

September 2021

GREEN BOND IMPACT REPORT 2021¹

Qatar National Bank (QNB) has commissioned Trucost, part of S&P Global, to calculate the environmental impact of QNB's latest green bond issued in September 2020. This analysis is based on data provided by QNB.

BOND INFORMATION

Green Bond ISIN	XS2233188353
Issue Date	22 September 2020
Maturity	22 September 2025
Nominal Value (million)	600
Currency	USD

ISSUER INFORMATION

Issuer Name	QNB
GICS Sector Name	Financials
Country	Qatar
Region	Asia

SUMMARY OF KEY RESULTS

Trucost has assessed the potential carbon savings achieved by QNB's Green Bond. QNB's Green Bond will likely help to avoid 162 tCO_{2e} per USD million invested. Trucost analyzed both the total allocation which represents the total portfolio of eligible projects for refinancing, and the prorated allocation specific to this green bond issuance, which amounts to USD 600 million nominal value. For more information on these metrics, please refer to the Glossary section in the appendix.

Indicator ²	Total Allocation	Prorated Allocation
Annualised Avoided GHG Emissions (tCO _{2e})	150,888	97,212
Lifetime Avoided GHG Emissions (tCO _{2e})	754,463	486,072
Annualised Avoided GHG Emissions Intensity (tCO_{2e}/ mUSD invested)	162	162
Lifetime Avoided Electricity Use (MWh)	1,155,867	744,682
Lifetime Avoided Heating Use (MWh)	4,242	2,733
Lifetime Quantity of Wastewater Treated (m ³)	40,478,018	26,078,467

¹ Portfolio as at time of issuance, reported financials as of 31 May 2021

² Figures represent net impacts including construction emissions

Indicator	Total Allocation	Prorated Allocation
Annualised Portfolio Construction emissions (tCO ₂ e)	13,554	8,732
Annualised Portfolio Operational emissions (tCO ₂ e)	305,544	196,851
Annualised Baseline Operational emissions (tCO ₂ e)	469,986	302,794
Lifetime Portfolio Construction emissions (tCO ₂ e)	67,716	43,627
Lifetime Portfolio Operational emissions (tCO ₂ e)	1,527,635	984,198
Lifetime Baseline Operational emissions (tCO ₂ e)	2,349,814	1,513,897

USE OF PROCEEDS

The charts below show the use of proceeds (%) per sector and region. The proceeds are allocated to finance projects related to Green Buildings, Energy Efficiency, Sustainable Water and Wastewater Management located in Qatar, United Kingdom, France and Kuwait.

