

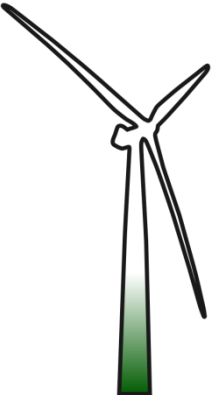
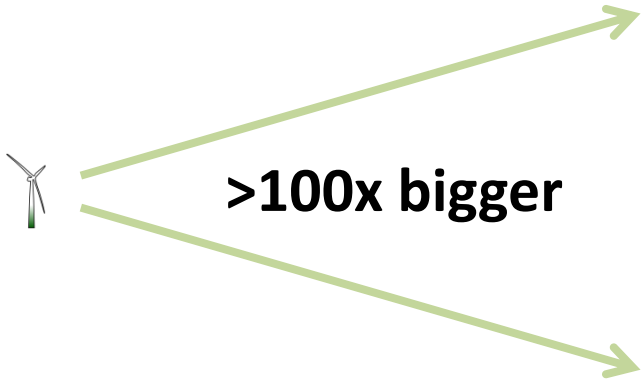
Wind Panels – enabling wind to complement solar in community energy systems



Nick Goddard – Commercial Director

Wind and solar have taken fundamentally different approaches to achieving economies of scale:

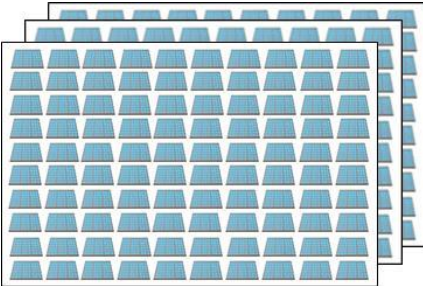
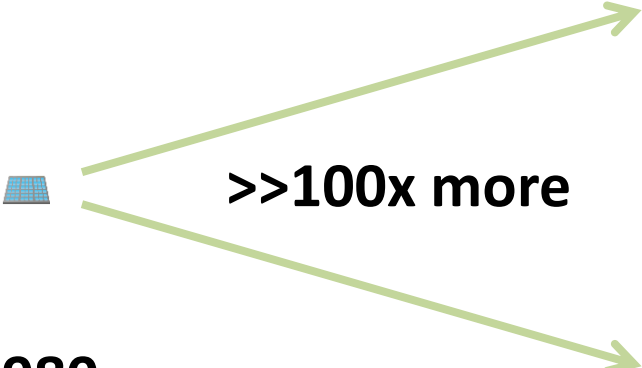
**Wind:
Giant Size**



2018 Cost
(\$/MWh)*

\$56

**Solar:
Mass
Production**



\$85

1980

2018

*Source: IRENA

Wind and solar deployment paradigms are fundamentally different at the 'Community' and 'Utility' scales

Power Requirement



Wind:

Install one small turbine

Install multiple huge turbines

Solar:

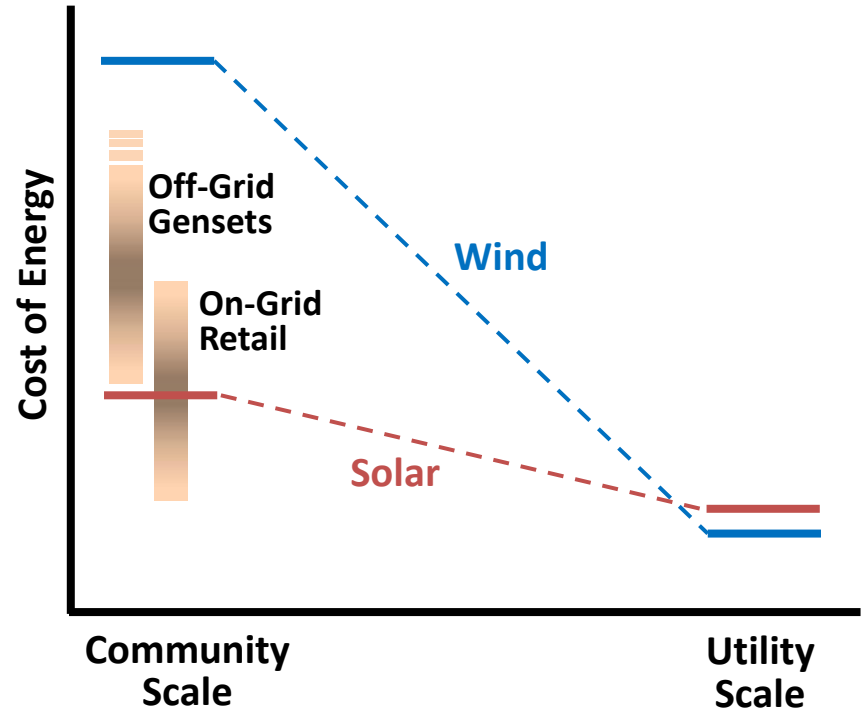
Install tens of commodity panels

Install tens of thousands of commodity panels

Because of its fundamentally different approach wind cannot compete with solar at the Community scale

