

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of
Facilitating Access to Spectrum for Offshore Uses
and Operations
WT Docket No. 22-204

NOTICE OF INQUIRY

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By the Commission: Chairwoman Rosenworcel and Commissioner Starks issuing separate statements

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I. INTRODUCTION

1. With this Notice of Inquiry, we take the first steps toward facilitating offshore operations through innovative spectrum management policy. Specifically, we seek input on whether changes in our rules and policies are needed to facilitate the development of offshore commercial and private networks. This Notice of Inquiry seeks to gather information on offshore operation use cases and their potential, including, but not limited to, the type of offshore uses that require spectrum, the appropriate spectrum bands for offshore uses, and potential assignment mechanisms. We take this action today to support U.S. industrial and scientific endeavors that will benefit from offshore spectrum availability, and in return benefit the public, while also protecting existing operations such as maritime and aviation safety operations.

2. We recognize that a variety of approaches may be appropriate as we consider potential paths forward, whether through industry-led voluntary sharing measures, Commission policy and

guidance, or regulation where other approaches would be insufficient. With this Notice, we seek to compile a comprehensive record on the various issues that the Commission should consider, inviting broad comment from all stakeholders. We look forward to reviewing the record that develops from this Inquiry to inform us regarding next steps that the Commission may take.

II. BACKGROUND

3. A bedrock Commission obligation is to manage and oversee the nation’s radio spectrum, “maintain[ing] the control of the United States over all [] channels of radio transmission” and “provid[ing] for the use of such channels, but not the ownership thereof, by persons for limited periods of time.”¹ To fulfill this obligation, the Commission assigns spectrum rights where there is public need for spectrum.² With respect to licenses on land, we continue to meet the ever increasing demands for spectrum, and generally have done so on a band-by-band or service-by-service basis as technology advances and spectrum needs evolve. We have utilized a wide array of models for assigning spectrum rights because of a wide diversity of land-based needs. With respect to access offshore for land-based spectrum, however, existing mechanisms may not be meeting current demand.

4. The Commission’s initial site-based, demand-driven, licensing paradigms that remain in effect today in many bands continue to provide for narrowband spectrum access in support of industry, public safety, and backhaul. The Commission uses ongoing, demand-driven licensing in the Gulf of Mexico and in other U.S. territorial waters in the Atlantic and Pacific Oceans, including areas adjacent to the Continental United States (CONUS), Alaska, Hawaii, Puerto Rico, the U.S. Virgin Islands, American Samoa, Guam, and the Northern Mariana Islands. Where applicable, such licensing (and deployments under those licenses) require coordination with Canada and Mexico. The majority of such site-based offshore authorizations are for Private Land Mobile Radio (PLMR) services, part 90 radiolocation services, aviation-ground services, and maritime coast stations.³ As of today, there are more than 1,400 active site-based licenses issued offshore across many different radio services.⁴ In addition, our part 15 rules for unlicensed operation and our part 5 rules for experimental radio use have provided parties with additional mechanisms for accessing radio spectrum offshore.

5. When the Commission began to use geographic area licensing, it provided for spectrum access in the Gulf of Mexico only in certain spectrum bands,⁵ and our rules do not provide for geographic-based access in the remaining bands in the Gulf of Mexico and in all other offshore areas surrounding and within the United States and its territories. In the context of notice and comment rulemaking proceedings, the Commission adopted an area license for the Gulf of Mexico when there was demand demonstrated in the record and there were no technical, legal, or policy reasons prohibit it. With the exception of the Gulf of Mexico,⁶ there is not a geographic area license specifically designated for offshore use—e.g., there is no market area license for water off the Atlantic or Pacific Coasts, or within the Great Lakes. We recognize that there may be offshore operations in other areas that may need access

¹ 47 U.S.C. § 301; *see also* 47 U.S.C. § 151 (declaring that a purpose of regulating interstate and foreign commerce in communication is “to make available, to all people of the United States . . . a rapid, efficient and world-wide wire and radio communication service”).

² *See id.* § 303 (providing the Commission with authority to, among other things, classify radio stations, prescribe the nature of the service to be rendered by each class of licensed stations and each station within any class, assign bands of frequencies to the various classes of stations, and assign frequencies for each individual station).

³ *See, e.g.*, 47 CFR § 90.315.

⁴ While these licenses are issued across 23 radio services, most are licensed in the Fixed Point-to-Point Microwave service, the Industrial/Business Pool service, and the Microwave Industrial/Business Pool service.

⁵ *See id.* § 27.6(c)(2)(i)-(ii).

⁶ *See, e.g., id.* § 27.6(a)(2). The Commission’s part 27 rules define the Gulf of Mexico Economic Area (EA) as extending from twelve (12) nautical miles off the United States Gulf Coast outward into the Gulf. *Id.*

to additional spectrum and could benefit from geographic-area licensing or other assignment mechanisms aside from site-based access.

6. Offshore communications are also available or are authorized via satellite-based systems.⁷ For instance, mobile earth stations located at sea provide communications services both offshore and in international waters. These include Mobile Satellite Services (MSS) provided by such companies as Inmarsat and Iridium,⁸ as well as services provided via Earth Stations in Motion (ESIMs) by such companies as SES, Intelsat, Telesat, and ViaSat.⁹ ESIMs are increasingly used to deliver broadband to maritime vessels—including enterprise services and broadband to cruise ships.¹⁰ In addition, satellite-based communications currently play a significant role in providing communications to oil rigs and platforms offshore.¹¹ In this inquiry, we are exploring the potential benefits of providing additional avenues for providing offshore access via terrestrial communications services. We also note that part 80 of the Commission's rules provides spectrum to vessels for maritime radio, such as Automatic Identification System (AIS) channels and other uses.¹² This Notice does not seek comment on Maritime Radio,¹³ but rather on other offshore spectrum use cases, including additional needs of vessels.