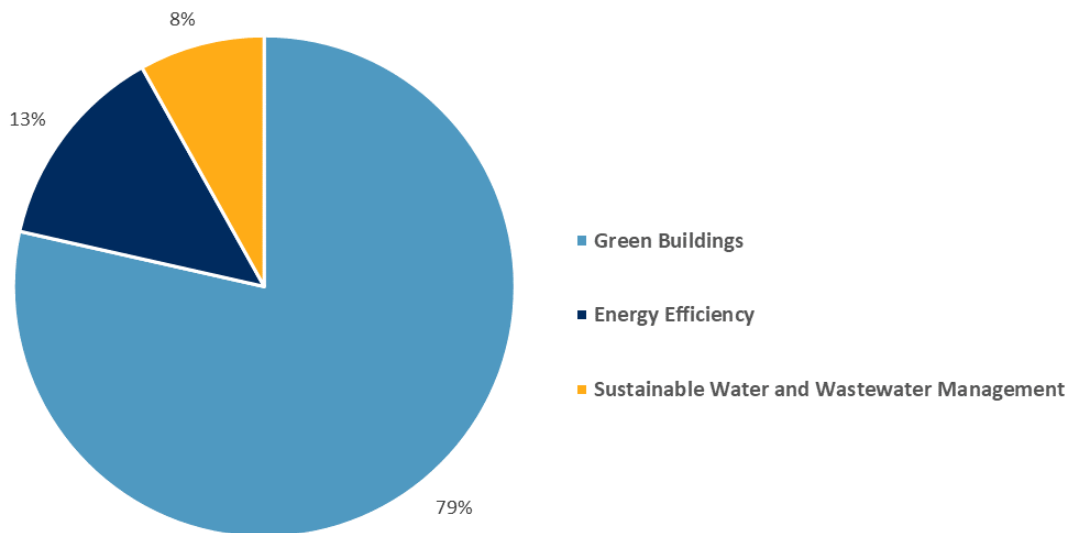


FIGURE 1: USE OF PROCEEDS BREAKDOWN BY ASSET TYPE³

The majority of proceeds are allocated to Green Buildings at 79%. Other project types funded by QNB's Green Bond include Energy Efficiency at 13% and Sustainable Water and Wastewater Management projects at 8%.

The projects refinanced by the bond are categorized according to the Green Bond Principles and the Climate Bonds Initiative (CBI) Taxonomy.

³ Portfolio as at time of issuance, reported financials as of 31 May 2021

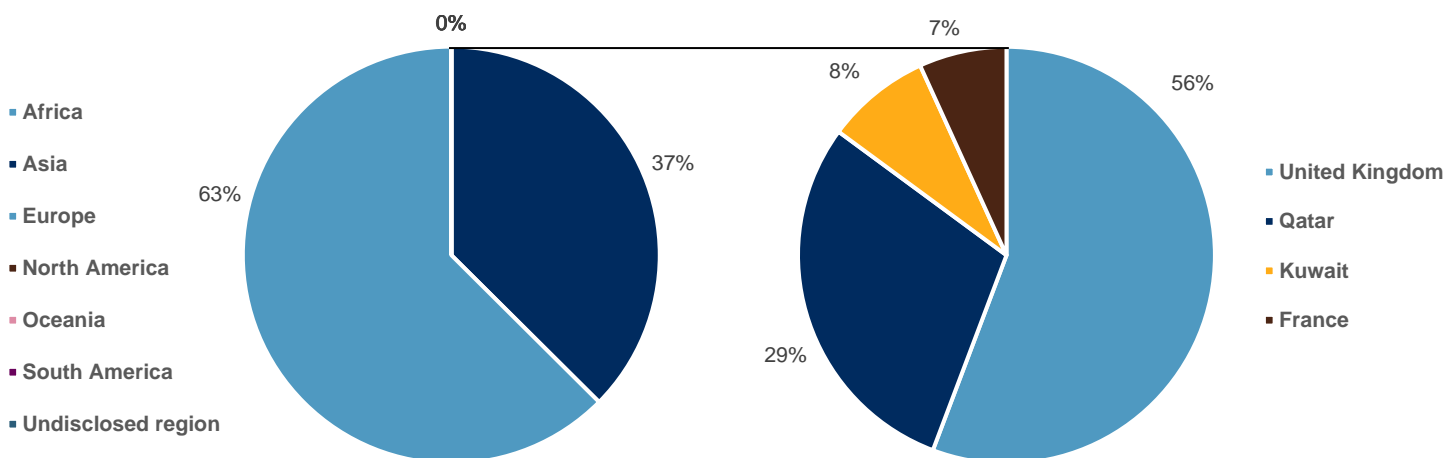


FIGURE 2: USE OF PROCEEDS BREAKDOWN BY REGION AND COUNTRY⁴

The chart above shows the aggregated breakdown of the use of proceeds per region and country (%). All the projects refinanced by the green bond are or will be located in Europe (63%) and Asia (37%). The majority of the projects financed by the green bond are or will be in the United Kingdom (56%).

PROJECT AVOIDED EMISSIONS

In order to analyze the anticipated avoided emissions of QNB’s Green Bond, Trucost has assessed the impact of each project refinanced.

