COLUMBIA LAW SCHOOL

SABIN CENTER FOR CLIMATE CHANGE LAW

Filed Electronically
Secretary Kimberly D. Bose
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, DC 20426

November 11, 2019

RE: Port Arthur LNG Expansion Project; Notice of Intent to Prepare an Environmental Assessment Statement for the Sempra PALNG Holdings, LLC Planned Port Arthur LNG Expansion Project, and Request for Comments on Environmental Issues (PF19-5-000)

Secretary Bose:

The Sabin Center for Climate Change Law ("Sabin Center")[1] submits these comments on the scope of the proposed environmental assessment statement ("EA") for the Port Arthur LNG Expansion Project, announced by the Federal Energy Regulatory Commission ("FERC" or the "Commission") in October 2019.

For the limited purposes of these comments, the Sabin Center takes no position on the export of liquefied natural gas ("LNG") or on whether FERC should approve the Planned Port Arthur LNG Expansion Project (the "Project"). Rather, consistent with the scoping process's goal of identifying significant issues for FERC to consider, the Sabin Center's comments focus on the potential impacts of climate change on the Project and vice versa—impacts not identified in FERC's Notice of Intent.

A. NEPA and Climate Change

Pursuant to its obligations under the National Environmental Policy Act ("NEPA"), the Commission must consider the environmental impacts of sea level rise and associated storm surge, flooding, and erosion risks, as exacerbated by increased frequency and intensity of hurricanes and tropical storms. In addition, it would be consistent with the purposes of NEPA for the agency to also assess the indirect impacts of upstream and downstream Project-related activities, to disclose the greenhouse gas emissions associated with them, and to assess the impacts of those emissions. These phenomena may additionally affect other issues already identified by FERC as pertinent to environmental review, such as endangered and threatened species; water resources, fisheries, and wetlands; cultural resources; vegetation and wildlife; cumulative impacts; and public safety. The Sabin Center urges FERC to robustly consider the impacts of climate change on the Project and the impacts of the Project's greenhouse gas emissions as part of the agency's environmental review.

[1] The Sabin Center for Climate Change Law at Columbia Law School develops legal techniques to fight climate change, trains law students and lawyers in their use, and provides the public with up-to-date resources on key topics in climate law and regulation. The Sabin Center works closely with the scientists at Columbia University's Earth Institute and with governmental, nongovernmental, and academic organizations. *See* https://climate.law.columbia.edu/. Please contact the Sabin Center for assistance locating any sources.

NEPA's implementing regulations and case law applying them provide that agencies must consider significant and reasonably foreseeable indirect[2] and cumulative environmental impacts.[3] Agencies must define an appropriate baseline for considering projected environmental impacts; such a baseline should incorporate anticipated environmental conditions.[4] Accordingly, the Commission must consider sea level rise, the increasing frequency and severity of hurricanes, and their combined effects on storm surge as future baseline environmental conditions. Several federal courts have confirmed that NEPA regulations require federal agencies to evaluate the impacts of a changing climate on their actions.[5] Furthermore, the withdrawal of the CEQ guidelines does not affect judicially upheld obligations as was explicitly noted in the withdrawal notice.[6]

FERC itself has already recognized the relevance and importance of climate change impacts to similar and similarly situated facilities located along the Gulf Coast and elsewhere. For instance, FERC required consideration of climate change impacts in connection with a proposed LNG export facility in flood-prone coastal Louisiana (the "Mississippi River LNG Project").[7] After the applicant for the Mississippi River LNG Project submitted draft resource reports to the Commission, FERC directed the applicant to supplement the reports with information regarding potential impacts of sea level rise and storm impacts for the design life of the facility.[8] Moreover, FERC's Environmental Assessments of the Dominion Cove Point LNG export facility on the Chesapeake Bay and the Cameron LNG facility in coastal Louisiana both

[2] *See* 40 C.F.R. § 1508.8 (defining "effects" to include both direct and reasonably foreseeable indirect effects); *Barnes v. U.S. Dep't of Transp.*, 655 F.3d 1124, 1139 (9th Cir. 2011) (requiring that indirect effects be considered in EA under 40 C.F.R. § 1508.8(b)); *Am. Rivers v. Fed. Energy Regulatory Comm'n*, 895 F.3d 32, 54-55 (D.C. Cir. 2018) (applying 40 C.F.R. § 1508.8 to EA); *Citizens for a Healthy Comty. v. U.S. Bureau of Land Mgmt.*, 377 F. Supp. 3d 1223, 1237 (D. Colo. 2019) (agency violated NEPA by failing to consider indirect effects in EA).

