species often develop. The stimulation of algae leading to large blooms may in turn result in eutrophication and hypoxia (excessive biological growth and decomposition that reduces oxygen available to other organisms). It is therefore possible to assess the potential for coastal eutrophication from a river's N, P, and Si loading. Higher values indicate higher levels of excess nutrients with respect to silica, creating more favorable conditions for harmful algal growth and eutrophication in coastal waters downstream.

Coastal flood Risk: Coastal flood risk measures the percentage of the population expected to be affected by coastal flooding in an average year, accounting for existing flood protection standards. Flood risk is assessed using hazard (inundation caused by storm surge), exposure (population in flood zone), and vulnerability.17 The existing level of flood protection is also incorporated into the risk calculation. It is important to note that this indicator represents flood risk not in terms of maximum possible impact but rather as average annual impact. The impacts from infrequent, extreme flood years are averaged with more common, less newsworthy flood years to produce the "expected annual affected population." Higher values indicate that a greater proportion of the population is expected to be impacted by coastal floods on average.

Drought Risk: Drought risk measures where droughts are likely to occur, the population and assets exposed, and the vulnerability of the population and assets to adverse effects. Higher values indicate higher risk of drought.

Groundwater Table Decline: Groundwater table decline measures the average decline of the groundwater table as the average change for the period of study (1990–2014). The result is expressed in centimeters per year (cm/yr). Higher values indicate higher levels of unsustainable groundwater withdrawals.

Interannual Variability: Interannual variability measures the average betweenyear variability of available water supply, including both renewable surface and groundwater supplies. Higher values indicate wider variations in available supply from year to year.

Overall Water Risk: Overall water risk measures all water-related risks, by aggregating all selected indicators from the Physical Quantity, Quality and Regulatory & Reputational Risk categories. Higher values indicate higher water risk.

Peak RepRisk Country ESG Risk Index: The Peak RepRisk country ESG risk index quantifies business conduct risk exposure related to environmental, social, and governance (ESG) issues in the corresponding country. The index provides insights into potential financial, reputational, and compliance risks, such as human rights violations and environmental destruction. RepRisk is a leading business intelligence provider that specializes in ESG and business conduct risk research for companies, projects, sectors, countries, ESG issues, NGOs, and more, by leveraging artificial intelligence and human analysis in 20 languages. WRI has elected to include the Peak RepRisk country ESG risk index in Aqueduct to reflect the broader regulatory and reputational risks that may threaten water quantity, quality, and access. While the underlying algorithm is proprietary, we believe that our inclusion of the Peak RepRisk country ESG risk index, normally unavailable to the public, is a value-add to the Aqueduct community. The peak value equals the highest level of the index in a give

Physical Water Quality Risk: Physical risks quality measures risk related to water that is unfit for use, by aggregating all selected indicators from the Physical Risk Quality category. Higher values indicate higher water quality risks.

Physical Water Quantity Risks: Physical risks quantity measures risk related to too little or too much water, by aggregating all selected indicators from the Physical Risk Quantity category. Higher values indicate higher water quantity risks.

Regulatory and Reputational Risk: Regulatory and reputational risks measures risk related to uncertainty in regulatory change, as well as conflicts with the public regarding water issues. Higher values indicate higher regulatory and reputational water risks.

Riverine flood Risk: Riverine flood risk measures the percentage of population expected to be affected by Riverine flooding in an average year, accounting for existing flood-protection standards. Flood risk is assessed using hazard (inundation caused by river overflow), exposure (population in flood zone), and vulnerability.16 The existing level of flood protection is also incorporated into the risk calculation. It is important to note that this indicator represents flood risk not in terms of maximum possible impact but rather as average annual impact. The impacts from infrequent, extreme flood years are averaged with more common, less newsworthy flood years to produce the "expected annual affected population." Higher values indicate that a greater proportion of the population is expected to be impacted by Riverine floods on average.

Seasonal Variability (Baseline): Seasonal variability measures the average within-year variability of available water supply, including both renewable surface and groundwater supplies. Higher values indicate wider variations of available supply within a year.

Seasonal Variability: Seasonal variability (SV) is an indicator of the variability between months of the year. Increasing SV may indicate wetter wet months and drier dry months, and higher likelihood of droughts or wet periods. We used the within-year coefficient of variance between monthly total blue water as our indicator of seasonal variability of water supply. We calculated the coefficient of variance between months for each year, then estimated projected change in seasonal variability as the 21-year mean around the target year over the baseline period mean.

Unimproved/no drinking water: Unimproved/no drinking water reflects the percentage of the population collecting drinking water from an unprotected dug well or spring, or directly from a river, dam, lake, pond, stream, canal, or irrigation canal (WHO and UNICEF 2017). Specifically, the indicator aligns with the unimproved and surface water categories of the Joint Monitoring Programme (JMP)—the lowest tiers of drinking water services. Higher values indicate areas where people have less access to safe drinking water supplies.