Trucost has calculated the avoided emissions on a lifetime and annualized basis. The avoided emissions are calculated based on the lifecycle emissions of a project including construction and operations of projects compared to the relevant baseline for each project, defined as a reasonable business-as-usual scenario in the absence of the project considered.

Trucost has considered both project refinancing and investment contributed to the project by the bond to estimate the avoided emissions financed by the green bond. For refinancing, the prorated annualized avoided emissions to be allocated equal that of the project during its lifecycle, however, the lifetime avoided emissions are allocated only for duration of the bond. The impacts are then apportioned according to QNB’s share of financing of the projects. For example, if QNB finances or owns 1% of the project value then QNB is held accountable for 1% of the net impact generated by the project.

The table below displays the results of the avoided emissions analysis at the project level. Positive values denote avoided emissions while negative values denote increased emissions compared to the baseline scenario. For more information on the methodology, assumptions and limitations, please refer to the appendix.

⁴ Portfolio as at time of issuance, reported financials as of 31 May 2021

TABLE 1: APPORTIONED AVOIDED EMISSIONS ANALYSIS AT THE PROJECT LEVEL (PRORATED ALLOCATION) INCLUDING CONSTRUCTION EMISSIONS

Category	Type of Asset	“Bond allocation” of prorated amount	Lifetime Avoided Electricity Use (MWh)	Lifetime Avoided Heating Use (MWh)	Annualised Avoided Emissions (tCO ₂ e)	Annualised Avoided Emissions Intensity (tCO ₂ e/mUSD invested)	Lifetime Avoided Emissions (tCO ₂ e)	Lifetime Avoided Emissions Intensity (tCO ₂ e/mUSD invested)	Annual Quantity of Waste-water Treated ('000 m ³)	Lifetime Quantity of Waste-water Treated ('000 m ³)
Green Buildings	Hospitality, Retail and Flat	79%	1,567	2,733	35	0.1	190	0.4	-	-
Energy Efficiency	District Cooling	13%	743,115	0	97,176	1,212	485,882	6,060	-	-
Sustainable Water and Wastewater Management	Waste-water Treatment	8%	-	-	-	-	-	-	1,043	26,078
Total		600 mUSD	744,682	2,733	97,212	162	486,072	810	1,043	26,078

The bond’s portfolio (incl. construction emissions) will help avoid 486,072 tonnes of CO₂e over the duration of the bond or about 97,212 tonnes a year, primarily from District Cooling project (97,176 tonnes CO₂e a year). The annualized avoidance ratio is 162 tonnes CO₂e/mUSD invested. While the portfolio as a whole will help avoid emissions, certain assets in the green building category will not generate any positive impact compared to the baseline scenario. This is due to the impacts generated by their construction.

TABLE 2: APPORTIONED AVOIDED EMISSIONS ANALYSIS AT THE PROJECT LEVEL (PRORATED ALLOCATION) EXCLUDING CONSTRUCTION EMISSIONS

Category	Type of Asset	“Bond allocation” of prorated amount	Lifetime Avoided Electricity Use (MWh)	Lifetime Avoided Heating Use (MWh)	Annualised Avoided Emissions (tCO ₂ e)	Annualised Avoided Emissions Intensity (tCO ₂ e/mUSD invested)	Lifetime Avoided Emissions (tCO ₂ e)	Lifetime Avoided Emissions Intensity (tCO ₂ e/mUSD invested)	Annual Quantity of Waste-water Treated ('000 m ³)	Lifetime Quantity of Waste-water Treated ('000 m ³)
Green Buildings	Hospitality, Retail and Flat	79%	1,567	2,733	253	0.5	1,244	2.6	-	-
Energy Efficiency	District Cooling	13%	743,115	0	105,691	1,318	528,455	6,592	-	-
Sustainable Water and Wastewater Management	Waste-water Treatment	8%	-	-	-	-	-	-	1,043	26,078
Total		600 mUSD	744,682	2,733	105,944	177	529,699	883	1,043	26,078

The bond’s portfolio (excl. construction emissions) will help avoid 529,699 tonnes of CO₂e over the duration of the bond or about 105,944 tonnes a year, primarily from District Cooling project (105,691 tonnes CO₂e a year). The annualized avoidance ratio is 177 tonnes CO₂e/mUSD invested. All the assets in the green building category will generate positive impact compared to the baseline scenario in this case since the impacts generated by their construction are excluded.