[3] *See* 40 C.F.R. § 1508.7 (defining "cumulative impact"); *Am. Rivers*, 895 F.3d at 54 ("NEPA requires that the agency's Environmental Assessment wrestle with the cumulative environmental impact of a proposed action."); *see also* CEQ, *Considering Cumulative Effects under the National Environmental Policy Act* (1997) [hereinafter "Considering Cumulative Effects Under NEPA"], *available at* https://bit.ly/34duKDd; *cf. Fath v. Texas Dep't of Transp.*, 924 F.3d 132, (5th Cir. 2018) (agency did not err by excluding cumulative impact analysis from EA where "the project would have no significant impact by itself").

[4] *See* Considering Cumulative Effects under NEPA, *supra* note 3, at 41; *see also W. Watersheds Project v. Bureau of Land Mgmt.*, 552 F. Supp. 2d 1113, 1128 (D. Nev. 2008) (EA must "succinctly describe the environment") (quoting 40 C.F.R. § 1502.15).

[5] *AquaAlliance, et al., v. U.S. Bureau of Reclamation*, 287 F. Supp. 3d 969, 1032 (E.D. Cal. 2018) (concluding that Bureau failed to adequately account for effects of climate change on water management project); *Idaho Rivers United v. United States Army Corps of Engineers*, No. C14-1800JLR, 2016 WL 498911, at *17 (W.D. Wash. Feb. 9, 2016) (finding that agency properly analyzed the effect of climate change on sediment disposition); *Kunaknana v. U.S. Army Corps of Engineer*s, No. 3:13-CV-00044-SLG, 2015 WL 3397150, at *10-*12 (D. Alaska May 26, 2015) (holding that USACE reasonably concluded, based on a supplemental information report, that a supplemental EIS was not necessary); *Kunaknana v. U.S. Army Corps of Engineers*, 23 F. Supp. 3d 1063, 1092-98 (D. Alaska 2014) (determining that USACE should consider whether to prepare supplemental environmental impact statement ("EIS") for issuance of § 404 permit in light of new information on climate change).

[6] Withdrawal of Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews, 82 Fed. Reg. 16576 (April 5, 2017), *available at* https://www.federalregister.gov/documents/2017/04/05/2017-06770/withdrawal-of-final-guidance-for-federal-departments-and-agencies-on-consideration-of-greenhouse-gas ("The withdrawal of the guidance does not change any law, regulation, or other legally binding requirement.").

[7] Louisiana LNG Energy, LLC, Proposed Mississippi River LNG Project (PF14-17-000).

[8] Letter to Louisiana LNG Energy, LLC providing comments on Draft Resource Reports 2 through 9 re the Mississippi River LNG Project under PF14-17 (Nov. 24, 2014) (enclosed).

consider several implications of climate change for those facilities.[9] Similarly, the EA that FERC prepares for the Port Arthur LNG Expansion Project should account for the effects of climate change.

Additionally, federal courts have repeatedly confirmed that NEPA regulations require federal agencies to evaluate the climate change-related impacts of their actions[10]—including when preparing an EA.[11] Accordingly, the Commission should consider the downstream greenhouse gas emissions caused by fossil fuel combustion,[12] as well as the other life cycle emissions from the facility's production and transportation of LNG.[13]

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[9] *See* FERC, Environmental Assessment for the Cove Point Liquefaction Project, Dominion Cove Point LNG, LP Docket No. CP13-113-000, at 40, 169–171 (May 2014), http://bit.ly/1k5fNM0 ("Climate change in the northeast region could have two effects that may cause increased storm surges: temperature increase of the Chesapeake Bay waters, which would increase storm intensity; and a rising sea level. The final grade elevation of the Liquefaction Facilities Project site would range between 70 and 130 feet above mean sea level. Therefore, even with increased sea levels due to climate change and increased storm surge, the Project facilities would not be vulnerable to even a 100-year climate change-enhanced storm surge because of its significant elevation above sea level."); FERC, Environmental Assessment for the Cameron LNG Expansion Project, Cameron LNG, LLC Docket No. CP15-560-000, at 115 (Feb. 2016), https://perma.cc/7MA8-DW2W ("Climate change in the region would have two effects that may cause increased storm surges, increased temperatures of Gulf waters, which would increase storm intensity, and a rising sea level. In Louisiana, relative sea level changes have been estimated by the NOAA to be about 14 inches by 2050. This is greater than the global average because of regional ground subsidence. The Cameron LNG Terminal is designed for a 500-year storm surge elevation level of 12.4 feet amsl. Given that the Expansion Project's process equipment minimum elevation point of support would be 12.5 feet amsl and the LNG storage tank (T-205) would be 14.0 amsl at top of the elevated pile cap, climate change-enhanced sea level rise and subsidence are considered adequately addressed in the Expansion Project design.").

