

Summary

The Castle Wind Offshore is a proposed 1000 MW offshore wind power project located in Morro Bay, California. The project is currently in the site control acquisition phase and is expected to be operational in 2030.¹ It will consist of approximately 100 floating offshore wind systems and will be spread over an area of 144km². The project is expected to supply enough clean energy to power 300,000 households.² Morro Bay is known by travelers, and it is a natural home for marine life. The city also has an iconic natural gas power plant that was closed in 2014, whose infrastructure Castle Wind can reuse. California is famous for its high renewable energy percentage in its energy structure, and the new offshore wind project can be a great addition to it. As such, the lawmakers of Sacramento and energy companies are enthusiastic about obtaining leases for the space to get started. However, environmental groups are concerned about the pace of pushing the project, worrying that environmental preservation may be overlooked. Furthermore, the fishermen of the area are concerned about whether the project will negatively impact the marine life and fishing industry. Castle Wind should resolve the conflicts with these local voices to proceed with the project.

Geography

The Castle Wind Offshore site is located in Morro Bay, California. Morro Bay is a coastal city on Central Coast along California State Route 1. Due to its unique location, it is well known to travelers. In addition, the city has a natural harbor and an estuary, making it a wonderful place to see marine wildlife. It is a natural refuge for animals like sea otters, sea lions, and harbor seals.³



Figure 1. Sea otters swimming in the Morro Bay⁴

Interestingly, one of the iconic structures in such a beautiful coastal town is a natural gas-fired steam electric power plant, the Morro Bay Power Plant. It was shut down in 2014 after approximately 60 years of operation. When it was first built, it was a coal power plant. Later, it was converted to burn natural gas. In 2014, the plant owner, Dynegy, claimed that it was going to be closed due to declining demand.⁵ However, the plant's infrastructure was not demolished, and a cooling water outfall structure previously used by this plant has the potential to be reutilized. In 2015, Trident Winds, the predecessor of Castle Wind Offshore, approached the city regarding the offshore wind energy project, seeking cooperation on the potential re-use of the outfall.⁶

Morro Bay is a small city with a population of around 10,500.⁷ Living in a coastal town, the residents enjoy fresh seafood, surfing, and kayaking. They typically have mixed feelings about the closing of the original power plant. Some people think such a picturesque small town doesn't match an industrial structure's vibe, while others believe this plant is iconic and memorable for the city. There were significant negative economic impacts and job losses related

to the closing of the plant.⁸ The Castle Wind Offshore project promised that it could create new job opportunities and revenue for the locals and is, therefore, favored by some Morro Bay residents. At the same time, others are worried about the potential harm deploying offshore wind power may bring to the fishing industry and marine wildlife.



Figure 2. The station's three smokestacks standing in the middle of town⁹

From a broader perspective, California is the fourth-largest electricity producer in the nation and is promoting renewable energy. In 2019, California's in-state electricity net generation from all renewable resources combined, including hydroelectric power and small-scale, customer-sited solar generation, was greater than that of any other state.¹⁰ From the 2020 Total System Electric Generation report by the California Energy Commission, the in-state electricity generation was 48.35% natural gas, 8.53% nuclear, and 33.35% renewables. Within the renewables, the top 3 are solar(15.43%), wind(7.18%), and geothermal(5.94%).¹¹ In 2019, the

energy consumption breakdown was 39.3% in transportation, 23.2% in industrial, 18.8% in commercial, and 18.7% in residential by end-use sector.¹²

