Offshore wind roadmap for the Philippines

Draft findings for consultation

7 December 2021

ESMAP
Energy Sector Management Assistance Program

WORLD BANK GROUP
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IFC International Finance Corporation

BVGAssociates

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Contents

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Puno Law

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Puno Law project lead: Jose M. Layug, Jr.

2. Project aims and status

Roadmap

- Capture the opportunity for OSW in a robust, realistic and independent way
- Provide evidence to help the Government of the Philippines make policy decisions
- Create a practical roadmap to deliver a pipeline of bankable projects
- Be relevant to a wide range of stakeholders

Concept study for an example early project

- Preliminary project concept and outline design
- Development timeline, inc. defining technical studies and budget

Status

- Key messages reviewed by DOE, full review underway
- Seeking wider feedback from industry through consultation mission
- Updated draft to be peer reviewed in January and complete in Q1 2022

3. Feedback

Seeking feedback

Method

- This presentation is available from https://bvgassociates.com/offshore-wind-roadmap-for-the-philippines/ - link will be emailed to all invitees today
- By email, to mip@bvgassociates.com or noppakwan@worldbank.org, before end 17 Dec
- By Teams meeting, booked via mip@bvgassociates.com, by end 13 Dec and held before end 17 Dec

Content

- Please respond on any points of interest or concern, or
- Please address the following:

1. Please provide your general views on the main findings of the offshore wind roadmap for the Philippines
2. Are there findings that you strongly agree with?
3. Are there findings that you strongly disagree with?
4. Are there any major issues or risks that you do not feel this roadmap has covered?
5. Do you have any other comments?

4. Executive summary

Philippines has significant OSW wind potential, explored in the roadmap through 2 possible scenarios:

- Low growth scenario, 3GW by 2040 & 6GW by 2050
  - In line with clean energy scenario of 11.8GW of wind energy by 2040 in the Philippines Energy Plan 2020-2040 (4 large projects by 2040)
- High growth scenario, 20GW by 2040 & 40GW by 2050
  - In line with other country aspirations in the region (average 2 large projects per year from 2033)

A moratorium on contracting further new coal plant, coupled with increasing electricity demand means that the Philippines needs an energy source that can deliver high volume

The Philippines has played a key role in establishing the 1.5-degree climate change agenda, being in the top 5% of countries most vulnerable to climate change, globally

There is strong logic for the high growth scenario:

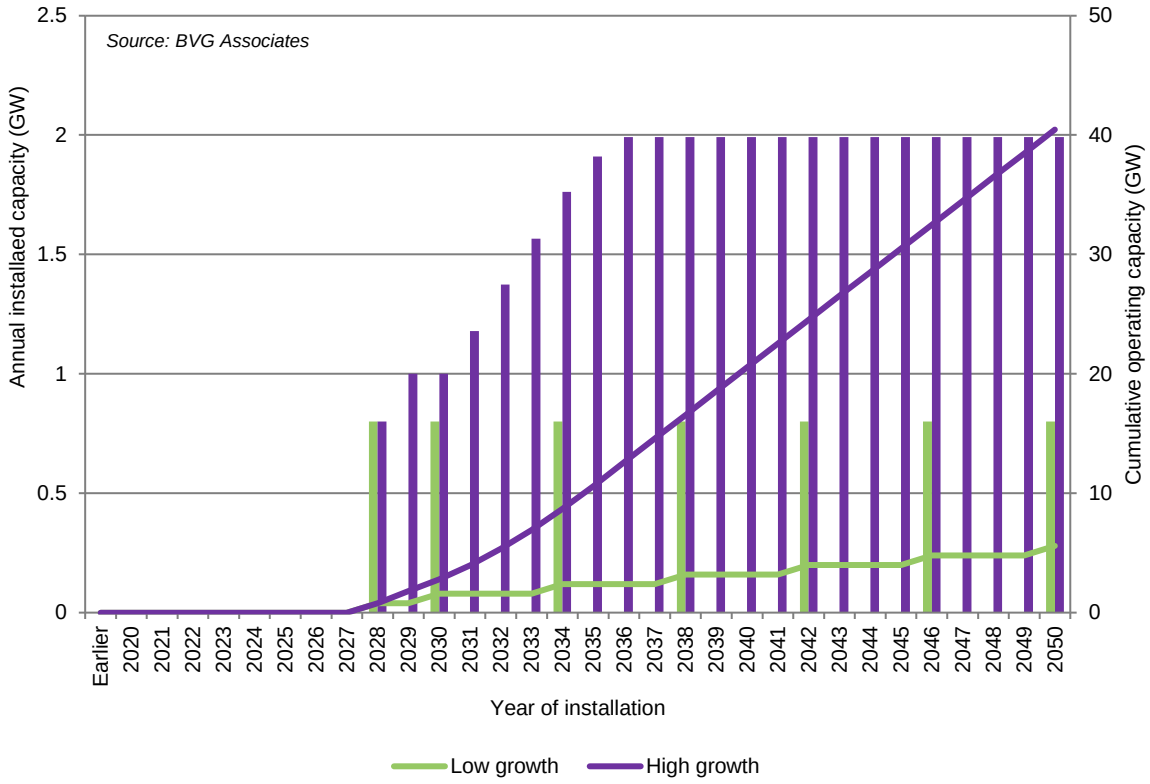
1. Provides 15% of total electricity demand and offsets about 60% of the anticipated growth in electricity demand due to decarbonization of transport and heating (cooking/water) by 2040
2. Low cost way to deliver high volume, low carbon energy (200m tonnes avoided by 2040)
3. More OSW than 20GW is likely to be needed eventually - also need large increase in onshore wind and solar, where feasible
4. Electricity and hydrogen for decarbonizing transport and heat provide storage / reduce issues of variability

Findings have been substantiated by experts in the field, who have collaborated during the draft preparation

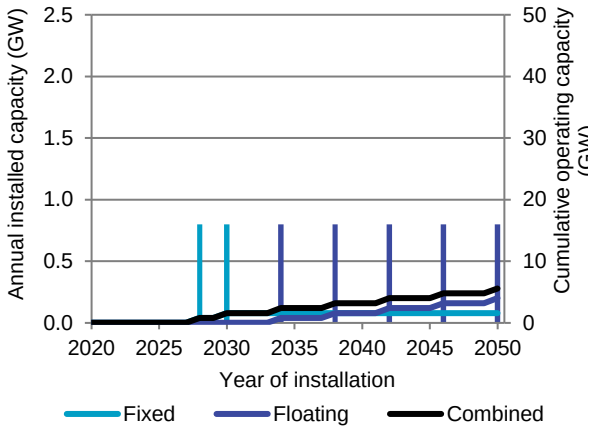
5. Scenarios

Volumes

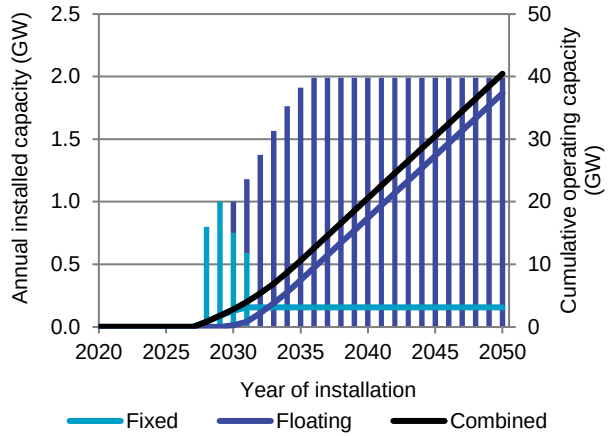
Comparison of scenarios



Low growth (1.6GW by 2030 and 3.2GW by 2040)



High growth (2.8GW by 2030 and 20.5GW by 2040)