[10] *Sierra Club v. Fed. Energy Regulatory Comm'n*, 867 F.3d 1357, 1363 (D.C. Cir. 2017) ("FERC's environmental impact statement did not contain enough information on the greenhouse-gas emissions that will result from burning the gas that the pipelines will carry."); *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1215-1217 (9th Cir. 2008) (finding that "[t]he impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct"); *High Country Conservation Advocates v. United States Forest Serv.*, No. 13-CV-01723-RBJ, 2014 WL 2922751, at *8-11, 13-15 (D. Colo. June 27, 2014) (holding that it was arbitrary and capricious for federal agencies to omit analysis of greenhouse gas emissions and related costs in EISs for mining exploration projects).

[11] *WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41, 74 (D.D.C. 2019) (BLM must analyze downstream emissions in oil and gas lease EAs); *San Juan Citizens All. v. United States Bureau of Land Mgmt.*, 326 F. Supp. 3d 1227, 1244 (D.N.M. 2018) (same).

[12] *Sierra Club*, 867 F.3d at 1373–74 (D.C. Cir. 2017) ("We conclude that the EIS . . . should have either given a quantitative estimate of the downstream greenhouse emissions that will result from burning the natural gas that the pipelines will transport or explained more specifically why it could not have done so. As we have noted, greenhouse-gas emissions are an indirect effect of authorizing this project, which FERC could reasonably foresee, and which the agency has legal authority to mitigate."); *see also Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 549 (8th Cir. 2003) (finding in NEPA review for coal railway, STB must account for greenhouse gas emissions and air quality effects from foreseeable increase in coal consumption and combustion); FERC, Guidance Manual for Environmental Report Preparation for Applications Filed Under the Natural Gas Act, FN 15, 4-123—4-127 (Feb. 2017), https://perma.cc/7DAW-BX9P (instructing "[y]ou should provide the data needed to support our NEPA analysis (e.g., the project's contribution to greenhouse gas emissions; local or state GHG emissions; and any local, state, or regional goals for GHG emissions or climate change)," and requiring reporting on greenhouse gas emissions from construction and operation of facilities).

[13] *Sierra Club v. United States Dep't of Energy*, 867 F.3d 189, 201–02 (D.C. Cir. 2017) (noting that as part of its review "the Department evaluated the upstream and downstream greenhouse-gas emissions (CO2 and methane) from producing, transporting, and exporting LNG in its Life Cycle Report").

The D.C. Circuit has held that FERC need not assess the greenhouse gas emissions resulting from export-induced increases in domestic production associated with new export facilities, because LNG exports cannot take place without approval from the Department of Energy ("DOE").[14] However, "[u]nder applicable NEPA regulations, [FERC] is required to include 'connected actions,' . . . in an environmental assessment."[15] Moreover, "[a]n agency impermissibly 'segments' NEPA review when it divides connected . . . federal actions into separate projects and thereby fails to address the true scope and impact of the activities that should be under consideration."[16] The D.C. Circuit has raised, without answering, the question of whether FERC's construction authorizations and DOE's export authorizations are "connected actions" for purposes of NEPA review in the LNG export context.[17]

"Connected actions" include those actions that "[a]re interdependent parts of a larger action and depend on the larger action for their justification."[18] FERC's action in approving two new liquefaction trains would not be justified without an expectation that the trains will be used to liquefy LNG for export. Nor could DOE justify approving LNG exports for which the necessary liquefaction capacity does not exist. FERC's and DOE's approval actions are thus interdependent parts of the larger LNG export process. Similarly, the D.C. Circuit has indicated that a project without substantial independent utility is more likely to be considered "connected" to other related actions.[19] An expanded LNG export facility has no independent utility absent additional export approvals. As the designated lead agency for NEPA compliance,[20] FERC should act jointly with DOE to assess upstream and downstream indirect emissions resulting from the additional exports of LNG that would occur if the Project is approved.[21]

Moreover, FERC should disclose the consequences of the Project's greenhouse gas emissions, in addition to including indirect and cumulative effects in its accounting of those emissions, in order to inform decision-makers and the public about the scale of the emissions impact from the Project.[22] There are a number of ways to assess the effects of a project's greenhouse gas emissions. Among the most useful are the social cost of carbon, methane, and