III. DISCUSSION

7. This Notice of Inquiry first seeks comment on the actual demand for offshore spectrum and whether the Commission needs to facilitate spectrum usage for offshore operations. This Inquiry recognizes different spectrum rights models that could facilitate offshore operations and seeks comment on which model would best serve spectrum needs offshore. We do not intend to structure our analysis by specific offshore regions or zones. Instead, we seek more broadly to understand the extent of the demand to use offshore spectrum and more generally where that demand is concentrated. Next, we seek comment on assignment mechanisms that would best serve the Commission's goal of effective and efficient use of spectrum. We also seek comment on the potential for unlicensed use and spectrum leasing models to meet offshore spectrum needs, and on individual spectrum bands that may facilitate offshore operations.

⁷ See *Communications Marketplace Report*, 36 FCC Rcd 2945, 2953-55, paras. 16-19 (2020) (*2020 Communications Marketplace Report*).

⁸ See 47 CFR § 25.103.

⁹ ESIMs include Earth Stations on Vessels, along with Vehicle-Mounted Earth Stations, and Earth Stations Aboard Aircraft. *2020 Communications Marketplace Report*, 36 FCC Rcd at 2954-55, para. 18; 47 CFR §§ 25.103, 25.228.

¹⁰ *2020 Communications Marketplace Report*, 36 FCC Rcd at 2954-55, paras. 18-19. Vessels can connect to the global communications network with VSAT (very small aperture terminal) technology to provide high-speed Internet access and phone service. *Id.* at 2955, para. 19.

¹¹ Rigzone, *How Do Offshore Communications Work?*, https://www.rigzone.com/training/insight.asp?insight_id=337 (last visited May 16, 2022) (noting that the most widely chosen mode of communications with offshore oil and gas platforms today is satellite communications involving VSATs at the offshore site connected via satellite to a teleport onshore).

¹² 47 CFR pt. 80.

¹³ We note that there are pending petitions in a separate proceeding asking the Commission to address part 80 of its rules. We do not address those petitions here. See Petition of the Radio Technical Commission for Maritime Services for Rulemaking, RM-11765 (filed Feb. 16, 2016), https://www.fcc.gov/ecfs/file/download/60001459665.pdf?file_name=60001459665.pdf (RTCM Petition); Petition of the Radio Technical Commission for Maritime Services for Rulemaking, RM-11813 (filed Aug. 20, 2018), https://www.fcc.gov/ecfs/file/download/DOC-5954ec679b000000-A.pdf?file_name=067-2018-SC110-PET%20-%20Pt%2095%20Petition-signed.pdf (RTCM PLB/MSLD Petition); Petition of the National Global Maritime Distress and Safety System Implementation Task Force to Request that FCC and the Coast Guard Amend Their Respective Rules to Update the Carriage Requirements for Radio Safety Equipment on Small Passenger Vessels to Enhance Their Safety and Conform to the Latest Standards, RM-11726 (filed June 16, 2014), https://www.fcc.gov/ecfs/file/download/7521678821.pdf?file_name=7521678821.pdf.

Finally, we seek comment on whether the approaches taken by other countries in making offshore spectrum available can inform our policy.

A. Demand for Offshore Spectrum

8. To better guide any potential change to Commission rules or policies, we seek to understand how extensive the need is for offshore spectrum access. In light of this, we seek comment generally on the demand for offshore spectrum. We recognize that, in the past, demand was initially driven largely by the offshore oil drilling industry's need for spectrum access offshore, but we anticipate that demand may have grown among other industries as well. What kinds of offshore operations would benefit from greater access to spectrum, both now and in the future? What distance from land would those operations be conducted? Are the use cases that need offshore spectrum fixed or mobile in nature, or a combination of both? Are there commercial or private maritime or aeronautical uses in addition to those already provided for by our rules? What types of services might entities consider deploying offshore? Are there both commercial and private operations offshore that require spectrum access and, if so, how are private versus commercial operations' respective needs for offshore spectrum different? To what extent are current or anticipated satellite-based services responding to various types of demand for offshore spectrum-based services? What are the potential benefits of making spectrum available for terrestrial-based Wi-Fi or mobile networks in addition to the spectrum available today?

9. We recognize that the Commission has granted several experimental licenses operating at various frequencies to facilitate scientific experimentation and exploration offshore. Descriptions of these experiments include communications, data gathering, and command and control of offshore platforms, sensors, and unmanned aerial systems for purposes of oceanography and navigation.¹⁴ We seek comment on how these experimental licenses might inform future offshore radio services, and in particular whether the Commission should consider adopting new offshore radio service rules to provide service and technical rules for devices used to support any of these applications.

10. Do commenters expect that spectrum demand will vary significantly by type of offshore operation or use case? How much spectrum do different types of offshore operations or uses need? How much contiguous spectrum do stakeholders anticipate needing? Are the needs localized or is the demand for communications or other services over long distances? What are the boundaries of offshore operation use cases? How far from the shore might demand for spectrum extend? Will the amount of spectrum needed for a given use or operation be static or will the amount of spectrum needed change over time? Is there a demand for wireless spectrum to provide backhaul from operations offshore? Commenters should specify the individual offshore operation, use case, or service discussed in their responses.

11. One use case that we anticipate may have various offshore spectrum needs is the construction and operation of windfarms in the Atlantic and Pacific oceans,¹⁵ and potentially beyond. We anticipate that such needs may include: providing wireless services to the site during construction of the windfarm; testing, daily operation, and scheduled and emergency maintenance and replacement; communications to ships and entities on shore; and communication capability among offshore operators

¹⁴ See, e.g., Ocean Infinity Group Limited, Experimental Special Temporary Authority, File No. 1315-EX-ST-2021, Call Sign WS9XPG, eff. from Aug. 26, 2021 to Feb. 21, 2022 (OET, ELB) (authorizing mobile station transmissions in eight Atlantic Ocean locations to conduct experiments involving the transmission of data signals using transmitters installed on unmanned vessels).