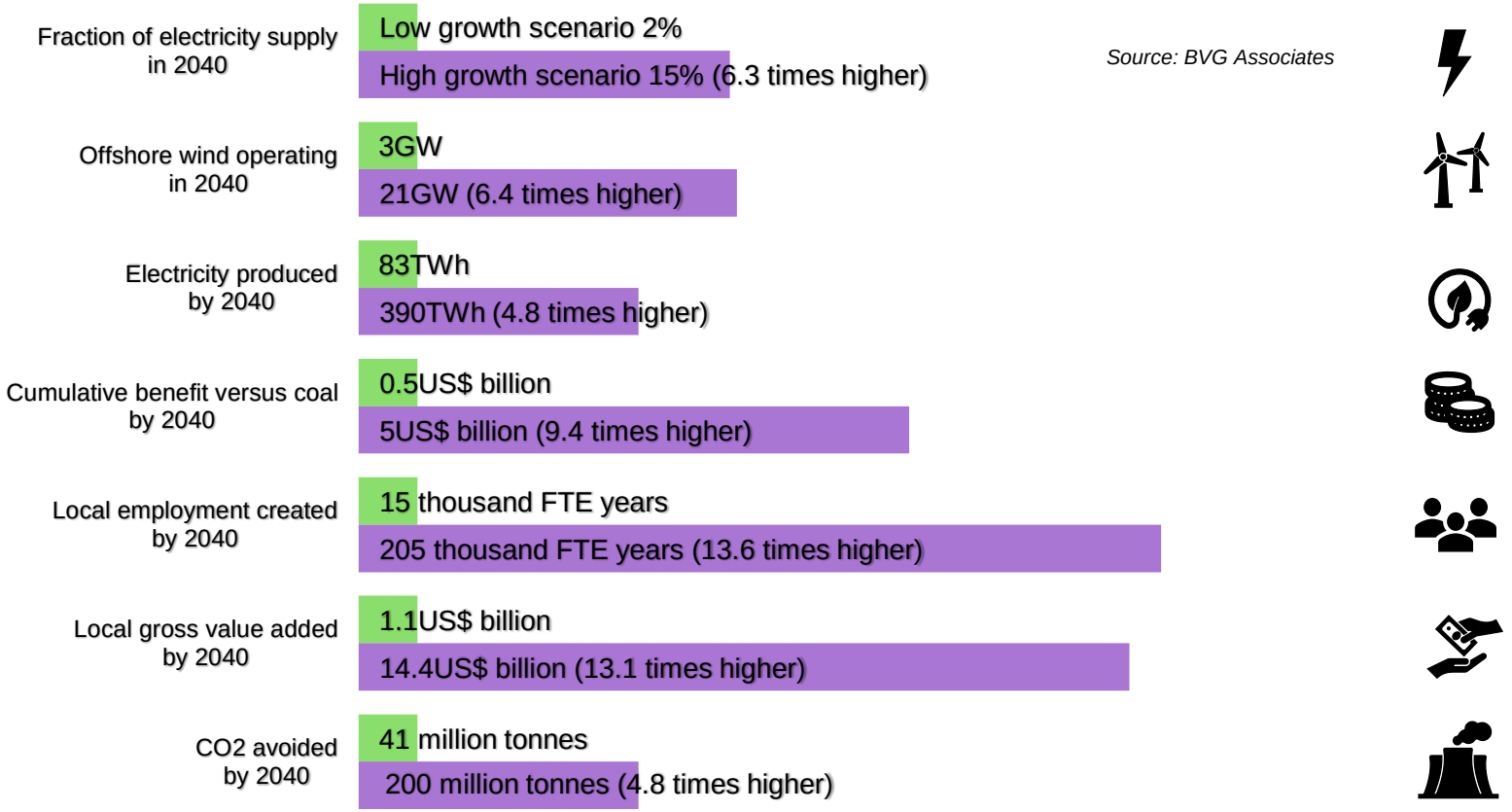


Key points

- Both scenarios dominated by floating, but starting with fixed
- Starting with large projects to minimise LCOE
  - International developers already experienced
  - Supply chain will be mainly overseas
- Start date driven by due process for early projects and reducing LCOE over time
  - Permitting 2022-23
  - PPA Award 2025
  - FID 2026
  - Completion 2028

5. Scenarios

Comparison, by key metrics



Source: BVG Associates

6. Offshore wind frameworks: route to market

Evolution of current frameworks to accelerate pipeline

Condition	Assessment
Wind resource	Good, especially where floating
Demand for clean power	High to 2040 and beyond
Leasing framework	Needs some change
Permitting framework	Needs some change
Power purchase framework	Needs some change
Grid connection framework	Needs some change
Health and safety framework	Needs some change
Transmission network	Clear vision and signficant upgrades required over time
Cost of energy	Industry likely to need to focus hard on cost reduction to meet proposed ceiling price
Local supply chain	Relatively weak – but OK to use regional / global supply chain

6. Offshore wind frameworks: route to market

Evolution of current frameworks to accelerate pipeline

Leasing

1. WESC arrangement leasing generally OK, though may struggle under high volumes of applications
    - We are aware of worries regarding length of service contracts, developers potentially tying up much space, what happens with projects close together (potentially causing loss of energy due to wake effects), project ownership
      [Recommendations 5, 6, 7, 8 – see section A.2 of this presentation for 34 roadmap recommendations]

Permitting

2. EVOSS arrangement generally OK, already with plans to make more joined-up and transparent [R9]
    - We suggest improvements to make regarding standards for ESIAs, health and safety and design standards
      [R27, 28, 29, 30]

Power Purchase

3. Regular OSW-specific auction (with ceiling and floor prices, announced early and standard form PPA across OSW projects)
    - This will likely drive fixed projects first, then floating - early OSW is unlikely to compete with onshore wind & solar in private-sector auctions
      [R11, 12, 13]

6. Offshore wind frameworks: route to market

Evolution of current frameworks to accelerate pipeline

Grid connection

4. A strategic approach to OSW development zones and transmission network upgrades is essential

   - We see that grid connection will be a significant challenge, especially beyond first projects
     [R17, 18, 19]
   - More clarity and efficiency needed for projects in securing grid connections, including on compensation for delayed grid connection availability once a Grid Connection Agreement is signed
     [R20]

Ongoing delivery

5. Ongoing collaboration within government and with Philippines' and global industry to address OSW opportunities and barriers

   - OSW is nationally important infrastructure – long-term industry confidence is key to successful delivery
     [R 3, 4, 16]

7. Potential development zones

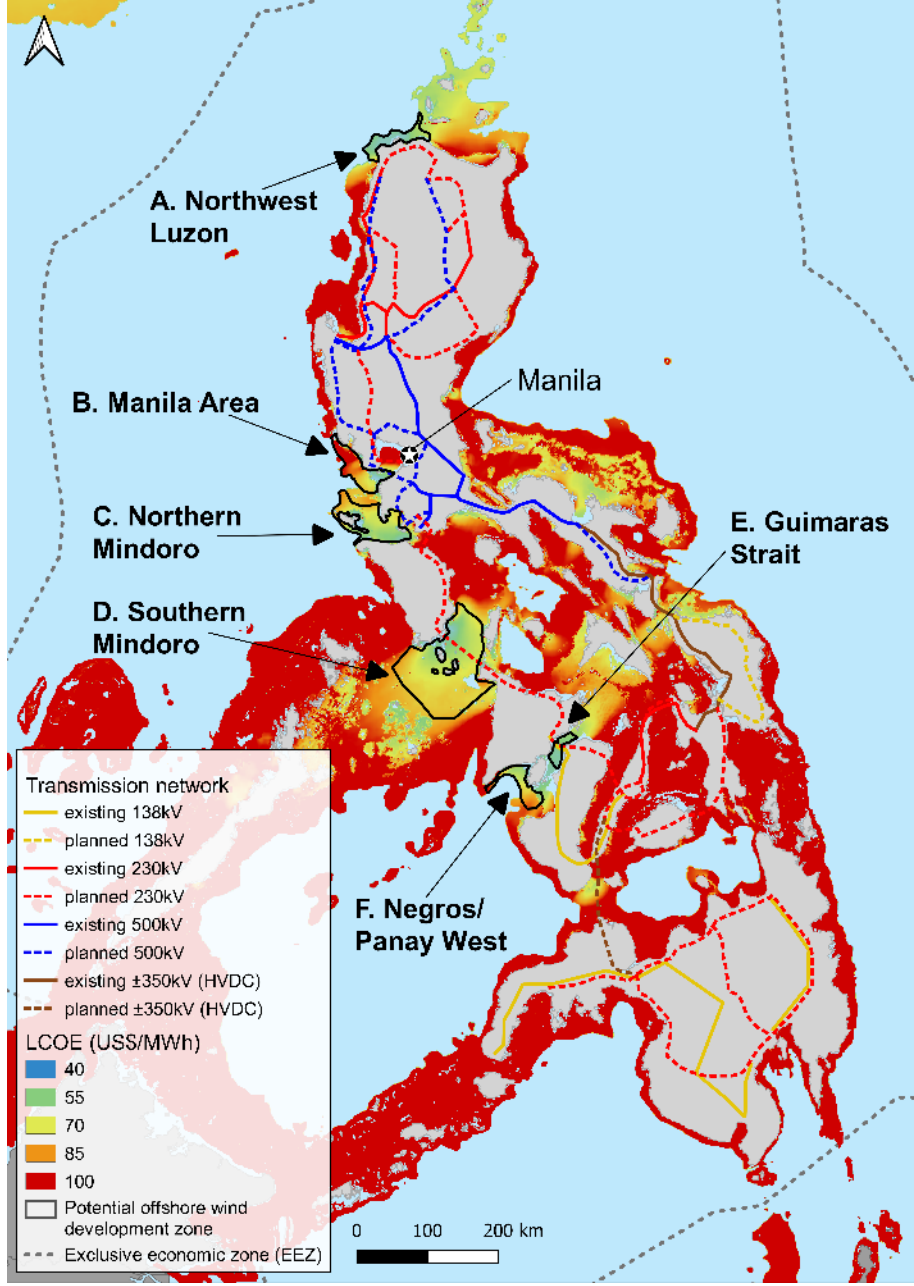
6 potential OSW development zones identified, considering:

- Environmental, social and technical restrictions and exclusions*
- Levelized cost of energy (wind speed is critical – consider measurement campaign) [R24]
- Transmission and port infrastructure and demand centers

Recommend DOE completes proportionate MSP and publishes final map by end 2023 [R6]

- Existing WESCs will be honored, and applications processed
- New applications outside of areas will be considered less favorably

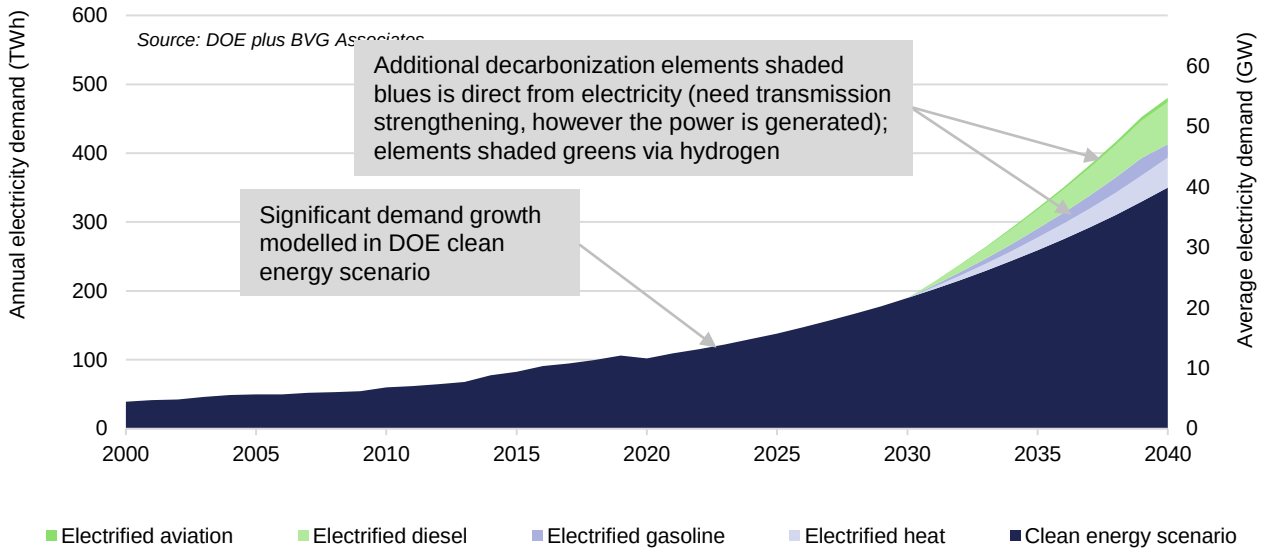
Potential development zone	Type	Potential volume to 2050
A: Northwest Luzon	Floating	5GW
B: Manila area	Fixed and floating	3GW
C: Northern Mindoro	Floating	10GW
D: Southern Mindoro	Floating	36GW
E: Guimaras Strait	Fixed	1GW
F: Negros / Panay area	Floating	3GW



* Restrictions – high risk areas requiring further evaluation for OSW; exclusions – areas of highest environmental or social sensitivity

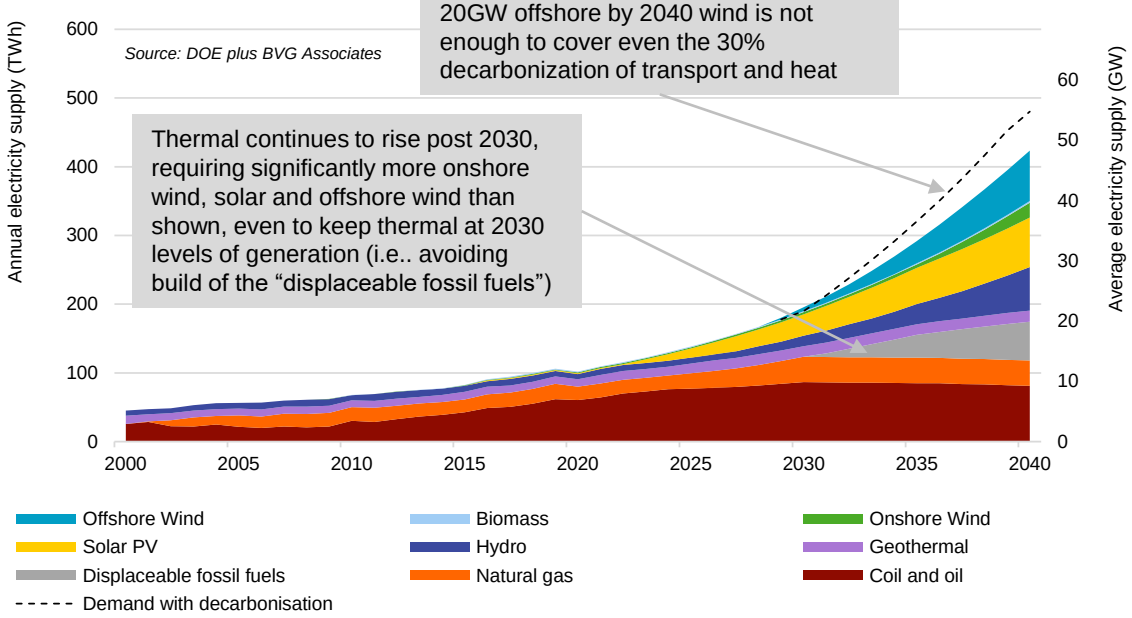
8. Electricity demand and supply

Electricity demand to 2040



Electricity supply to 2040

Decarbonization of transport and heat provides storage into system, but a bigger vision is needed to avoid any new thermal capacity after 2030 and to start a path to net zero by 2050 or soon after

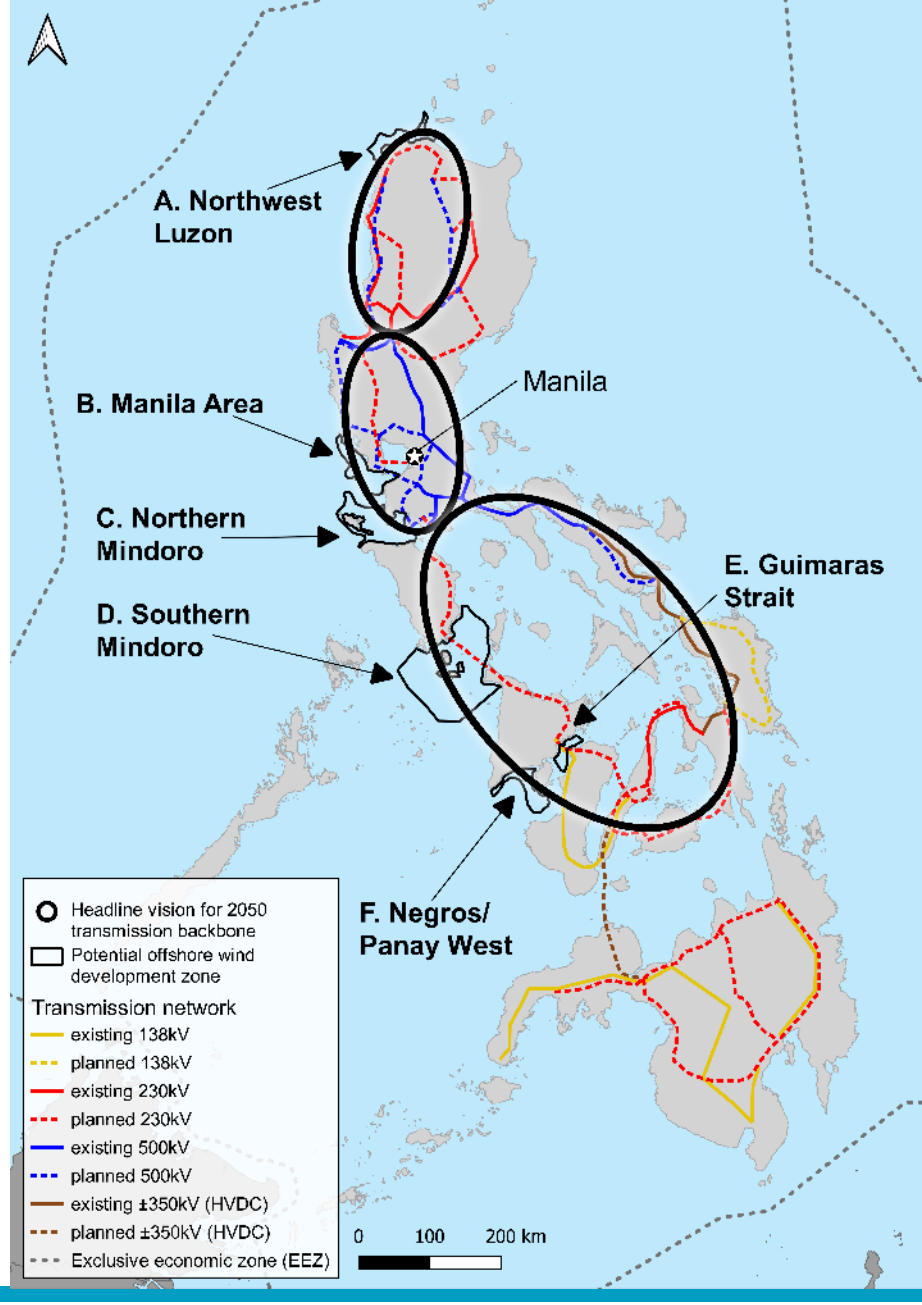


Assumptions

1. Supply and demand from DOE clean energy scenario (CES) in the Philippines Energy Plan 2020-2040
2. Offshore wind follows high growth scenario – first generation in 2029 and reaches 20GW by 2040
3. Additional demand added for decarbonisation of transport and heat, beginning in 2030, and reaching 30% electrification by 2040 (20% for moto-gasoline because 10% already assumed in CES); assumed heat demand (cooking, water) equates to 70% of household consumption
4. No import or export of electricity

