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California Energy Commission

DRAFT COMMISSION REPORT

Assembly Bill 525 Offshore Wind Strategic Plan

Volume 1: Overview Report

Gavin Newsom, Governor

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ABSTRACT

Assembly Bill 525 (Chiu, Chapter 231, Statutes of 2021) directs the California Energy Commission (CEC) to complete and submit a strategic plan for offshore wind development in federal waters off the California coast to the California Natural Resources Agency and the relevant fiscal and policy committees of the State Legislature.

This strategic plan is the last of four work products the CEC is directed to prepare by AB 525. The strategic plan consists of three volumes: **Volume I** is an overview report, **Volume II** is the main report, and **Volume III** contains the technical appendices.

In preparing the strategic plan, the CEC coordinated with federal, state, and local agencies and a wide variety of stakeholders. As required by AB 525, this strategic plan identifies suitable sea space to accommodate California's offshore wind planning goals, includes a discussion of economic and workforce development and port space and infrastructure, and assesses transmission investments, upgrades, and associated costs. In addition, this strategic plan presents the permitting processes for offshore wind facilities and identifies potential impacts on coastal resources, fisheries, Native American and Indigenous peoples, underserved communities, and national defense. The plan also outlines potential strategies that could address possible impacts such as avoidance, minimization, monitoring, mitigation, and adaptive management.

Keywords: Offshore wind energy; floating offshore wind; offshore energy; offshore development; offshore wind planning goals; decarbonization; coastal, cultural, and environmental resources; renewable energy; reliability; transmission; infrastructure planning; ports and waterfront facilities; workforce; economic benefits; sea space; fisheries; floating; Assembly Bill 525; Senate Bill 100

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CHAPTER 1:
Offshore Wind Introduction and Background

Offshore wind energy developed in federal ocean waters off California's coast is poised to play an important role in diversifying the state's portfolio of resources. Offshore wind can support grid reliability and help California achieve its 100 percent renewable and zero-carbon energy goals, as well as the electrification of other sectors, such as transportation.

In January 2022, Assembly Bill 525 (AB 525, Chiu, Chapter 231, Statutes of 2021) became effective, setting the analytical framework for offshore wind energy development off the California coast in federal waters and tasked the California Energy Commission (CEC) with developing a strategic plan for offshore wind development. The strategic plan must include, at a minimum, the following five chapters:

1. Identification of sea space
2. Economic and workforce development and identification of port space and infrastructure
3. Transmission planning
4. Permitting
5. Potential impacts on coastal resources, fisheries, Native American and Indigenous peoples, and national defense, and strategies for addressing those potential impacts.

The strategic plan chapters are guided by three AB 525 interim reports. The first report, adopted in August 2022, evaluated and quantified the maximum feasible capacity of offshore wind to achieve reliability, ratepayer, employment, and decarbonization benefits and established aspirational planning goals of 2 to 5 gigawatts (GW) for 2030 and 25 GW for 2045.[1] The second report, adopted in February 2023, provided a preliminary assessment of the economic benefits of offshore wind as they relate to seaport investments and workforce development needs and standards.[2] The third and

1 Flint, Scott, Rhetta de Mesa, Pamela Doughman, and Elizabeth Huber. August 2022. *Offshore Wind Energy Development in Federal Waters Offshore the California Coast: Maximum Feasible Capacity and Megawatt Planning Goals for 2030 and 2045.* CEC-800-2022-001-REV. Available at https://efiling.energy.ca.gov/GetDocument.aspx?tn=244285.

2 Deaver, Paul and Jim Bartridge. December 2022. *Preliminary Assessment of Economic Benefits of Offshore Wind: Related to Seaport Investments and Workforce Development.* CEC-700-2022-007-CMD. Available at https://www.energy.ca.gov/publications/2022/preliminary-assessment-economic-benefits-offshore-wind-related-seaport.

final interim report, adopted in May 2023, described permitting roadmap options that included time frames and milestones for a coordinated, comprehensive, and efficient permitting process for offshore wind energy facilities and associated electricity and transmission infrastructure off the coast of California.[3] The strategic plan also discusses the impacts and strategies to address those impacts in California's underserved communities.

Status of Offshore Wind Development

The offshore wind industry is growing rapidly with the total amount of global installed capacity exceeding 59 GW in 2022.[4] By early 2023, there were 18 countries with operating offshore wind projects. That number is expected to double by 2030. In addition, the United States has set several offshore wind goals at the federal and state levels. The Biden administration has set a goal of deploying 30 GW of offshore wind in U.S. waters by 2030 and an additional 15 GW of floating offshore wind by 2035.[5] Individual states have established goals to collectively procure 39 GW by 2040, with California's 2045 goal, that brings the total to 64 GW by 2045. With this trajectory, the United States is on a path to deploy 110 GW by 2050.

California Offshore Wind Leases

Offshore wind development off the California coast will occur primarily in federal waters under the exclusive jurisdiction of the Department of Interior's Bureau of Ocean Energy Management (BOEM). On December 6 and 7, 2022, BOEM conducted its first auction for California lease sale, known as the Pacific Wind Lease Sale 1 (PACW-1) for commercial leasing wind power on the Outer Continental Shelf in California. This auction resulted in the awards to five lease holders off California's North and Central Coasts.

The winning bids for the five lease areas total more than $757 million from five companies: RWE Offshore Wind Holdings, California North Floating, Equinor Wind U.S.,

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3 Jones, Melissa, Kristy Chew, Eli Harland, and Jim Bartridge. April 2023. *Assembly Bill 525 Offshore Wind Energy Permitting Roadmap.* CEC-700-2023-004. Available at https://www.energy.ca.gov/event/workshop/2023-06/workshop-assembly-bill-525-offshore-wind-energy-permitting-roadmap.

4 Musial, Walter, Paul Spitsen, Patrick Duffy, Philipp Beiter, Melinda Marquis, Daniel Mulas Hernando, Jennifer King et al. August 2023. *Offshore Wind Market Report: 2023 Edition*. Available at https://www.nrel.gov/wind/offshore-market-assessment.html.

5 The White House. September 2022. *Biden-Harris Administration Announces New Actions to Expand U.S. Offshore Wind Energy.* [Fact sheet]. Available at https://www.whitehouse.gov/briefing-room/statements-releases/2022/09/15/fact-sheet-biden-harris-administration-announces-new-actions-to-expand-u-s-offshore-wind-energy/?utm_source=link.

Golden State Wind, and Invenergy California Offshore.[6] On June 1, 2023, each of the five leases became effective. An important element of the lease stipulations is the inclusion of bidding credits for community benefits agreements (CBAs), which include a collective commitment by lessees of more than $50 million to support communities and ocean users. A breakdown of these CBA commitments and more information on CBAs can be found in **Volume II, Chapter 7**.

Offshore Wind Planning and Procurement

An outcome of planning for offshore wind is identifying pathways for utilities to procure offshore wind. The California Public Utilities Commission (CPUC) is authorized to order the procurement of resources by electrical corporations, electric service providers, and community choice aggregators as part of the Integrated Resource Planning (IRP) process.

Through the IRP process, the CPUC may request that the California Department of Water Resources (DWR) procure these resources on behalf of electrical corporations, electric service providers, or community choice aggregators. In addition, local publicly owned electric utilities can voluntarily obtain eligible energy resources that DWR acquires on a contract-by-contract basis.

Overview of Collaborative Efforts

As directed by AB 525, several California state agencies are collectively working to assess the potential role and opportunity offshore wind can provide for California. Led by the CEC, these coordinating agencies include the California Coastal Commission (CCC), the California Ocean Protection Council (OPC), the California State Lands Commission (CSLC), the Governor's Office of Planning and Research (OPR), the California Department of Fish and Wildlife (CDFW), the Governor's Office of Business and Economic Development (GO-Biz), and the California Public Utilities Commission (CPUC).

The CEC also consulted with the California Independent System Operator (California ISO) and other relevant federal, state, and local agencies, as needed, in the development of this report. The agencies have consulted with California Native American tribes, regularly met with an intertribal working group, and engaged with stakeholders identified in AB 525, including fishermen, labor unions, industry, environmental justice organizations, environmental organizations, and other ocean users. Detailed outreach to specific entities is described in **Volume II, Chapter 4**.

6 BOEM California activities web page is available at https://www.boem.gov/renewable-energy/state-activities/california.

Organization of the Report

This strategic plan is composed of three volumes: **Volume I — Overview Report**, **Volume II — Main Report**, and **Volume III – Technical Appendices**. **Volume I** is an overview of Volume II. **Volume II** provides the in-depth analytical framework for each of the components of the strategic plan, as well as recommendations to move the state towards achieving its vision and goals for offshore wind. **Volume III** includes four appendices that details floating offshore wind technologies, identifies types of potential impacts anticipated to arise from the development and operation of offshore wind projects, expands upon the approach, methodology, and data inputs used to identify suitable sea space, and provides offshore wind transmission schematics.