APPENDIX

METHODOLOGY

Trucost follows a rigorous life cycle analysis-based research process, underpinned by a robust quality management system.

For each project, Trucost seeks to quantify the net impact – either positive or negative – that the project will have compared to a relevant baseline greenhouse gas emissions scenario, in other words compared to a business-as-usual (BAU) scenario. The BAU scenario takes the conservative approach to only account for impacts associated with the operation of the technology that is being replaced – not its manufacture/construction, nor disposal/decommissioning, unless a clear case exists to do otherwise.

For instance, for an investment in newly constructed certified green building in the United Kingdom, the BAU scenario is the operation of a similar building without sustainability certification. The investment scenario includes the lifetime emissions from the construction and operation of the green building. The net benefit is the difference between the emissions from the project financed and the emissions associated with the BAU scenario.

Lifetime Avoided Emissions (tCO₂e) = BAU Operational Lifetime GHG Emissions (tCO₂e) – [Alternative Project Construction Lifetime GHG Emissions (tCO₂e) + Alternative Project Operational Lifetime GHG Emissions (tCO₂e)]

Green Building:

The baseline scenario for green building is assumed to be the operation of a similar building without sustainability certification.

The construction impacts are modelled based on a similar type of building and as a function of the floor area.

The operational impacts from electricity are calculated by multiplying the amount of electricity use per year by the corresponding grid emission factor. The impacts of heating use in the building are calculated for one year and then assumed to remain constant for all consecutive years the building is in operation.

Trucost modelled electricity and heating energy consumption and carbon emissions using energy and emission intensity factors based on the floor area provided by QNB. Trucost has researched the most accurate energy intensity factors available, in absence of a consistent official energy intensity database.

Energy Efficiency:

The baseline scenario for district cooling project is assumed to be the operation of a conventional cooling system in the same building.

The construction impacts are based on a similar type of chiller and district cooling network and as a function of the total cooling capacity and the length of the network.

The operational impacts from electricity are calculated by multiplying the amount of electricity use per year by the corresponding grid emission factor.

Sustainable Water and Wastewater Management:

The numbers are included in the report as disclosed by QNB.

ASSUMPTIONS

Trucost combines data from leading global databases with internal modelling to calculate the net benefits of individual investments. Disclosed data used includes project type, asset life, investment value, quantity of assets, size, year of construction and, country or region of deployment.

Trucost has also created analytics to account for changes in national infrastructure to 2050. This includes the change in the mix of energy sources to generate energy for the national grid, for example, from a planned increase in the use of renewable energy generation.

As mentioned above, Trucost has considered both project re-financing and the investment contributed to the project by the bond to determine the green bond financed avoided carbon emissions.

A number of assumptions are taken when calculating the environmental performance of a project. The assumptions that we deem most relevant are listed below:

- Chiller load factor is taken as 60% with COP value of 9.6.
- The district cooling systems are considered to have 35% lower electricity consumption compared to conventional cooling.
- After the end of the asset life, the asset is deemed to be decommissioned and the benefits from this asset end.
- The planned evolution of the national grid is taken into account such that changes in generation mix and growth in energy production are accounted for.
- The efficiency of the asset being deployed, and the asset being replaced do not change over time (with the exception of the national grid).
- Due to data availability, the grid's planned evolution is forecasted up until 2050. Beyond that year the grid mix is deemed constant. Likewise, the grid mix is assumed to be constant before the year 2000.
- The duration of both the bond and the total allocation are assumed to be the same.