¹⁵ For example, offshore spectrum may further the infrastructure and clean energy goal to deploy 30 gigawatts of offshore wind energy by 2030 that will "catalyze offshore wind energy, strengthen the domestic supply chain, and create good paying, union jobs." The White House, *Fact Sheet: Biden Administration Jumpstarts Offshore Wind Energy Projects to Create Jobs*, (March 29, 2021) <https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/29/fact-sheet-biden-administration-jumpstarts-offshore-wind-energy-projects-to-create-jobs/>; U.S. Department of the Interior, *Secretary Haaland Outlines Ambitious Offshore Wind Leasing Strategy*, (Oct. 13, 2021) <https://www.doi.gov/pressreleases/secretary-haaland-outlines-ambitious-offshore-wind-leasing-strategy>.

in adjacent areas and between those operators and first responders. Is this an accurate overview of uses for spectrum at windfarms? Are there other uses? How do these needs differ from those on offshore oil platforms, which today utilize both terrestrial-based and satellite-based communications services? How much spectrum would a windfarm need to support these kinds of operations, and would the amount of spectrum vary by stage of the project?

12. Another potential use case is for communications services by vessels in coastal waters. Is there a need for additional offshore spectrum access models that would provide greater opportunities for vessels at sea to access mobile networks or connect onboard Wi-Fi networks to the internet? We recognize that there are satellite-based services currently being provided to vessels at sea.¹⁶ What are the potential benefits of making additional spectrum available from terrestrial-based Wi-Fi or mobile networks?

13. What other use cases exist that require offshore spectrum access that is not being provided under the existing access models? Are there other industrial or scientific research demands for offshore spectrum? We seek comment generally on other industries that might have a need for offshore spectrum. Are there offshore operations that utilities may conduct? Is there a need for telephone service to subscribers working offshore, like there is in the Gulf of Mexico? Commenters should include specific examples for industries operating offshore and uses of offshore spectrum.

14. We also seek comment on the degree to which terrestrial technologies using spectrum allocated for fixed or mobile wireless operations could supplement the demand for offshore spectrum access currently served by satellite technologies using spectrum allocated for satellite operations. Further, how does the Internet of Things (IoT) landscape affect demand for offshore spectrum? What sort of IoT technologies require additional offshore spectrum? What other relevant use cases should we consider? For example, space launch operations can involve the offshore retrieval of launch components.¹⁷ What are the spectrum needs for these activities and how well suited are the authorization mechanisms that are currently being used? Are there any potential impacts to satellite operations from increased offshore terrestrial operations?

15. Additionally, we seek comment on the infrastructure needed to support offshore spectrum operations. Specifically, what infrastructure is needed to support base stations, end-user equipment, fixed transmitters, beacons, and other equipment offshore? Is the infrastructure likely to be fixed/stationary, drifting in the water, airborne, or deployed in another way? What are the needs—infrastructure related or otherwise—of offshore operations that may sometimes be fixed but at other times are mobile or need to move locations over time, such as operations by the fishing industry, scientific researchers, and cruise ships?

B. Spectrum Rights Models

16. To the extent that there is a need for increased access to spectrum offshore, we seek comment on what kinds of spectrum rights should be conveyed to meet the demand. Possible models include shared spectrum rights, authorizations for secondary operations, and authorizations with primary rights. We seek comment generally on these approaches, or combinations thereof, including the advantages and disadvantages of each and any associated cost and benefits.

17. In advocating for or against particular spectrum rights models, we encourage commenters to consider not only the circumstances and needs of offshore operations (including incumbent operations requiring protection), but also the unique characteristics of radio transmissions over open water. For

¹⁶ See, e.g., *2020 Communications Marketplace Report*, 36 FCC Rcd at 2954-55, paras. 18-19.

¹⁷ We note our ongoing rulemaking proceeding to establish an efficient regulatory spectrum access framework for U.S. commercial space launch operations. See *Allocation of Spectrum for Non-Federal Space Launch Operations et al.*, ET Docket No. 13-115, Report and Order and Further Notice of Proposed Rulemaking, 36 FCC Rcd 7764 (2021).

example, commenters should discuss the impact of the propagation of signals over open water on preventing harmful interference. Commenters should also discuss the use of directional antennas, including those with advanced beamforming capabilities, and the potential for these measures to increase opportunities for coexistence with incumbent operations. Similarly, commenters should consider whether the use of antenna gain patterns to reduce transmissions at high angles could reduce interference risk to incumbent aeronautical operations not otherwise protected by ground clutter or terrain.

18. *Shared Spectral Rights.* We seek comment on whether a spectrum commons approach could serve the needs of offshore spectrum. Under a spectrum commons approach, all spectrum is shared and there is no expectation of interference protection. Could a spectrum commons model, or similar shared spectral rights model, offer enough spectrum for offshore operations and enough interference protection? Why or why not? Under such an approach, would individual offshore operators or users coordinate with each other for interference protection and resolution? How could this best be enabled? For example, would a band manager or spectrum manager be needed? Are there certain types of offshore operations that could utilize a shared model, while others need primary or secondary rights? Why or why not? Commenters should discuss in detail advantages and disadvantages of a spectrum commons or similar shared spectrum rights approach for offshore operations, including the effect on incumbent operations. What spectrum bands are good candidates for shared spectrum use? What bands should not be considered on a shared basis for offshore operations? What are the costs and benefits to this approach, as opposed to primary or secondary use authorizations?

19. *Secondary Authorization.* Next, we seek comment on providing secondary spectrum rights to offshore operations. Under a secondary rights framework, the incumbent user would have primary use of the band at issue, consistent with the terms of its authorization, and the incumbent would have an expectation of protection of interference from any secondary users. Offshore operations could be granted authority to act as secondary users that cannot cause harmful interference to primary operations in the band (whether that primary user is on land or, in the case of the Gulf of Mexico or existing site-based authorizations, in the water). Would an individual authorization with secondary status model meet the needs of some offshore operations, but not others? Why or why not? How might the sufficiency of secondary use vary based on the specific use case or phase of the project at issue?

20. If a secondary rights model is appropriate, should the primary license, if on land, be modified to allow secondary use offshore? How far offshore should the modification extend? Should the Commission allow secondary use offshore by both the primary licensee on land and another user? In either instance, what would be the best mechanism to do this? Are there any other secondary use models that the Commission should consider for offshore operations? Which spectrum bands should be considered for secondary use offshore? Commenters should discuss the advantages and disadvantages of any approach proposed, and the associated costs and benefits.