CHAPTER 2:
Creating a California Offshore Wind Industry

Offshore wind development will create a new industry in California with the potential to bring significant economic and environmental benefits. If developed at scale, offshore wind energy presents an opportunity to attract investment capital and provide economic and workforce development benefits to the state, California Native American tribes, and local communities.

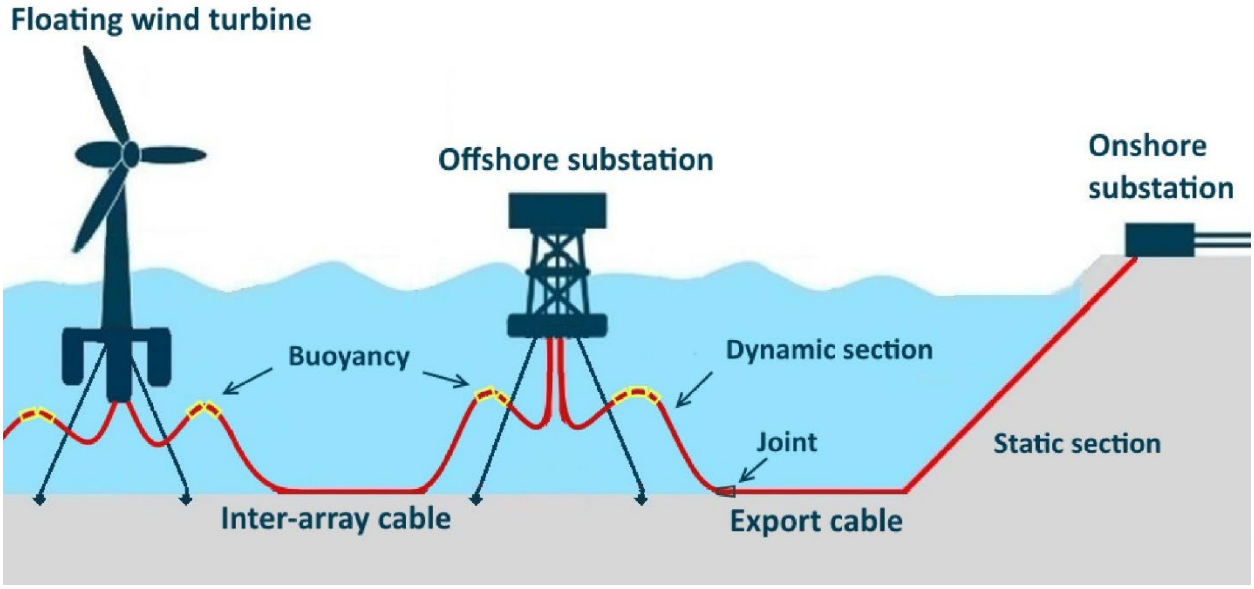
To date, most offshore wind energy projects have used fixed-bottom foundations, which are more suitable for shallow waters of 60 meters (about 200 feet) or less. At the end of 2022, there were only 10 floating offshore wind energy projects operating globally, totaling 123.4 MW.[7] The deep waters of the Pacific Outer Continental Shelf off California's coast have steep drop-offs and will require offshore wind turbines installed on floating platforms.

There are several designs for floating foundations, also referred to as *floating platforms,* which vary depending on several factors, including sea and seabed conditions and depth, wind speeds, turbine size, and the availability and location of manufacturing facilities, or the availability and price of imported components and equipment. These designs include three primary types of floating offshore wind platforms: spar-buoy, semi-submersible, and tension legs platforms. The industry has indicated that semi-submersible platforms made of concrete, steel, or a hybrid are likely to be the preferred technology.

These floating platforms will include midwater-suspended electrical cables linking the turbines, mooring cables, and anchors attaching the turbines to the seafloor, with an electrical cable to transport the energy from the turbines to a substation, either onshore or offshore, feeding into the bulk transmission grid and distribution system. Continued advancements in floating offshore wind technology will be needed to achieve the state's offshore wind planning goals. A floating offshore wind technology configuration is shown in **Figure 2-1.**

7 Musial, Walter, Paul Spitsen, Patrick Duffy, Philipp Beiter, Melinda Marquis, Daniel Mulas Hernando, Jennifer King et al. August 2023. *Offshore Wind Market Report: 2023 Edition*. Available at https://www.nrel.gov/wind/offshore-market-assessment.html.

Figure 2-1: Floating Offshore Wind Configuration



Source: Lerch, De-Prada-Gil, and Molins. 2020

Ports and Waterfront Facilities

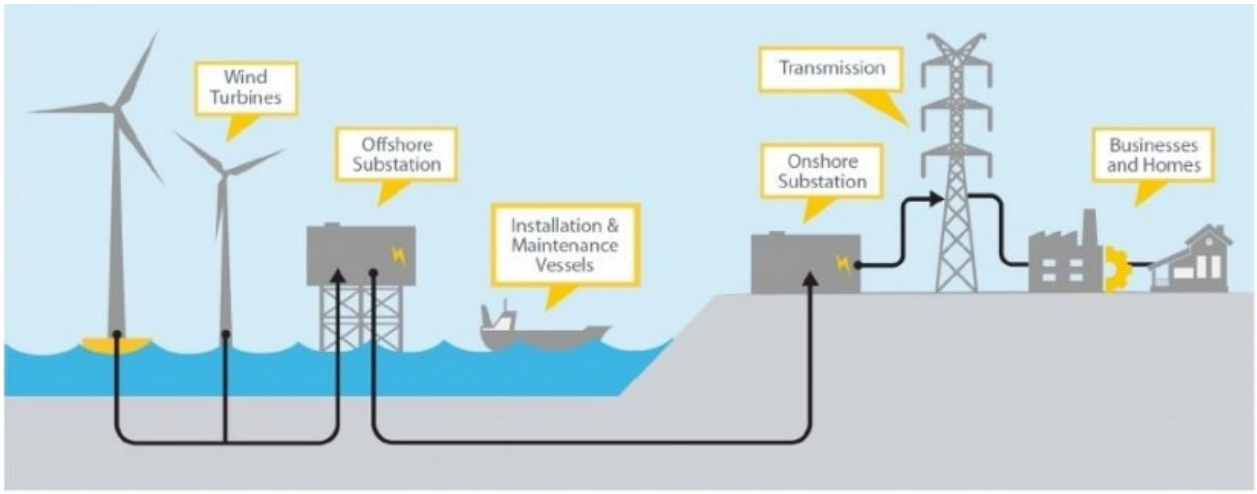
Seaports (or ports) and waterfront facilities are essential for developing a new offshore wind industry and will be an important driver of potential economic benefits, including jobs and economic growth opportunities. Offshore wind development will require upgrades to ports and waterfront facilities to support a range of activities, including construction and staging of floating platform foundations, manufacturing and storage of components, final assembly, and long-term operations and maintenance.

Types of port sites needed to support the industry may vary depending on the type of floating turbine design, location, mooring systems, distance from shoreline, and water depths for turbine operation. Regardless of the specific floating technology used, staging and integration port sites will need to receive, stage, store, assemble, and load offshore wind components. Operations and maintenance sites will need to support operation and maintenance vessels; and manufacturing or fabrication sites will need to receive raw materials and manufacture and assemble larger components. Additional detail on port types can be found in **Volume II, Chapter 6**.

Transmission

Transmission infrastructure is essential to developing an offshore wind industry, as it will be needed to deliver offshore wind generation to the larger transmission and distribution systems, as shown in **Figure 2-2**. The electric system on the North Coast is relatively isolated from the larger California grid and serves primarily local communities, so additional transmission infrastructure will be needed in this region. Existing transmission on the South-Central Coast is robust, however there is still a need for long-term planning.

Figure 2-2: Offshore Wind Transmission Infrastructure



Source: EERE *Offshore Wind Energy Strategies Report*. 2022

CHAPTER 3:
Offshore Wind Potential Economic and Workforce Benefits

Creating a durable domestic floating offshore wind industry in California can provide good paying jobs and career paths for Californians, particularly those in communities near ports and waterfront facilities. To ensure these opportunities are realized, California will need to develop a skilled and trained workforce capable of developing offshore wind to meet the AB 525 offshore wind planning goals of 2 to 5 GW for 2030 and 25 GW for 2045. The skilled workforce will include jobs in construction, manufacturing, engineering, operations and maintenance, sales, and maritime services. Many other jobs will also be created, such as longshoreman and tugboat and other watercraft operators.

As mandated by AB 525, the CEC's *Preliminary Assessment of Economic Benefits of Offshore Wind Related to Seaport Investments and Workforce Development* (Preliminary Economic Assessment)[8] highlights the importance of port improvements and the development of a supply chain in California to maximize potential benefits, all of which will require significant investments. A more detailed discussion of economic and workforce benefits can be found in **Volume II, Chapter 3**.

