

SPECIAL REPORT

INNOVATION'S ROLE IN THE NEXT STAGE OF WIND ENERGY GROWTH

**WHY WE NEED NEW THINKING TO MEET
CLIMATE TARGETS**

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POWERED BY

**A WORD
ABOUT WIND**

 **TAMARINDO GROUP**

IN PARTNERSHIP WITH

 **WindESCO**

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A WORD ABOUT WIND

www.awordaboutwind.com
 membership@tamarindogroup.com
 T: +44 (0)20 7100 1616

3rd Floor, Tyndale House,
 134 Cowley Road, Oxford, OX4 1JH

Managing Director: Ilaria Valtimora
 Business Development Team: Joe Tagg &
 Pip Cull
 Design: Sam Pilgrim & Rachael Moreland

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Juan Diego Diaz, Chairman, Asociación Empresarial Eólica

Stefano Bezzato, Head of European Utilities Research, Credit Suisse International

Enrique Doheijo, Energy Team Director, Deloitte

Nicolas Navas, Chief Financial Officer, Matrix Renewables

Bob Psaradellis, Chief Executive Officer, Renewable Power Capital

Edward Wagner, Chief Revenue Officer, WindESCo

Executive summary

We will not be able to cut net carbon emissions to zero by 2050 at current rates of progress. That is the consensus of experts gathered for a Wind Investment Boardroom debate, hosted by A Word About Wind and sponsored by WindESCO, a Greentech innovator focused on improving asset performance, in July 2022.

In short, society faces very limited time to cut emissions at the same time as supporting economic growth and ensuring energy security. To achieve this will require massive substitution of fossil fuels with renewable energy, as well as capacity additions that satisfy the growth ambitions of emerging economies.

This buildout is not happening at anything like the scale required. Worse still, even the most advanced markets in terms of energy transition still face significant barriers in scaling up the deployment of renewables.

European developers, for example, still face vexing hurdles when it comes to permitting, while those in North America are beset with regulatory uncertainty owing to the transitory nature of tax-based funding models.

The key to change lies in regulation since the actions of individuals and enterprises will always be guided and bound by the laws of the land. Beyond

this obvious fact, it is also evident that current market structures are poorly equipped to support the scaling up of renewable generation demanded by the climate crisis.

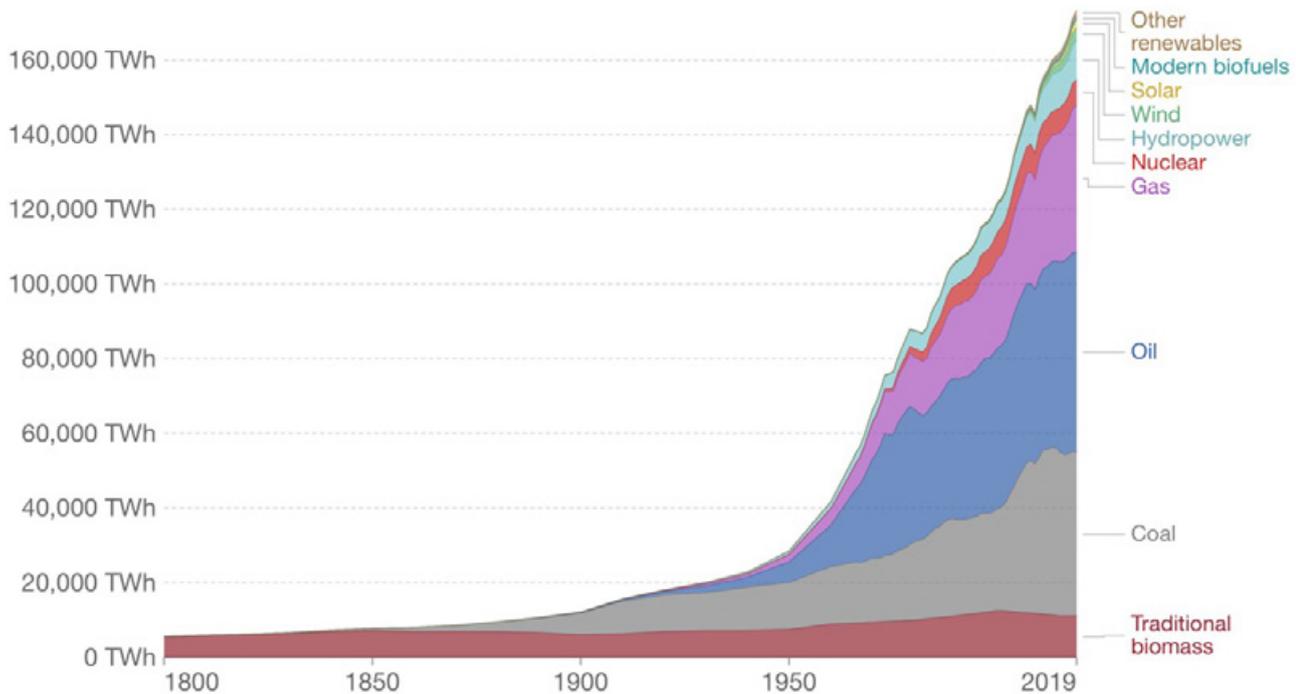
Hence, it will also be important to innovate, not only in technology terms, as is already happening with the advent of technologies such as floating offshore wind, but also in terms of business models, asset management and more.

