USING CLIMATE MODELS TO ASSESS CLIMATE RISK

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Climate change poses many risks to businesses. It is important to understand these risks to make meaningful decisions about corporate strategy and to guide actions to prevent and mitigate the effects of climate change. Owens Corning is developing our approach for how we use climate models to assess climate risk and support our objective to reduce our footprint and increase our handprint.

Combating Climate Change

Owens Corning recognizes that climate change poses a real and grave threat to life around the world — we also acknowledge that human behavior is largely to blame. The concentration of greenhouse gases in the atmosphere is causing temperatures around the world to increase significantly, which is proving severely detrimental as it exposes people to extreme heat, drought, and rising sea levels. The Intergovernmental Panel on Climate Change reports that to avoid the worst impacts of climate change, the world must prevent global warming from exceeding 1.5° Celsius over preindustrial levels. Significant reduction in atmospheric greenhouse gases is needed to achieve this.

To help combat climate change, Owens Corning is taking action through a global strategy to reduce the emission of greenhouse gases, such as carbon dioxide and methane, our value chain. As a company, we focus on reducing the emissions from our raw materials and processing, as well as increasing renewable energy sources while implementing process innovation, capital improvements and low- and no-cost solutions to drive reductions in energy use. For our 2030 goal, we have embraced a Science-Based Target for greenhouse gas (GHG) emissions in line with the most stringent standard, designed to limit global warming to 1.5° Celsius. Our 2030 goal is to reduce absolute Scope 1 and Scope 2 GHG emissions by 50% from 2018 emissions, and we are committed to reducing Scope 3 greenhouse gases — indirect emissions such as those from our supply chain — within the same timeframe in line with the path to limit global warming to well below 2° C. These goals have been verified by SBTi, and are aligned with the recently announced guidance for future goals.

To calculate greenhouse gas emissions, we use a software application from Schneider Electric, EcoStruxure™ Resource Advisor. The software tracks electricity and fuel consumption at the plant level and applies site-specific emission factors based on location and supplier. The data are normalized on a unit of production basis to evaluate variations and trends. If risks are identified, mitigation plans are developed. The plant-level emissions data are then aggregated at a business unit and corporate level. Every plant, business unit, and corporate organization is provided footprint files for comparisons and the ability to track against their goals. Future emissions are also forecast based on estimated future production and the same calculation method.

Our strategy for reducing emissions includes energy reduction projects, using renewable electricity, and eliminating blowing agents with high global warming potential. Each year, we commit to a wide range of projects throughout our operations, and through these efforts we have made improvements that help reduce our carbon footprint.

We have also established a 2030 goal for 100% renewable electricity to help us sharply reduce emissions from our processes and products. We continue to review potential renewable energy projects in the U.S.

and around the world. We have also committed to solve the technical, business, and commercial puzzles in both our global foam insulation operations and our products to eliminate blowing agents that have high global warming potential, a significant source of Scope 1 emissions for our operations. For example, in 2020 Owens Corning introduced a new product line: FOAMULAR® NGX™ (Next Generation Extruded). The proprietary blowing agent in this new line of extruded polystyrene (XPS) foam products delivers a 90% reduction in global warming potential (GWP) compared to legacy FOAMULAR® insulation, and is optimized to demonstrate a greater than 80% reduction in embodied carbon. The investment in developing a product that meets or exceeds the stringent regulations going into effect in 2021 reflects Owens Corning's commitment to offering smart building materials that merge the highest levels of performance and sustainability.

Assessing Climate Risk

Climate risks to Owens Corning include the impacts of climate change on our operations, both from physical occurrences (e.g., severe weather events), and regulatory obligation (e.g., carbon pricing regulation). For information about how Owens Corning defines and manages all risk, see the Risk Management section of our latest sustainability report.

Carbon Emissions Trading Schemes

Carbon Emissions Trading Schemes are intended to drive reduction in GHG emissions. Owens Cornng is subject to or has chosen to voluntarily participate in Emissions Trading Schemes around the world, such as the EU Emissions Trading System, California's Cap-and-Trade system, the Canadian Federal Output-Based Pricing System, the Alberta Technology Innovation and Emissions Reduction, the Québec Cap-and-Trade system, and South Korea's Emissions Trading Scheme, as well as other similar schemes limiting emissions.

While Owens Corning always strives to go beyond compliance, many of Owens Corning's products are made from heavy manufacturing processes that generate carbon emissions. The company has a long-term strategy to manage its greenhouse gas emissions focused on compliance with regulations and driving cost reductions, while taking advantage of market opportunities in areas where trading schemes are in existence. Our strategy for complying with the systems in which we participate includes tracking and reducing emissions.

Our facilities continue to improve their energy and GHG efficiency. However, allowances are decreasing year over year by a flat rate without consideration of production increase. This is why the company's emissions are higher than allowances this year, despite progress in reducing emissions. In most cases the difference is compensated by surplus allowances from previous years. With the further reductions in allowances coming in the EU ETS in the coming years, we forecast that our carryover allowances will be reduced after 2021, requiring us to purchase allowances. We consider the potential financial impact to our business of having to purchase allowances to be a climate-related incentive for accelerated investment to achieve reductions.