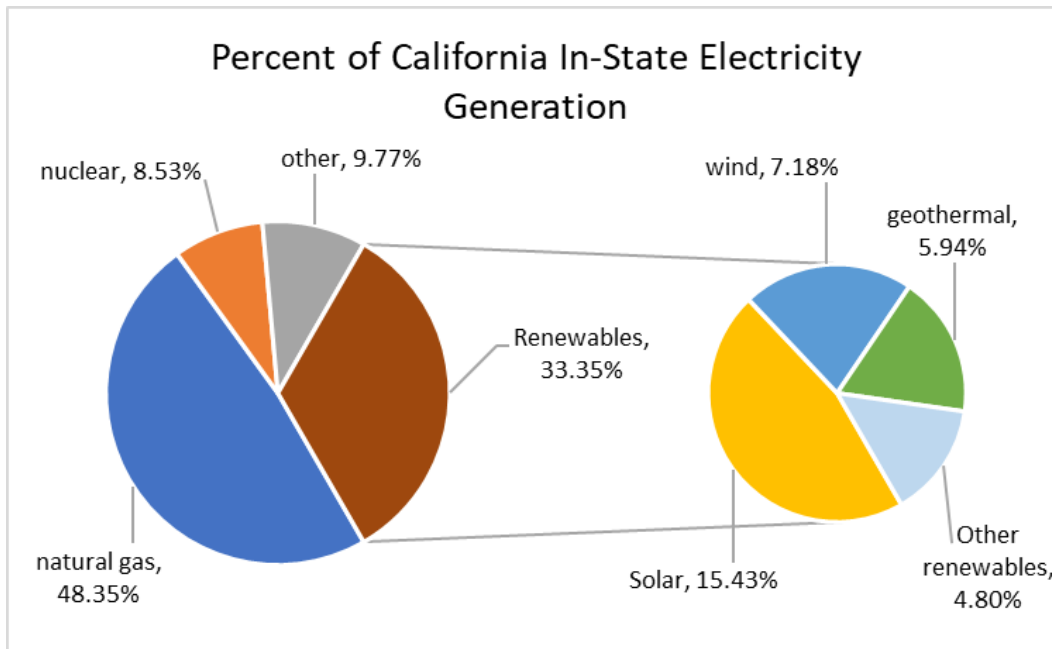
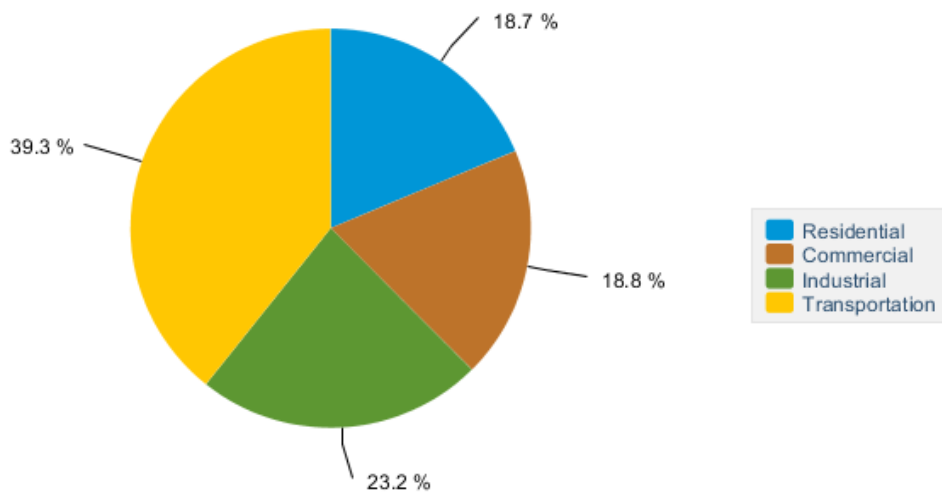


Figure 3. Percent of California in-state electricity generation, 2020¹³

California Energy Consumption by End-Use Sector, 2019



eia Source: Energy Information Administration, State Energy Data System

Figure 4. California energy consumption by end-use sector, 2019¹⁴

Technology

Energy generation is coming from floating GE, Siemens, and MHI-Vestas wind turbines in Morro Bay. The wind farm is expected to generate 1000 MW. Offshore wind turbines generate electricity using the energy from the wind. The wind pushes the turbines which drive the rotor. The rotor is connected to a generator that generates electricity (figure 5). The GE turbines used in this project contain direct-drive generators. Electricity is generated by spinning a ring of magnets that spin with the rotors. Direct-drive generators remove the usage of a gearbox, this reduces the amount of moving parts in the turbine. However, this requires the turbine to have permanent magnets made up of expensive and rare metals such as dysprosium and neodymium.¹⁶