Quantifying Economic and Workforce Benefits

Many of the potential offshore wind economic and workforce benefits are expected to come from construction at ports, which are short-term and end once construction is complete. Although economic benefits come from multiple offshore wind activities, most are expected from long-lasting (more than 20 years) and well-paying jobs created in the manufacturing and supply chain sectors. These jobs will develop as the supply chain matures, and offshore wind businesses acquire materials, services, and parts from throughout California. Income generated from offshore wind activities can be re-spent into local, regional, and state economies, stimulating economic activity throughout the state, in both the short- and long-term, and increasing local, state, and federal tax revenue.

Several studies have been completed that estimate the potential economic and workforce benefits from offshore wind. Catalyst Environmental Solutions estimates that a $124 million investment at the Port of Humboldt, a $20 million training center, and

8 Deaver, Paul and Jim Bartridge. December 2022. *Preliminary Assessment of Economic Benefits of Offshore Wind: Related to Seaport Investments and Workforce Development.* CEC-700-2022-007-CMD. Available at https://www.energy.ca.gov/publications/2022/preliminary-assessment-economic-benefits-offshore-wind-related-seaport.

workforce development would create 500 annual short-term jobs by 2030 and 14,000 annual long-term jobs by 2045 (in addition to the direct jobs included in the workforce).[9] In 2045, upward of $5 billion in state-level gross domestic product would be generated. In addition, $1.2 billion in labor income and $385 million in fiscal revenue would be generated by 2045. These benefits could be increased by about 20 percent if the state of California adopts robust policies and incentives to promote in-state supply chain capacity.

A similar assessment of the California Offshore Wind High Road Training Partnership being deployed by the proposed CADEMO project estimates the economic and workforce benefits for constructing the proposed 60 MW offshore wind demonstration project, along with a larger, hypothetical 1 GW Morro Bay project off the Central Coast.[10] It found the proposed CADEMO project could create more than 900 full-time jobs, with more than $200 million in economic output each year for the three years of construction. The larger 1 GW project could create more than 13,000 full time jobs, about $1.09 billion in earnings, $3.23 billion in output, and $1.57 billion in gross domestic product. A separate study by the Natural Resource Defense Council and Environmental Entrepreneurs estimates that 10 GW of offshore wind development in the Morro Bay and Humboldt offshore wind areas could create more than 169,000 jobs and more than $45 billion in short-term economic benefits to the state.[11]

Benefits for Communities

In addition to economic and workforce benefits, offshore wind development can improve public health, services, and resiliency, while benefitting those most impacted by the historical inequities of energy and other industries. The communities that should receive benefits include California Native American and underserved communities, the fishing industry, subsistence and cultural fishing, dock workers, coastal visitors, nearby communities, those historically impacted by the energy industry, and those potentially impacted by the offshore wind industry.

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9 The $124 million investment would only cover a relatively small portion of the costs needed to fully upgrade the Port of Humboldt. Additional port upgrade costs are discussed in Chapter 6.

Catalyst Environmental Solutions. April 2023. *Analytical Guidance and Benefits Assessment for AB 525 Strategic Plan: Seaport and Workforce Development for Floating Offshore Wind in California*. Available at https://efiling.energy.ca.gov/GetDocument.aspx?tn=250296.

10 Collier, Robert, David Vallee, Miriam Noonan, and Stephanie Tsai. July 2023. *Trial Run for California's Offshore Wind Workforce: Lessons Learned From the CADEMO High Road Training Partnership*. Available at https://offshorewindhrtp.slocoe.org/.

11 Environmental Entrepreneurs. February 2023. *California's Offshore Wind Opportunity: Creating jobs by developing a new clean energy resource, and capitalizing on a robust job creation potential*. E2R: 22-10-B. Available at https://e2.org/reports/ca-offshore-wind-opportunity-2022/.

CHAPTER 4:
Potential Impacts of Offshore Wind and Avoidance, Minimization, and Mitigation Strategies

AB 525 specifies that offshore wind should be developed in a manner that protects coastal and marine ecosystems to ensure avoidance, minimization, and mitigation of significant adverse impacts. The CEC and coordinating agencies, conducted extensive outreach to understand impacts and strategies to address them. This included numerous confidential tribal consultations, community engagement, weekly and biweekly meetings with working group calls, public workshops, webinars, consultation discussions, and in-person meetings. A detailed discussion of impacts and strategies can be found in **Volume II, Chapter 4**.

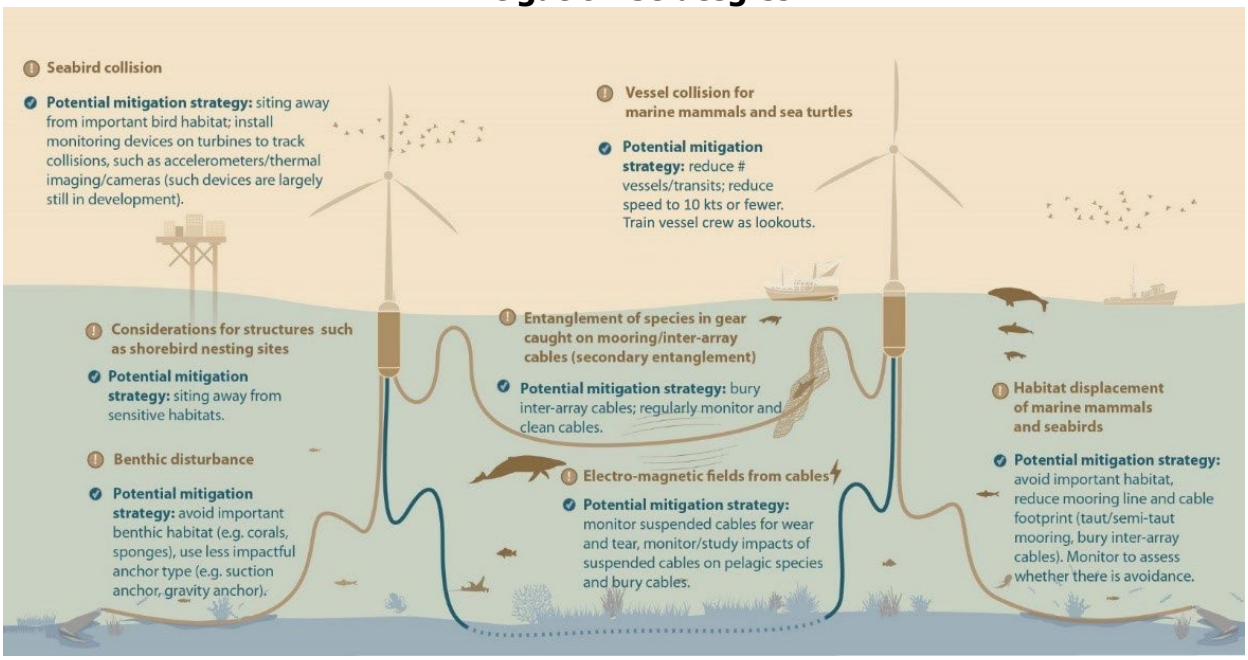
Potential Impacts from Offshore Wind Projects

Installation and operation of offshore wind projects will likely impact tribal, cultural, and natural resources as well as existing uses in California's coastal and marine environment. The coastal resources that may be impacted include terrestrial and marine ecosystems (habitats and species), air and water quality, visual resources, sacred and culturally significant places and items, religious and cultural practices, commercial, subsistence, and recreational fishing, public access to and along the shoreline, recreation, and industrial infrastructure.

While permitting agencies and developers have extensive experience with development and operation of various types of onshore and nearshore facilities, including deepwater oil and gas platforms, there is a great deal of uncertainty about the impacts from large-scale floating offshore wind facilities anchored more than 20 miles off California's coast. Nevertheless, reasonable inferences can be drawn regarding the types of impacts that may occur from developing and operating an offshore wind project. Based on the experience of projects elsewhere and other marine-based activities, it is possible to anticipate a range of potential impacts that may occur from developing and operating an offshore wind project, as shown in **Figure 4-1**. In addition to the details in the AB 525 Strategic Plan, **Volume II**, a detailed analysis and consideration of impacts in the current Morro Bay and Humboldt lease areas can also be found in the Coastal Commission's consistency determinations.[12]

12 The California Coastal Commission application of CZMA to BOEM's consistency determinations and the final reviews and adopted conditions and findings for each wind energy area: Humboldt WEA Coastal

Figure 4-1: Impacts of Floating Offshore Wind Components and Potential Mitigation Strategies



Source: Maxwell, et al. 2023

Marine Biological Resources: Overview of Impacts and Strategies

The impacts to marine biological resources from offshore wind development will vary based on development phases, seasonality of climate (for example, seasonal upwelling, El Niño), and species life history (for example, migration, spawning). Offshore wind project impacts will vary by type and intensity as well as the location of development and ongoing operation activities within the offshore lease areas. Impacts will also vary along the seafloor as infrastructure brings energy to shore, and within near and onshore areas affected by cable landings and port development.