At the **Utility** scale wind and solar are competitive – installed **wind capacity is roughly the same as solar**

At the **Community** scale, solar panels can compete with off-grid diesel gensets and behind-the-meter grid energy prices, but conventional wind turbines cannot – installed **wind capacity is only 1-2% that of solar**



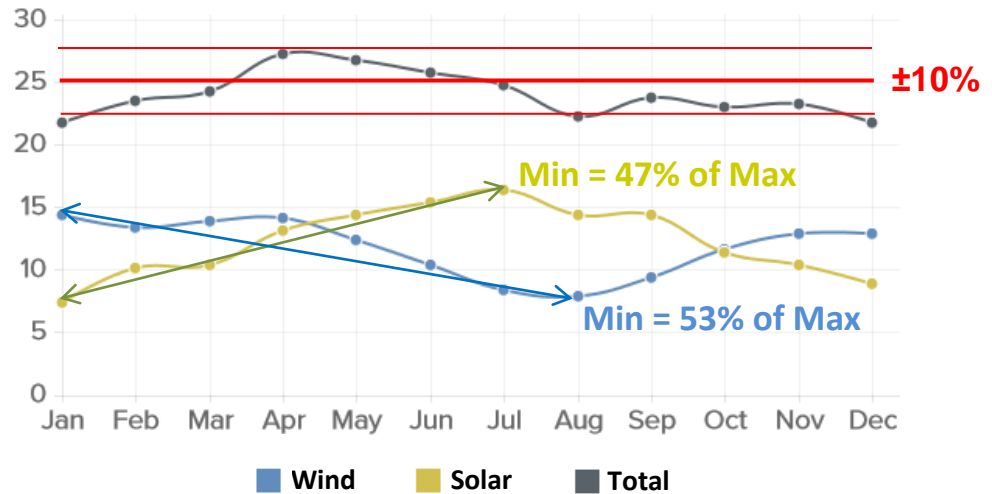
If it wasn't for cost it would make sense to harvest a combination of wind and solar at the Community level

There is an inverse correlation between solar and wind outputs:

- Solar outputs are mainly in summer, only during the day
- Wind outputs are mainly in winter and also at night

➔ By combining wind and solar energy in a Community microgrid, seasonal variations in output can be significantly reduced

Daily Average Power Production (kWh)*



Published data for a site in Minnesota

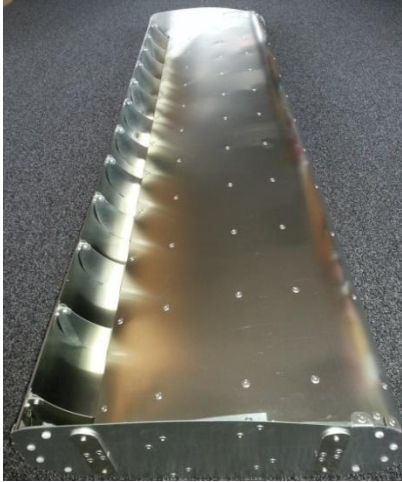
Spinetic Energy Ltd has developed a patented system which allows wind energy to be harvested at the Community scale at a cost and convenience which is competitive with solar energy

It has done so by applying the 'panelised' solar approach to economies of scale – manufacturing huge numbers of identical human-scale units rather than small numbers of giant structures

This has the potential to unlock a billion-dollar market for Community scale wind installations

The Spinetic 'Wind Panel'