[14] *Sierra Club v. Fed. Energy Regulatory Comm'n*, 827 F.3d 36, 46-47 (D.C. Cir. 2016) ("Sierra Club Freeport") (holding that FERC did not need to consider upstream emissions that would only occur if the Department of Energy approved the facility for LNG export); *EarthReports, Inc. v. Fed. Energy Regulatory Comm'n*, 827 F.3d 949, 954 (D.C. Cir. 2016) (extending the holding of *Sierra Club Freeport* to downstream emissions).
[15] *Myersville Citizens for a Rural Community, Inc. v. Fed. Reg. Energy Comm'n*, 783 F.3d 1301, 1326 (D.C. Cir. 2015).
[16] *Id.* (quoting *Delaware Riverkeeper Network v. Fed. Regulatory Comm'n*, 753 F.3d 1304, 1313, 1314 (D.C. Cir. 2014)).
[17] *Sierra Club Freeport* at 45-46 (citing 40 C.F.R. § 1508.25(a)(1)).
[18] 40 C.F.R. § 1508.25(a)(1)(iii).
[19] *Delaware Riverkeeper*, 753 F.3d at 1315-16.
[20] 15 U.S.C. § 717n(b)(1)(designating the Commission to be "the lead agency for the purposes of coordinating all applicable Federal authorizations and for the purposes of complying with the National Environmental Policy Act"); *see also* 42 U.S.C. § 7172(a)(2)(B).
[21] For further information regarding federal agencies' obligation to assess greenhouse gas emissions resulting from fossil fuel transportation projects under NEPA, please refer to the attached article (Attachment A: Burger and Wentz, 2019).
[22] *See, e.g., San Juan Citizens All.*, 326 F. Supp. 3d at 1247 (agency must evaluate potential impacts of greenhouse gas emissions caused by project in light of revised total greenhouse gas projections).

nitrous oxide.[23] Although they were developed for a rulemaking context, these metrics can readily be used in an environmental analysis to better understand the potential costs associated with greenhouse gas emissions. The cost estimates are a useful proxy for the actual impacts of climate change. Additional tools to understand the magnitude of greenhouse gas emissions' impact include the EPA's quantification threshold of 25,000 tons per year of carbon dioxide equivalent to identify major emitters for the purposes of greenhouse gas reporting (as noted by EPA, facilities that surpass this threshold are considered the "largest emitters" in the country).[24] FERC should also consider using the EPA's Greenhouse Gas Equivalencies Calculator, which can be used to compare emissions from the proposal with, for example, emissions from household electricity use or vehicle miles driven.[25] This tool provides a reference point that an agency can use to assess a proposed project's impact on the climate. Finally, FERC could evaluate the Project's greenhouse gas emissions in the context of global and national carbon budgets; estimates have been developed for both.[26]

Finally, in assessing the Project's potential climate impacts, FERC should use updated figures to properly assess the magnitude of greenhouse gas pollution that would result from the Project. FERC has recently used a global warming potential (GWP) of 25 for methane, based on a 100-year time horizon, in conducting NEPA analysis.[27] This GWP is flawed for two reasons. First, because methane remains in the atmosphere for under two decades,[28] a 20-year timeframe is more relevant than the 100-year span. At least one court has concluded that an "unexplained decision to use the 100-year time horizon," even a decision based on EPA's use of that timeframe, "when other more appropriate time horizons remained available, qualifies as arbitrary and capricious."[29] The most recent Intergovernmental Panel on Climate Change (IPCC) Assessment Report estimates that methane's GWP is 87 over a 20-year timeframe (when the

[23] The Social Cost of Carbon, Methane, and Nitrous Oxide, though now rescinded, are scientifically credible estimates of the societal costs of greenhouse gas emissions, developed through a lengthy process of interagency consultation and peer review, and that cost is absolutely relevant to assessing the nature and significance of the proposed Project's environmental consequences. See *Zero Zone Inc. v. Dept. of Energy*, 832 F.3d 654 (7th Cir. 2016) (upholding use of methodology for calculating social cost of carbon used by the Interagency Working Group on the Social Cost of Carbon); Interagency Working Group on the Social Cost of Greenhouse Gases, Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (May 2013, Revised August 2016); Interagency Working Group on the Social Cost of Greenhouse Gases, Addendum to Technical Support Document on Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide (Aug. 2016). *See also Montana Environmental Information Center v. OSM*, 274 F.Supp.3d 1074 (D. Montana 2017) (requiring disclosure of greenhouse gas costs in NEPA review where benefits were also disclosed, and citing the federal Social Cost of Carbon as an available disclosure tool); *High Country Conservation Advocates v. USFS*, 52 F.Supp.3d 1174 (D. Colo. 2014) (same)

[24] EPA, GHG Reporting Program Facts and Figures, https://www.epa.gov/ghgreporting/key-facts-and-figures.

[25] EPA, Greenhouse Gas Equivalencies Calculator, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

[26] *See, e.g.*, Corinne Le Quéré et al., Global Carbon Budget 2018, Earth Systems Science Data (2018); Daniel J. Hayes, The North American Carbon Budget, in Second State of the Carbon Cycle Report: A Sustained Assessment Report (Cavallaro et al. eds, USGCRP 2018).

