Assessing how Lubricants May Impact Maintenance Costs for the US Offshore Fleet of 2050

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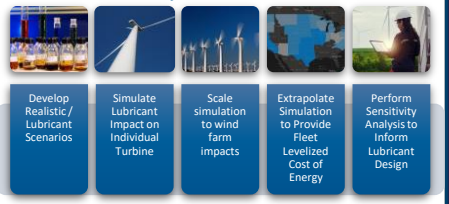
Intro

Lubrication is a key aspect of maintaining a wind turbine. In this study, we look at how advanced gear oil technology could impact the US wind fleet of 2050.

Project Workflow



Assumptions for Potential Lubricant Advances

Improvement Mechanism	Scenario		
	Baseline	Realistic	Stretch
Oil change frequency	Every 5 years	Every 7 years (-29%)	Every 10 years (-50%)
Oil cost	$15/liter	$10/liter (-33%)	$5/liter (-67%)
Cold weather operation	21 hours of cold weather stoppage per year in Ice Class 2+	15 hours / year (-29%)	9 hours / year (-57%)
Gearbox efficiency	Unmodified reference power curve	+0.5% at <10% load +0.2% at 10-50% load +0.1% at >50% load	+1.0% at <10% load +0.4% at 10-50% load +0.2% at >50% load

Advances in **gear lubricant technology** could save the US offshore wind fleet 43M$ and power 20k additional homes annually by 2050.

Download additional reference material here

OFFSHORE WINDPOWER

2050 US Offshore Fleet Benefits

	Fleet Annual Energy Production	Median LCOE (not including transmission)	Fleet cost ($/yr)	Difference in fleet cost ($/yr)	Difference in fleet AEP	Difference in # households
Baseline	141,480 GWh	$48.32/MWh	$6,820,974,376	–	–	–
Realistic	141,650 GWh	$47.97/MWh	$6,778,872,891	$42,101,485	170 GWh	~14,000
Stretch	141,761 GWh	$47.92/MWh	$6,778,062,343	$42,912,033	281 GWh	~23,200

Conclusion:

- Advances in lubrication can increase electricity production and reduce maintenance costs for the offshore wind industry.
- Operators should demand more from their lubricants.

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National Renewable Energy Laboratory (NREL)

References:

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