Career Opportunities and Workforce Development for the Offshore Wind Industry

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Background

Today, energy is critical for industries, agriculture, transportation, housing, and consumer utilities. Many upcoming technologies are electricity-driven - electric vehicles, data centers, artificial intelligence, and machine learning are but a few on this list. There is a growing need to use alternate energy sources for power generation to meet many sustainability goals. With the rise in installed capacity and reduction in the cost of renewable energy technologies (**Figure 1, Figure 2**) [1], the increased use of wind, solar, and biomass, has shown many positive impacts on our society. As shown in **Figure 3**, no other energy sector has seen so much growth in the last decade as renewable energy. In particular, the growth in the installed capacity of wind turbines has been significant. When compared to onshore wind, offshore wind offers many advantages As the offshore wind industry grows, a diverse workforce is needed for support. This work aims to discuss the importance of workforce development and career opportunities for the offshore wind industry.

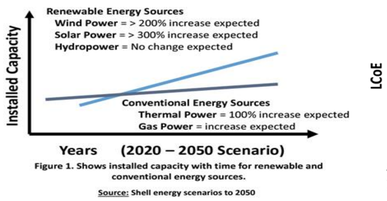


Figure 1. Shows installed capacity with time for renewable and conventional energy sources.

Source: Shell energy scenarios to 2050

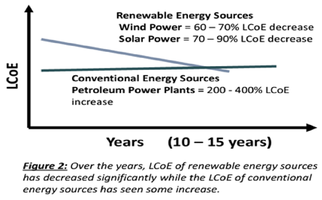


Figure 2: *Over the years, LCoE of renewable energy sources has decreased significantly while the LCoE of conventional energy sources has seen some increase.*

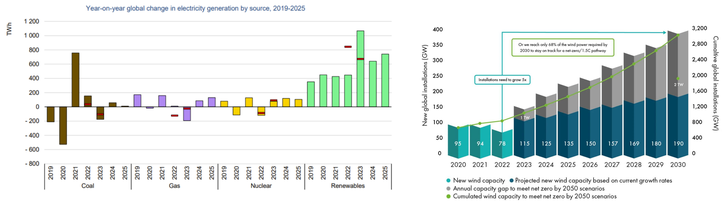


Figure 3. Significant growth of the renewable energy industry as compared to other energy sources. Especially, there has been a significant growth in the wind turbines industry and such growth is expected to continue in the future [**2,3**].

Importance of Renewable Energy Industry in achieving United Nations Sustainable Development Goals (SDG)

Globally, there are many challenges to be met and such challenges have been identified as Sustainable Development Goals (SDG) by the UNO. As was shown by **Sinha** [4], and as electricity is key to the development and sustainability of a society, investments made in the renewable energy industry are likely to enable the achievement of many SDGs across the world (**Figure 4**). One of the challenges with sustaining the renewable industry (/offshore wind industry) is meeting the demand for a skilled workforce, making communities aware of the opportunities in the renewable industry, and enabling workforce and skills development institutions and colleges. This work looks at the workforce developmental needs and career opportunities in the offshore wind industry.

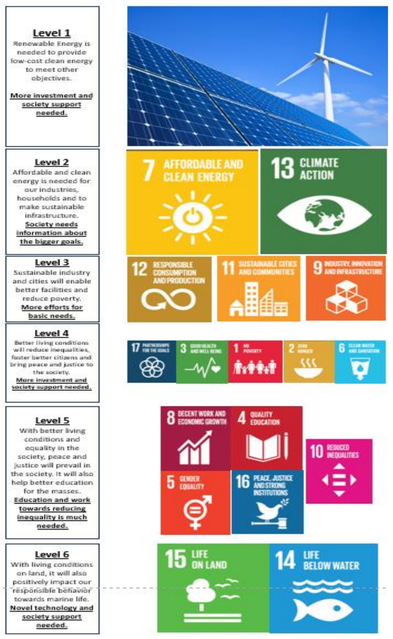


Figure 4. Investments in renewable energy will impact SDG [4].

References

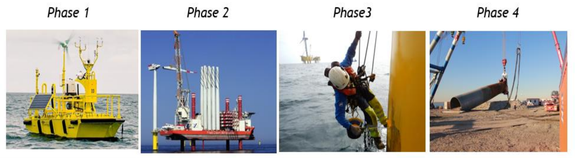
[1] "Shell 2050 Scenario" Available at https://energyforum.fiu.edu/outlooks/shell_outlook.pdf (Accessed: 04/16/2024)
[2] https://gwec.net/globalwindreport2023/ (Accessed: 04/16/2024)
[3] https://www.statista.com/statistics/476327/global-capacity-of-offshore-wind-energy/ (Accessed: 5/1/2024)
[4] Sinha Y (2014) Using Renewable Energy to Achieve Sustainable Development Goals, ICR24, Washington DC.
[5] https://www.energy.gov/eere/articles/national-lab-study-charts-path-toward-significant-growth-offshore-wind-workforce#:~:text=The%20report%20estimates%20that%20the,less%20than%201%2C000%20jobs%20today. (Accessed: 5/1/2024)
[6] https://www.nrel.gov/wind/offshore-workforce.html (Accessed: 5/1/2024)
[7] https://openei.org/wiki/Offshore_Wind_Workforce/Education_and_Training_Database (Accessed: 5/1/2024)
[8] https://www.bls.gov/ooh/fastest-growing.htm (Accessed: 5/1/2024)

Offshore Wind Turbines are offering major energy generation potential for the world and will also enable the achievement of many SDGs.