21. *Primary Authorization.* Finally, we seek comment on the need for individual authorizations with primary rights for offshore operations, with the expectation of exclusive use and protection from interference from other users. Do certain offshore operations require primary spectrum rights? Why or why not? If an operation requires primary rights, commenters should address not only why, but also whether that need will change over time. Would the spectrum supporting primary rights need to already be supporting LTE or other next-generation wireless services? Which spectrum bands would be possible candidates for primary rights authorized on an individual basis to offshore operations, and why? Commenters should discuss advantages and disadvantages to primary rights authorized to support offshore needs, and the costs and benefits of such an approach.

C. Assignment Mechanisms for Initial Licensing

22. We seek comment generally on which assignment mechanisms might be best suited for the needs of offshore operations. We also seek comment on using more than one assignment mechanism for licensing spectrum offshore, as we recognize that operations seeking to use spectrum offshore may have a diversity of funding sources and budget cycles. Commenters should discuss how our choices of

assignment mechanism could best ensure diversity in access. Commenters should also discuss the costs and benefits of the different mechanisms.

23. *License-by-Rule and “Licensed Light” Access Models.* We seek comment generally on whether the Commission should provide additional offshore spectrum access through spectrum rights models that have minimal or no registration requirements. These can include a “license light” approach, where users submit a simplified registration form before using specific frequencies and sites, or a license-by-rule approach, where users are permitted to operate without registering or obtaining an individual license so long as they meet the qualifications to operate and their operations are consistent with the Commission’s rules.¹⁸ Such models generally offer low barriers of entry but do not allow for exclusive spectrum use. They are premised on all entrants being able to share the available spectrum resource with little or no formal coordination and through operation under the framework provided by the applicable service rules. How well would these kinds of approaches serve offshore operations, and how do their benefits compare to those associated with other licensed assignment mechanisms? Should the Commission consider, for example, issuing nonexclusive, offshore-area licenses with site or area registrations in the Universal Licensing System (ULS) or a third-party database to facilitate coordination among offshore operators? Why or why not? Are there existing registration-based access models that could work well here?

24. *Ongoing, Demand-Driven, Licensing On a Site-by-Site Basis.* The Commission has significant experience implementing demand-driven, site-based, licensing mechanisms. Under this approach, an applicant requests authorization to construct at a specific transmitter location (or multiple locations) and expands its service by applying for additional sites as needed. The prime examples of this model of licensing are in the context of Private Land Mobile Radio and microwave services.¹⁹ Could a site-based licensing approach meet the needs of offshore spectrum operations? And would it meet the Commission’s goal of advancing innovative and efficient spectrum policy?

25. The Commission has also relied on ongoing, demand-driven, licensing in the Cellular context and in its 700 MHz Relicensing regime. In the Cellular Service, after the initial licensing of geographic areas and buildout to establish service contours, applicants have applied for individual licenses only where there was a need for coverage, growing their network on a site-by-site basis.²⁰ Is the Cellular Service licensing model something the Commission should consider for meeting the needs of offshore operations? Is it a good analogy for offshore licensing, or are there differences at sea versus land that would make that approach less desirable here? Assuming it is an appropriate model, could the Commission rely on the existing Cellular Service licensing rules for offshore licensing? Why or why not, and how would those rules need to be changed or updated if used as a starting point for potential offshore licensing rules?

26. Should the Commission use something similar to its 700 MHz Relicensing regime as a model for demand-driven licensing to meet offshore needs?²¹ In the 700 MHz Relicensing regime, the

¹⁸ See, e.g., 47 CFR § 95.305 (“[T]his rule section authorizes eligible persons to operate part 95 Personal Radio Service stations and part 96 Citizens Broadband Radio Service stations without individual licenses.”); *id.* §96.33 (describing authorization for General Authorized Access in the 3.5 GHz band).

¹⁹ See 47 CFR pt. 90; *id.* pt. 101.

²⁰ See 47 CFR § 22.949; *Amendment of Parts 1 and 22 of the Commission’s Rules with Regard to the Cellular Service, Including Changes in Licensing of Unserved Area et al.*, WT Docket No. 12-40, Report and Order and Further Notice of Proposed Rulemaking, 29 FCC Rcd 14100, 14114-15 (2014).

²¹ The Commission determined that, at the end of the license term, licensees that fail to meet the end-of-term benchmark would be subject to a “keep-what-you-use” rule, which would make unused spectrum available to other potential users for certain spectrum blocks in the 700 MHz band. Licensees who fail to meet the construction benchmarks keep the areas of the license that they serve, and lose the remaining unserved areas, which are returned to the Commission’s inventory for relicensing. See generally *Service Rules for 698-746, 747-762, and 777-792*

(continued....)

Commission had a single Phase I process for applicants to file applications for authority to operate in unserved areas. Phase II is an ongoing process that allows eligible parties to apply for any unserved areas that may remain after the Phase I process is complete. Would this approach be appropriate to meet the needs of offshore operations? How would “unserved” be defined in the offshore context? What are the advantages and disadvantages of this model if applied to offshore licensing? Could the Commission rely on this kind of model, regardless of which spectrum band is used?

27. *Negotiations-Based Licensing.* In the 900 MHz band, the Commission established a transition mechanism based primarily on negotiations between prospective overlay licensees, whether in-market or an adjacent market, and incumbent licensees.²² Would a negotiations-based authorization process meet offshore spectrum needs? Would an approach similar to the one used in the 900 MHz band facilitate more rapid offshore deployment? Why or why not?

28. *Geographic Area Licensing.* In many services, including many of our more recently licensed flexible-use services, the Commission has issued geographic area licenses for exclusive use. With geographic area licensing, a licensee is authorized to construct anywhere within a particular geographic area’s boundary (subject to certain technical and other requirements) and generally does not need to submit additional applications for prior Commission approval of specific transmitter locations.²³ We seek comment on whether geographic area licensing is appropriate for offshore licensing. Are there advantages to geographic area licensing over site-based licensing in the offshore space? Why or why not? If so, should we assign geographic area licenses offshore for all 3GPP standardized bands?²⁴ Should there be multiple geographic area markets to cover any given U.S. coastal area or shores of the Great Lakes in any given band, or just one in each?