The scale and duration of offshore wind development and operations will potentially affect a wide range of marine biological resources including impacts to specific species (for example, humpback whales, albatross) and to habitats (for example, deep sea rocky reefs, coral and sponge habitat, estuarine, and eelgrass beds). Potential impacts from offshore wind development and operation may result from surveys, equipment and transmission installation, port expansion, turbine operation, and associated disturbance, underwater noise, and electromagnetic fields in transmission cables. These impacts may include damage or destruction of marine and coastal habitats, changes in oceanographic conditions, injury or mortality of wildlife caused by direct impacts (such

Commission Consistency Determination Adopted Findings and Conditions and Morro Bay WEA Coastal Commission Consistency Determination Adopted Findings and Conditions.

as bird strikes, primary entanglement, habitat disturbance) or indirect impacts (such as changes in behavior, avoidance or shift in feeding or migratory patterns, and secondary entanglement).

Some strategies to address marine impacts could include conducting additional site surveys to guide project design to avoid or minimize cuts on sensitive resources, undertake habitat restoration, monitor construction areas for sensitive species, implement adaptive management strategies to address unforeseen impacts when they arise, and consider employing technological approaches for mooring, cabling, and construction that minimize impacts on marine animals and ecosystems.

Native American Tribes and Peoples: Overview of Impacts and Strategies

AB 525 requires the CEC to prepare a strategic plan that identifies and proposes strategies for potential impacts to Native American and Indigenous peoples. For the purposes of this report, the CEC has interpreted Indigenous peoples to mean people indigenous to the state of California. Since the passage of AB 525, the CEC and the coordinating agencies have engaged in tribal consultations with California Native American tribes to discuss the potential impacts from future offshore wind projects and the development of the strategic plan.[13]

Many California Native American tribes and peoples have connections to the Pacific Ocean, the coast, and marine habitats and species. Each California Native American tribe has its own perspective, concerns, and priorities regarding offshore wind. Overall, California Native American tribes are concerned that the development of offshore wind is a continuation of resource extraction that will not have meaningful benefits to their governments and communities. There is great concern about impacts to ancestral territories, sacred sites, and their direct connection and reliance on marine habitats and species. Tribes would like to see additional studies and monitoring to inform the decisions about identification of new sea space and future offshore wind leases. Tribes are also concerned that the influx of nonlocal workers to support a new industry, such as offshore wind, could lead to a potential increase of violence resulting in higher numbers of missing and murdered Indigenous peoples. They are also concerned with the identification of new sea space for future offshore leases, uncertainties about floating technology, and the desire for further studies and monitoring to inform the decisions about additional offshore wind leases.

13 For the strategic plan, the CEC is relying on the following definitions: California Native American tribes include federally and nonfederally recognized Native American tribes located within California. Native American tribes include federally and nonfederally recognized Native American tribes within the United States of America. Indigenous people include individuals who identify as Indigenous, Native American, and who may be, but not are not necessarily, members of Native American tribes.

Tribes requested a direct role in the decision-making process throughout the planning, permitting, operation, and decommissioning of offshore wind operations and associated infrastructure for offshore wind development. Tribes are also concerned about the fiscal impact and burden for tribes to participate in ongoing and frequent meetings about offshore wind development, permitting processes, and other activities.

Native American tribes have expressed deep concerns about the impacts of offshore wind and associated infrastructure on tribal cultural resources. This includes the impacts of offshore wind and associated infrastructure on sacred and culturally significant sites, features, places, and objects in the ocean, coast, and inland.[14] Tribes also have concerns about impacts to cultural landscapes such as viewsheds and biological resources, including plants, animals, and their habitats. In addition, they raised significant concerns about unknown weather impacts, including altered microclimatic conditions such as surface temperature, wind speed, and fog dispersion, as well as related impacts to species and habitats.

Many tribal members depend on local fishing and harvesting of sea life for cultural, subsistence, and commercial needs, and have concerns about the potential impact on their ability to feed their families and loss of income from commercial fishing. On the North Coast, tribes expressed significant concern about the impacts on the population and migration patterns of the already endangered salmon.

Tribes noted concerns about the lack of local grid reliability and limited access to offshore wind generation if new transmission infrastructure does not include upgrades to local and tribal areas. They also desire increased accessibility to distributed energy resources and microgrids to provide local power and improve their local reliability.

Tribes seek to ensure they receive economic benefits associated with new jobs created by the offshore wind industry and want access to jobs and training programs that benefit tribal and local community members first. Tribes have also requested the development of tribal community benefits agreements (TCBAs) with lease holders and the permitting agencies to ensure benefits are provided to their tribes and tribal communities.

Strategies for addressing impacts to California Native American tribes could include conducting meaningful consultation with tribal representatives, supporting the establishment of strong, legally binding tribal community benefits agreements, continuing to study impacts on tribes including exploring public safety measures to reduce violent crime and sexual and gender-based violence against California tribes and other vulnerable populations, and collaborating with tribes on avoidance, mitigation, and co-management opportunities.

14 Ocean tribal cultural resources include submerged sites and objects resting on top of the sea floor and underground. Coastal and in-land tribal cultural resources include a wide variety of sites, features, places, and objects that contain deep cultural and sacred significance to California Native American tribes.

Fisheries: Overview of Impacts and Strategies

Offshore wind development and ongoing operation can impact commercial and recreational fisheries in California with consequences to local economies and livelihoods. Fishing industry representatives have described several potential impacts to the commercial and recreational fishing industry through in-person and virtual outreach meetings and webinars and written comments. The section below summarizes some of the potential impacts to commercial and recreational fishing from offshore wind development.

Offshore and nearshore, the construction, ongoing presence, and operation of floating turbines and substations, and related undersea infrastructure, can interfere with or restrict access to fishing areas used by commercial and recreational fishermen. Changes to access may result from hazards to navigation and present safety issues, such as interference with navigational radar from offshore wind turbines and project components and potential interference with United States Coast Guard (USCG) rescue efforts. Additionally, there are potential hazards from increased vessel traffic and potential snagging, or loss of fishing gear associated with offshore wind project vessels and infrastructure. There is concern about the potential prohibition of fishing within leased and developed offshore wind areas that could potentially result in increased fishing pressure on a smaller area. In addition, fisherman fear the potential negative economic impacts to fishing and industries that support commercial and recreational fishing.

The fishing industry could also be affected by port construction, development, and ongoing activities to support manufacturing, assembly, and operation of offshore wind facilities. Fishing industry representatives also identified concerns about unknown environmental impacts from offshore wind development and expressed frustration about the uncertainty surrounding offshore wind overall, often commenting about lack of data, information, and engagement from the lessees.

Strategies for addressing impacts to fisheries could include initiating an offshore wind and fisheries working group to develop strategies to avoid or minimize impacts on the fishing community, developing communications plans with the fishing community in the offshore wind lease areas, maximizing continued access for fisherman to productive fishing areas, developing a template community benefits agreement for fisheries, and considering opportunities to compensate fisherman for economic losses.

National Defense: Overview of Impacts and Strategies

Essential Department of Defense (DOD) operations in California are based inland, in coastal facilities, and in the ocean itself. DOD testing, training, and operations include high- and low-level flights, search and rescue, and marine transit, and they rely on radar and other tracking technologies. The construction and operation of floating offshore wind turbines can alter radar signals and present additional risk of collisions

between military marine vessels or aircraft and floating turbines. Military marine vessels may collide with or snag mooring cables, inter-array cables, and turbine anchor systems. Onshore transmission lines can present hazards to DOD activities, especially for low-altitude flights. In ports and harbors, offshore wind construction and operation, and maintenance could compete with military uses of port facilities and traffic lanes. The increase in marine vessel traffic may also increase the number of events requiring search and rescue actions by the USCG.

Avoidance of conflict with DOD coastal, marine, and air operations could be addressed through coordination with BOEM and offshore wind project developers during planning, leasing, siting, design, and operations activities. Mitigation would focus on avoidance of conflicts, considering potential interference with navigational radar, risk of collisions with infrastructure (including anchoring systems and floating turbine structures), risk of electromagnetic emissions conflict, and risk of snagging or being entangled with underwater cables. Coordination in advance of offshore facility construction and operation should also include the development of communications plans and vessel transit routes to ease vessel lane management, law enforcement, and search-and-rescue activities by the USCG.

Underserved Communities: Overview of Impacts and Strategies

Underserved communities have experienced a disproportionate level of impacts from a combination of economic, health and environmental burdens, which include poverty, high unemployment, air and water pollution, the presence of hazardous waste, as well as high incidence of asthma and heart disease.[15] Developing an equitable energy system requires that the economic, health, and social benefits accrue across all levels of society, regardless of ability, race, or socioeconomic status. This requires intentionally designing systems, technologies, procedures, and policies that help lead to the fair and just distribution of energy system benefits. California's clean energy transition and the development of offshore wind provides a unique and historic opportunity to provide benefits to communities who have suffered the most from systemic injustices.[16]

Offshore wind has the potential to provide reliability and resilience benefits to rural and remote communities with inadequate energy services that limit their ability to participate in the clean energy economy. This includes significant equity benefits by creating well paying, sustainable jobs from upgrading port and waterfront facilities,

15 California Public Utilities Commission. 2021. "Disadvantaged Communities." Available at https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/infrastructure/disadvantaged-communities.