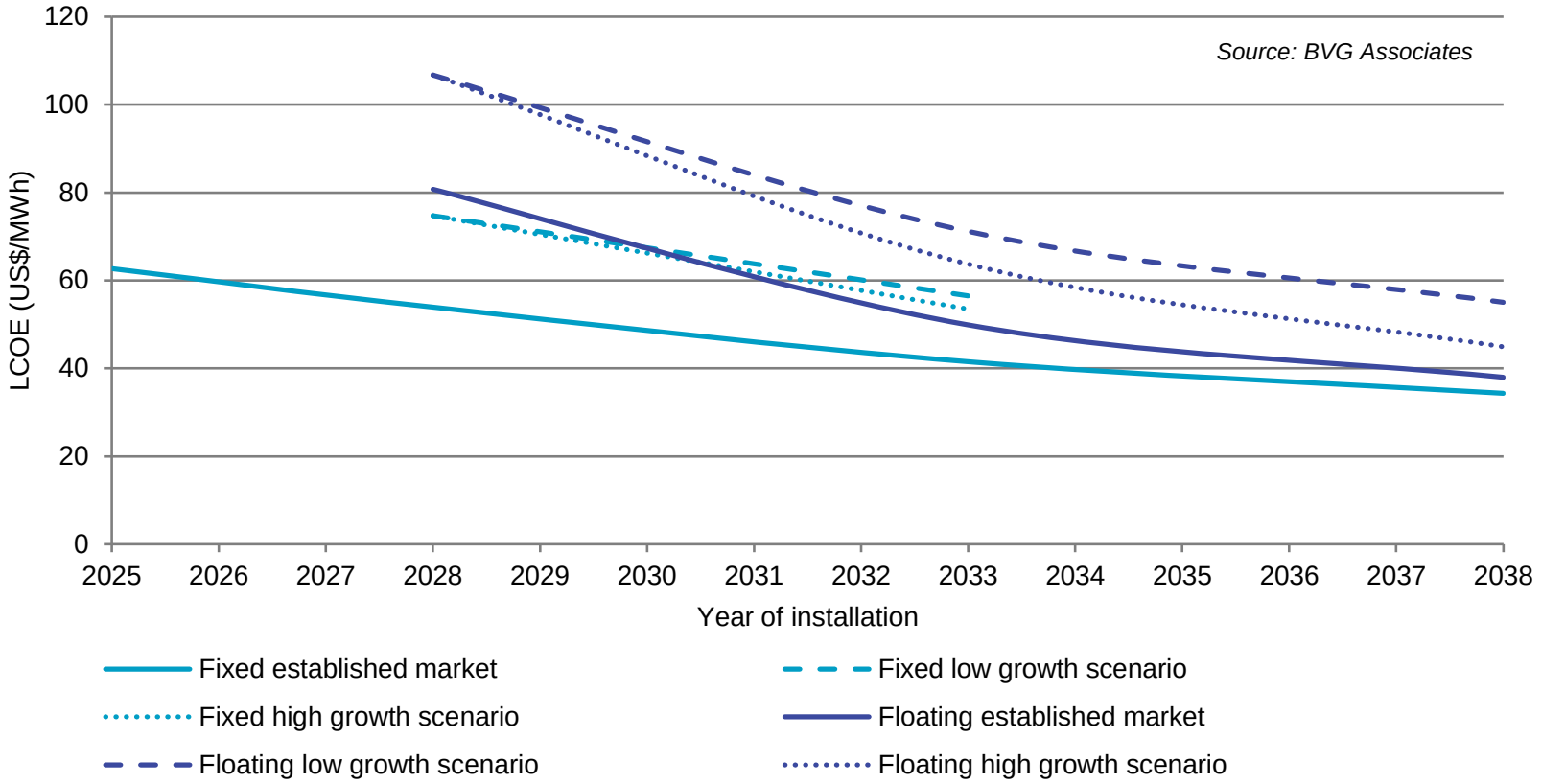
9. Transmission network

1. Significant upgrades required over next 30 years (not just for OSW)
2. Current plans from NGCP are 1st step, but bigger 2050 vision needed to support energy transition [R17, 18]
3. Significant stretches of proposed loops could be subsea - some OSW projects could connect to offshore transmission hubs
4. Financing and timing of transmission network upgrades will be critical [R19]
5. Closer look at upgrade plans provided in the roadmap



10. Levelized cost of energy

1. Target around $70/MWh for first fixed projects installed from 2028, with floating following, around 2032 (helped by higher winds and expectation of transmission network upgrades)
2. This means OSW cost competitive from the start, removing deployment barriers
3. Description of how LCOEs derived provided in the roadmap – recognise this is Government giving industry a challenge to deliver volume at competitive cost



11. Feedback - reminder

Seeking feedback

Method

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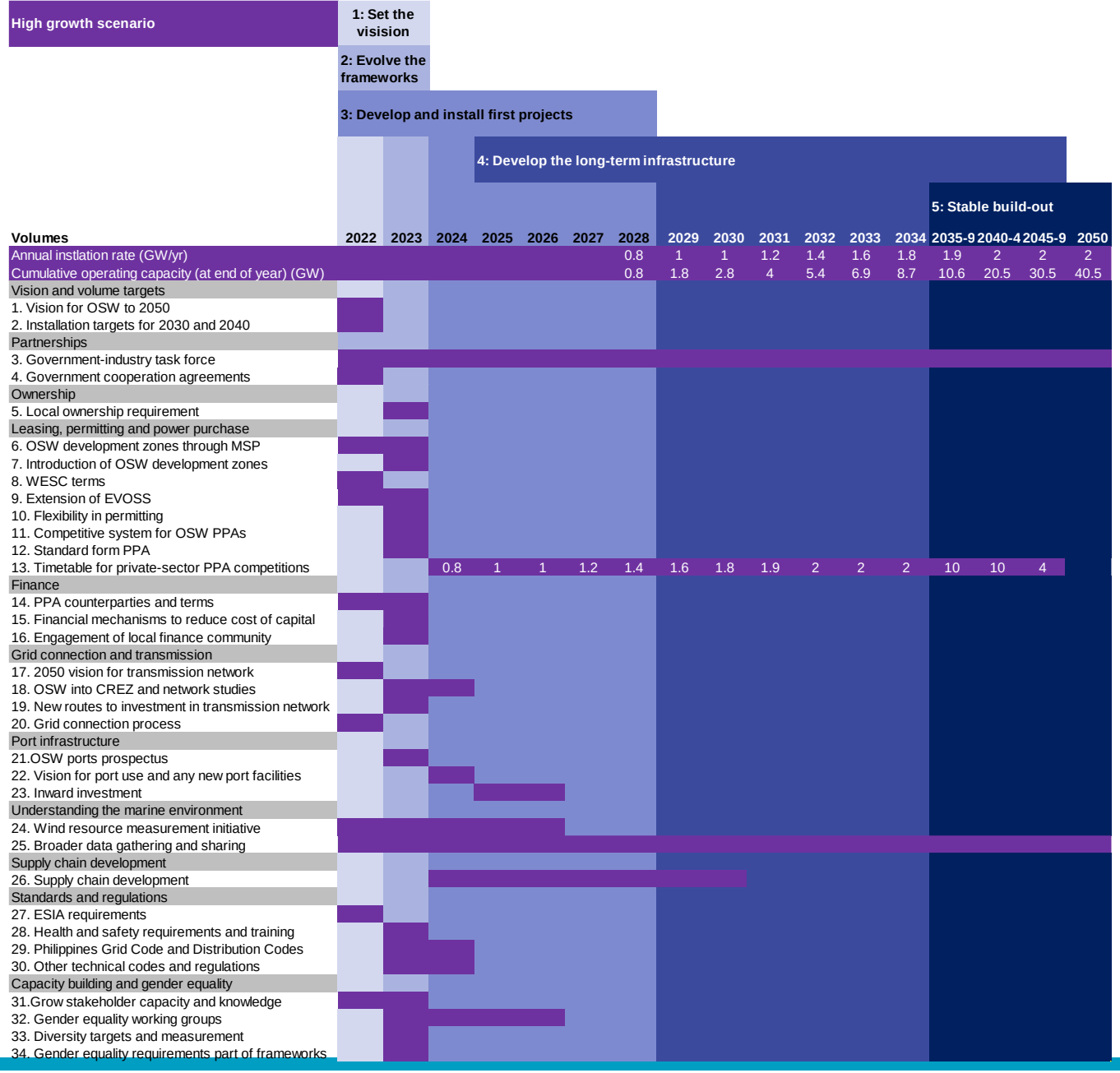
A. Additional roadmap material for consultation

