OFFSHORE WIND VESSELS

Courtesy of Dominion Energy (June 2021)

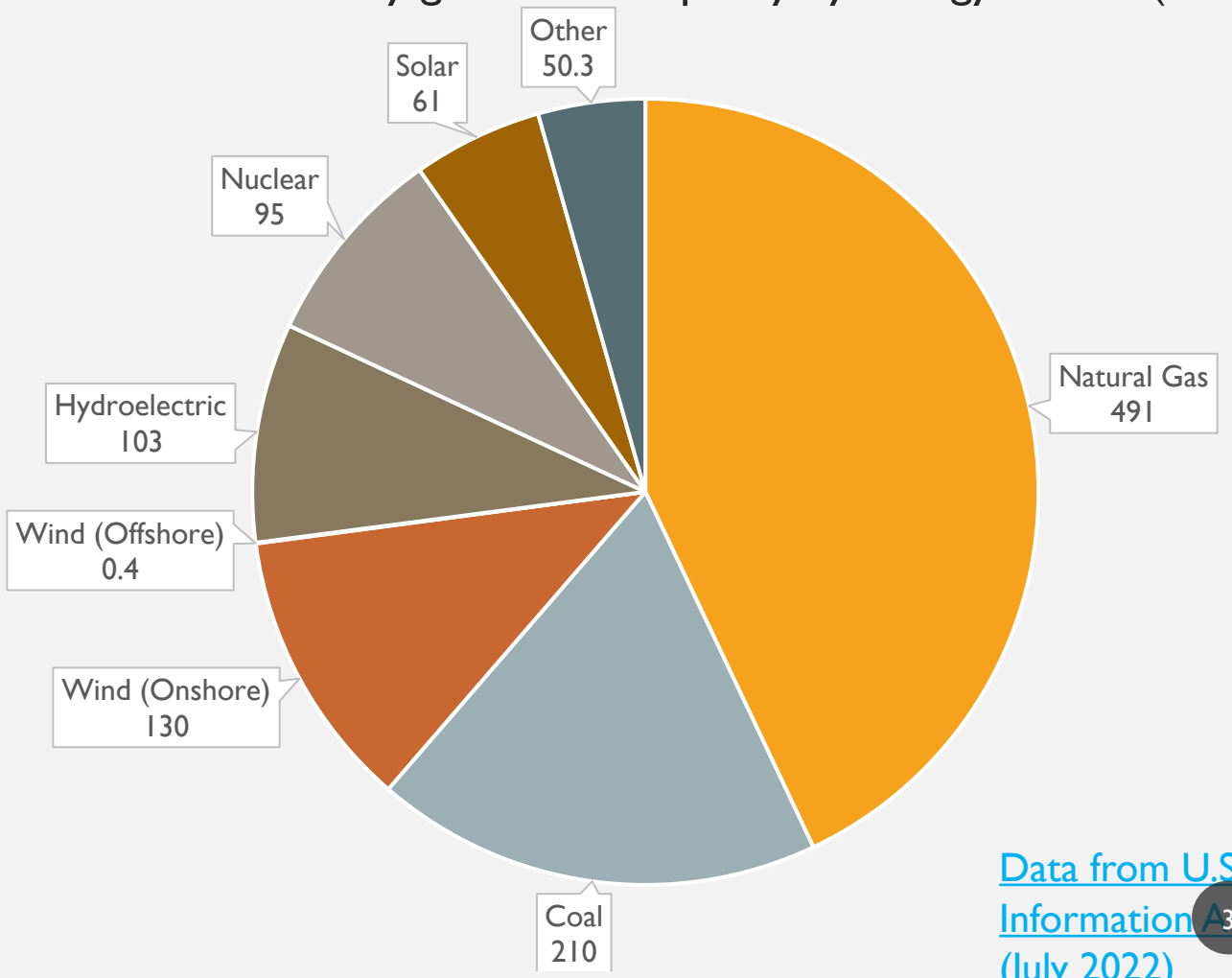
OUTLINE

- Introduction
  - Context
  - Significance
- Scenario 1: “Uncertainty dominates”
- Scenario 2: “Coordinated action”
- Policy options