Unimproved/no sanitation: Unimproved/no sanitation reflects the percentage of the population using pit latrines without a slab or platform, hanging/bucket latrines, or directly disposing human waste in fields, forests, bushes, open bodies of water, beaches, other open spaces, or with solid waste (WHO and UNICEF 2017). Specifically, the indicator aligns with JMP's unimproved and open defecation categories— the lowest tier of sanitation services. Higher values indicate areas where people have less access to improved sanitation services.

Untreated Connected Wastewater: Untreated connected wastewater measures the percentage of domestic wastewater that is connected through a sewerage system and not treated to at least a primary treatment level. Wastewater discharge without adequate treatment could expose water bodies, the general public, and ecosystems to pollutants such as pathogens and nutrients. The indicator compounds two crucial elements of wastewater management: connection and treatment. Low connection rates reflect households' lack of access to public sewerage systems; the absence of at least primary treatment reflects a country's lack of capacity (infrastructure, institutional knowledge) to treat wastewater. Together these factors can indicate the level of a country's current capacity to manage its domestic wastewater through two main pathways: extremely low connection rates (below 1 percent), and high connection rates with little treatment. Higher values indicate higher percentages of point source wastewater discharged without treatment.

Water Demand: Water demand was measured as water withdrawals. Projected change in water withdrawals is equal to the summarized withdrawals for the target year, divided by the baseline year, 2010. Since irrigation consumptive use varies based on climate, we generated unique estimates of consumptive and non-consumptive agricultural withdrawal for each year. Estimates for consumptive and non-consumptive agricultural withdrawal for each ensemble member, scenario, and target year are the mean of the 21-year window around the target year.

Water Depletion: Baseline water depletion measures the ratio of total water consumption to available renewable water supplies. Total water consumption includes domestic, industrial, irrigation, and livestock consumptive uses. Available renewable water supplies include the impact of upstream consumptive water users and large dams on downstream water availability. Higher values indicate larger impact on the local water supply and decreased water availability for downstream users. Baseline water depletion is similar to baseline water stress; however, instead of looking at total water withdrawal (consumptive plus no consumptive), baseline water depletion is calculated using consumptive withdrawal only.

Water Stress (Baseline): Baseline water stress measures the ratio of total water withdrawals to available renewable surface and groundwater supplies. Water withdrawals include domestic, industrial, irrigation, and livestock consumptive and no consumptive uses. Available renewable water supplies include the impact of upstream consumptive water users and large dams on downstream water availability. Higher values indicate more competition among users.

Water Stress: Water stress is an indicator of competition for water resources and is defined informally as the ratio of demand for water by human society divided by available water.

Water Supply: Total blue water (renewable surface water) was our indicator of water supply. Projected change in total blue water is equal to the 21-year mean around the target year divided by the baseline period of 1950–2010.

Annex I – Galp sites' coordinates

Table 8 - Galp sites' coordinates (latitude and longitude)

Name	Latitude	Longitude	Country
Biofuel units			
Biofuels - Palma crops (TailândiaPará)	-2.954	-46.95	Brazil
Biofuels - Palma crops (Tomé-açuPará)	-2.392	-48.148	Brazil
Biofuels - Enerfuel (2nd Generation biofuel plant)	37.995	-8.825	Portugal
Cogeneration units			
Cogeneration Unit - Agroger	39.138	-9.276	Portugal
Cogeneration Unit - Carriço	40.015	-8.815	Portugal
Exploration & Production			
EP - Bloco 14	-5.653	11.447	Angola
EP - Bloco 14K-A-IMI	-5.638	11.314	Angola
EP - Bloco 32	-7.32	11.294	Angola
EP - BAR-M-300	-1.647	-42.13	Brazil
EP - BAR-M-342	-1.873	-42.13	Brazil
EP - BAR-M-344	-1.875	-42.873	Brazil
EP - BAR-M-388	-2.071	-41.938	Brazil
EP - BM-S-11 (Tupi & Iracema)	-25.461	-42.825	Brazil
EP - BM-S-11 A (BerbigãoSururuAtapu)	-24.973	-42.607	Brazil
EP - BM-S-24	-25.415	-42.345	Brazil
EP - BM-S-8	-25.476	-44.199	Brazil
EP - Campos 791	-24.565	-40.596	Brazil
EP - North Bacalhau (ex-Carcará)	-25.336	-43.991	Brazil
EP - PEPB-783	-8.162	-34.351	Brazil
EP - PEPB-839	-8.37	-34.38	Brazil
EP - POT-M-663 (POT-16)	-3.889	-37.367	Brazil
EP - POT-M-665 (POT-17)	-3.889	-37.118	Brazil
EP - POT-M-760 (POT-16)	-4.125	-37.126	Brazil
EP - POT-M-764	-4.125	-36.624	Brazil
EP - POT-M-853 (POT-17)	-4.393	-36.865	Brazil
EP - POT-M-855 (POT-17)	-4.393	-36.612	Brazil
EP - Uirapuru	-25.049	-43.811	Brazil
EP - Rabo Branco (onshore) (SEAL-T-412429)	-10.807	-37.031	Brazil
EP - Sanhaçu (onshore) (POT-T-436479480)	-5.231	-36.932	Brazil
EP - Rovuma Área 4	-11.102	41.046	Mozambique
EP - LNG Plant (Rovuma - onshore)	-10.828	40.55	Mozambique
EP - Pel 82	-22.346	12.6	Namibia