16 Governor Gavin Newsom. September 2022. *Executive Order N-16-22*. Available at https://www.gov.ca.gov/wp-content/uploads/2022/09/9.13.22-EO-N-16-22-Equity.pdf?emrc=c11513.

developing local supply chain capacity, manufacturing of components, and assembly of offshore wind turbines. Local workforce partnerships and training and education programs can support the development of an equitable and diverse workforce that reflects California's population. While offshore wind presents potential benefits to underserved communities, the construction of these facilities may add to the cumulative impacts of environmental burdens from existing industrial development and environmental hazards for port communities. Industrial activity and development at ports can impact underserved communities living near ports through air, water, noise, and light pollution. Additional air pollution may occur from increased vehicle emissions on land and vessel emissions offshore to transport raw materials and turbines. The construction and operation of offshore wind turbines use oil-based lubricants and other products, and there is a chance that an oil spill may occur, cumulatively adding to existing environmental burdens for local communities.

The CEC and the coordinating agencies met with community members and environmental justice advocates in the development of this report. While there is support for the potential benefits that offshore wind could bring, there are also concerns about the potential burdens to port communities. Advocates would like to see increased engagement with potentially impacted communities, zero emission goals for ports, a timely transition to clean energy resources, and strong legally binding community benefits agreements (CBAs). Additional opportunities for engagement will be posted on the CEC's Offshore Renewable Energy web page.[17]

Strategies for addressing impacts to underserved communities include conducting early and meaningful community outreach and engagement efforts throughout the offshore wind planning and development process, holding informational meetings at trusted locations in the affected communities at times convenient for working families, considering mitigation and strategies to reduce pollution from the beginning of offshore wind planning and development, supporting the development of CBAs, and prioritizing the training, hiring, and recruiting for employment opportunities in underserved communities and those most impacted by the offshore wind industry.

17 More information on Offshore Wind Renewable Energy is available at https://www.energy.ca.gov/programs-and-topics/topics/renewable-energy/offshore-renewable-energy.

CHAPTER 5:
Sea Space for Offshore Wind Development

AB 525 directs the CEC to identify sea space in two primary steps. First, identify the sea space established by the federal BOEM in its 2018 call for nominations and any other relevant information necessary to achieve the offshore wind planning goals of 2 to 5 GW for 2030. Second, identify suitable sea space for future development of offshore wind to accommodate the 2045 offshore wind planning goal of 25 GW.

In identifying suitable sea space, AB 525 also directs the CEC to consider existing data and information on offshore wind resource potential and commercial viability, existing and necessary transmission and port infrastructure, and protecting tribal cultural and biological resources with the goal of prioritizing least-conflict ocean areas. In addition, AB 525 requires the CEC to incorporate the information developed by the BOEM California Intergovernmental Renewable Energy Task Force, use the California Offshore Wind Energy Gateway, or functionally equivalent publicly accessible CEC-approved internet website, to provide relevant information developed for sea space identification. A more detailed discussion of sea space can be found in **Volume II, Chapter 5**.

Identification of Suitable Sea Space

The process for identifying sea space includes spatial mapping of locations potentially suitable for offshore wind in federal waters from about 3 miles offshore to the 200-mile federal boundary. Working with other state agencies, the CEC identified six sea space locations for further screening: five areas off the North Coast and one off the South-Central Coast just north of the current Morro Bay WEA. Each sea space location is characterized by average wind speed greater than 7 meters per second, average water depth of 2,600 meters or less, ocean bottom slope of 10 percent or less, and a minimum distance of 20 miles from shore. Constraints were used exclusively to identify the areas and were not changed in response to conflict screening, beyond siting 20 miles from shore to reflect reduced conflicts.

The identified potential conflicts in these areas include marine biological resources such as benthic habitats and marine birds, mammals, and turtles; concerns from California Native American tribes and Indigenous peoples, including viewsheds, cultural resources and practices, and ocean and coastal uses; and existing ocean uses such as commercial fisheries and shipping, and DOD military operations. Throughout the spatial data analysis, CEC found that ocean use activity and marine species presence are generally highest in waters within about 20 miles from shore. Therefore, identification of sea space beginning 20 miles from shore avoids the highest conflict areas and minimizes impacts. A map of suitable sea space identified for further analysis can be found in **Figure 5-1**.

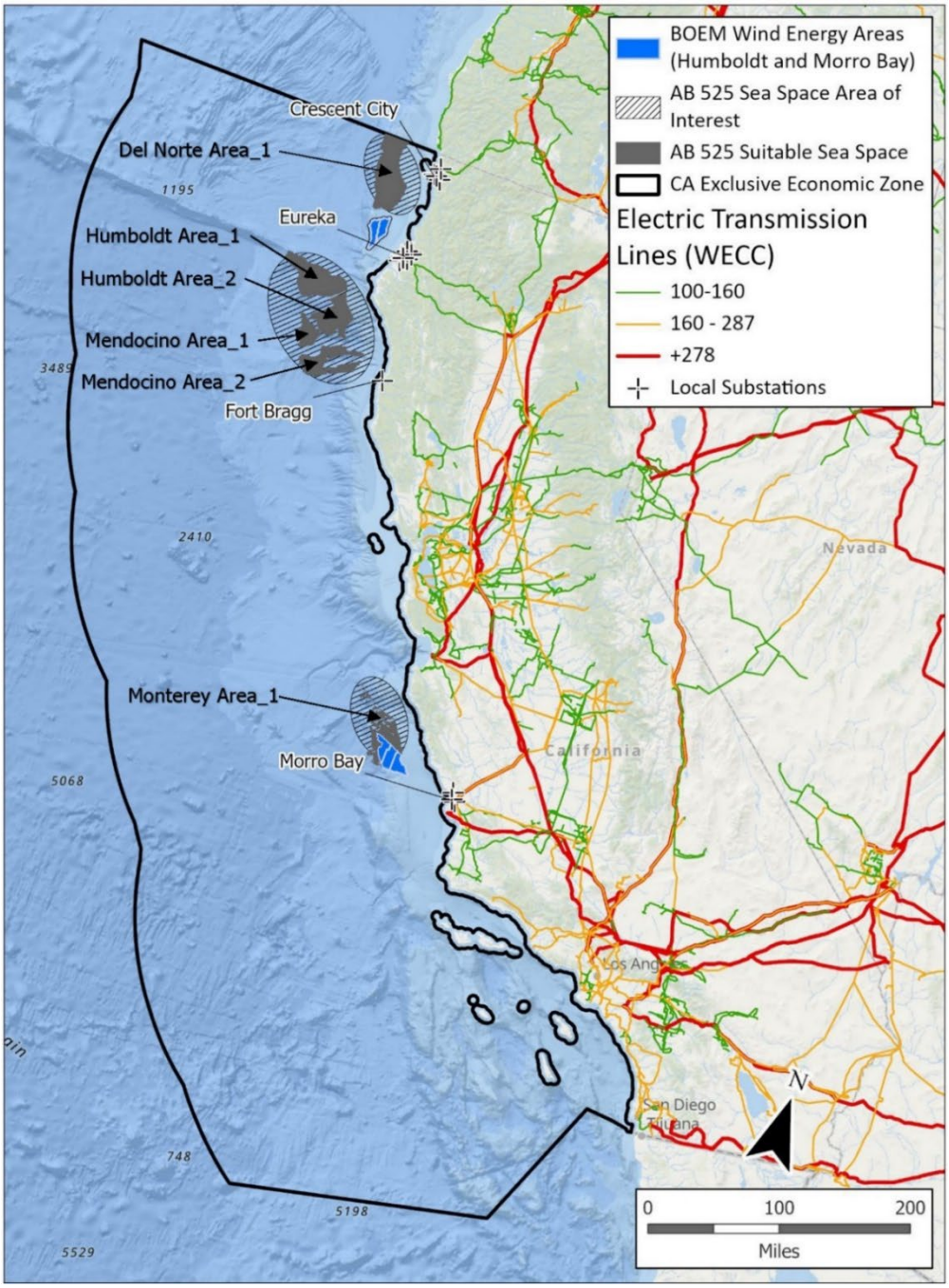
Offshore wind development in waters up to 1,300 meters deep is more feasible in the near term considering the current status of offshore technologies. In addition, the shorter distance to ports and transmission infrastructure, access to components and construction materials, and transportation costs are more favorable for offshore wind development and associated activities at 1,300 meters. To accommodate the offshore wind planning goals, sea space was identified that could support deployment in deeper waters up to 2,600 meters to help the industry meet the longer-term 2045 goals. Development in deeper waters is anticipated to be less challenging as technology matures and scales up and associated costs decline.