CONTEXT

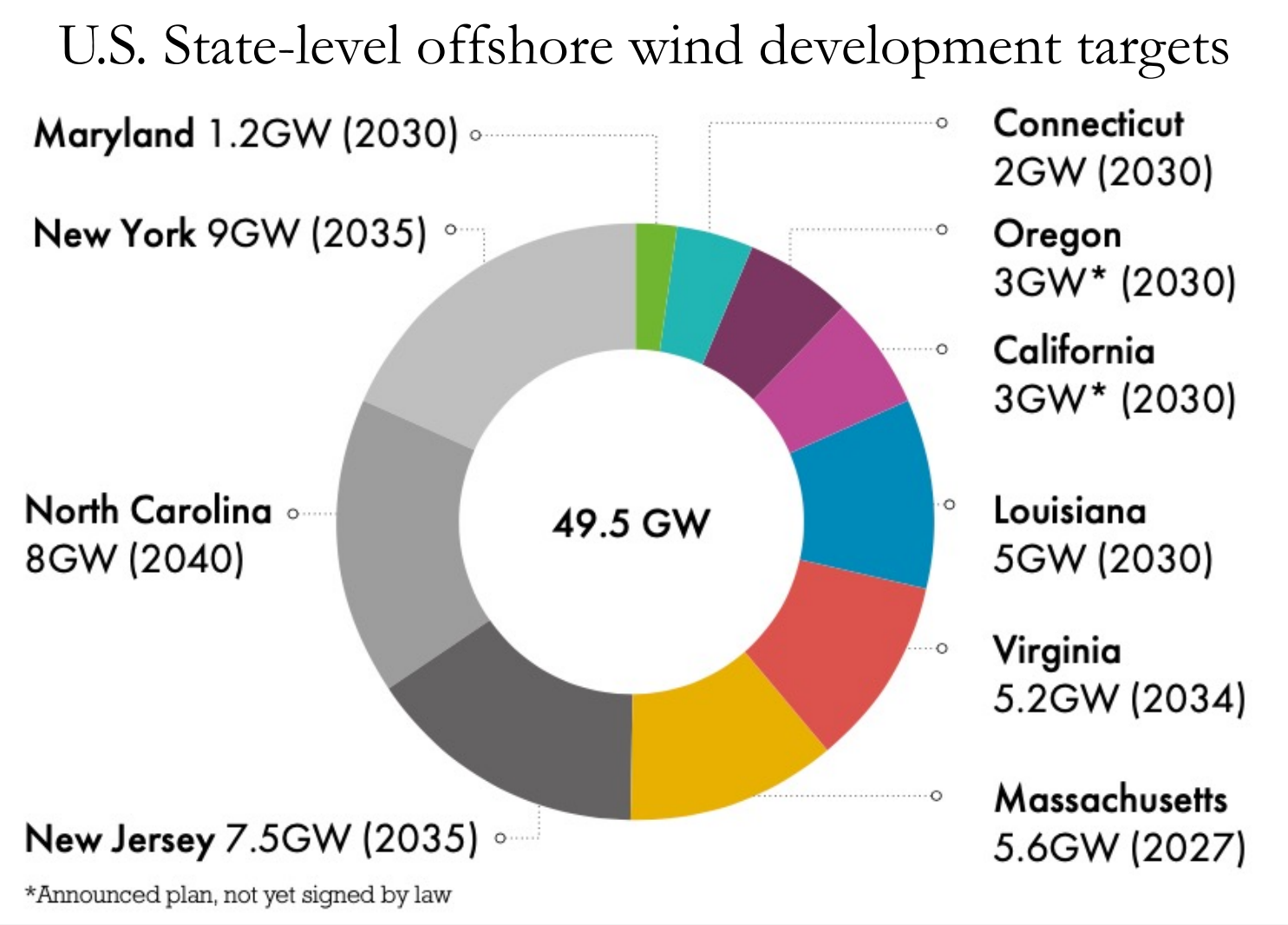
- 30 GW by 2030 target

2021 U.S. electricity generation capacity by energy source (GW)



Data from U.S. Energy Information Administration (July 2022)