29. If we were to assign geographic area licenses offshore, should we then require offshore licensees to protect land-based licensees and adjacent-area, co-channel, offshore licensees using existing applicable signal strength limits, or would our rules need to be adjusted? What are the interference concerns we should consider, and would they vary by band? Would the ability to protect terrestrial licensees vary by band? Would existing bands’ construction requirements or license terms need to be adjusted for offshore license areas depending on the use case? If so, how? Would a geographic area license be impractical if the offshore operation is mobile or on a structure such as a barge, and therefore could move between different geographic areas? Commenters should discuss all other advantages and disadvantages of geographic area licensing.

30. *Other Considerations.* We note that in the Gulf of Mexico, the Commission has licensed spectrum using various approaches. How should our experience in the Gulf inform our approach for other offshore areas? Is offshore spectrum too complex for one assignment mechanism? Would multiple assignment mechanisms better suit offshore operations’ spectrum needs? In other words, should the Commission consider using a variety of mechanisms, depending on which offshore area is at issue and the level of demand for spectrum usage? For example, is there an immediate and competing demand for certain areas in the Atlantic Ocean where windfarms are already being built, but less demand in the Great

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MHz Bands et al., Second Report and Order, 22 FCC Rcd 15289, 15348 at para. 153 (2007) (*700 MHz Second Report and Order*).

²² *Review of the Commission’s Rules Governing the 896-901/935-940 MHz Band*, WT Docket No. 17-200, Report and Order and Order of Proposed Modification, and Orders, 35 FCC Rcd 5183, 5195, paras. 20-21 (2020).

²³ See, e.g., 47 CFR § 22.911 (defining a Cellular Geographic Service Area). Some geographic-based services include the Advanced Wireless Service, Broadband Personal Communications Service, and the 600 MHz, 700 MHz, and 3.5 GHz Services.

²⁴ The 3rd Generation Partnership Project (3GPP) is an international partnership of industry-based telecommunications standards bodies that, among other things, establishes standards for different LTE band classes. See 3GPP, *ABOUT 3GPP*, <http://www.3gpp.org/about-3gpp> (last visited May 12, 2022).

Lakes or off the Pacific coast, and should there be different assignment mechanisms implemented to reflect these differences? What is the demand, if any, for additional spectrum access off the shore of Alaska into the Arctic Ocean?

31. What would be the appropriate zones in which either an onshore or offshore licensee has exclusive authority to operate, subject to specific coordination and interference resolution mechanisms? Parties should discuss boundaries based on the Gulf of Mexico, state and county lines, or any other relevant consideration. Commenters should also discuss how far seaward the Commission could extend existing land-based service areas in a proposed band.

32. We also note that section 309 of the Communications Act requires assignment via competitive bidding for acceptance of mutually exclusive applications,²⁵ with an exemption for public safety radio services.²⁶ If demand were such that mutually exclusive applications were filed for a license offshore, an auction could be required to assign that license, unless an exemption applied. To what extent might the public safety exemption apply to assigning offshore spectrum? Are there other issues we should keep in mind regarding licenses assigned via competitive bidding for offshore purposes?

33. Are there any U.S. treaty obligations that may be relevant in assigning spectrum for offshore operations depending on which body of water is implicated? If yes, what are they and how should we take them into account? We note also that there are maritime and other definitions of what constitutes offshore areas.²⁷ To what extent are these definitions relevant for our purposes here?

D. Unlicensed Spectrum Use

34. We also seek comment on how unlicensed spectrum access under our part 15 rules can support the needs of offshore operations.²⁸ These rules allow operation without a license and provide low barriers for entry and wide flexibility in how the spectrum can be used. However, unlicensed operations must be conducted at low power levels that might limit the distance at which the signals could practically be used for offshore applications (such as in long-distance vessel-to-vessel or shore-to-offshore communication scenarios). Furthermore, unlicensed operations must not cause harmful interference to licensed services and must accept any harmful interference received.

35. Our existing rules generally permit unlicensed operation in offshore locations, although there are limitations that preclude such use in certain bands.²⁹ Here, we seek to better understand how unlicensed operations are being used and how unlicensed use can be expanded in the offshore environment.³⁰ What specific types of offshore operations are well-suited for deployment under our unlicensed rules and what applications might be better realized through licensed access models, and why? Do commenters anticipate that an expansion of licensed access models in offshore locations would affect existing unlicensed operations or future deployments, and if so how? What are the bandwidth requirements of those applications that can be realized through unlicensed use, and is there sufficient capacity and equipment presently available for deployment? Are there particular bands that would be

²⁵ 47 U.S.C. § 309(j)(1).

²⁶ *Id.* § 309(j)(2)(A)(1).

²⁷ *See, e.g.*, Dep't of State, Exclusive Economic Zone and Maritime Boundaries; Notice of Limits, 60 Fed. Reg. 43825 (Aug. 23, 1995).

²⁸ 47 CFR pt. 15.

²⁹ *See, e.g., id.* § 15.407(d)(1) (stating that operation of specified devices in the 5.925-7.125 GHz band. . . is prohibited on oil platforms, cars, trains, boats, and aircraft . . .).

³⁰ For example, we note that in a petition for a waiver in ET Docket No. 19-240, Kongsberg Seatex AS (formerly Hydroid, Inc.) is seeking a waiver of the antenna gain rules in section 15.407(a)(3), 47 CFR § 15.407(a)(3), to permit broadband communications between maritime vessels and between vessels and fixed points on shore on an unlicensed basis. The petition remains under consideration.

especially well suited for unlicensed operations in offshore locations?³¹ Finally, are there changes to our existing rules that could facilitate the use of spectrum on an unlicensed basis in offshore locations?