This paper, based on the Wind Investment Boardroom discussion, reviews the importance of innovation in scaling up the energy transition.



The challenge we face

It is no exaggeration to say that the modern world is almost entirely built upon fossil fuels. Since the industrial revolution, coal then oil and finally natural gas have powered industry and commerce, creating today's value chains and providing the basis for industrialised economies.



Global primary energy consumption by source.

Source: OurWorldinData.org, based on Vaclav Smil, 2017, and the BP Statistical Review of World Energy.

However, we are now aware that this progress has come at tremendous cost to the environment. Fossil fuels' carbon emissions are having a significant impact on global climate, exacerbating the frequency and scale of extreme weather events and precipitating pernicious trends such as habitat loss and sea level rise.

The tools to avert a climate catastrophe are largely within our reach. Wind and solar energy can

provide vast amounts of electricity at lower cost than traditional alternatives. And the intermittency of these power sources can be largely overcome through a growing range of energy storage technologies.

For industries that cannot be powered by renewable electricity alone, meanwhile, low-carbon hydrogen is emerging as a viable substitute for fossil fuels. Hydrogen could also replace natural gas and address

seasonal variations in demand that cannot be covered by energy storage. Hydro, nuclear and biomass can further contribute to the grid.

The Sixth Assessment Report of the Intergovernmental Panel on Climate Change shows that these technologies should be deployed at massive scale immediately to avoid the worst impacts of global warming. Yet this is not happening.

Worrying signals

Italy's latest renewable energy auction saw 3.3 GW of capacity up for grabs. Given the urgent need to decarbonise Europe's energy system, the auction should have been massively oversubscribed. But in the event less than a third of the capacity was awarded. And this is not an isolated event.

In another example of how the energy transition is stalling, Siemens Gamesa Renewable Energy—the third-largest turbine manufacturer in the Americas, according to 2020 data from Wood Mackenzie—this year halted manufacturing in the US following concerns over tax subsidy extensions in the market.

Juan Diego Diaz, Chairman of Spain's wind association, the Asociación Empresarial Eólica, says all western turbine makers are currently operating at a loss. "The market is the best we can expect but at the same time we are losing an incredible amount of money," he says.

The wind industry has become unsustainable due to government auctions where developers have secured capacity with rock-bottom bids, he says. This has forced turbine makers to pour money into new turbine designs offering lower levelised costs of electricity.

A company such as Siemens Gamesa can invest between €500 million and €1 billion in developing a new onshore turbine model, only to have developers requesting more efficient machines in a short space of time. "The period of time we are selling these wind turbines is not enough to amortize these investments," says Diaz.

Matters have worsened since 2020 with increases in raw materials and transport costs. The latter have risen sevenfold in the last year, Diaz says.



Critical challenges

Regulation sits at the heart of many of the problems facing the scale up of renewables deployment. In Italy, for example, the reason the government auction was undersubscribed was down to issues with the permitting process, a problem that is also endemic in other European markets.

In Spain, for instance, Matrix Renewables, which has a €1 billion war chest to invest in renewable projects, has representatives who are reduced to waylaying planning officials on their coffee breaks to move permits up the municipal agenda.

The representatives “try to communicate in different settings the urgency of the requests, I wish the government would outsource some of the process to a private entity to improve timelines,” says Nicolas Navas, Chief Financial Officer at Matrix.

Meanwhile in Chile, arguably Latin America’s most progressive market in terms of the energy transition, lawmakers extended a permitting deadline by six months so they could process the avalanche of requests received, Navas says. Government policy can make renewable energy markets but also break them, sometimes inadvertently.

Sometimes, officials sluggish in their response to permitting requests, sowing the seeds for a complete inability to achieve renewable

energy targets, according to Enrique Doheijo, Energy Team Director at the consulting giant Deloitte.