Climate Models

In addition to the impacts associated with climate regulation, Owens Corning is affected by the physical consequences of a changing climate. While the effects of climate change are being felt globally, the risks associated can vary across geographical regions depending on external factors. These include both the region's actual climate and the ability of its infrastructure to absorb the impacts. Owens Corning is committed to understanding the climate risk at each of our sites around the world. In 2020, Owens

Corning began work with The Ohio State University to assess the resilience of our strategies against a range of climate-related scenarios and time horizons.

Climate models are continually developed, updated, and refined, and Owens Corning recognizes this continuous evolution as we advance our understanding of relevant physical processes and biogeochemical cycles. Climate modeling groups coordinate their projections of future climate conditions through a Coupled Model Intercomparison Project (CMIP).

Each of the climate models in the most recent release of climate model projections — CMIP6 — has been developed independently, and they are used collectively to characterize projected changes in the climate system in various emissions scenarios. An aggregate model is preferable to a single climate model, as it maximizes the signal and limits the noise, providing a more robust prediction of future climate conditions. It is important to note that the number of global models that are used in the aggregate varies slightly from one climate variable to another because of the specifics of the models. Not all models report all variables, so we select the most appropriate models for each variable.

The coarse resolution of global climate models such as CMIP6 does not allow local factors and conditions to be represented in model projections. Actual values may deviate from the projections based on regional geography and climatology. However, employing global climate models is a reasonable approach for maximizing consistency across all variables and all sites around the globe, and is the optimal approach for the time scale of this project.

Global climate models account for the primary natural (e.g., volcanoes, solar forcing) and anthropogenic (e.g., greenhouses gases and aerosols) factors that affect the climate. In addition, models use standard emissions pathways to describe greenhouse gas emission rates in the future.

Several emissions pathways have been developed to describe the potential impact of a range of human behaviors on the global climate. The pathways upon which the CMIP6 models are built are called Shared Socioeconomic Pathways (SSPs), and they include the factors that strongly impact emission rates of greenhouse gases, such as population, technological, and economic growth. Through this approach, the CMIP6 models are able to project climate conditions in a range of human behavior and societal advances, from high-emission scenarios in which human society continues emitting greenhouse gases at a high level, to low-emission scenarios in which human society takes substantial measures to reverse high emissions rates.

We use the models to create climate projections for the following scenarios:

- SSP1-2.6 (model mean warming: 2.0°C by 2100): Substantial efforts are taken to limit global temperature increase to <2°C. Rates of emissions are reduced below historical levels through gradual shifts in development, management, and education that accelerate demographic transition.
- SSP2-4.5 (model mean warming: 3.0°C by 2100): Uneven development and growth slow progress toward sustainable goals. Greenhouse gas emissions peak in 2024 and decline through 2100.
- SSP5-8.5 (model mean warming: 5.0°C by 2100): Rapid technological development is coupled with intensive fossil fuel usage, leading to rapid global economic growth and declining population by 2100.

For each of the variables in this report, magnitude of the variable is calculated for the historical period (1951-1970), averaged across several models from CMIP6. Projected magnitude is then calculated in the same models for three future 20-year time periods, named by the center year: 2026 (2016-2035), 2036

(2026-2045), and 2051 (2041-2060). Deviations from this approach are described for each variable, where applicable.

Indicators of Climate Risk

The models enable us to assess specific indicators of climate risk, based on the different climate change scenarios described by the SSPs. The following indicators were selected for this analysis because of their potential impact on Owens Corning facilities, both in terms of their frequency and severity.

Temperature. As climate change causes temperatures to rise, the risk of impact is higher for some sites than for others. Owens Corning measures the following variables related to temperature:

- Sites with the highest maximum temperature. This variable represents the potential severity of heat stress. We calculate the highest temperature in each of the 20-year periods, averaged across five climate models, and we calculate the percent change in maximum temperature for each Owens Corning site.

  The maximum temperature is projected to increase in the next several decades across all Owens Corning locations. The percent change in these increases is strongly dependent on latitude, with higher latitude locations projected to experience larger relative increases in the maximum temperature than lower latitude locations by 2051. This relationship is more pronounced under the high emissions scenario than the moderate emissions scenario.

- Number of days exceeding 90°F. This variable is also an indicator of potential heat stress or heat-related operational challenges. We calculate the number of times the daily maximum high temperature exceeded 90°F in a 20-year period, averaged across five climate models from CMIP6. This number is then converted to the number of days >90°F per year. The percent change relative to the historical period is calculated for each future time period and for each Owens Corning site.

- Number of freeze days. Temperatures below 32°F are an important variable for assessing potential cold stress, which can lead to frozen pipes, frozen water supplies, and uncomfortable working conditions. We calculate the number of days with a minimum temperature below 32°F in a 20-year period, averaged across five models. This number is then scaled to the number of freeze days per year. Percent change is calculated for each Owens Corning site so that changes can be assessed relative to the location.