Similar to the process utilized by the BOEM-California Intergovernmental Task Force to establish the 2018 Call Areas, establishment of future Call Areas will involve robust outreach and engagement with members of coastal communities, fishing communities, Native American tribes, local, state, and federal agencies, academics and scientists, environmental organizations, and renewable energy developers. Data received through that outreach and engagement process will be added to the California Offshore Wind Energy Gateway and will support BOEM in issuing future Call Areas.

Sea Space Conclusions

It is expected that the 2030 goal of 2 to 5 GW can be met from projects developed in the existing lease areas. The CEC also identified sufficient sea space area to meet the 2045 offshore wind planning goal of at least 25 GW. Available information indicates that up to 50 percent of sea space identified could be unsuitable for offshore wind development due to conflicts with marine resources and other uses of the sea space. Visual comparison of available geospatial layers within the sea space shows large-scale conflicts with benthic habitats, shipping lanes, and DOD military activity. These conflicts could reduce the size of the sea space, depending on decisions made regarding ocean use conflict minimization and marine resource protection. Maps showing these potential large-scale conflicts are presented in **Volume II, Chapter 5**.

Figure 5-1: AB 525 Suitable Sea Space Identified for Further Analysis



Source: CEC. 2023

CHAPTER 6:
Port Infrastructure Needs

AB 525 directs the CEC to develop a plan to improve ports and waterfront facilities to support offshore wind energy development as part of the strategic plan. Ports and waterfront facilities will play a critical role in developing an offshore wind industry in California. Existing California port infrastructure is unable to support an offshore wind industry in the state. As it will take a decade to make the needed port improvements that can support the full offshore wind supply chain, the state may need to import components from other parts of the world to meet the state's 2030 offshore wind planning goals. However, to meet the state's 2045 offshore wind planning goals significant investments in port infrastructure upgrades are required.

Offshore wind turbines deployed off the California Coast are likely to be between 15 to 25 MW and the only feasible way to transfer components from one location to another is over water. As a result, staging and integration port sites where floating offshore wind turbines are assembled are critical to the future of offshore wind in California. Once assembled, fully integrated wind turbine generator systems can be towed out to the installation site. Waterfront facilities at ports will also be needed to manufacture offshore wind components such as turbine blades, towers, nacelles (the housing for generating components), and floating foundations. Port sites will also be needed to perform ongoing operations and maintenance for offshore wind facilities. Furthermore, port development provides an opportunity for California to maximize the economic benefits associated with developing an offshore wind industry by creating jobs and developing a local supply chain within the state.

A more detailed discussion of port infrastructure and the Moffat & Nichols' Port Plan assessment for ports to meet the AB 525 planning goals can be found in **Volume II, Chapter 6**.[18]

Port Infrastructure Conclusions

No single port site in California can serve all the needs of the offshore wind industry. Instead, a coordinated multiport strategy will be needed and could require more than 16 large and 10 small port sites to support offshore wind development over the next decade or more. Staging, integration, and operations and maintenance sites are

18 Lim, Jennifer and Matt Trowbridge (Moffat & Nichol). July 2023. *AB 525 Port Readiness Plan*. 221194/02. Available at https://slcprdwordpressstorage.blob.core.windows.net/wordpressdata/2023/07/AB525-Port-Readiness-Plan_acc.pdf.

essential, unlike manufacturing and fabrication sites since components can be imported. The Moffat & Nichols' Port Plan identifies several port sites within the state that can be used for these offshore wind activities, and notes that these sites must be developed as soon as possible to provide the state with the best opportunity to achieve the offshore wind planning goal of 25 GW by 2045. The number of port sites or acreage potentially required for the different types of offshore wind facilities needed to meet the 2045 planning goal are summarized in **Table 6-1** below. The Port Plan identifies that three to five 80-acre sites are required for staging and integration, and 12 sites will be required for manufacturing and fabrication (including two sites for blades, one site for towers, one site for nacelles, four sites for floating foundation subcomponent manufacturing, and four sites for floating foundations assembly). Nine to 16 berths at several port sites will be required for operations and maintenance.

Table 6-1: Number of Port Sites or Acreage to Meet 25 GW Offshore Wind Energy by 2045

Type of Site	Number of Port Sites or Acreage Required
Staging and Integration Sites	**3 to 5**
Blade Manufacturing and Fabrication Sites	**2**
Tower Manufacturing and Fabrication Sites	**1**
Nacelle Assembly Sites	**1**
Foundation Subcomponent Manufacturing and Fabrication Site	**4**
Foundation Assembly Sites	**4**
Service Operations Vehicles Berths for Operations & Maintenance Activities	**9 to 16**
Mooring Line and Anchor Storage Sites	**20 to 65 acres**
Electrical Cable Laydown Sites	**12 to 22 acres**

Source: Port Plan. 2023

Furthermore, an estimated investment of about $11 billion to $12 billion is needed to upgrade existing port infrastructure to meet the 2045 offshore wind planning goal. A collaborative port development strategy is needed to support various port upgrades, and programs to encourage early-stage port development, including port readiness, concept design, and engineering, as well as permitting and environmental assessments are needed.

CHAPTER 7:
Workforce Development

AB 525 directs the CEC to analyze offshore wind workforce development needs, including the need for skilled and trained workers with specialized skills and adequate safety training to support the offshore wind industry. It also requires the CEC to develop recommendations for workforce standards, including prevailing wage, apprenticeship, local hiring, and targeted hiring standards that ensure sustained and equitable economic development benefits.

Workforce benefits can accrue from the development and preservation of a skilled and trained workforce, the creation of long-term jobs, and the development of a local offshore wind energy supply chain. The workforce to support offshore wind includes workers to install offshore wind turbines, cables, offshore substations, as well as workers to upgrade infrastructure across the state, such as port and waterfront facilities and transmission infrastructure. The development of a local workforce presents an opportunity to attract investment capital and provide significant economic benefits to the state and local communities.

In preparing the strategic plan chapter on workforce, the CEC relied on two recent studies, the *Analytical Guidance and Benefits Assessment for AB 525 Strategic Plan* (Catalyst Assessment)[19] and the *AB 525 Workforce Development Readiness Plan* (Workforce Plan).[20]

Workforce Development Needs

The type and number of jobs needed vary during each phase of project development (supply chain and manufacturing, integration and assembly, and operations and maintenance) and by component type (turbines, nacelles, blades, foundations, cables for transmission and mooring, and so forth). Roughly two-thirds of the offshore wind

19 Catalyst Environmental Solutions. April 2023. *Analytical Guidance and Benefits Assessment for AB 525 Strategic Plan: Seaport and Workforce Development for Floating Offshore Wind in California*. TN 250296. Available at https://efiling.energy.ca.gov/GetDocument.aspx?tn=250296.

20 Fox, Brooklyn and Sarah Lehmann (Moffatt & Nichol). June 2023. *AB 525 Workforce Development Readiness Plan*. 221194/02. Available at https://slcprdwordpressstorage.blob.core.windows.net/wordpressdata/2023/07/AB525-Workforce-Readiness-Plan_acc.pdf.

workforce is centered around the supply chain and manufacturing of key components.[21] The integration and assembly of offshore wind projects require highly skilled and trained workers but represent only 11 percent of the total workforce required. Roughly 20 percent of the workforce is responsible for wind project operations and maintenance.

The build-out of the offshore wind supply chain will have the highest demand for skilled-trade standards and skilled trade specialist jobs because of the broad range of activities they perform across the various project phases. Supply chain and manufacturing jobs will be distributed across the state as the offshore wind supply chain expands, and port facilities are upgraded to manufacture and provide materials, services, and components. These careers and high-paying jobs do not require a bachelor's degree; instead, much of the education will be centered on some form of postsecondary education or training and certification.

Workforce Standards

Workforce standards are proactive policy mechanisms that support the creation of high-quality jobs by enacting specific requirements regarding worker job quality and job access. Workforce standards can include prevailing wage, workforce skills, workforce training, apprenticeship programs, local hiring initiatives, targeted hiring standards, and equitable hiring standards. Workforce standards can address worker safety and ensure consistent quality in all phases of offshore wind development.

Workforce standards, including prevailing wage, can be part of Project Labor Agreements, which BOEM historically requires as a lease stipulation for offshore wind projects. In BOEM's December 2022 California offshore wind lease sale, bidding credits were offered in exchange for commitments to fund workforce training programs and community benefits agreements (CBAs). California offshore wind lessees committed at least $23.34 million toward general CBAs and at least $29.35 million toward lease area use CBAs to fulfill their lease stipulations.