A1. Roadmap (high growth scenario)
A2. Recommendations
A3. Environmental and social
A4. Supply chain
A5. Economic impacts
A6. Ports

A1. Roadmap



A2. Recommendations [R1, 2…]

Vision and volume targets

1. Department of Energy (DOE) publishes a vision for offshore wind to 2050 as part of a decarbonized energy mix for the Philippines, considering plans also for transport and heat, explaining how and why offshore wind is so important.
2. DOE sets offshore wind installation targets for 2030 and 2040.

Partnerships

3. DOE establishes by Circular a long-term official Government-industry task force involving local and international project developers and key suppliers, to work together to address these recommendations and other considerations, as they arise.
4. DOE agrees Memoranda of Agreement with other relevant Government departments, especially Department of Environment and Natural Resources (DENR), to define inter-departmental cooperation on offshore wind.

Ownership

5. DOE and the private sector seek that Congress changes the Constitution to relax requirement for 60% local ownership of each renewable energy source.

Leasing, permitting and power purchase

6. DOE establishes offshore wind development zones through MSP in line with Good International Industry Practice (GIIP), considering environmental and social considerations (including cumulative impact of multiple projects) and long-term vision for transmission network development. This should include focus on engagement with key stakeholders.
7. DOE introduces OSW development zones, respecting also existing WESCs and applications, providing guidance as to their use in focusing OSW projects in the most advantageous areas, whilst minimizing negative environmental, social and economic impacts.
8. DOE issues appropriate guidance regarding applying for a WESC for offshore wind adjacent to an existing WESC, and gives comfort to developers on the expectation to extend a WESC for a further 25 years after the initial 25-year term if a project is still in operation. DOE should also confirm that there is no requirement for payment of offshore occupation fee.
9. DOE extends EVOSS to cover all relevant Government departments to enable efficient and transparent permitting including ESIA in line with GIIP, clarifying and streamlining the permitting process and providing appropriate supporting guidance, considering all parties, including clear timelines for permit decisions.

A2. Recommendations

Leasing, permitting and power purchase (cont.)

10. DOE reviews permit flexibility in design to prevent the need for full re-application and subsequent delays should any design changes be required as the project progresses, plus the availability and appropriateness of supporting guidance regarding the permitting processes, considering all parties.
11. DOE establishes a competitive system solely for offshore wind power purchase agreements (PPAs), with a ceiling price to limit cost to consumers and a floor price in early years to avoid the risk of lowball bids.
12. DOE explores the opportunity to develop a standard form PPA for adoption across OSW projects to accelerate market development.
13. DOE sets out a suggested timetable for private-sector competitions, and coordinates across Government and private sector organizations involved in administering competition to deliver.

Finance

14. DOE explores to how to ensure PPA counterparties and PPA terms remain viable as volumes of offshore wind contracted increase, including clarity on curtailment.
15. Congress encourages financial mechanisms to reduce cost of capital, including climate and other concessional finance.
16. DOE supports the engagement of the local finance community with offshore wind, including communication of environmental and social performance standards required to gain access to concessionary and project financing.

Grid connection and transmission network

17. DOE publishes 2050 vision for a nationwide electricity transmission network for a decarbonized energy system, with milestone plans for 2030 and 2040, and consideration of finance.
18. DOE incorporates OSW development zones fully into Competitive Renewable Energy Zones (CREZ) processes and TDP processes and with the National Grid Corporation of the Philippines (NGCP), undertakes power systems studies to understand the potential impacts of large volumes OSW on the future transmission network and ESIAs in line with GIIP and lender requirements to understand the environmental and social implications of transmission network upgrades, feeding these into MSP activities.

A2. Recommendations

Grid connection and transmission network

19. DOE considers low-cost solutions for investment in transmission system upgrades, such as concessional finance
20. DOE ensures clarity and efficiency for projects in securing grid connections, including on compensation for delayed grid connection availability once a Grid Connection Agreement (GCA) is signed.

Port infrastructure

21. Philippines Ports Authority (PPA) encourages the publication of an offshore wind ports prospectus, showing port capabilities against offshore wind physical requirements, and use this to encourage dialogue and timely investment in relevant port facilities. This will involve engagement with independent government entities managing Freeports.
22. PPA and DOE work with ports to build a vision of how a pipeline of projects in the potential OSW development zones could be delivered in line with a strong Government vision and to assess whether it is viable to establish any new port facilities. Careful consideration should be given to environmental and social considerations and robust ESIA analysis undertaken for any potential developments.
23. DOE, PPA and relevant Freeport zone authorities explore potential inward investment to finance port upgrades or new facilities.

Understanding the Marine Environment

24. DOE initiates or coordinates wind resource measurement to build confidence in available resource and extreme winds, recognizing typhoon risk.
25. DOE, as part of a proportionate MSP process, initiates or coordinates other measurement and data gathering campaigns on key aspects of the zones including:
    - Metocean campaigns also considering significant wave heights and currents
    - Geological surveys of the seabed and substrates
    - Ecological surveys to address any identified gaps in current knowledge of the zones, and
    - Social perceptions and potential impacts on local industries such as fishing, shipping, aquaculture and tourism .

Supply chain development

26. DOE presents a balanced vision for local supply chain development, encouraging international competition, and enables education and investment in local supply chain businesses, including in training of onshore and offshore workers.

A2. Recommendations

Standards and regulations

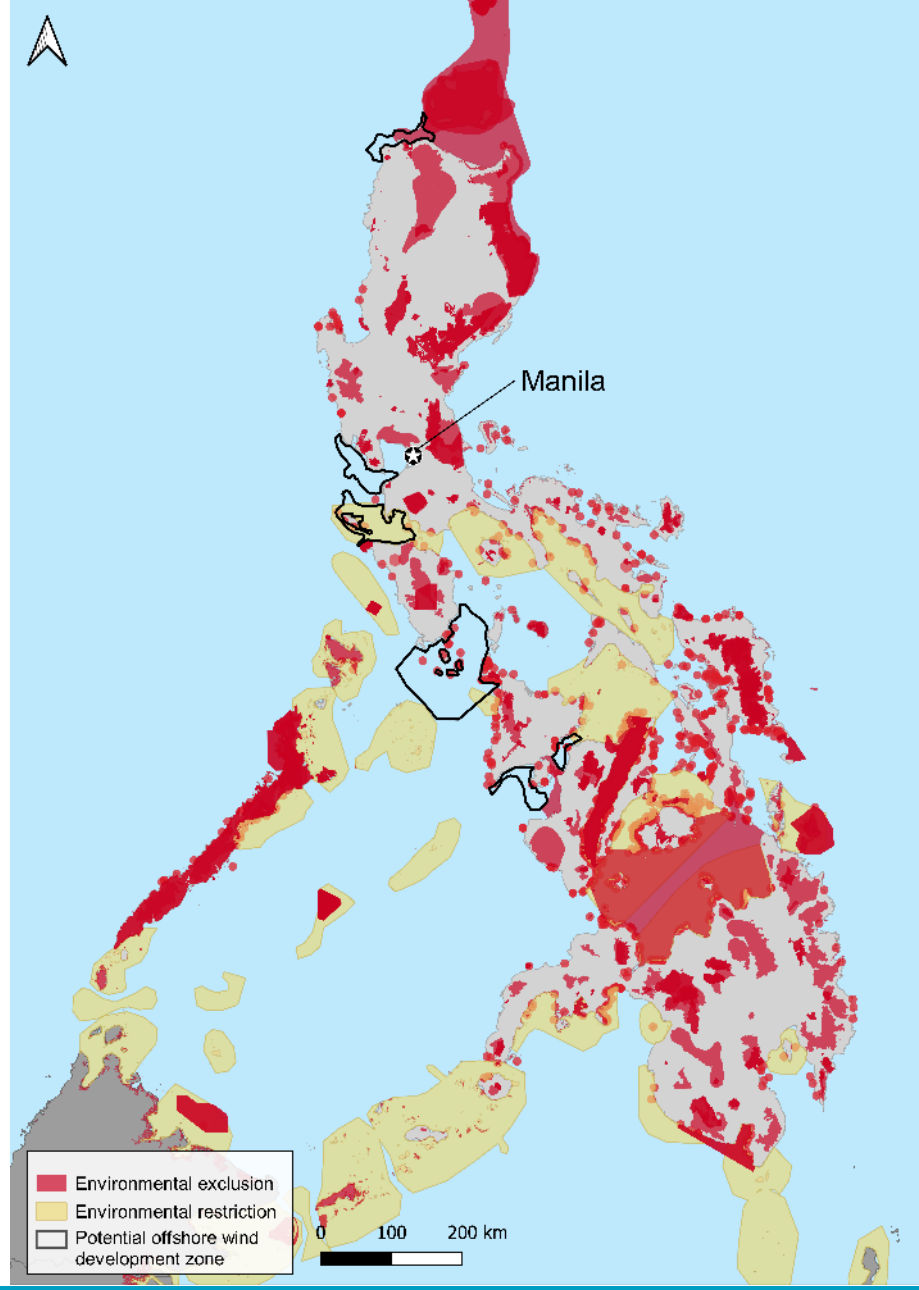
27. DENR reviews the requirements for environmental and social impact assessment (ESIA) for compatibility with international standards of GIIP, updates the legislative and policy framework where necessary and produces guidance for developers and stakeholders on the requirements and their relationship with the permitting and financing processes.
28. DOE extends the Renewable Energy, Safety, Health and Environment Rules and Regulations (RESHERR) to cover health and safety for offshore wind and encourages focus on behavioral and cultural aspects of H&S.
29. DOE considers amendments to the existing Philippines Grid Code and Distribution Codes to cater for the significant increase in renewable power from OSW and other variable forms of RE generation.
30. DOE leads the creation of a framework of technical codes and regulations relevant to offshore wind, adopting international industry codes where appropriate.