Offshore Wind Turbines need work over 30 years

The lifetime of an Offshore Wind farm excessed 35 yrs. - from pre-installation to decommissioning. This work cycle requires many skillsets and job profiles.

With many opportunities and career options, offshore wind provides many long and short time, skilled and unskilled jobs, and specialist and generalist type jobs.



	Pre-Installation	Installation	Operation & Maintenance	Decommissioning
Time	5 – 7 years	1–9 days (Avg 5.9)	**20 – 25 years**	Turbine - 1.3 day Monopile - 130 days
% Cost	5 – 10%.	50 – 60%.	20 – 35%.	5 – 10%.
Challenge	Ability to predict long term loads.	Costlier, Offshore Transport, hazards.	Accessibility, Cost, Safety Concerns.	Recycling, limited experience, reuse.
Cost ($)	As high as 10 million.	Turbine ($1-2m/MW) Foundation (50% of Turbine Cost).	$350K/MW.	$300K - $600K/MW.
Potential	Cost Constant.	Scale of Installation	Need to control cost.	New Field

Workforce Development Framework for Offshore Wind

Figure 5. The offshore wind workforce requirement is diverse and multidisciplinary in nature. It also needs to have a futuristic view and long-term contribution to society for the business to sustain.

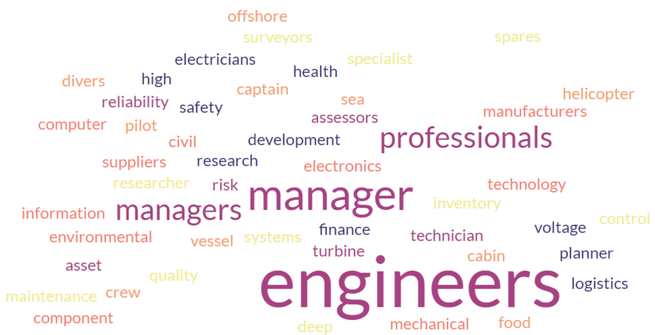
Workforce Demand

Offshore wind industry will need 15,000 - 58,000 full-time jobs per year from 2024 to 2030 **[5]** however our education system is not prepared to meet this demand – certificates, UG, PG, doctorate and short courses **(Figure 6)**. With wind turbine technician job ranking high **(Figure 6)**, there is a growing need to attract more people from similar and different industries. There is an opportunity to engage and involve underrepresented and underserved population **[6]**.

OCCUPATION	GROWTH RATE, 2022-32	2023 MEDIAN PAY
Wind turbine service technicians	45%	$61,770 per year
Nurse practitioners	45%	$126,260 per year
Data scientists	35%	$108,020 per year
Statisticians	32%	$104,110 per year
Information security analysts	32%	$120,360 per year
Medical and health services managers	28%	$110,680 per year
Epidemiologists	27%	$81,390 per year
Physician assistants	27%	$130,020 per year
Physical therapist assistants	26%	$64,080 per year
Software developers	26%	$132,270 per year
Occupational therapy assistants	24%	$67,210 per year
Actuaries	23%	$120,000 per year
Computer and information research scientists	23%	$145,080 per year
Operations research analysts	23%	$83,640 per year
Solar photovoltaic installers	22%	$48,000 per year
Home health and personal care aides	22%	$33,530 per year
Taxi drivers	21%	
Personal care and service workers, all other	21%	
Veterinary technologists and technicians	21%	
Veterinary assistants and laboratory animal caretakers	20%	

Figure 6. The USA has many institution offering courses and programs in offshore wind **[7]** however this number is not expected to meet the demand of offshore wind – both skills wise and capacity wise. According to Burue of labour Statistics, Wind Turbine Technician is the fastest growing job in the USA [8].

Key Background of Workforce



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Conclusion

Due to the extent of work required, we need a workforce with diversified skills and backgrounds. This is likely to require collaboration between institutions, social groups, employment agencies, industries, and training providers across the USA and abroad **(Figure 7)**. There is also a growing need for people to get informed and make informed decisions before contributing to this industry. Only then are we going to meet the workforce demand created by offshore wind industry.

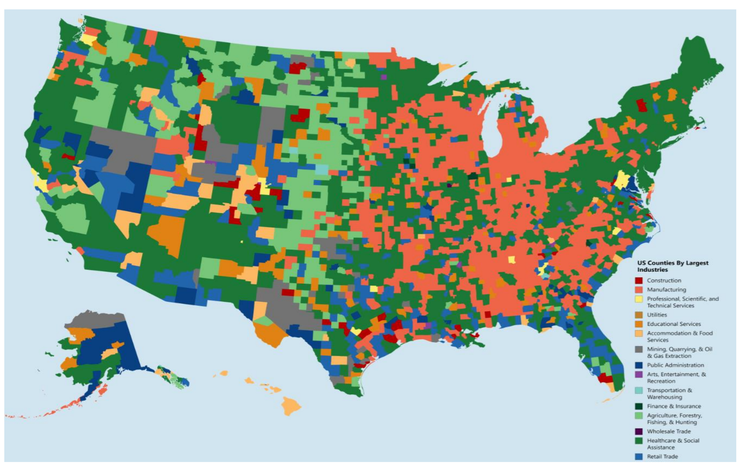

Figure 7. Number of businesses (as percentage of all U.S. businesses) by sector.