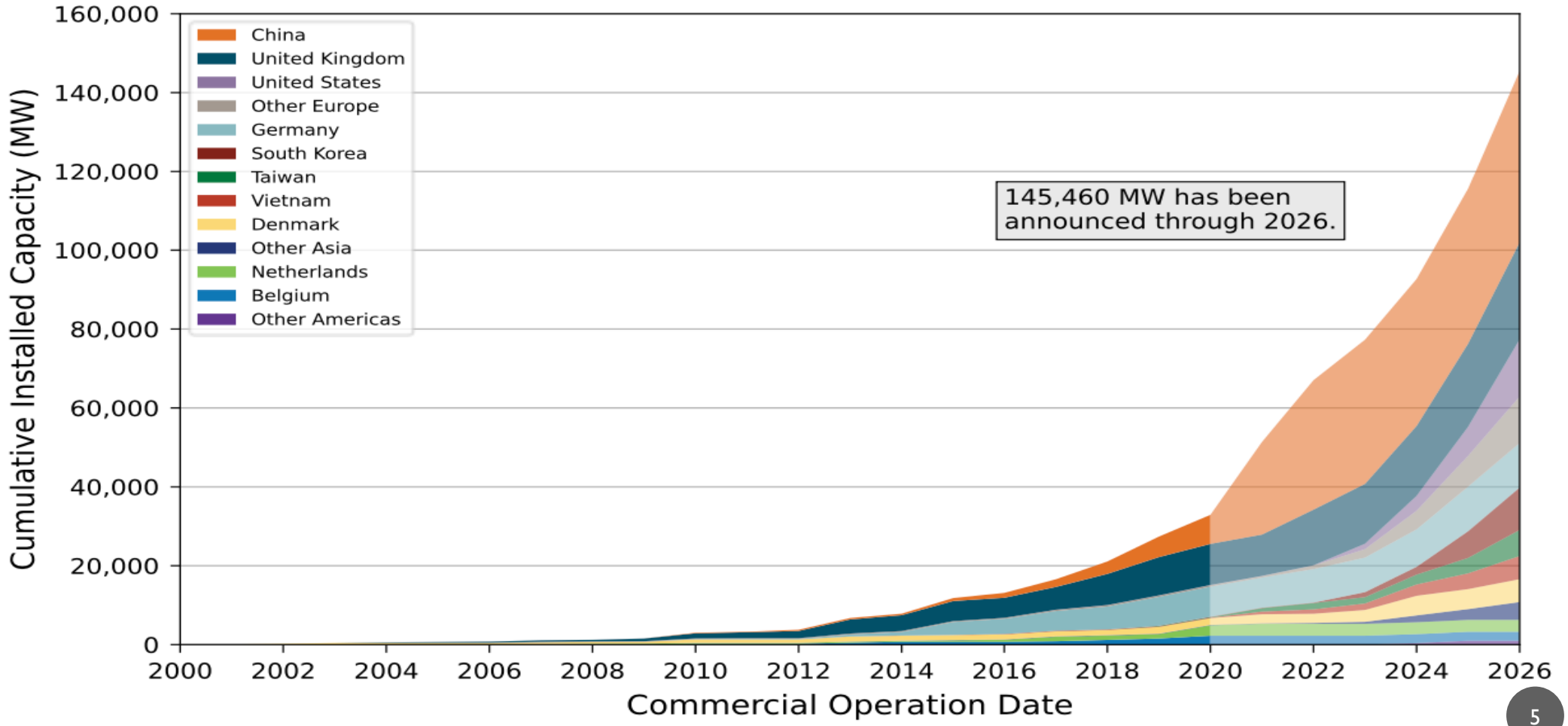
CONTEXT



Courtesy of Global Wind Energy Council (June 2022)