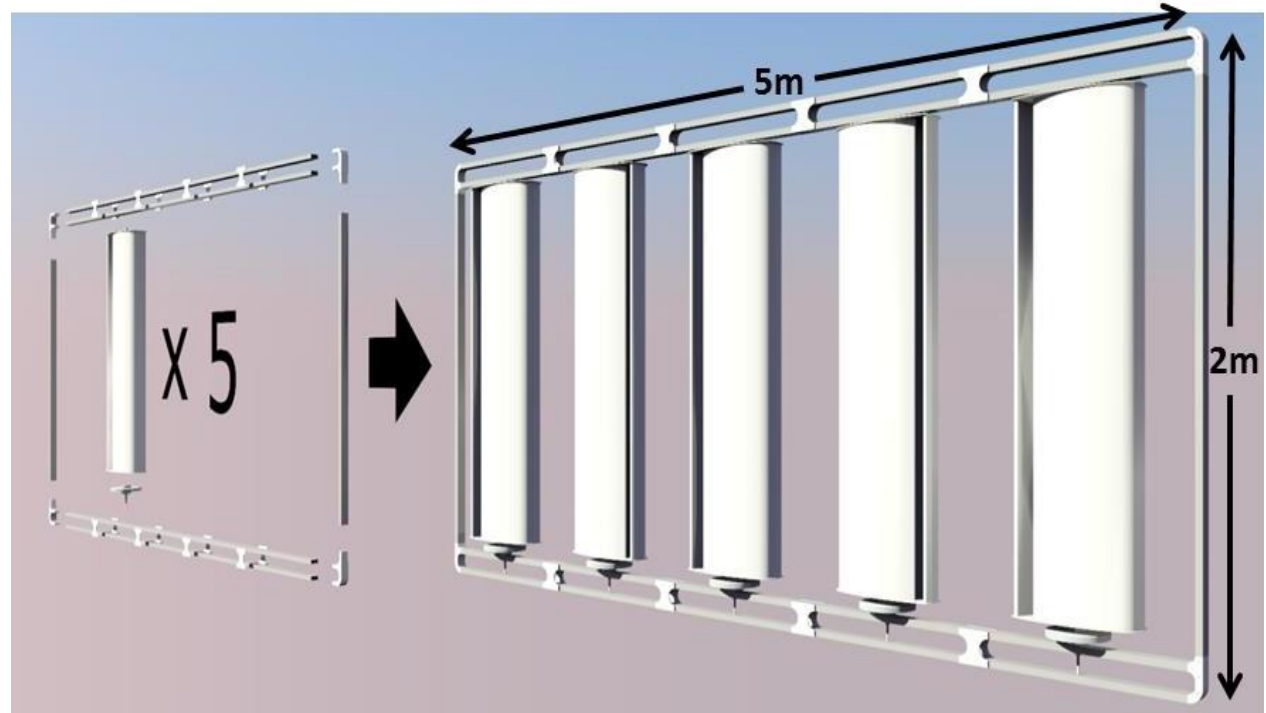
Wind Panels comprise 4-6 turbine-generator units plugged into a frame. They are designed for ease of delivery and rapid deployment at remote locations



Lightweight Blade



Plug-in Generator



Modular Assembly (weighs <100kg fully assembled)

Deployment: the 'Wind Fence' system



Four prototype Wind Panels on test in Wiltshire
(five-bladed variant)

Artist's impression of multiple
Wind Panel arrays ('Wind Fences')

A six-bladed Wind Panel has a rated power output of ca 1kW. Multiple panels can be installed to produce a 'Wind Fence' of the required capacity and footprint



Key attributes of Wind Panels

- Broadly similar size and weight to solar panels (<2m, <100kg) and therefore an equivalent ease of delivery to remote sites over weak infrastructure
- Similar foundation requirements to solar and hence ease/speed of deployment without the need for heavy equipment
- 'Plug and play' – slotting together the mass-produced sub-units simultaneously makes the electrical connections
- Power exported through the frame members, avoiding expensive cabling
- Power output tailorable in 1 kW steps to site requirements (footprint, capacity)
- Easily redeployed to meet changing site requirements
- Made almost entirely from easily recycled materials (aluminium, thermoplastics)
- **Similar cost of energy to solar for Community scale installations (<\$100/MWh)**

Current state of development

- **Spinetic received initial VC funding in 2013 from IP Group and Lark Energy**
- **Basic design format finalised by 2016 – earliest prototypes of this design have been spinning reliably for >3 years with zero down-time**
- **2017-2019 – systematic optimisation of individual components and development of batch manufacturing routes for sub-units**
- **First batch of ‘pre-commercial’ panels recently manufactured and about to be installed at test sites in the UK – company is now at TRL 7**
- **Further demonstrations in various ‘real world’ hybrid microgrid service environments planned for 2020-21 (TRL 7 → TRL 9)**
- **Commercial sales scheduled to commence in 2021/22 using Engineering, Procurement and Construction (EPC) players as value-added resellers**
- **11 families of patents filed to date – five families filed internationally**

Funding position

- **£2.75m of VC investment to date (IP Group, Larkfleet Group, HNWI's)**
- **£600k of government grants (Energy Entrepreneurs Fund, Innovate UK)**
- **Next funding round planned for 2020Q2**
- **Seeking £1-2m depending on developments in 2019H2**

Contact

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