E. Access via Spectrum Leasing

36. Another potential vehicle for accessing offshore spectrum, in addition to the assignment mechanisms discussed above, could be a spectrum lease arrangement.³² The Commission's spectrum leasing rules apply to all "included services,"³³ and include Wireless Radio Services in which commercial or private licensees hold exclusive use rights.³⁴ We seek comment on whether spectrum leasing might meet some (or all) of offshore operational needs, and whether this would vary by use case. Are there incumbent licensees with spectrum available for leasing? Are there existing terrestrial or offshore licensees interested in leasing spectrum for offshore operations? Would the Commission need to modify the authorizations of coastal land-based licensees to first provide them with rights that extend to offshore areas, as a threshold to enabling leasing of those rights? Why or why not? Should the Commission provide incentives for license holders to lease spectrum, and if so, what would those incentives look like? Would leased spectrum provide enough bandwidth for offshore operations? Should the Commission update the list of services to which our spectrum leasing rules apply to include offshore spectrum operations to facilitate the possibility of leasing? Should the Commission consider leasing combined with other approaches? Are there other rule or policy changes the Commission would need to take to enable a leasing marketplace for offshore spectrum?

F. Spectrum Bands for Offshore Operations

37. Different spectrum bands provide different spectral properties and utility that can meet different needs. Given the potential use cases for offshore spectrum discussed above, we seek comment generally on which individual bands, or a combination thereof, could best support the various needs of offshore operations.

38. What type of spectrum would best support offshore use? What characteristics are needed, such as high bandwidth, low latency, particular propagation characteristics, or other properties? Would a band used to support offshore operations need to already have certain equipment standards, such as 3GPP? Which specific bands, or combination of bands, would best support offshore use? Possibilities could include 600 MHz, 700 MHz, 800 MHz, 900 MHz, or AWS bands. Are any of these bands appropriate for offshore use? Why or why not? Would AWS-1 or other low-band frequencies accommodate offshore operations' spectrum needs? Would the interference protections in the aforementioned bands be enough to accommodate offshore spectrum and incumbent users?

³¹ While unlicensed operations are permitted on any frequency that is not identified as a restricted band of operations under section 15.205, 47 C.F.R. §15.205, unlicensed operations have become especially prolific in bands where higher power is permitted (e.g., 900 MHz, 2.4 GHz, and 5.9 GHz). In addition, sections 15.215-15.258 of the rules, *id.* §15.215-15.258, set forth additional provisions that allow for alternatives to our general radiated emission limits (which are quite low) in specified bands, which has resulted in increased unlicensed use—often for specific types of applications—in many of these bands.

³² A "spectrum leasing arrangement" is one between a licensed entity and a third-party entity in which the licensee (spectrum lessor) leases certain of its spectrum usage rights in the licensed spectrum band to the third-party entity, the spectrum lessee. 47 CFR § 1.9003. The arrangement may involve the leasing of any amount of licensed spectrum, in any geographic area or site encompassed by the license, for any period of time during the term of the license authorization. Under the Commission's rules, only licensees that hold "exclusive use" licenses can lease spectrum to third parties using either Spectrum Manager leasing, *id.* § 1.9020, or *De Facto Transfer* leasing, *id.* § 1.9030.

³³ *See id.* § 1.9005.

³⁴ *Id.* § 1.9001 *et seq.*

39. Are there other bands currently used for commercial or private wireless networks that we should consider? For each band proposed, commenters should address whether there any issues regarding existing operators, whether large enough blocks or sufficient bandwidth would be available for offshore operations, and what modifications, if any, would be needed to service rules to accommodate offshore use. Are there advantages and disadvantages of any spectrum band considered?

40. We recognize that Commission rules contain performance requirements in certain bands.³⁵ Would offshore operations be able to meet the existing performance requirements in the band(s) commenters propose and should they be required to meet them? How might those performance requirements need to be adjusted given the difference of use cases and operations offshore versus on land? How might this vary based on whether the operations are private or commercial, and how localized the service offering is? Would license terms need to be adjusted given potential differences between deploying on land versus at sea?

41. Are there spectrum bands that we should not consider in order to protect incumbents in the band, or for other reasons? If so, which bands and why? Commenters should take into consideration the existing operations of both federal and non-federal users, particularly those uses related to public safety and other critical national purposes, including maritime and aeronautical endeavors.³⁶ We seek comment on how to ensure protection of such operations as appropriate. Commenters should discuss interference protections for both incumbents and new offshore operations in any proposed band(s). We seek comment generally on what additional interference protections, for any band considered, offshore operations would need.

42. We note that offshore incumbent uses may differ from operations being protected by commercial or private wireless operations onshore, and thus protection requirements for a given band's use offshore may be different from those required for a band's onshore use. In other words, commenters should not assume that a band's use for a particular purpose onshore necessarily means it is well-suited for that purpose offshore.

G. Offshore Spectrum Access in Other Countries

43. We note that other countries authorize use of offshore spectrum. We seek comment generally on the extent to which frameworks used abroad provide any insight for how the Commission might move forward in facilitating offshore licensing here. In the Netherlands, for example, Agentschap Telecom, part of the Ministry of Economic Affairs and Climate, has issued Tampnet and T-Mobile offshore 700 MHz licenses in the North Sea,³⁷ using what it termed a "distribution by demand" model that was implemented by means of an auction.³⁸ Ofcom, the United Kingdom telecommunications regulator, issues unified Spectrum Access Offshore Mobile licenses that cover all of the United Kingdom "mobile bands" (800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2.3 GHz and 3.4 GHz), but only for areas not

³⁵ See, e.g., 47 CFR § 27.14 (containing construction requirements for Advance Wireless Services (AWS) and Wireless Communication Services (WCS)).

³⁶ Examples of such federal operations include, but are not limited to: military operations; National Science Foundation research and oceanography (including the Arecibo Observatory, located in the Puerto Rico Coordination Zone, and the Very Long Baseline Array site located in St. Croix, Virgin Islands); National Aeronautics and Space Administration operations on the coast for space launch purposes and other public safety activities; and Department of Transportation wireless communications with vessels in the oceans and the waterways of the Great Lakes.

³⁷ Agentschap Telecom, *5G at Sea* (May 17, 2021) <https://www.agentschaptelecom.nl/actueel/nieuws/2021/05/17/5g-op-zee>.