CONTEXT

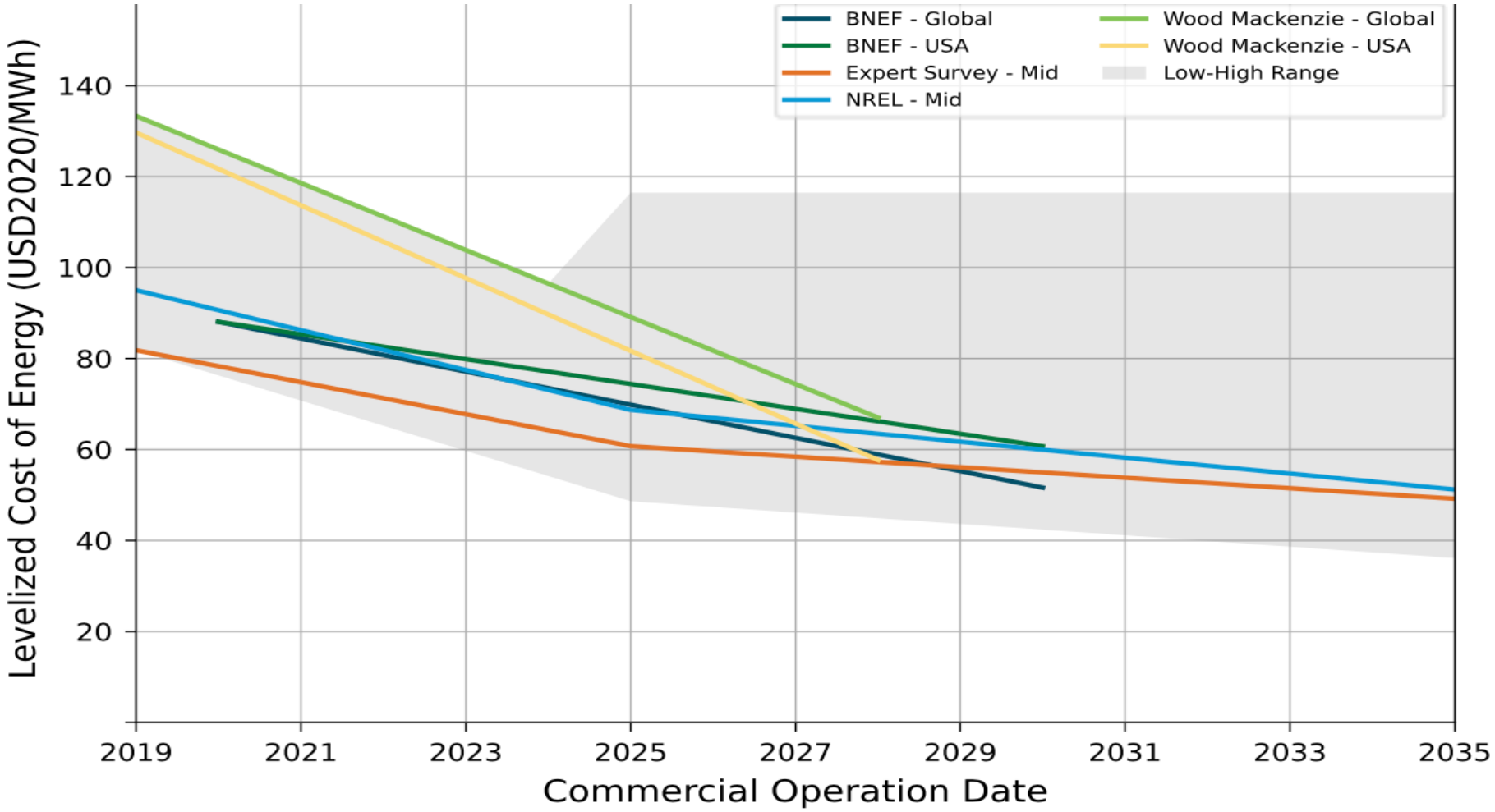
Figure 14. Developer-announced offshore wind capacity through 2026 for projects with financial closure



Courtesy of U.S. Department of Energy (August 2021)