Workforce safety is a top priority for the offshore wind workforce and industry. Offshore wind project activities are conducted both onshore and offshore, presenting a need to delineate responsibility for workforce safety to the appropriate federal and state entities. Onshore worker safety is primarily under the authority of the California Division of Occupational Safety and Health, with some aspects also regulated at the federal level. Offshore worker safety is primarily overseen by the federal entities, including the USCG, which is primarily responsible for maritime safety, security, and environmental stewardship in U.S. ports and inland waterways.

21 BVG Associates Limited. October 2017. *U.S. Job Creation in Offshore Wind: A Report for the Roadmap Project for Multi-State Cooperation on Offshore Wind*. NYSERDA Report 17-22. Available at https://www.cesa.org/wp-content/uploads/US-job-creation-in-offshore-wind.pdf.

Workforce Training Programs and Apprenticeships

Offshore wind occupations differ by type of education, certification, or credentialing. Most occupations will require some form of postsecondary education or training (such as a bachelor's degree, apprenticeship, or technical certification). In the CEC's engagement with representatives of key labor organizations, manufacturers, offshore wind project developers, training stakeholders, and apprenticeship experts, they identified the need for education in science, technology, engineering, and math (STEM), including computer competency, for operating and maintaining offshore wind components and facilities. Offshore wind project developers and training stakeholders highlighted the importance of maritime training, and that maritime experience, engineering, and technical skills needed for the offshore wind industry are transferable from other existing industries.

Workforce Development Conclusions

The most needed skills in the near term for the offshore wind industry are in the trades, technician, and construction sectors. In the longer term, most jobs are in the supply chain and manufacturing sector. A workforce with the right skillsets will require training that must be timed to accommodate industry needs for different types of workers. Many skilled-trade jobs will require specific training and certifications that can be obtained from apprenticeships, pre-apprenticeships, and vocational training programs. Effective workforce development depends heavily on partnerships between industry, educational and training institutions, government entities, and the community. A more detailed discussion of workforce development can be found in **Volume II, Chapter 7**.

CHAPTER 8:
Transmission Technology and Alternatives Assessment

AB 525 requires the CEC, in consultation with the CPUC and the California ISO, to assess the transmission investments and upgrades necessary, including subsea transmission options, to support the 2030 and 2045 offshore wind MW planning goals. The assessment must include relevant cost information for subsea transmission and network upgrades, as well as the extent to which existing transmission infrastructure and available capacity could support offshore wind energy development.

Transmission and interconnection infrastructure is needed to transport power from offshore wind projects and connect them to the larger transmission system to deliver generation to load centers. Some of the key technologies needed to interconnect large amounts of offshore wind to meet the planning goals are viable but still emerging and not yet commercially available. Continued research and development on dynamic cables, floating substations, direct current circuit breakers, and other technologies are needed to meet California's long term offshore wind planning goals. In addition, innovative approaches such as networked or backbone systems needed to efficiently interconnect offshore wind projects and minimize environmental impact will be required.

The Schatz Energy Research Center assessed several offshore wind geographic locations and various transmission solutions for regional offshore wind development for the North Coast.[22] The scenarios assessed a range from 7.2 GW to 25.8 GW within the study area, which includes five offshore wind areas.[23] The Schatz Study presents 10 transmission alternatives specific to the Northern California and Southern Oregon transmission systems. The different transmission alternatives include overland transmission, subsea transmission, high voltage alternating current and direct current options. In addition, a high-level feasibility assessment examined potential environmental impacts and the siting viability for developing the alternatives. Transmission alternatives have also been evaluated to interconnect offshore wind generation on the Central Coast and will also require further study.

22 Zoellick, J., G. Adams, A. Mustafa, A. Cooperman, et al. 2023. *Northern California and Southern Oregon Offshore Wind Transmission Study*. Schatz Energy Research Center. Available at https://efiling.energy.ca.gov/GetDocument.aspx?tn=252604.

23 These areas include, from north to south, the Coos Bay Call Area, the Brookings Call Area, the Del Norte planning area, the Humboldt WEA, and the Cape Mendocino planning area.

Large investments in transmission upgrades and new transmission infrastructure will be needed to accommodate offshore wind development to meet the state's planning goals and deliver offshore wind power to local communities and the larger grid to serve major load centers. This can avoid stranded transmission investments built for near term needs that must be removed and replaced in later stages of development. Phased transmission development and implementation can also provide for cost-savings and reduced environmental impacts, while helping the state achieve the offshore wind planning goals. **Volume II, Chapter 8** provides additional detail and discussion of transmission technology and alternatives for offshore wind.

Transmission Technology and Alternatives Conclusions

While currently available technology has met the needs of existing offshore wind projects, some of the transmission technologies needed to bring offshore wind energy to shore and interconnect with the larger bulk transmission system are still emerging. Continued research and development will be needed on existing export cable, substation, and other transmission technologies to minimize environmental impacts, accommodate offshore wind projects located in deeper waters, and to export larger volumes of power in an efficient manner. Although several studies have evaluated a number of potential transmission pathways on the North and Central Coasts, additional detailed evaluation will be needed. Finally, exploring transmission alternatives that connect regionally can maximize the potential benefits of offshore wind across the Western Interconnection.

CHAPTER 9:
Transmission Planning and Interconnection

AB 525 identifies the need for transmission planning to deliver offshore wind generation. The transmission grid will need to expand dramatically to meet the state's clean energy and climate policies, not just the offshore wind planning goals. This chapter discusses transmission planning and interconnection, which are long lead-time activities that need to be done in an integrated process. A more detailed discussion of transmission issues can be found in **Volume II, Chapter 9**.

California has enhanced its transmission planning processes over the last several years and today has robust processes in place. The California ISO, CPUC, and CEC recently bolstered transmission planning with a December 2022 memorandum of understanding (MOU) to tighten the linkages between the agencies. While these processes ensure development of transmission projects for reliability, economic, and policy reasons, innovative planning approaches may be needed to identify and move offshore wind transmission projects forward.

Another important aspect of transmission planning is ensuring sufficient transmission corridors that can accommodate new and expanded transmission. The CEC has conducted landscape-scale planning processes over the years to identify and prioritize appropriate locations for renewable energy and transmission development. A landscape-scale approach considers a wide range of potential constraints and conflicts, such as environmental sensitivities, habitats, existing land uses, tribal cultural resources, and others. This type of landscape planning approach, along with the possible use of the CEC's corridor designation authority, could expedite transmission development, especially for North Coast offshore wind resources where transmission availability is severely constrained. In addition, the state's permitting processes may require additional enhancements to eliminate possible duplication in need assessment, permitting, and environmental review.

In recent years, interconnecting generation and battery storage projects has become increasingly challenging as the California ISO interconnection queue has been inundated with interconnection requests for new resources. To address this, interconnection process enhancements are underway. In addition, innovative interconnection approaches may be needed to interconnect offshore wind projects, including network and meshed systems currently being explored on the East Coast and in Europe. These approaches will use emerging technologies that could more efficiently interconnect wind projects and potentially reduce environmental impacts from interconnection equipment.

Commenters in the AB 525 process have raised concerns about the length of time it takes to approve transmission projects. They recommend that transmission permitting

be accelerated and that duplicative processes at the CPUC and California ISO are streamlined to accommodate the large amounts of transmission that will be needed in the coming decades. In addition, some commenters suggest that targeted transmission planning, similar to the planning undertaken to accelerate transmission development for wind generation in the Tehachapi area, will be needed to identify and permit sufficient transmission for offshore wind.

Transmission Planning and Interconnection Conclusions

Proactive planning and innovative interconnection approaches will be needed to bring transmission projects online to meet the offshore wind planning goals. Landscape level planning for transmission can evaluate potential corridor options and associated environmental and land use conflicts not historically addressed in existing transmission planning processes. Conducting detailed routing studies, environmental permitting analyses, community engagement, and cost assessments can provide valuable input to the transmission planning processes and regulatory decisions. Eliminating duplication in need determinations and environmental reviews for transmission projects can help ensure they come online in a timely and efficient manner.

In addition to planning for bulk transmission, assessing the potential to provide reliability and resiliency to offshore wind host communities and other rural communities along transmission routes can help address equity issues. Further, examining the potential role of energy storage to complement new offshore wind transmission is important as it can relieve congestion, minimize curtailment, and optimize the use of offshore wind energy when it is most valuable.

CHAPTER 10:
Offshore Wind Permitting

The permitting process for any large infrastructure project, such as offshore wind, is complex. It involves numerous state, federal, and local agencies, with differing data and information requirements, timelines, and processes. Each agency is expected to have responsibilities for permitting different aspects of offshore wind development, along with different application and review processes for projects within their jurisdictions. To ensure a coordinated, comprehensive, and efficient process for offshore wind permitting, the desert Renewable Energy Action Team (REAT) model could be applied to the ocean and marine environment and include permitting for offshore wind projects, port and waterfront facilities, and transmission infrastructure. The desert REAT model was a coordinated multi-agency permitting approach developed in 2008 that streamlined permitting for utility-scale renewable energy projects in the California desert.