³⁸ Agentschap Telecom, *Distribution on demand 700 MHz licenses in the North Sea*, <https://www.agentschaptelecom.nl/onderwerpen/veilingen/verdeling-op-afroep-700-mhz-vergunningen-noordzee> (last visited May 16, 2022).

covered by the rights granted to existing mobile network operators.³⁹ The Spectrum Access Offshore Mobile license authorizes use of spectrum on a non-protection and non-interference basis, leaving coordination up to the licensees.⁴⁰

44. Do the Ofcom or North Sea models provide useful lessons for spectrum use by U.S. offshore operations? Why or why not? Do differences in geography and regulatory frameworks in the United Kingdom and the Netherlands warrant different approaches offshore in the United States? Are there other models for offshore spectrum access used by other countries that could provide guidance for our approach here, while still furthering our goals of innovative spectrum management and efficient spectrum use?

H. Additional Issues

45. We invite comment on other possible approaches for the Commission's consideration. For instance, would convening Commission-led workshops comprised of a diverse array of experts from industry and government be helpful? Would any pilot project be appropriate, and if so, which particular frequency band(s) should be considered? Are there further studies that could help inform the Commission on important considerations with regard to offshore operations? Are there other studies, efforts, or analyses that we should consider in this proceeding? If so, we ask that commenters identify them and explain why they should be considered. We also seek comment on whether there are any security or other concerns to any of the approaches discussed herein. What international coordination issues may arise if we provide spectrum for offshore operations such as IoT?

46. In addition, the Commission, as part of its continuing effort to advance digital equity for all,⁴¹ including people of color, persons with disabilities, persons who live in rural or Tribal areas, and others who are or have been historically underserved, marginalized, or adversely affected by persistent poverty or inequality, invites comment on any equity-related considerations⁴² and benefits (if any) that may be associated with the various approaches and issues discussed herein. Specifically, we seek comment on how the various approaches that the Commission may consider may promote or inhibit advances in diversity, equity, inclusion, and accessibility.

³⁹ Ofcom, *Radiocommunication Licenses*, <https://www.ofcom.org.uk/manage-your-licence/radiocommunication-licences> (last visited May 16, 2022).

⁴⁰ “This licence product authorises use of spectrum on a strictly non-protection/ non-interference basis, and licensees will have to coordinate between themselves to resolve any problems that arise. There is no restriction on the number of licences that Ofcom will issue, and none of the licences will be technically coordinated by Ofcom. This licence also requires the licensee to meet the transmission levels at the UK coast, as set out in internationally agreed coordination agreements, when deploying systems.” Ofcom, *Radiocommunication Licenses*, <https://www.ofcom.org.uk/manage-your-licence/radiocommunication-licences>, (last visited May 16, 2022).

⁴¹ Section 1 of the Communications Act of 1934 as amended provides that the FCC “regulat[es] interstate and foreign commerce in communication by wire and radio so as to make [such service] available, so far as possible, to all the people of the United States, without discrimination on the basis of race, color, religion, national origin, or sex.” 47 U.S.C. § 151.

⁴² The term “equity” is used here consistent with Executive Order 13985 as the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality. See Exec. Order No. 13985, 86 Fed. Reg. 7009, Executive Order on Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (Jan. 20, 2021).

IV. PROCEDURAL MATTERS

47. *Ex Parte Rules.* This proceeding shall be treated as a “permit-but-disclose” proceeding in accordance with the Commission’s *ex parte* rules.⁴³ Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter’s written comments, memoranda, or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with Rule 1.1206(b), 47 CFR § 1.1206(b). Participants in this proceeding should familiarize themselves with the Commission’s *ex parte* rules.

48. *Comment Filing.* Pursuant to sections 1.415 and 1.419 of the Commission’s rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using the Commission’s Electronic Comment Filing System (ECFS). See *Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- Electronic Filers: Comments may be filed electronically by accessing ECFS at <https://www.fcc.gov/ecfs>.
- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing.
- Filings can be sent by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission’s Secretary, Office of the Secretary, Federal Communications Commission.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9050 Junction Drive, Annapolis Junction, MD 20701. U.S. Postal Service first-class, Express, and Priority mail must be addressed to 45 L Street NE Washington, DC 20554.
- Effective March 19, 2020, and until further notice, the Commission no longer accepts any hand or messenger delivered filings. This is a temporary measure taken to help protect the health and safety of individuals, and to mitigate the transmission of COVID-19. See FCC Announces Closure of FCC Headquarters Open Window and Change in Hand-Delivery Policy, Public Notice, DA 20-304 (March 19, 2020). <https://www.fcc.gov/document/fcc-closes-headquarters-open-window-and-changes-hand-delivery-policy>.

49. *Availability of Documents.* Comments, reply comments, and *ex parte* submissions will be publicly available online via ECFS. These documents will also be available for public inspection during regular business hours in the FCC Reference Information Center, when FCC Headquarters reopen to the public.

⁴³ 47 CFR §1.1200(a). Although the rules do not generally require *ex parte* presentations to be treated as “permit but disclose” in Notice of Inquiry proceedings, see 47 CFR §1.1204(b)(1), we exercise our discretion in this instance, and find that the public interest is served by making *ex parte* presentations available to the public, in order to encourage a robust record. See *id.* § 1.1200(a).

50. *People with Disabilities.* To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty).

51. *Further Information.* For additional information on this proceeding, contact Nellie Foosaner by email at nellie.foosaner@fcc.gov or phone at (202) 418-2925.

V. ORDERING CLAUSES

52. Accordingly, IT IS ORDERED that, pursuant to sections 1, 2, 4(i), 301, 302, 303, 332, 403 of the Communications Act of 1934, as amended, 47 USC §§ 151, 152, 154(i), 301, 302, 303, 332 and 403 this Notice of Inquiry IS ADOPTED.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

**STATEMENT OF
CHAIRWOMAN JESSICA ROSENWORCEL**

Re: *Facilitating Access to Spectrum for Offshore Uses and Operations*, WT Docket No. 22-204, Notice of Inquiry (June 8, 2022)

If there is one thing you can count on with spectrum policy in the United States, it is creativity. The willingness to test frequency frontiers is part of our national DNA. It is what led us to commercial spectrum auctions and incentive auctions, unlicensed airwaves, dynamic spectrum sharing models, and more.