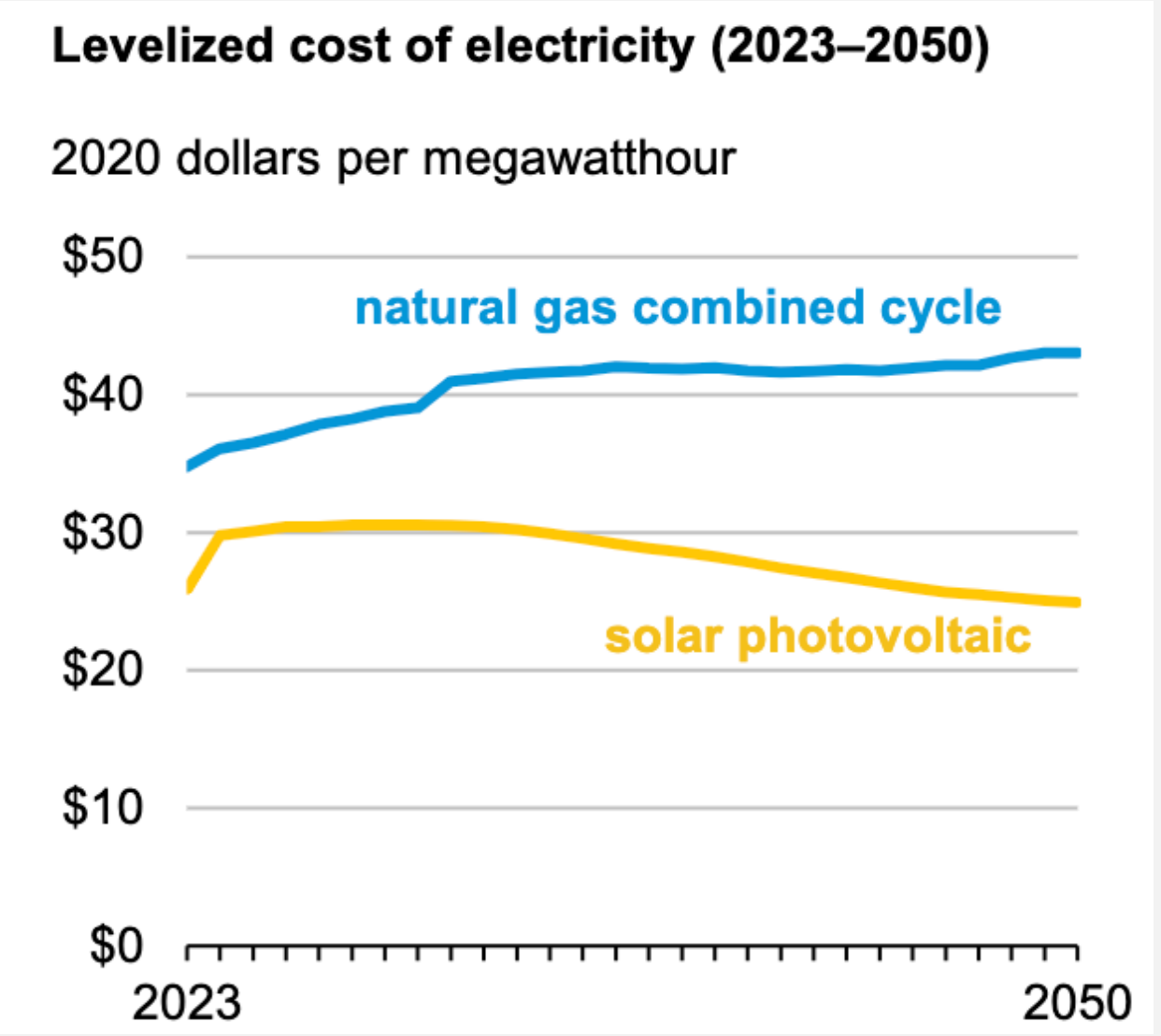
CONTEXT

Figure 35. Global LCOE estimates for fixed-bottom offshore wind



Courtesy of U.S. Department of Energy (August 2021)

CONTEXT



Data from U.S. Energy Information Administration (February 2021)

CONTEXT

$$\frac{\$51}{1\ metric\ ton\ of\ CO2} * \frac{576{,}000{,}000\ metric\ tons\ of\ CO2\ emissions\ from\ natural\ gas\ at\ U.S.\ power\ plants\ in\ 2020}{1{,}402{,}438{,}000\ MWh\ of\ electricity\ generated\ from\ natural\ gas\ at\ U.S.\ power\ plants\ in\ 2020}$$

= $20.95 per MWh

$$\frac{\$1{,}500}{1\ metric\ ton\ of\ CH4} * \frac{6{,}404{,}000\ metric\ tons\ of\ CH4\ emissions\ from\ natural\ gas\ at\ U.S.\ power\ plants\ in\ 2020}{1{,}402{,}438{,}000\ MWh\ of\ electricity\ generated\ from\ natural\ gas\ at\ U.S.\ power\ plants\ in\ 2020}$$