Name	Latitude	Longitude	Country
Exploration & Production			
EP - Pel 83	-29	14	Namibia
EP - Bloco 11	0.22	7.302	S. Tome and Principe
EP - Bloco 12	-0.645	7.292	S. Tome and Principe
EP - Bloco 6	0.633	7.922	S. Tome and Principe
Refining			
Refining - Sines	37.965	-8.8	Portugal
Renewable Energy Sources			
RNW - Parque Eólico de Vale Grande	40.188917	-7.9129	Portugal
RNW - Vestinveste	40.218	-8.056	Portugal
RNW - ParkAlgar	37.232	-8.629	Portugal
RNW - El Robledo	41.264733	-0.171314	Spain
RNW - Emocion	41.237825	-0.285342	Spain
RNW - Envitero	41.25965	-0.285225	Spain
RNW - Escarnes	41.269772	-0.297714	Spain
RNW - Escatron Dos	41.242308	-0.271017	Spain
RNW - Esplendor	41.196558	-0.341019	Spain
RNW - Hazana	41.212869	-0.336686	Spain
RNW - Ignis Uno	41.230325	-0.252936	Spain
RNW - Mediomonte	41.223608	-0.263125	Spain
RNW - Mocatero	41.243278	-0.252383	Spain
RNW - Palabra	41.227089	-0.233647	Spain
RNW - Ribagrande	41.257397	-0.172811	Spain
RNW - Sierrezuela	41.252172	-0.154017	Spain
RNW - Talento	41.205106	-0.345017	Spain
RNW - Valdelagua	41.252172	-0.154017	Spain
RNW - Alcazar 1	39.186849	-3.327846	Spain
RNW - Alcazar 2	39.18685	-3.327847	Spain
RNW - FV Ictio Manzanares Solar	39.096606	-3.298119	Spain
RNW - Valdecarro	39.186848	-3.327845	Spain
RNW - Valdivieso	39.186847	-3.327844	Spain
Storage Facilities & Terminals			
GMI - Park of S. Vicente Island	16.882	-24.99	Cape Verde
GMI - Park of Sal Island	16.756	-22.976	Cape Verde
GMI - Park of Santiago Island	14.913	-23.496	Cape Verde
GMI - CLC	11.839	-15.591	Guinea-Bissau
GMI - Park of LPG (Casamance)	11.84	-15.59	Guinea-Bissau

Name	Latitude	Longitude	Country
Storage Facilities & Terminals			
GMI - Parque de Boloia	11.861	-15.575	Guinea-Bissau
GMI - Park of Beira	-19.805	34.843	Mozambique
GMI - Park of LPG	-25.952	32.488	Mozambique
Parques - Horta-CL	38.527	-28.623	Portugal
Parques - CLCM	32.743	-16.727	Portugal
Parques - Flores-CL	39.378	-31.171	Portugal
Parques - Horta-GPL	38.542	-28.629	Portugal
Parques - Leixões Terminal	41.187	-8.707	Portugal
Parques - Nordela LPG - S. Miguel	37.736	-25.693	Portugal
Parques - Praia da Vitória - Terceira	38.705	-27.049	Portugal
Parques - Viana do Castelo Terminal	41.686	-8.828	Portugal
Parques Matosinhos	41.21	-8.71	Portugal
Parques - Bancas de Sines	37.956	-8.885	Portugal
Parques - Mitrena	38.479	-8.808	Portugal
Parques - Sigás	37.965	-8.873	Portugal
Parques - Sines Terminal	37.954	-8.881	Portugal
Parques - Gijon	43.551	-5.692	Spain
Parques - Valência	39.447	-0.303	Spain
Parques - Mérida	38.904	-6.386	Spain
GMI - FUEL Park of Matsapha	-26.502	31.307	Swaziland