[27] *See, e.g.,* FERC, Alaska LNG Project, Draft Environmental Impact Statement (June 2019) at 4-878; FERC, Jordan Cove Energy Project, Draft Environmental Impact Statement (March 2019) at 4-666.

[28] IPCC, Climate Change 2013, The Physical Science Basis, Chapter 8, 714 (Sept. 2013).

[29] *W. Org. of Res. Councils v. U.S. Bureau of Land Mgmt.*, CV-16-21-GF-BMM, 2018 WL 1475470, at *15 (D. Mont. Mar. 26, 2018).

effects of oxidation are taken into account).[30] FERC should use this figure. Second, the most recent IPCC Assessment Report estimates that methane's GWP over a 100-year time frame is 36 (when the effects of oxidation are included).[31] Even though this time horizon is inappropriate, the FERC should not use outdated science. Although the Greenhouse Gas Reporting Rule uses a GWP of 25 for methane,[32] courts have recognized the IPCC as authoritative,[33] and "[t]he EPA considers the GWP estimates presented in the most recent IPCC scientific assessment to reflect the state of science."[34]

B. Complementary Legal Authorities and Policies Supporting Consideration of Climate Impacts

Complementing NEPA requirements, state law also supports consideration of climate change impacts such as sea level rise in the proposed EA. In 1999, Texas enacted the Coastal Erosion Planning and Response Act (CEPRA), which tasks the General Land Office (GLO) Coastal Resources Division with reducing impacts to valuable coastal resources caused by coastal erosion.[35] The GLO is responsible for conducting coastal erosion studies, demonstration projects, and response projects under the CEPRA.[36] Most relevant here, the CEPRA program must also address relative sea level rise and impacts from tropical storms and hurricanes.[37]

Federal guidance further directs assessment of climate change impacts. The Securities and Exchange Commission ("SEC") has issued guidance regarding publicly traded companies' obligation to disclose the impacts that climate change may have on their operations.[38] FERC can facilitate such disclosure by conducting an analysis of climate change impacts on the proposed facility.

C. Primary Climate Impacts Pertinent to Environmental Review of the Project

1. Sea Level Rise

As anthropogenic greenhouse gas emissions warm the planet, causing glaciers and ice sheets to melt and oceans to absorb increasing volumes of heat, global sea levels will continue to

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[30] IPCC, *supra* note 28.
[31] *Id.*
[32] 40 C.F.R. Pt. 98, Subpt. A, Tbl. A–1.
[33] *See, e.g.*, *Mass. v. Env. Protection Agency*, 549 U.S. 497, 508 (2007); *Ctr. For Biological Diversity v. National Highway Traffic Safety Admin.*, 538 F.3d 1172, 1190 (9th Cir. 2008).
[34] EPA, Understanding Global Warming Potentials, https://www.epa.gov/ghgemissions/understanding-global-warming-potentials.
[35] Texas General Lands Office, "Coastal Erosion Planning & Response Act: A Report to the 85th Texas Legislature" (2015) at 1, *available at* http://www.glo.texas.gov/coast/coastal-management/forms/files/CEPRA-Report-2015.pdf.
[36] TX. NAT. RES. § 33.603(a).
[37] Texas General Land Office, *supra note 35* at 2.
[38] Sec. Exch. Comm'n, *Commission Guidance Regarding Disclosure Related to Climate Change* (2010) ("Significant physical effects of climate change… have the potential to affect a registrant's operations and results. For example, severe weather can cause catastrophic harm to physical plants and facilities and can disrupt manufacturing and distribution processes…. Registrants whose businesses may be vulnerable to severe weather or climate related events should consider disclosing material risks of, or consequences from, such events in their publically filed disclosure documents."), *available at* http://www.sec.gov/rules/interp/2010/33-9106.pdf.

rise, and will do so at increasing rates.[39] In the next several decades, storm surges and high tides will combine with sea level rise to increase flooding, threatening coastal communities and industries.[40] Though the proposed location for the Project is not directly on the coast, its placement on the Sabine-Neches ship channel makes it vulnerable to storm surge, especially in light of rapid sea level rise coastal erosion, subsidence, and wetland loss in the northern Gulf of Mexico.[41]

Sea level rise is occurring especially quickly in the region,[42] on top of rapid erosion along the Texas coast. Eighty-four percent of the Texas gulf shoreline is retreating, with an average rate of approximately four feet per year.[43] Some areas are losing as much as 55 feet per year.[44] Regionally, coastal counties and parishes in Alabama, Mississippi, Louisiana, and Texas already face significant losses from hurricane winds, land subsidence, and sea level rise that annually average $14 billion.[45] The same study estimates that future losses for the 2030 timeframe could reach between $18 billion to $23 billion with approximately 50% of the increase in the estimated losses related to climate change.[46]