Here we go again. In the past, most of our efforts to provide access to spectrum have stopped at our shorelines. But we know there are a lot of industrial, scientific, and recreational endeavors that could benefit from greater access to spectrum offshore. So we are taking steps to facilitate more of this kind of activity with an inquiry that asks broad questions about the kind of offshore operations that may require access to airwaves, the right combination of spectrum bands for these uses, and creative licensed and unlicensed ideas for assigning these rights.

In practice, this can help the development of offshore wind farms that can harness wind over water and convert it to renewable electricity. It can mean improved tsunami warning systems with sensors that help predict and manage natural disasters. It can lead to more opportunities to keep tabs on aquatic animals to better understand the state of marine life. And it can also provide public safety with further control of drones assisting with offshore search and rescue missions.

Of course, while we're making more spectrum available at sea, we're not slowing down on land. We are freeing up more spectrum—and especially mid-band spectrum—for 5G. In October, we kicked off an auction of 100 megahertz of prime mid-band airwaves in the 3.45 GHz band. Last month, we granted more than 4,000 licenses won in that auction. We've also granted more than 5,600 licenses in the C-band as well as 335 licenses in the 2.5 GHz band that will support new broadband service in our Tribal communities. And we are rolling right into our next mid-band spectrum auction, which will kick off in July.

But back to the inquiry before us and the possibilities of offshore airwaves. It's clear that a new era of innovation at sea lies ahead. Let's make sure our efforts at the agency do more than just keep pace. Let's make sure they lead with the kind of creativity that has always been a hallmark of our spectrum policy.

Thank you to the staff responsible for this effort, including Peter Daronco, Nellie Foosaner, Jessica Greffenius, Kari Hicks, Jon Markman, Charles Mathias, Roger Noel, Jessica Quinley, Blaise Scinto, Joel Taubenblatt, and Brian Wondrack from the Wireless Telecommunications Bureau; Jonathan Campbell, Nicholas Copeland, Judith Dempsey, Rachel Kazan, Kate Mataves, Giulia McHenry, Mark Montano, Erik Salovaara, Martha Stancill, Donald Stockdale, Emily Talaga, and Aleks Yankelevich from the Office of Economics and Analytics; Nese Guendelsberger, Dante Ibarra, Karl Kensinger, Wayne Leighton, Olga Madruga-Forti, Kathy O'Brien, Andrew Pegues, Jim Schlichting, and Tom Sullivan from the International

Bureau; John Evanoff, David Furth, Lauren Kravetz, and Nicole McGinnis from the Public Safety and Homeland Security Bureau; Douglas Klein, William Richardson, and Anjali Singh from the Office of General Counsel; and Bahman Badipour, Martin Doczkat, Michael Ha, Ira Keltz, Nicholas Oros, Jamison Prime, Ronald Repasi, Anthony Serafini, Dana Shaffer, Thomas Struble, and Hugh Van Tuyl from the Office of Engineering and Technology.

**STATEMENT OF
COMMISSIONER GEOFFREY STARKS**

Re: *Facilitating Access to Spectrum for Offshore Uses and Operations*, WT Docket No. 22-204, Notice of Inquiry (June 8, 2022)

From the inception of cellular licensing way back in the 1980s, the Commission has had a framework in place for bringing wireless connectivity to offshore platforms drilling in the Gulf of Mexico. The time has come to explore solutions that also work for offshore renewables—in the Gulf, on the Atlantic seaboard, off the West Coast, and wherever else the oceans take us.

I have talked often about how the work we do in this building can help mitigate climate change and its harmful effects. Earlier this year at State of the Net, I shared my vision for a technology and telecom sector that would build out the environmental benefits along with the economic benefits of 5G—embracing efficient new radio technologies that consume dramatically less energy per bit; driving impact through energy-saving applications like smart grids and smart cities; and minimizing electronic waste, to name a few.

Here at the FCC, our programs and decisions are also working to improve the resilience of our communications networks, and to make sure that more Americans stay connected during severe storms and other alarmingly frequent natural disasters.

But we shouldn't stop there, and after one of the warmest years on record, we must keep pushing. I support this Notice of Inquiry because it takes an important step toward ensuring that our rules work for a clean energy economy. By 2030, the federal government is targeting at least 30 gigawatts in offshore wind capacity, more than one thousand times 2019 deployments yet still a small fraction of our total potential. States from North Carolina up to Massachusetts have upped the ante with targets that, in the aggregate, exceed the federal amount.¹ Real scale is on the horizon, and each project will rely on wireless in one form or another. So will the hubs of economic activity—and new employment—that these projects spin out, from busier ports, to offshore grids, to an uptick in American shoreside manufacturing.² Our inquiry puts us ahead of the game in understanding these connectivity requirements, and makes sure we'll have the right framework in place to meet their needs, too. And we correctly seek comment on virtually every framework imaginable—licensed by rule, licensed by site, licensed “light,” by geography, and even unlicensed—so that we calibrate our approach to each band and the nature of demand

¹ Emma Penrod, *Offshore Wind on Track To Hit, Possibly Exceed Biden's 30 GW Target by 2030*, Utility Dive (Feb. 17, 2022), <https://www.utilitydive.com/news/offshore-wind-on-track-to-hit-possibly-exceed-bidens-30-gw-target-by-2030/619002/>; Tanya Peevey & Tony Lenoir, *Assessing Wind Speeds, Potential Performance Across Atlantic Offshore Portfolio*, S&P Global Market Intelligence (May 18, 2022), <https://www.spglobal.com/marketintelligence/en/news-insights/research/assessing-wind-speeds-potential-performance-across-atlantic-offshore-portfolio>.

² See, e.g., Jeffrey Ball, *America's Offshore Wind-Powered Future Begins in a Texas Shipyard*, TexasMonthly (May 2021), <https://www.texasmonthly.com/news-politics/offshore-wind-power-brownsville-shipyard-renewable-energy/>; *First U.S. Offshore Wind Blade Facility Will be Built in Virginia*, The Maritime Executive (Oct. 25, 2021), <https://www.maritime-executive.com/article/first-offshore-wind-turbine-blade-facility-to-be-in-virginia-port>.

behind it.

I am grateful to the Commission staff who developed this item, and it has my full support.