

How will larger wind turbines in the future affect wind project siting, power output, and noise impacts?



Methods

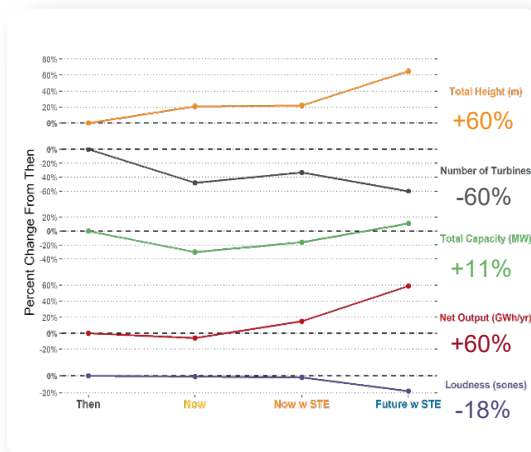
We redeveloped two prototypical existing sites using desktop software. 11 wind turbine models were used for three epochs:

- 1) Those installed in the last 10 years (**Then**);
- 2) Those installed in the last 2 years (**Now**);
- 3) Those to be installed in 3 to 5 years (**Future**)



Most “Future” turbines will have **serrated trailing edges (STE)** to make turbines quieter. So, we also looked at “Now” turbines with STE.

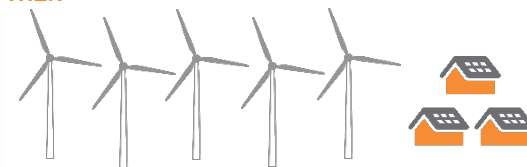
Results



- Growth in turbine height results in fewer turbines in the fixed land area.
- Larger turbines are set farther back from homes, which results in lower sound levels.
- Despite 60% fewer turbines, project output increases by 60%.
- Future turbines will likely increase local economic benefits.

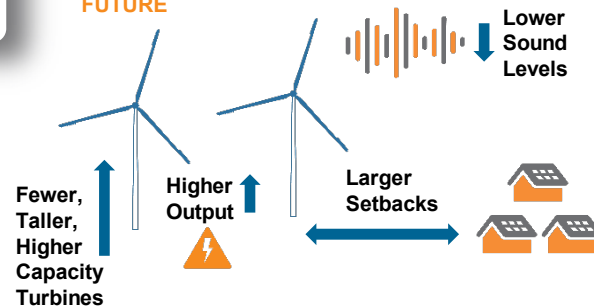
Conclusion

THEN



Compared to past (or present) wind projects (above), for the same amount of land, future projects (below) will have fewer but higher capacity wind turbines, larger setback from homes, lower community sound levels and greater output.

FUTURE



“Effects of land-based wind turbine upsizing on community sound levels and power and energy density,” Ben Hoen (LBNL), Ryan Haac (RSG), Joe Rand (LBNL), Ken Kaliski (RSG), Ryan Darlow (VERA), *Applied Energy*, Volume 334, March 2023.