Many sources provide current and credible data regarding sea level rise and its potential consequences generally and for Texas in particular. As relevant examples, the Sabin Center directs the Commission's attention to:

- Intergovernmental Panel on Climate Change ("IPCC"), Chapter 2.2.3 Ocean, Cryosphere and Sea Level, in Climate Change 2014 Synthesis Report, Fifth Assessment Report, at 62, *available at* https://perma.cc/9K4F-LDFC[47]

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[39] Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, B. DeAngelo, S. Doherty, K. Hayhoe, R. Horton, J.P. Kossin, P.C. Taylor, A.M. Waple, and C.P. Weaver, 2017: Executive Summary of the Climate Science Special Report: Fourth National Climate Assessment, Volume I [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 26 pp .12-34.

[40] Fleming, E., J. Payne, W. Sweet, M. Craghan, J. Haines, J.F. Hart, H. Stiller, and A. Sutton-Grier, 2018: Coastal Effects. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 322-352; Kate Gordon et al., The Risky Business Project, *Risky Business: The Economic Risks of Climate Change in the United States* at 20 (2014) [hereinafter "Risky Business"], *available at* http://riskybusiness.org/report/national/.

[41] *See, e.g.*, Thatcher, C.A.; Brock, J.C., and Pendleton, E.A., 2013. Economic vulnerability to sea-level rise along the northern U.S. Coast. *In*: Brock, J.C.; Barras, J.A., and Williams, S.J. (eds.), *Understanding and Predicting Change in the Coastal Ecosystems of the Northern Gulf of Mexico*, Journal of Coastal Research, Special Issue No. 63, p. 234 Coconut Creek (Florida); Texas General Lands Office, *supra* note *35* at 1-2.

[42] Texas General Lands Office, supra note 35 at 6; NOAA*, U.S. Sea Level Trend Map (2016) [hereinafter "NOAA Sea Level Trend Map"], available at* https://tidesandcurrents.noaa.gov/sltrends/slrmap.htm.

[43] Texas General Lands Office, *supra* note 35 at 6.

[44] *Id*.; Texas General Land Office, "Coastal Erosion Planning & Response Act: A Report to the 86th Texas Legislature" (2019) at 1, *available at* http://www.glo.texas.gov/coast/coastal-management/forms/files/cepra-report-2019.pdf.

[45] America's Wetland Foundation, America's Energy Coast, and Entergy, *Building a Resilient Energy Gulf Coast: Executive Report* (2010), *available at* www.entergy.com/ content/our_community/environment/GulfCoastAdaptation/ Building_a_Resilient_Gulf_Coast.pdf.

[46] *Id*.

[47] Intergovernmental Panel on Climate Change, Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (R.K. Pachauri and L.A. Meyer, eds., 2014).

- Intergovernmental Panel on Climate Change ("IPCC"), Chapter 13 Sea Level Change, in Climate Change 2013: The Physical Science Basis, *available at* https://perma.cc/EK2J-WSLX[48]
- The Fourth National Climate Assessment, Chapter 8 at 329, 335, 338, *available at* https://nca2018.globalchange.gov/downloads/NCA4_Ch08_Coastal-Effects_Full.pdf[49]
- The Fourth National Climate Assessment, Chapter 19 at 746, 749, 757-58, 761, *available at* https://nca2018.globalchange.gov/downloads/NCA4_Ch08_Coastal-Effects_Full.pdf[50]
- Climate Central, Surging Seas: Sea Level Rise Analysis, *available at* https://perma.cc/D7GV-BUTQ
- Risky Business: The Economic Risks of Climate Change in the United States, *available at* https://perma.cc/U62D-KRVG
- America's Wetland Foundation, America's Energy Coast, and Entergy, Building a Resilient Energy Gulf Coast: Executive Report, *available at* https://perma.cc/NZ33-9ZUC
- Davin J. Wallace, John B. Anderson; Unprecedented erosion of the upper Texas coast: Response to accelerated sea-level rise and hurricane impacts. *GSA Bulletin*; 125 (5-6): 728–740, *available at* https://bit.ly/2N9eqNW.

2. Increasing Frequency and Severity of Hurricanes and Tropical Storms

Since the early 1980's, Atlantic hurricane activity has substantially increased by measures including intensity, frequency, and duration as well as the number of strongest (Category 4 and 5) storms.[51] Warming sea surface temperatures in the Atlantic are linked to this increase in hurricane activity.[52] Human-induced emissions of heat-trapping gases and particulate pollution influence these local sea temperatures.[53] The coastline along the northern Gulf of Mexico is especially vulnerable to disastrous flooding and erosion during hurricanes.[54] The combination of sea level rise with more severe and frequent hurricanes will affect storm surge and coastal damages. The previously listed resources describe these impacts and costs.