Proposed Ocean REAT Approach

The proposed *Ocean REAT approach* for offshore wind would include the establishment of an Ocean Renewable Energy Policy Group (Ocean REPG) and an Ocean Renewable Energy Action Team (Ocean REAT). The Ocean REPG would be composed of executives and principals from local, state, and federal entities with a role in the planning, environmental review, and permitting aspects of California offshore wind projects. The Ocean REPG would receive updates from agency staff and resolve potential issues, disputes, or conflicts that emerge.

The Ocean REAT would be composed of staff from local, state, and federal entities with a role in the planning, environmental review and permitting aspects of California offshore wind. This interagency staff working group would work with lessees, stakeholders, and tribes in the review of applications and preparation of environmental documents. They would regularly update the Ocean REPG and elevate issues, disputes, or conflicts that emerge. The Ocean REAT would identify opportunities for joint project-level environmental documents under National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). They could also work with CSLC, as CEQA lead agency, to establish a joint review panel to facilitate timely, collaborative, and comprehensive environmental review and agreement on impact analyses and mitigation measures during the administrative draft phase of the environmental review process.

Environmental Review Conclusions

The *Ocean REAT approach* would identify opportunities for parallel reviews under NEPA and CEQA. The *Ocean REAT approach* would also coordinate reviews, under the CSLC as CEQA lead agency, to promote timely, collaborative, and comprehensive environmental review and agreement on impact analyses and mitigation measures.

As identified in the Permitting Roadmap, it could take up to five years following submittal of the construction and operations plan for federal and state agencies to complete their review for an offshore wind facility. A coordinated environmental review process under NEPA and CEQA could be considered to support the various state and federal permitting processes required for offshore wind energy projects. A more detailed discussion of offshore wind permitting can be found in **Volume II, Chapter 10**.

CHAPTER 11: Recommendations

Offshore wind presents an opportunity for California to continue advancing the state's clean energy and climate goals by diversifying the state's energy portfolio and supporting a reliable and resilient electric grid, while also creating economic development and workforce benefits.

It will require time, effort, and funding to implement offshore wind in California. The pace of implementation will depend upon the feasibility and availability of resources. This strategic plan, with the below recommendations, provides direction and guidance for the development of offshore wind in a responsible and timely manner.

Potential Impacts of Offshore Wind

Consistent with AB 525, the following recommendations address the potential impacts of offshore wind on coastal (or marine) resources, Native American and Indigenous people (or tribal), fisheries, and national defense. Though not required by AB 525, recommendations to address the potential impacts of offshore wind on underserved communities are also included.

Marine Impacts

- Support comprehensive environmental research and monitoring that uses best available science and monitoring technologies, traditional ecological knowledge, and baseline and long-term monitoring to guide project siting, assess project-level and cumulative impacts during construction and ongoing operations, and inform adaptative management strategies throughout the project lifecycle and future sea space planning and lease sales. This effort should incorporate scientific advice from academia, governments, tribes, non-governmental organizations, the offshore wind industry, and other interested entities.
- Continue promoting coordination and collaboration among lessees on surveys, comprehensive monitoring plans, and project implementation to minimize environmental impacts, leverage resources, and increase efficiency.
- Develop a comprehensive mitigation framework that prioritizes avoidance and identifies strategies to minimize and offset impacts to marine life and habitats from offshore wind development and ongoing operations, including impacts from port development. Adaptive management strategies should also be identified to facilitate rapid response to unanticipated impacts.

Tribal Impacts

- The study, development, and operation of offshore wind related projects should include early, often, and meaningful consultations with California Native American tribes and collaborative development of appropriate avoidance, minimization, and mitigation strategies for impacts to tribal cultural resources, natural resources, cultural, social, economic, and other interests.
- Continue to study and develop public safety measures to reduce violent crime and sexual and gender-based violence particularly against Native American and other vulnerable populations.
- Encourage project proponents to contract with California Native American tribes for cultural and environmental monitoring before, during, and after construction of offshore wind projects, port improvements, and expansion of transmission infrastructure.
- State and federal agencies should explore opportunities for increased tribal access and stewardship in state and federal waters.

Fisheries Impacts

- The latest commercial, recreational, subsistence, and cultural fishing data should be used to conduct analyses assessing spatial and temporal trends in fishing effort and value metrics in the offshore and nearshore environments, in consultation with California Native American tribes and the California Offshore Wind Fisheries Working Group. These efforts will inform deployment within existing lease areas and planning for port development and sea space for future offshore wind projects.
- Continue to support the California Offshore Wind Fisheries Working Group in developing a statewide strategy for avoidance, minimization, and mitigation of impacts to fishing and fisheries that prioritizes fisheries productivity, viability, long-term resilience, and safe navigation.
- Continue working with researchers, offshore wind leaseholders, tribes, and other state and federal agencies to develop a strategy to avoid, minimize, and mitigate impacts to ongoing fisheries surveys that inform fisheries management.

National Defense Impacts

- The state should continue to coordinate with the DOD to prevent potential offshore wind development from encroaching on military testing, training, and operations areas.

Underserved Communities Impacts[24]

- The study, development and operation of offshore wind related projects should include early regular, and meaningful community outreach and engagement with underserved communities, non-governmental organizations, local governments, and other potentially impacted underserved groups.
- Offshore wind development and operation should avoid, minimize or mitigate impacts to underserved communities, including those in and around ports.
- Evaluate and identify ways to increase capacity for stakeholders to engage in the permitting, development, and mitigation of offshore wind development.

Sea Space

The following recommendation encourages the identification of suitable sea space in a way that prioritizes least-conflict ocean areas:

- Continue suitable sea space identification, research, analysis and refinement, in coordination with BOEM, underserved and tribal communities, and stakeholders to inform the feasibility of offshore wind development that minimizes impacts to California's coast and ocean resources.

Advancing Port Development

The following recommendations support port electrification and adequate port infrastructure needed for the development of the offshore wind industry:

- Continue to support, in coordination with federal, tribal, and local governments, developers, and underserved and local communities a port development and readiness framework. This should include consideration of potential funding sources and strategies, as well as local content and prevailing wages, to identify port site developments needed for offshore wind project development and operations.
- A port development and readiness framework should continue to be coordinated with larger West Coast port network evaluation efforts and state and national supply chain development.
    - Continue to collaborate with ports and harbor districts, tribal governments, underserved communities, local communities, port users and tenants, and developers to understand the unique challenges and opportunities of each port and harbor district and their potential role in supporting offshore wind development and operations.

24 Recommendations related to workforce development efforts for underserved communities can be found in the "Workforce Development" section.

- Continue to engage with industry leaders, developers, and supply chain entities to explore options to support local supply chain development.

Workforce Development

The following recommendations will help California develop an equitable, skilled, and trained workforce to support the offshore wind industry:

- Identify immediate and long-term workforce needs, understand diversity gaps, develop targeted and equitable hiring standards, establish training curricula and programs, fund training and education centers, recruit entry-level as well as experienced workers, set local, tribal, and equitable hiring standards, and prioritize prevailing wage and union labor.
- Coordinate with local communities, tribes, workforce training centers, government agencies, community organizations, employers, high schools, community colleges, and universities to create career opportunities, workforce training, and economic development benefits.
- Support the development of project labor agreements that provide local and underserved communities and tribes with meaningful economic benefits from offshore wind development.

Transmission Technology and Alternatives

The following recommendations support technology development and alternatives assessment to effectively plan for offshore wind transmission:

- Continue assessing transmission alternatives for the North and Central Coast offshore wind development to meet the offshore wind planning goals, including analyzing corridors, routes, and rights-of-way for promising transmission pathways, including land-based (overhead and underground, HVAC and HVDC) and subsea cable alternatives.
- Consider phased approaches to transmission development to examine both short-term and long-term offshore wind development needs, costs, and benefits that balance these factors.

Transmission Planning and Interconnection

The following recommendations support effective and timely planning and interconnection processes for offshore wind transmission:

- Foster regional bulk transmission planning efforts to support offshore wind development along the West Coast to maximize the potential benefits throughout the Western Interconnection.

- Explore innovative approaches, such as networked or backbone systems, and implementation mechanisms, to efficiently bring offshore wind energy to shore to meet the offshore wind planning goals.
- Inform existing transmission planning processes by systematically identifying and prioritizing alternative points of interconnection that limit the number of landfall sites and minimize environmental impacts and long run costs.

Offshore Wind Permitting

The following recommendations address the need for a coordinated, comprehensive, and efficient permitting and environmental review process:

- The state should consider a permitting process modeled on the successful Renewable Energy Action Team (REAT) and Renewable Energy Policy Group (REPG) models developed in 2008 for large sol projects in the California desert.
- The state should engage early and consistently with BOEM on its offshore wind programmatic environmental impact study to ensure the analysis is reflective of the state's priorities as it relates to data collection, analysis methodology, impact identification, and mitigation measures.