LIMITATIONS AND CONSIDERATIONS

The results are forecasted based on current technologies and expected changes in infrastructure, like the national grid. Metrics produced by our analysis are estimates and may not be directly replicated in the real world. This can be due to increasing or decreasing efficiencies of project performance, or changing external factors, such as the amount of wind a wind farm receives for instance.

SOURCE DATA

Trucost used reported data whenever these were available and estimated the data when the data was not provided or incomplete, using the Trucost estimation model for avoided emissions. The analysis models carbon emissions using emissions intensity factors.

Source types	Data used by Trucost
Green Building: Total Floor Space (m ²)	Data provided by QNB
Green Building: Building Certification	Data provided by QNB
District Cooling: Total Cooling Capacity (MW)	Data provided by QNB
District Cooling: Chiller Type	Data provided by QNB
District Cooling: Length of District Cooling Networks (km)	Data provided by QNB
Sustainable Wastewater: Annual Quantity of Wastewater Treated (m ³)	Data provided by QNB
Asset Life (years)	Data provided by QNB
Construction Year	Data provided by QNB
Asset Type	Data provided by QNB
Locations	Data provided by QNB
Use of Proceeds	Data provided by QNB
Total Asset Value	Data provided by QNB
Energy Intensity and Energy Mix – France	Estimated from: Centre d'études et de recherches économiques sur l'énergie (CEREN)
Energy Intensity and Energy Mix – United Kingdom	Estimated from: Non-domestic National Energy Efficiency Data Framework (ND-NEED), 2021 Energy consumption in new domestic buildings 2015 to 2017 (England and Wales)
Energy Intensity and Energy Mix – Qatar Energy savings from GSAS certifications	Estimated from: Y. Alhorr, E. Elsarrag, Climate change mitigation through energy benchmarking in the GCC green buildings codes, Buildings 2015, 5(2), 700-714
Energy savings from BREEAM certifications	BREEAM New Construction - Non-Domestic Buildings Technical Manual SD5073 – 5.0:2011 Department of Building Services Engineering, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong SAR, China - Benchmarking energy use assessment of HK-BEAM, BREEAM and LEED

Energy savings from HQE certifications	France GBC, International environmental certifications for the design and construction of non-residential buildings: the positioning of HQE certification relative to BREEAM and LEED, 2015
Fossil Fuels GHG Emissions Factors	Department for Environment Food & Rural Affairs, 2021
Electricity GHG Emission Factors from 2000 to 2050	Trucost has used electricity generation data (GWh per year) per country/ US state per production type in conjunction with LCA data from Ecoinvent to create forecast national grid emissions factors from 2000 to 2050.
GHG Emission Factors associated with the Construction of Building	University of Washington. (2016) Initial Embodied Carbon Data Visualization. Carbon Leadership Forum. [Online] Available from: http://carbonleadershipforum.org/projects/embodied-carbon-benchmark-study-data-visualization/ [Accessed on: 9.8.21]. Please select 'Building use' for X Axis and 'Structure, foundation, enclosure and interiors' for Building Scope.
GHG Emission Factors associated with the Construction of Chiller Production and Pipeline	Ecoinvent Version 3 - Life-cycle analysis (LCA) datasets
COP and Load Factor of Chiller to estimate Annual Cooling Energy Production (kWh per year)	Daikin, Centrifugal Compressor Water Chillers, https://daikinlatam.com/wp-content/uploads/2018/05/Daikin_WDC_Single-Stage_Dual_Centrifugal_Comp_Chiller.pdf
District Cooling Electricity Consumption Savings (%)	Danfoss, https://files.danfoss.com/download/Heating/Danfoss_District_Cooling_Infographic.pdf
Exchange Rate for Currency Conversion	S&P Capital IQ