Texas residents are still recovering from the impacts of Hurricane Harvey, which flooded more than 150,000 homes and caused 8.3 million pounds of unauthorized air pollution—including known carcinogens—resulting from the sudden shut-down of industrial plants.[55] Harvey inflicted an estimated $125 billion worth of damage altogether, making it the second costliest tropical cyclone ever to strike the United States mainland.[56] The 2017 hurricane season was particularly catastrophic with 17 named storms, 10 of which became hurricanes, including three category 4 storms that made landfall in the U.S.[57] The 2018 hurricane season produced 15 named storms, including eight hurricanes of which two were "major" (Category 3, 4 or 5).[58] The

[48] J.A. Church et al., *Sea Level Change*, in Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (T.F. Stocker et al., eds., 2013).
[49] Fleming, *supra* note 21.
[50] L., A. Terando, K. Dow, K. Hiers, K.E. Kunkel, A. Lascurain, D. Marcy, M. Osland, and P. Schramm, 2018: Southeast. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 743–808.

2018 hurricanes Florence and Michael caused $24 billion and $25 billion worth of damage, respectively.[59] Global models project further increases in intensity, precipitation rate, and wind speed for tropical cyclones over the 21st Century.[60]

3. Upstream and Downstream Impacts

Sempra proposes to construct and operate additional liquefaction capacity at the site of the Port Arthur Liquefaction Project near Port Arthur, Texas. The planned expansion would add two liquefaction trains, increasing liquefied natural gas production capacity from 13.5 million metric tons per annum (MTPA) to approximately 27.0 MTPA.[61] Extracting natural gas from wells, processing it for transport, cooling it for loading into tankers, transporting it in those tankers, and, of course, combustion by end-users, are all activities that will occur as a result of the proposed expansion. Each of these component activities has predictable environmental impacts.[62] Further, these activities will contribute to the Project's upstream and downstream

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[51] U.S. Global Change Research Program, 2014: Climate Change Impacts in the United States: The Third National Climate Assessment (Melillo, Jerry M. et al., eds., 2014), 41-42; Christensen, J.H., et al., *Climate Phenomena and their Relevance for Future Regional Climate Change*, in Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Stocker, T.F., et al. eds.)(See especially 14.3.4-5, 14.6, 14.8.3); *see also* Kossin, J.P.et al., *Extreme storms*, in 2017: Climate Science Special Report: Fourth National Climate Assessment, Volume I 257-276 (Wuebbles, D.J., et al. eds., U.S. Global Change Research Program, 2017)[hereinafter "NCA 4 Extreme Storms"].

[52] *Id*.

[53] *Id*.

[54] *See* Thatcher, *supra* note 41 at 234.

[55] Jen Rice, "'The Numbers Ain't Crunching': Two Years After Harvey, Some Flooded Homes Still Aren't Repaired," HOUSTON PUBLIC MEDIA (Aug. 30, 2019), *available at* https://www.houstonpublicmedia.org/articles/news/in-depth/2019/08/30/344180/two-years-after-harvey-some-flooded-homes-still-arent-repaired/; Fernando Alfonso III, "Where the most homes were flooded during Hurricane Harvey," HOUSTON CHRONICLE (June 10, 2018), *available at* https://www.houstonchronicle.com/houston/article/hurricane-harvey-houston-homes-flooded-2018-12979495.php; Jeff Mosier, "Impact of Hurricane Harvey on health, environment still a concern a year later," DALLAS MORNING NEWS (Aug. 16, 2018), *available at* https://www.dallasnews.com/news/texas/2018/08/16/impact-of-hurricane-harvey-on-health-environment-still-a-concern-a-year-later/.

[56] Nat. Hurricane Ctr., "Costliest U.S. tropical cyclones tables updated" (Jan. 26, 2018), *available at* https://www.nhc.noaa.gov/news/UpdatedCostliest.pdf.

[57] Brian Sullivan, "The Most Expensive U.S. Hurricane Season Ever: By the Numbers," BLOOMBERG (Nov. 26, 2017), *available at* https://perma.cc/R3JM-PXAY.

[58] Nat. Oceanic and Atmospheric Admin., "Destructive 2018 Atlantic hurricane season draws to an end," (Nov. 28, 2018), *available at* https://www.noaa.gov/media-release/destructive-2018-atlantic-hurricane-season-draws-to-end.

[59] Nat. Oceanic and Atmospheric Admin., "Assessing the U.S. Climate in 2018," (Feb. 6, 2019), *available at* https://www.ncei.noaa.gov/news/national-climate-201812.