Capacity building and gender equality

31. DOE leads in helping government departments and other key stakeholders to grow capacity and knowledge needed to process a growing volume of offshore wind projects.
32. DOE involves developers and supply chain companies in gender equality working groups, supported by women's rights organizations in the Philippines, Global Wind Energy Council (GWEC) and Global Women's Network for the Energy Transition (GWNET).
33. Government and industry determine together the key data that needs to be collected to ensure progress to diversity targets is measured and make sure a framework is in place to collect it accurately.
34. DOE considers introducing gender equality requirements into leasing and power purchase frameworks.

A3. Environmental and social

1. Potential OSW development zones chosen to avoid large exclusions; some have restrictions
   - Exclusions – areas of highest environmental or social sensitivity
   - Restrictions – high risk areas requiring further evaluation for OSW
2. Northwest Luzon zone (floating) part overlaps Important Marine Mammal Area (IMMA), elsewhere considered as exclusion - this will need additional consideration during ESIA
3. Some zones have small exclusions within them, to be respected by project developers
4. Maps enabling understanding of key receptors, exclusions and restrictions in the roadmap
5. Roadmap assessment is preliminary input to proposed DOE proportional MSP in line with Good International Industry Practice, including stakeholder engagement [R6]



A4. Supply chain

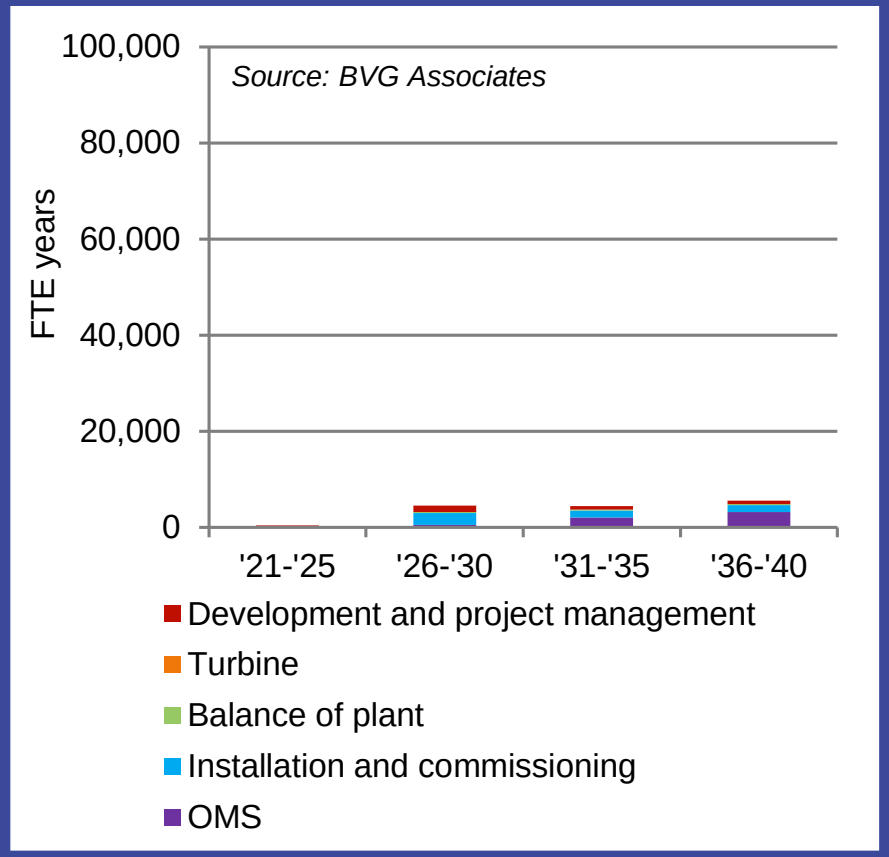
1. Generally not expecting much local supply and not high government focus on developing supply chain – will be worth increased focus in due course [R26]
2. Low growth scenario: project development and construction support services; offshore substation assembly; potential use of local tugs for floating turbine installation; operational phase services
3. High growth scenario: As low, plus tower factory; 60% of floating foundation manufacture; more operational phase services
4. Minimal exports likely
5. Description of supply chain analysis provided in the roadmap

Level 2 category	Track record and capacity in offshore wind	Capability in parallel sectors	Benefits of local supply	Investment risk in the Philippines	Size of the opportunity
Development and project management	1	4	4	4	2
Nacelle and hub, and assembly	1	1	2	1	4
Blades	1	1	3	1	4
Tower	1	2	3	2	3
Foundation supply	1	3	3	2	4
Arrray and export supply	1	1	1	1	3
Offshore substation supply	1	2	2	3	2
Onshore infrastructure	2	4	4	4	2
Turbine and floating foundation installation	1	2	2	2	2
Array and export cable installation	1	2	1	2	4
Offshore and onshore substation installation	1	2	2	2	2
Wind farm operation	1	2	4	3	3
Turbine maintenance and service	1	2	4	4	4
Balance of plant maintenance	1	2	3	3	3
Decommissioning	1	2	1	2	2