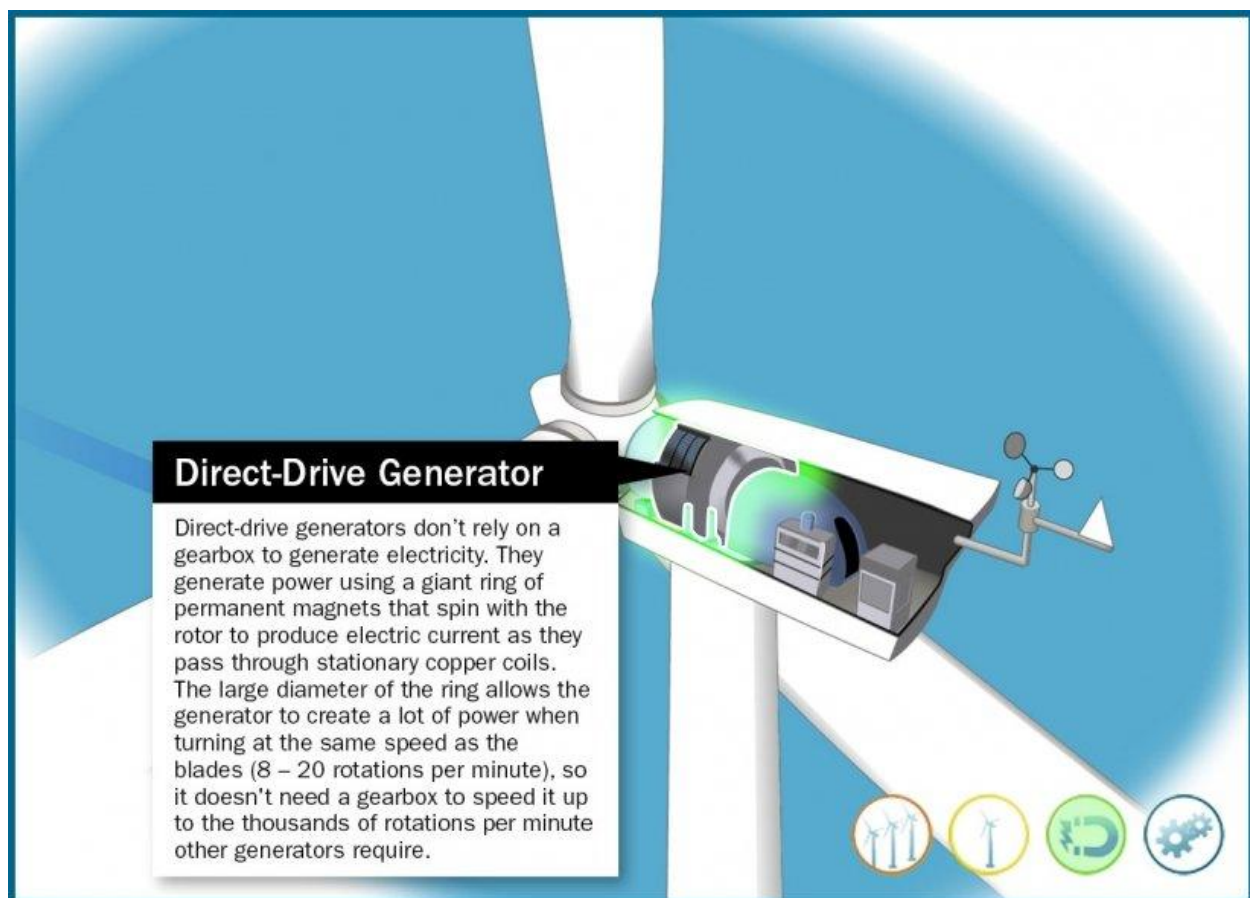


Figure 5. Wind Farm graphic¹⁵

The turbines are going to be installed in Morro Bay, California. Due to the depth of the water, the turbines cannot be installed traditionally by attaching the turbine directly to the seafloor. Instead, the turbines are buoyant. The Castle Wind project has not yet released any information on what floating technology they will be implementing. Currently, some technology available are tension leg platforms, spar buoys, and semi-submersible designs (figure 6). Tension leg platforms are platforms fixed in place by taut lines attached to the ocean floor. Spar buoys are large cylinders, weighted with ballast, and extend from the bottom of the turbine. Spar buoys are held in place by slacklines. Semi-submersible platforms are large, anchored, floating hulls extended from the turbine tower. Semi-submersible platforms are anchored to prevent drifting. Floating turbine technology places a turbine on top of a floating platform and fixes the platform in place by mooring lines. Floating platforms are required to make more areas off the Pacific coast usable for offshore wind. NREL estimates that floating platforms will be 29.5% of the capital cost of wind farms.¹⁸



Figure 6 Available floating technology¹⁷

Stakeholders

Stakeholders of Castle Wind who support building the wind turbines can be split into private companies and government officials. Government officials are eager to get the turbines online so that they can replace jobs lost from closing down the gas-fired Morro Bay power plant in 2014.¹⁹ Furthermore, by leasing the land the government can receive income for the land. In turn, companies like Castle Wind, Shell, and Equinor are vying for the leases because of the prospect of profit. After Castle Wind's subsidiary Trident Winds found that Morro Bay was an optimal location for wind, Shell and Equinor sensed the opportunity and jumped in on the bid. That move prompted the Bureau of Ocean Management to assess offshore wind in Morro Bay as "enough competitive interest... to explore the prospect in earnest."²⁰ As such, the proponents of Castle Wind see the project as a business opportunity.

What government officials and companies see as "business opportunity" are seen as "business encroachment" by the established locals. They consist of three categories: fishermen, environmental protection groups, and upscale property owners. In the fishermen category, there are the Morro Bay Fishermen and Washington Dungeness Crab Fishermen's Association. These two organizations are worried about the wind turbine's arrival bringing exclusion zones to fishing. The loss in profit is estimated to be up to \$8.75 million per year.