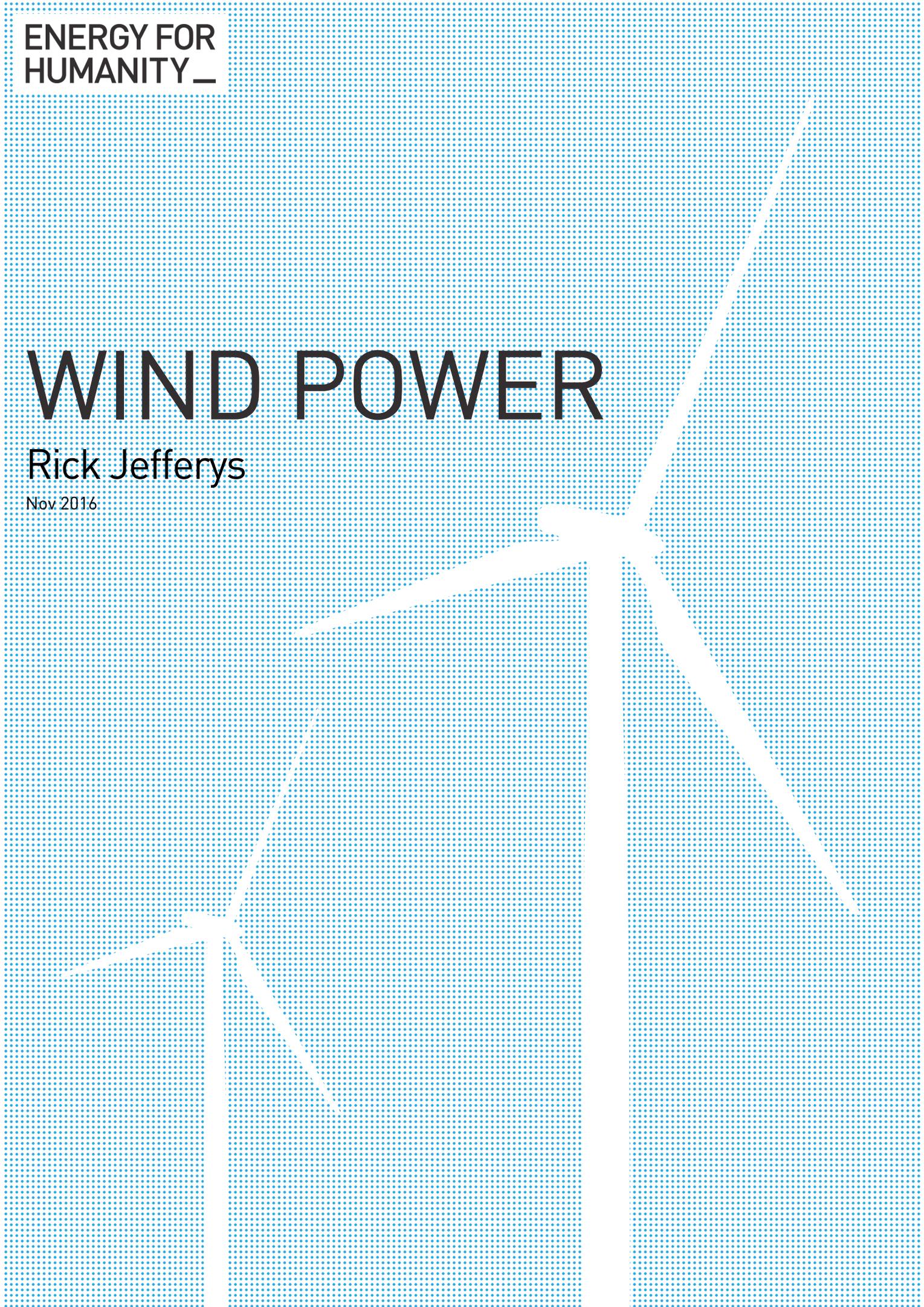


ENERGY FOR
HUMANITY_

WIND POWER

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The cost of wind power is steadily declining, driven by advances in system and component design, materials, controls, monitoring and maintenance.

The cost of wind power is steadily declining, driven by advances in system and component design, materials, controls, monitoring and maintenance. Subsidised costs of power are naturally comparable with wholesale power prices in relevant markets and in some areas, unsubsidised wind competes with wholesale prices. Wind is typically uneconomic in urban areas due the poor resource and significant noise; there is no small scale wind equivalent to rooftop solar, although small turbines can be cost effective for remote power.

While the industry has converged on a three bladed upwind design, for onshore (1MW - 3MW) and offshore applications (3MW - 8MW) there is still innovation at the conceptual level, with interest in kite

or not blow, for days at a time, considerably longer than any energy storage system, other than hydroelectricity can handle.

Networks with a lot of hydro, such as Norway, Quebec, Costa Rica. can absorb large amounts of wind energy. Many hydro schemes do not receive enough water to run all year, so can flex up and down to fill the gaps in wind production without loss of overall output.

Interconnection between regions can also help but, absent some form of long term storage, perhaps seasonal storage of heat and cold, wind is a fuel saver which needs other forms of generation to back it up during (sometimes rare) extended periods of calm

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or balloon (dirigible) supported turbines which can access higher and more constant wind speeds with significantly less structure.

Utility scale wind typically has better annual productivity for each unit of installed capacity than solar. The average production onshore in Europe is around 25-30% of peak, offshore over 40%, while more favoured onshore areas, for example in the US can exceed 50%.

Storage can smooth the output of wind turbines over hours, assisting grid integration, but wind can blow,

weather. Put another way, while the levelised cost of wind energy can make wind economic for the owner, wind still may not make sense as an addition to the grid. This is because the incremental capital cost is not justified by the fuel saving (including CO₂ costs), and the system costs more to run (driving higher prices) with the wind than without it.

The European and US wind energy association sites provide a lot of detailed info on the wind industry, technology, sites on and offshore.

See <https://windeurope.org> and <http://www.awea.org>