= $6.85 per MWh

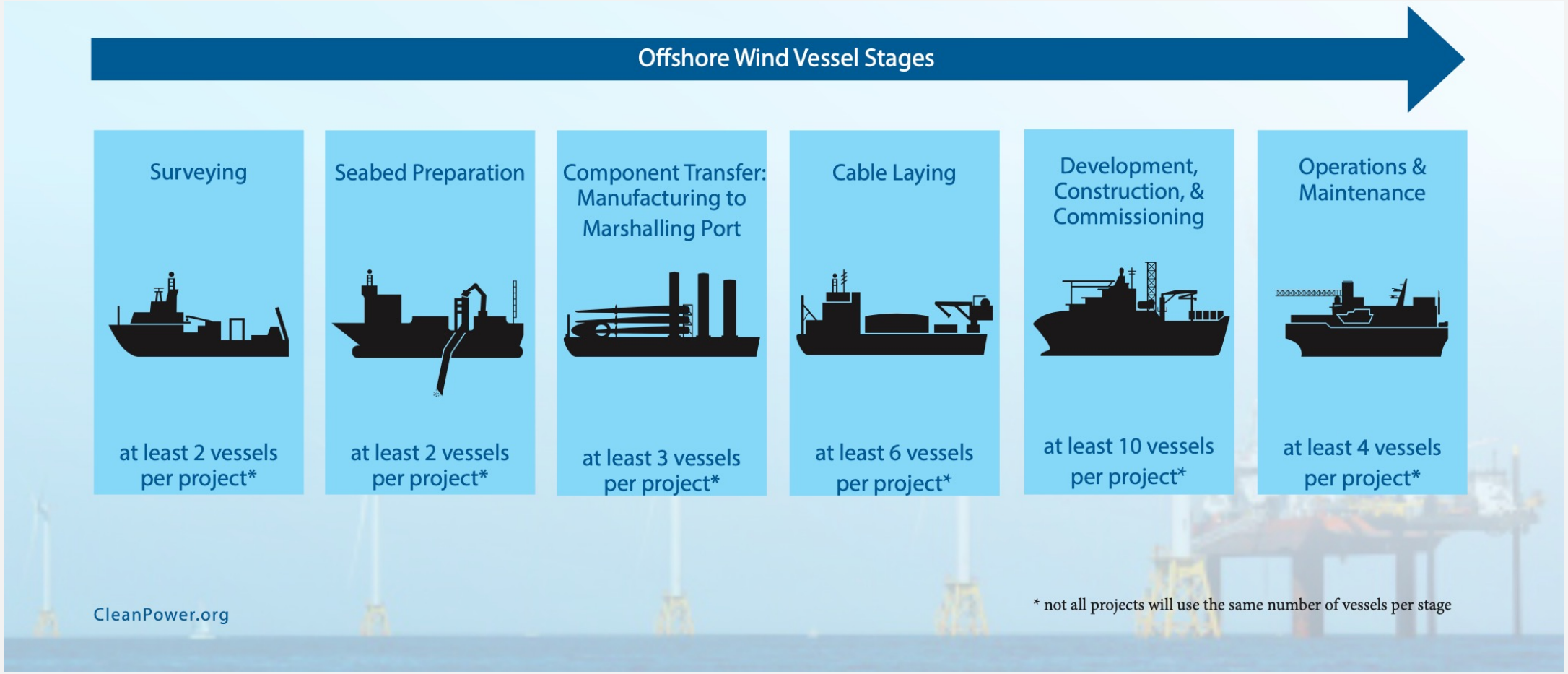
2023 natural gas LCOE (including social costs) = 35+20.95+6.85 = $62.80 per MWh

Data sources provided on next slide

CONTEXT

Data figure(s)	Source
Social costs of carbon dioxide and methane	Interagency Working Group on Social Cost of Greenhouse Gases, United States Government
Metric tons of carbon dioxide emissions from natural gas at U.S. power plants in 2020	U.S. Energy Information Administration
Metric tons of methane emissions from natural gas at U.S. power plants in 2020	International Energy Agency
MWh of electricity generated from natural gas at U.S. power plants in 2020	U.S. Energy Information Administration

CONTEXT



Courtesy of American Clean Power (May 2022)

CONTEXT

Data from U.S. Department of Energy (June 2022)

Vessel type	Estimated cost	Estimated construction time	Number of existing Jones Act-compliant vessels	Estimated peak demand to 2030	Risk to 30GW target	Jones Act requirements
Wind turbine installation vessel (WTIV)	$250M-$600M	3 years	0 (1 under construction)	5	High	Can be FF (if feeder vessel strategy used)
Cable lay vessel (CLV)	$200M	3 years	0	4	Moderate	Can be FF
Scour protection vessel	$200M	3 years	0 (1 under construction)	2	Moderate	Can be FF (if rocks/foundation not yet present)
Service operation vessel (SOV)	$50M-$100M new, $10M-$50M retrofit	2-3 years	0 (2 under construction, multiple oil and gas vessels which could be adapted)	13+	Moderate	Must be Jones Act vessel
Crew transfer vessel (CTV)	$5-$10M	1-2 years	3	58	Moderate	Must be Jones Act vessel
Feeder barge/vessel	$150M-$200M new, $10M-$20M retrofit	Depends on design	20 jack-ups, 44 barges	10	Moderate	Must be Jones Act vessel
Heavy lift vessel	Depends on design	Depends on design	18	Depends on installation strategy	Moderate	Must be Jones Act vessel
Anchor handling tug supply vessel	$100-$200M	2 years	Limited supply	2	Moderate	Must be Jones Act vessel