A5. Economic impact

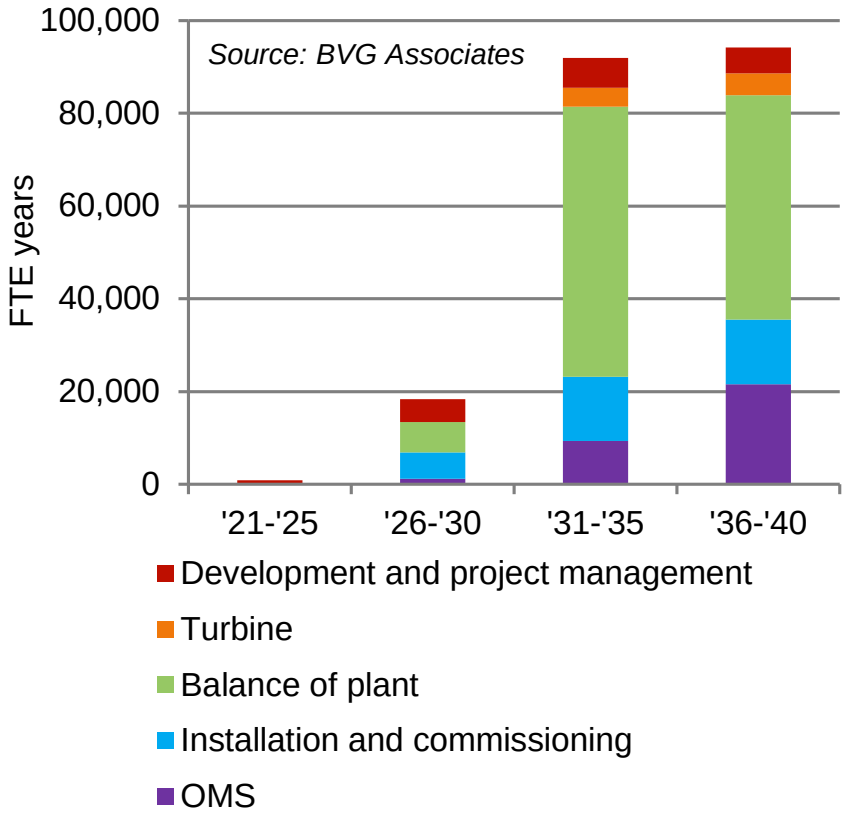
Job creation

- Low growth



- Description of methodology provided in the roadmap

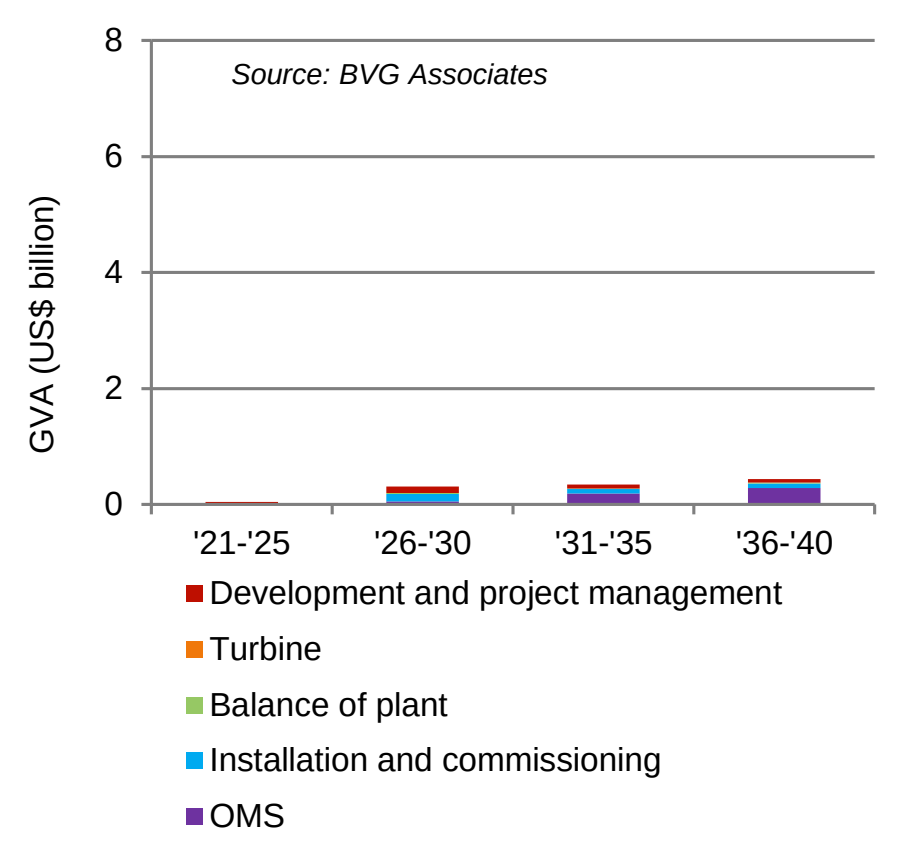
- High growth



A5. Economic impact

Gross value added

- Low growth



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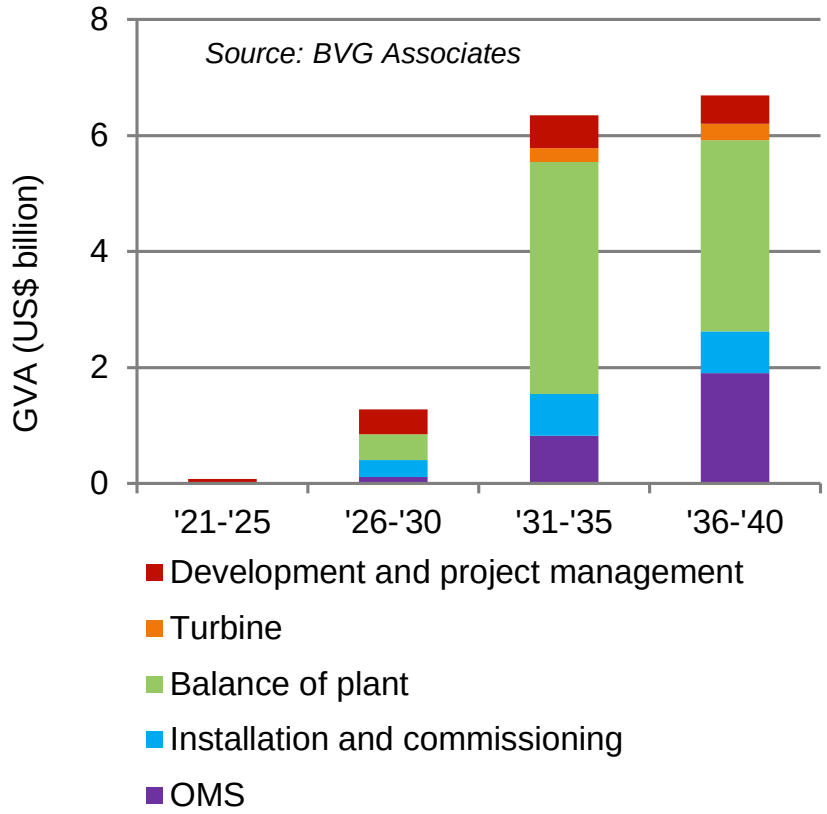
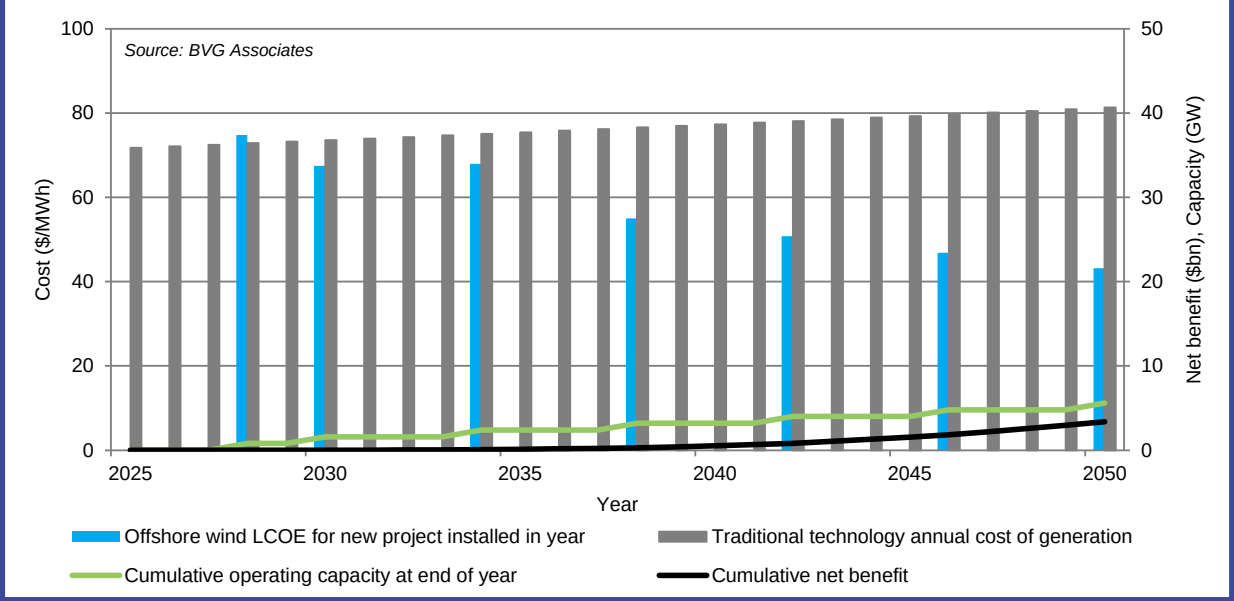


A5. Economic impact

Consumer net benefit

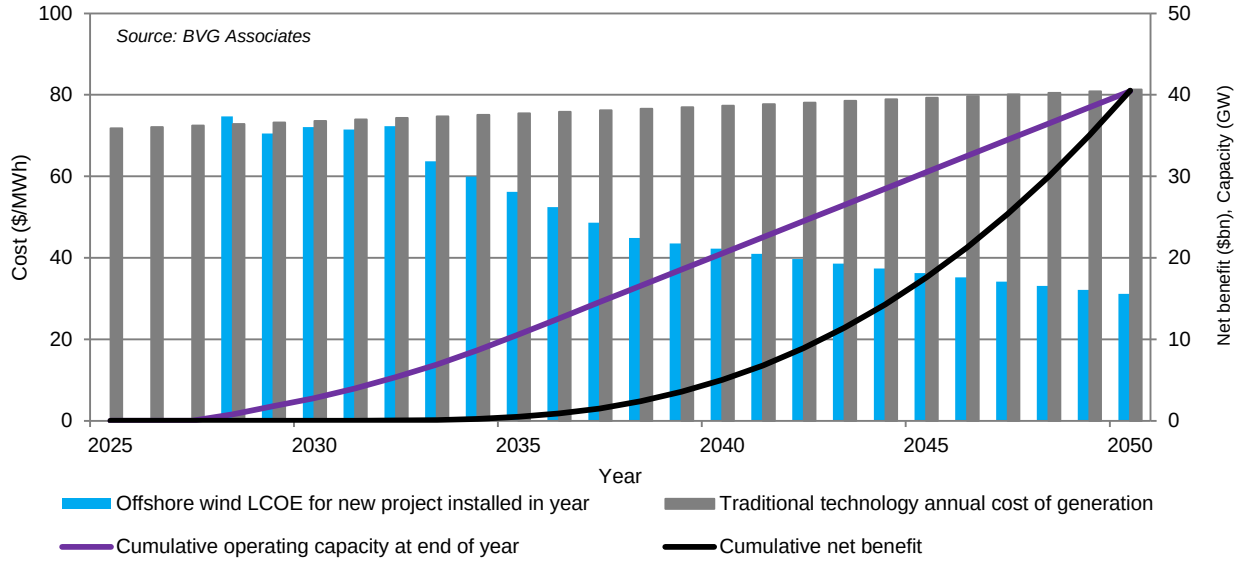
- Low growth



- Blue bars: LCOE for OSW installed in the given year, assumed constant for the life of each project