[60] Melillo, *supra* note 51.

[61] *See* Notice of Intent.

[62] *See, e.g.*, Timothy Vinciquerra et al., *Regional air quality impacts of hydraulic fracturing and shale natural gas activity: Evidence from ambient VOC observations*, 110 Atmospheric Env't 144 (2015) (identifying natural gas hydrofracture drilling operations as sole plausible cause for increase in ambient emissions of ethane and VOCs—and, by inference, methane—in region downwind of drilling operations in Pennsylvania and West Virginia); Victor M. Heilweil et al., *Stream Measurements Locate Thermogenic Methane Fluxes in Groundwater Discharge in an Area of Shale-Gas Development*, 49 Envtl. Sci. & Tech. 4057 (2015) (measuring migration of fingerprinted methane, i.e., gas not attributable to sources other than drilling, into waters near shale-gas development operations); Christopher W. Moore et al., *Air Impacts of Increased Natural Gas Acquisition, Processing, and Use: A Critical*

greenhouse gas emissions. DOE has analyzed the life cycle impacts of greenhouse gas emissions from U.S. LNG export facilities.[63] In a 2014 addendum analyzing the upstream greenhouse gas emissions of LNG export facilities, DOE estimated that that each incremental increase in natural gas production of 1 trillion standard cubic feet per year will generate an additional 6.8 million metric tons of CO_2 equivalent per year.[64] While the exact downstream emissions of combusting natural gas may depend on several uncertain variables, FERC should engage in "reasonable forecasting" and provide a quantitative estimate of the greenhouse emissions, or else a complete explanation for why it cannot provide the estimate.[65] Additionally, as discussed, FERC should assess the impacts of the direct and indirect greenhouse gas emissions associated with the Project.

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To adequately protect the Port Arthur LNG Expansion Project and its surrounding environment from future climate change impacts, the Commission should consider the risks arising from increasing frequency and severity of hurricanes combined with sea level rise and associated storm surge, flooding, and erosion risks. Consideration of such risks by a federal agency would not be a novel undertaking,[66] and is especially exigent here given that the Project will support the compression and transport of combustible and potentially explosive gas.

Specifically, the Commission should assess the projected range of sea level rise and related potential for storm surge and erosion throughout the planned life of the Project, and should identify ways to effectively manage the associated risks. Similarly, the Commission should assess projected changes to frequency and severity of hurricanes in the vicinity of the Project and identify engineering solutions capable of managing the host of risks that extreme weather poses to sensitive infrastructure.

In its projections of the future state of coastlines, the Commission should take note of the Gulf Coast's high rate of sea level rise relative to other regions of the U.S. and the world[67] coupled with erosion and its vulnerability to hurricanes and tropical storms. Texas loses an average of 235 acres of land to erosion each year along its coast, bays, estuaries, and navigation channels.[68] The baseline of the Project's future environmental circumstances should reflect that the area surrounding the project appears to be highly sensitive to storm surge, climate change, subsidence, and the worsening synergistic impacts of these forces.

Review, 48 Envtl. Sci. & Tech. 8349 (2014) (discussing several case study-based natural gas lifecycle emissions assessments).

[63] U.S. Dept. of Energy, Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States, 79 Fed. Reg. 32,260 (June 4, 2014), *available at* https://perma.cc/V353-JDYZ.

[64] U.S. Dept. of Energy, Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the United States, 79 Fed. Reg. 48,132 (Aug. 15, 2014),*available at* https://perma.cc/7Y6A-PM5Z.

[65] *Sierra Club*, 867 F.3d at 1373–74 (D.C. Cir. 2017); *see also Delaware Riverkeeper Network*, 753 F.3d at 1310.

[66] *See, e.g.*, Department of Interior, Seward Peninsula - Nulato Hills - Kotzebue Lowlands Rapid Ecological Assessment, Final Report II-3-c (Oct. 2012), *available at* http://bit.ly/207u2Rk.

[67] NOAA Sea Level Trend Map; Texas General Lands Office, supra note 35 at 6.

[68] General Lands Office, supra note 35 at 6.

Additionally, the Commission should take into account the indirect and cumulative impacts that the Project would have on climate change. In doing so, the Commission should use up-to-date GWP estimates and evaluate the effects of the Project's greenhouse gas emissions.

Thank you for the opportunity to submit comments on the Commonwealth LNG Project. Please feel free to contact the Sabin Center with any questions.

Sincerely,

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enclosures:

- FERC's Letter to Louisiana LNG Energy, LLC providing comments on Draft Resource Reports 2 through 9 re the Mississippi River LNG Project under PF14-17 (Nov. 24, 2014)