SIGNIFICANCE

- Energy security
- Climate change
- Economy

SCENARIO 1: UNCERTAINTY DOMINATES

- Political pressure
- Temporary Jones Act waiver for offshore wind until 2030

SCENARIO 1: UNCERTAINTY DOMINATES

ADVANTAGES

- Less restrictions for developers

DISADVANTAGES

- Stifles domestic maritime sector, jeopardizing long-term U.S. energy security
- Gambles that global WTIV shortage will not continue to derail U.S. development regardless

SCENARIO 2: COORDINATED ACTION

- U.S. shipbuilders construct offshore wind vessels

SCENARIO 2: COORDINATED ACTION

ADVANTAGES

- Ensures U.S. energy security
- Increases jobs and profit in American maritime and manufacturing industries

DISADVANTAGES

- Developers likely to pay higher vessel and labor costs, though global shortage means likely expensive regardless
- Gambles that shipbuilders have enough incentive

POLICY OPTIONS

1. Tax rebates
2. Port Infrastructure Development Program (PIDP) grants
3. Federal Ship Financing Program (Title XI)

OPTION 1: TAX REBATES

- Similar to Business Energy Investment Tax Credit

OPTION 1: TAX REBATES

ADVANTAGES

- Simple incentive that applies evenly
- No need to allocate money from existing MARAD programs

DISADVANTAGES

- Requires Congressional action and coordination with Department of Treasury

OPTION 2: PIDP GRANTS

FY	Total PIDP funding
2021	$230M
2022	$680M
2023	$680M

Data from U.S. Maritime Administration

OPTION 2: PIDP GRANTS

ADVANTAGES

- Direct subsidy for high up-front costs
- Can be implemented alongside Option 3

DISADVANTAGES

- Requires expanding traditional scope of PIDP
- Not able to fund other PIDP grant proposals

OPTION 3: TITLE XI

- June 2022: "Vessels of National Interest" declaration
- Insufficient funding

OPTION 3: TITLE XI

FY	Title XI funding (requested and received)	Total Title XI subsidy available	Title XI new loan guarantee support available (MARAD estimate)	PIDP funding (requested and received)	Supplemental PIDP funding from IIJA	Total PIDP funding
2021	$3M	$32.5M	$435M	$230M	-	$230M
2022	$3M	$35.5M	$475M	$230M	$450M	$680M
2023	$3M	$38.5M	$515M	$230M	$450M	$680M
2024	$38.5M	$77M	$1.03B	$194.5M	$450M	$644.5M

Data from U.S. Maritime Administration

OPTION 3: TITLE XI

ADVANTAGES

- Better loans for shipbuilders
- Makes sense politically
- Could be implemented alongside Option 2

DISADVANTAGES

- Requires reallocating funds from PIDP

LITERATURE REVIEW

Institution	Month published/updated	Title of report	Relevant information
U.S. Department of Energy	August 2021	*Offshore Wind Market Report: 2021 Edition*	Provides high-level overview of offshore wind projects in the U.S. and around the world
U.S. Department of Energy (National Renewable Energy Laboratory)	June 2022	*The Demand for a Domestic Offshore Wind Energy Supply Chain*	Provides U.S. demand forecasts of various offshore wind vessels
Government Accountability Office	December 2020	*Offshore Wind Energy: Planned Projects May Lead to Construction of New Vessels in the U.S., but Industry Has Made Few Decisions Amid Uncertainties*	Describes major uncertainties facing U.S. shipbuilding industry regarding offshore wind
Information Handling Services Markit	February 2022	*As offshore wind farms expand, potential turbine installer shortage comes under spotlight*	Provides global supply projections for WTIVs
American Clean Power	May 2022	*Offshore Wind Vessel Needs*	Provides overview of vessels typically required for offshore wind projects