²¹ After all, the last time a commercial project of this scale set back the fishing industry: when internet companies went to the bottom of the ocean to install fiber-optic cables, the fish didn't bite for two years.²² Upscale property owners also view the incoming wind turbines as unwelcome visitors, since the turbines would obstruct their property's view, thereby lowering property values.

Environmental groups such as the Defenders of Wildlife and the Coast of California Project are less concerned with the wind turbine plant's installment, but more with the

procedure’s timeline. They are worried about the fact that legislators and companies alike are racing to lease first and ask questions later. The Coast of California project in particular points out a lack of alignment with the National Environmental Protection Agency and California Environmental Act: moving to electricity conforms with preservation, but there is a lack of information available to the public. As Mernit from the Atlantic points out, “if conflicts aren’t addressed in advance—if local opponents are left to stew in their anger—large-scale renewable-energy projects will founder in the face of organized opposition.”²⁴

Figure 7: List of stakeholders and their respective positions

For	Against	Proceed with Caution
CA Governor Gavin Newsom	Morro Bay Fishermen	Defenders of Wildlife
Sacramento Elected Officials	Wealthy coastal property owners	Coast of California Project
Castle Wind	Washington Dungeness Crab Fishermen's Association	
Equinor	Port San Luis Commercial Fishermen Association	

Conclusion

We believe that the Castle Wind Offshore should proceed as planned, though with caution. In Morro Bay, the negative economic impacts of the closing of the natural gas plant can be reduced if the offshore wind farm is constructed and reutilizes the previous infrastructure. In addition, Castle Wind promised that it would bring new employment opportunities and generate revenue for the locals. From a broader perspective, this newly planned offshore wind plant can be a great addition to California’s radical plan of switching to renewable energy sources.

However, Castle Wind should also address local concerns about the fishing industry and environmental conservation. Failure to do so could lead to fierce pushback that could impede the project. Nevertheless, we support the viewpoint of California's lawmakers and companies eager to create an offshore wind farm in Morro Bay, as the conditions are optimal and increasing renewable energy will be a right step toward transitioning America off of its fossil-heavy electric grid.

Endnote

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