



EUROPEAN TECHNOLOGY & INNOVATION
PLATFORM ON WIND ENERGY

The Energy Transition

—

An attempt at framing

The goal of the ETIPWIND

” The ETIPWIND is an EU supported, industry led forum where industry and academia can meet, discuss, and decide on the priorities needed in wind related research and innovation. The forum can then guide the EU in its analysis of what areas of research and innovation should be considered by the EU in its research initiatives.”

5 Pillars of research and innovation for wind energy

Grids systems,
integration and
infrastructure



Developing wind energy capabilities to fit in a grid with significant shares of renewable energy.

Operation and
maintenance



More and further enhanced sensors enabling more reliable and efficient operation and maintenance of turbines, improving yields and optimising lifetime.

Industrialisation



Developing the value chain and facilitating the interaction between stakeholders notably through standardisation to achieve economies of scale and faster production.

Offshore
balance of plant



Exploring new areas for offshore wind and making it competitive with conventional generation through the improvement of substructures and foundations, site access, offshore grid infrastructure, assembly and installation.

Next generation
technologies



Consolidating the scientific base for wind research and enabling pioneering research to lead to breakthroughs.

From R&I to deployment

Adapting markets and policies for optimal integration of renewables, integrating wind turbines into their natural surroundings, ensuring public engagement and acceptance and deploying human resources.



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Important to frame the impact
of politics, technology and climate
reality.

- What does the energy transition mean ?

Challenges of our time that will impact the transition

- Anti-science rhetoric (fake news)
- Short term business as usual thinking everywhere
- Bad air quality an increasing issue worldwide
- Climate change is coming;
 - Droughts and flooding
 - Chaotic weather systems
 - Climate migration? Migration of disease
- The water crisis
- Outdated belief in data storage techniques
 - Most Knowledge = energy in 1 or 0's now

The political world of today

- Energy policy vacuum across Europe.
- How long should we expect business as usual?
- Age of accountability.
 - You can rave but you cannot hide
 - Will impact politics but also corporations
- Today the best most credible story wins.
 - Who is really telling it? How do you tell it?
- System instability
 - One large hack / solar flare can bring down the modern digital society.

The political world will not deliver the climate solutions
we need



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Electrification and Digitalisation Two vital sides of the same coin

Digitalisation – some challenges

- Amazing new data storage techniques but:
 - Lack of storage permanence
 - Confusion due to sheer volume
 - One big solar flare and we are toast (digitally)
 - One big hack and we are in the 1950's
 - Difficulty in cross contamination of data
- "The cloud" will go away and what then?
- Need for a dispersed digital backbone to ensure reliability – central systems are vulnerable.
 - Need rigorous system protocols
 - We can store more information than ever before but we lose much more of it so easily

Electrification of society

- Vital to contain/stabilize and reduce pollution
- This will be the new Digi@Power age with storable electricity becoming a commodity.
- Power production will become the "new Airbnb"
 - An informal power economy will develop
 - Centralised systems will be in crisis
 - Forecasting will not be as needed as now
- Power to the people = people will control power.

Cheap medium term electrical storage will change everything

Oil majors – Quo vadis

- Carbon constrained world
- Possible stigma of "the corporate bad guys"
- Fossil fuel applications are getting out of date
70 % of energy in an internal combustion engine is wasted = stupid
- The oil majors will migrate to generating, trading and delivering power – Low risk, captive market, trading experts, complex system management. Shell , Total and Statoil have begun.

Norway 2050 - Days of load it up and wave goodbye have gone

- Producing close to 100% of energy from green sources
- Very minimal release of greenhouse gases.
- Oil and gas production continues but not for fuel
 - used for designer feedstocks & chemical industry
- Norway a now leading force in
 - composite, metal/composite and intelligent polymer development and production.

Oil majors & Chemicals in 2050

Oil majors

- Main business not fuel based
- Material development to replace dependence on steel and cement
- Developing biodegradable plastics
- Develop Metal/plastic hybrid constructions

Chemical industry

- Working to being close to greenhouse gas free
- Digital world will increase scrutiny

A vision for wind energy in 2050 (1)

- Delivering cheapest affordable electricity
- Wind turbines act as a Digi@Power network
 - Charging facilities for EV´s
 - Digital back bone services with back up data storage
 - Black start and grid independent operation
- Wind energy is providing integrated solutions
 - power, heat, cooling, water treatment etc Ideal also for developing world and rural areas
- Battery ships
 - charging up offshore and deliver power to prebooked market requests onshore.

A vision for wind energy in 2050 (2)

- Driving green electrification of the internet and EV's
- Driving E-Farming = increased electrification
 - Reduce fossil fuel dependence
 - Microdose chemicals
 - Filter and recirculate nutrients
 - Develop underground close systems for drought ridden areas. Croyden – UK
 - Harvest bugs as protein source rather than using insecticide.
- Driving marine electrification.

Selected Research and innovation needed for wind delivery of Digi@Power

- Storage, storage, storage
 - Electrical and thermal
- Fixation of the digital wind world
 - Quick recovery when it breaks down
 - A digital hard copy is vital
 - Seamless integration to the grid
 - Make wind a Backbone of grid giving power & data stability
 - Increased smarter non-metallic materials
 - Black start & extended storage capabilities.

The Caveats

- The national and EU political consensus is that the energy transition will happen in a slow, planned and orderly way with gas being the bridging fuel. What if it does not?
- Black Swan events can cause flash points
- Renewables are delivering clean low risk power at unparalleled prices – this will prompt a surge in investment
- Mainstream storage will change everything a lot faster

We exceed the 2/3 Celcius increase in temperature sooner than we think.

Thank you
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