  Average cost of production in a given year (not shown) is made up of higher LCOE of earlier projects and lower LCOE of later projects, combined with capacity factors for each
- Gray bars: Average cost of production for traditional technology (assumed to be coal) operating in a given year, assumed to increase slowly over time due to fuel price inflation and other carbon abatement measures

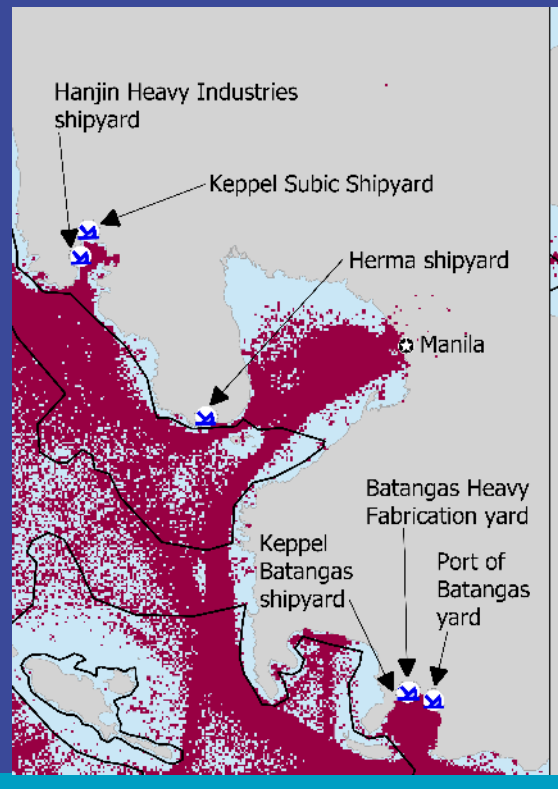
- High growth

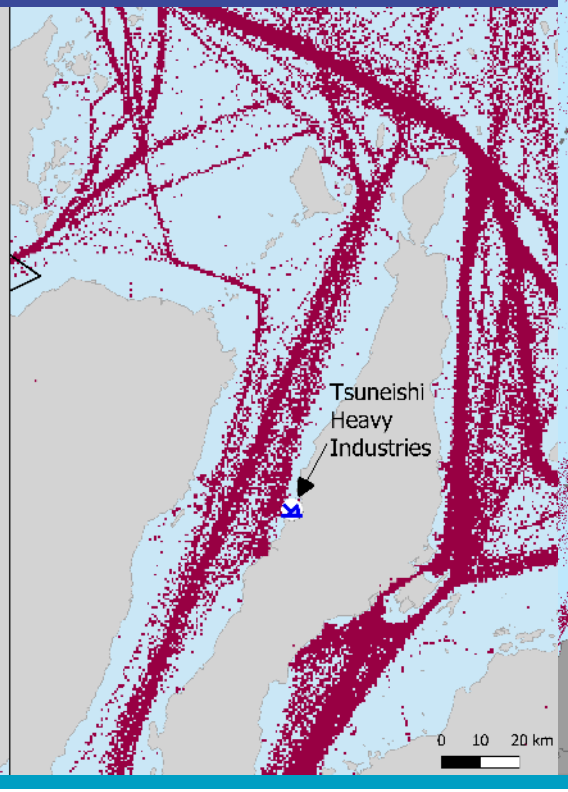


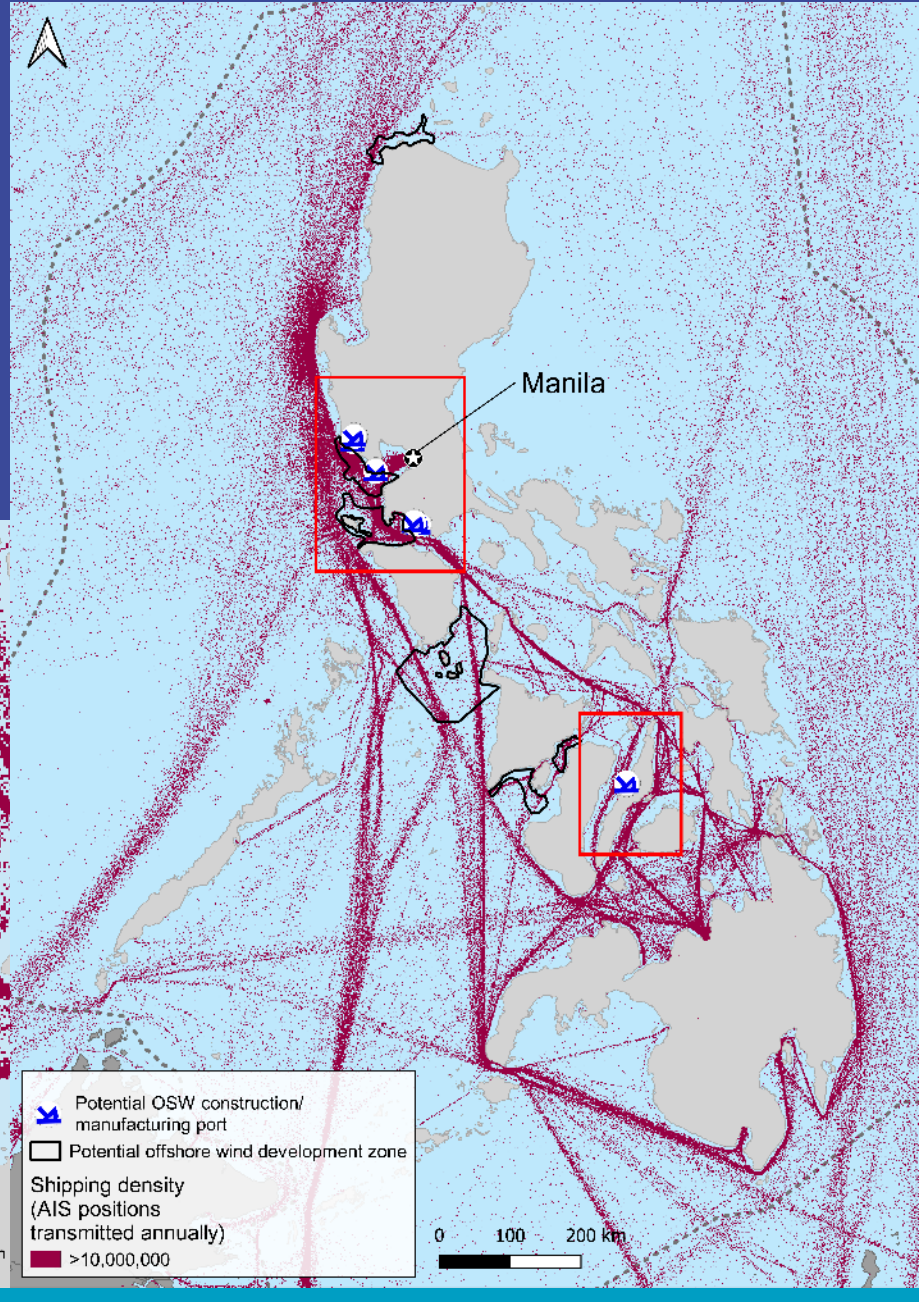
- Colored line: Cumulative installed capacity of offshore wind
- Black line: Cumulative net benefit of production from offshore wind based on the difference in average cost of production between the two technologies, each year
- Analysis is based on project costs only, with OSW simply offsetting traditional technology. It is not based on any power system modelling and does not consider the cost of carbon dioxide or other pollutants
- Full description of methodology provided in the roadmap

A6. Ports

1. 7 ports identified for construction / manufacturing
2. Most need minor to moderate upgrades (<$50m)
3. Ports cover proposed WESC sites and potential OSW development zones (except northern Luzon and west coast)
4. Data about ports is challenging to find [R21]
5. Description of port requirements and analysis provided in the roadmap







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