GLOSSARY OF THE MAIN TERMS

Name	Description
Green Bond ISIN	International Securities Identification Number (ISIN) is a 12 character alpha-numerical code that uniquely identifies a security listed on a stock exchange.
Issuer Name	Listed name of the company issuing the bond (excluding share class information, but including business-related abbreviations such as 'PLC', 'LTD' etc.).
GICS Sector Name	The Global Industry Classification Standard (GICS®) was developed by MSCI and Standard & Poor's (S&P) to enhance the investment research and asset management process for financial professionals worldwide. The GICS structure consists of 11 sectors, 24 industry groups, 67 industries and 156 sub-industries. The taxonomy and structure of the classification system are available in the public domain.
Country	Country of headquarter. For dual listed companies, only one country is displayed.
Region	Region where the country is located.
Issue Date	Date the bond was issued/priced to market. (Day-Month-Year)
Maturity	Date at which the principle amount of bond is due. (Day-Month-Year)
Nominal Value	Amount issued in the denominated currency.
Currency	Bond denominated currency.
Annualised Avoided GHG Emissions (tCO ₂ e)	The estimated amount of avoided carbon emissions that can be achieved by the bond within a year (tCO ₂ -eq). This value covers SDG 13: Climate action.
Lifetime Avoided GHG Emissions (tCO ₂ e)	The estimated amount of avoided carbon emissions that can be achieved by the bond over the lifetime of the projects (tCO ₂ -eq).
Annualised Avoided GHG Emissions Intensity (tCO ₂ e/million invested)	The estimated amount of avoided carbon emissions that can be achieved by the bond within a year (tCO ₂ -eq) per Million of reported currency invested. This value covers SDG 13: Climate action.
Lifetime Avoided GHG Emissions Intensity (tCO ₂ e/million invested)	The estimated amount of avoided carbon emissions that can be achieved by the bond over the lifetime of the projects (tCO ₂ -eq) per Million of reported currency invested. This value covers SDG 13: Climate action.
Sustainable Water and Wastewater Management	Includes Water Monitoring, Water Storage, Water Treatment, Water Distribution, Flood Defence, Nature-Based Water Solutions projects according to the Climate Bonds Initiative (CBI) Taxonomy.
Green Buildings	Includes Residential, Commercial, Products and systems for efficiency, Urban development projects according to the Climate Bonds Initiative (CBI) Taxonomy.
Energy Efficiency	Includes Energy Efficiency projects according to the Climate Bonds Initiative (CBI) Taxonomy.
Lifetime Avoided Electricity Use (MWh)	Total lifetime electricity use (MWh) avoided by projects.
Lifetime Avoided Heating Use (MWh)	Total lifetime heating use (MWh) avoided by projects.
Lifetime Quantity of Wastewater Treated (m ³)	Total lifetime quantity of wastewater treated (m ³) by projects.

Annualised Portfolio Construction emissions (tCO _{2e})	Annual GHG emissions (tCO _{2e}) associated with the construction of the projects.
Annualised Portfolio Operational emissions (tCO _{2e})	Annual GHG emissions (tCO _{2e}) associated with the operations of the projects.
Annualised Baseline Operational emissions (tCO _{2e})	Annual GHG emissions (tCO _{2e}) associated with the operations of the baseline.
Lifetime Portfolio Construction emissions (tCO _{2e})	GHG emissions (tCO _{2e}) associated with the construction of the projects over its lifetime.
Lifetime Portfolio Operational emissions (tCO _{2e})	GHG emissions (tCO _{2e}) associated with the operations of the projects over its lifetime.
Lifetime Baseline Operational emissions (tCO _{2e})	GHG emissions (tCO _{2e}) associated with the operations of the baseline over its lifetime.
Annual Quantity of Wastewater Treated (m ³)	Annual quantity of Wastewater treated (m ³) by water projects
Lifetime Quantity of Wastewater Treated (m ³)	Lifetime quantity of Wastewater treated (m ³) by water projects

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