Precipitation and Flood Risk. High levels of precipitation are an increasing risk as climate change becomes more severe, which in turn carries a greater risk for flooding and damage to our sites. Owens Corning measures the following variables related to precipitation and flood risk.

- Maximum one-day precipitation. This variable is derived from the maximum daily precipitation in a 20-year time period, averaged across five climate models. For each site, the percent change in maximum one-day precipitation is calculated to demonstrate the magnitude of any changes relative to each location.

- Maximum five-day precipitation. Multiple days of rain can lead to major flooding, which is slower to recede than flooding from single day rainfall, potentially leading to water quality issues and disruptions in transportation. In addition, flooding on this scale can cause soil to become saturated and urban water systems to exceed capacity. This variable is calculated as the largest amount of precipitation accumulated in five consecutive days, in each 20-year window. Maximum 5-day precipitation is reported in units of inches. The percent change is calculated for each of the future time periods relative to the reference period. This allows changes in maximum 5-day precipitation to be expressed as a relative change for each Owens Corning site.

- **Number of very heavy precipitation days.** Defined as days with greater than 20 mm (0.79 inches) of precipitation, this variable indicates the frequency with which a site may be exposed to transportation disruptions, flooding, high humidity, and water damage. The number of very heavy precipitation days is identified for a 20-year period, averaged across 5 models, and reported as the number of days per year.

Drought

A warming climate creates greater risk for drought, which decreases the availability of water and can increase the potential for degraded water quality and fire. Owens Corning measures the frequency of both extreme and moderate drought. We use the thresholds established by the U.S. National Drought Mitigation Center, which considers a range of indicators including the Standard Precipitation Index.

- **Extreme drought** is defined as a prolonged period (3+ months) in which precipitation is substantially lower than normal, as indicated by an Standard Precipitation Index range of -1.6 to -1.9, along with other indicators. This is calculated for each 20-year period, each of which is averaged between five climate models.

- **Moderate drought** frequency indicates the frequency with which 3-month precipitation totals result in an Standard Precipitation Index score of -0.8 to -1.2. This is calculated for each 20-year period, each of which is averaged between five climate models. Changes in the moderate drought frequency indicate potential changes in the frequency with which a site may be exposed to water stress and degraded water quality, depending on the geographic location.

Severe Weather

More frequent and more severe heavy winds, hail, and tornados can have a major impact on our operations. Owens Corning is measuring changes in severe weather frequency, including the following variables.

- **Number of severe weather days.** Occurrences of thunderstorm-related winds, hail, tornados and other storms pose immediate threats to the Owens Corning facilities and personnel. Because of the relatively localized nature of thunderstorms, our approach is to compute the number of days that the environment was conducive to the occurrence of severe weather in both the reference historical period and the combinations of future time periods and scenarios. The final metric is the percent change in the number of days that can potentially cause severe thunderstorms.

- **Number of hail days.** Damaging hail days (where hail >2" in diameter is possible) can disrupt operations through damage to facilities as well as transportation or staffing issues. Because hail potential is not explicitly measurable in CMIP6 climate models, the number of hail days is estimated using several severe weather variables that are conducive to the development of large hailstones. For each period and emissions scenario, the number of hail days is averaged across six climate models, then scaled to the number of hail days per year.

Wind

Owens Corning measures the risk of wind damage beyond that which occurs as a result of thunderstorms, as it has a potentially high impact on our operations. The following variables are included in our assessments.

- Magnitude of maximum wind. The potential for wind-related infrastructure damage, both within Owens Corning facilities and in the regions surrounding our sites, is directly related to maximum wind speed. This variable is calculated as the strongest wind in a 20-year period, averaged across four models. Percent change in projected maximum wind speed indicates the relative change in maximum wind speed for each site.

- Number of very windy days. Depending on the local geography, excessively high wind can increase the potential for damage, power outages, and transportation disruptions. The number of very windy days is calculated as the frequency with which the historical 95^{th} percentile wind magnitude is exceeded. The 95^{th} percentile of daily wind speed is calculated for the historical period, 1951-1970. The number of days for which this value is exceeded in each future time period and emissions scenario is counted and scaled to days per year. This value is averaged across four models.

Tropical Cyclones

Predicting the exact location and strength of future tropical cyclones is beyond current modeling capabilities, but there are large-scale climate indicators that can be used to assess how the frequency and intensity of tropical cyclones will change in the future. As a first step, we determined the subset of sites that could reasonably expect to be impacted by tropical cyclones. We then compared the relative frequency of tropical cyclone occurrence between the baseline historical period and the future at these sites.

Conclusion

Owens Corning's recognition of the risks posed by climate change to both our operations and the communities we serve is at the heart of our 2030 goals related to reducing our environmental footprint. We set these goals based on science, and we use scientific models to help us measure our risk and performance. Responsible sourcing and use of natural resources, reducing emissions, and transforming to the circular economy will help us meet our ambitious goals – and will help mitigate the risks we face.

Climate models will help us track our progress against these goals and help us evaluate the impact of climate risk on our business. The CMIP provides a valuable approach to ensuring that the latest scientific consensus informs our risk assessment, guiding our efforts at both the local, plant level and across our operations.