“In some parts of Spain, they have now established that you cannot use more than 2% of the space to install renewable energy capacity,” he says. “According to an assessment that we are developing for 2050, we would need around 4% to 6% of the surface to fulfil with the targets because there are strong restrictions to apply the most effective renewable technologies.”



The need for innovation

While issues with permitting are belatedly being addressed in regions such as the European Union, the dependence on government support schemes such as auctions and tax credits continues, despite the problems it is causing for turbine makers.

This dependence forces developers to take a cyclical approach to projects, pausing development in the absence of clear government signals. Practically, this might mean holding off on committing or progressing projects, until developers have a clear idea of government timeframes for a series of subsidy rounds, that subsequently means ebbs and flows in the project pipeline rather than a steady flow of investment ready plans. This means investment tends to appear once new government auctions in a nation are announced, even though they could be led by market appetite. Yet it need not be this way, says Bob Psaradellis, Chief Executive Officer at Renewable Power Capital.

“There is no case for governments, taxpayers, to underwrite the revenue streams of power generation plants of any kind,” he says. “We always appear to be with our hands out to government, looking for subsidies. I can’t think of any other industry that has paid so little attention as to how to get their product to market.”

Renewable developers need to think beyond subsidies, Psaradellis says. “We need new investment models, new risk management strategies. People who have owned and operated gas-fired power plants say, ‘Why are you so afraid of merchant risk? I have merchant risk on my revenue stream and on my fuel. Your fuel comes from God.’”

While developers will never be entirely free of the red tape that comes with a regulated market such as energy, there is clearly room to innovate in terms of business models and revenue structures.

Bob’s view is there should be no fear in selling directly to the market, but that requires new and deep capabilities to sell power under a wide range of contractual structures and duration into the market.



The role of asset management

Innovation of business models and market structures takes time. And time is in short supply in the rush to decarbonise the global economy. So, what else can be done to speed up the process? One option is to get more out of existing assets.

Renewable energy asset managers are already working hard to improve the yield and capital efficiency of their assets. But there is still room for innovation here. On wind farms, for example, “turbines all operate independently,” says Ed Wagner, Chief Revenue Officer at WindESCo. “They are designed to worry about themselves, not the whole site.”

This leads to wake problems that reduce production. To overcome the problem, WindESCo has produced a hardware and software system called Swarm that allows turbines to communicate and learn from each other.

On projects equipped with Swarm, “all the wind turbines are operating as a single integrated system,” says Wagner, “they can be yawed by consensus, they can be predictive. This way, we can reduce wake losses at scale, and build resilience against extreme events and climate change.”

Swarm has been deployed in the US and evaluated by the assurance and risk management leader DNV, with tests showing it can deliver up to a 5% gain in site-wide annual energy production. WindESCo is now looking for asset managers that want to test the system in Europe.

Asset management innovations such as Swarm will not in themselves deliver the capacity improvements needed to reach net-zero emissions by 2050, but they can deliver incremental improvements today with relatively low complexity and cost. “This doesn’t require changing the blades, the capital or the regulatory expense of repowering to achieve comparable production improvements,” says Wagner.



Conclusion

At the end of the WindESCo-sponsored Wind Investment Boardroom, the experts gathered around the table were asked to give their verdict on whether achieving net-zero emissions was a likely outcome under current conditions. The majority acknowledged it was not.

This is a sobering conclusion given the magnitude of the risk involved in not hitting climate targets. The Wind Investment Boardroom was held in Spain as the second extreme heat wave of the year hit the country, sending temperatures soaring well above July averages in 48 of the nation's 50 provinces.

Such events will increasingly become the norm without urgent action on climate. But the good news is that there is plenty of investment standing by to take on the challenge. "There is no shortage of capital in the system," says Psaradellis of Renewable Power Capital. "It's not a cost issue."

Instead, regulation is clearly acting as a brake on development in many markets, as is clear from the record levels of renewable energy installation being achieved in China under favourable state-sponsored policies.

For developers in Western markets, regulatory problems will likely remain a challenge for some time to come, but that does not mean companies cannot work to minimise their impact.

On the development side there would appear to be clear opportunities for unfettered growth if asset managers and investors are willing to embrace merchant risk and seek revenue streams that are not directly dependent on government policy.

Meanwhile, asset managers also need to stay focused on innovation as a way of delivering additional value from existing assets. With so much at stake, everything counts.





If you'd like to find out more about our Wind Investment Boardroom programme **click here** or get in touch with the team:

MEMBERSHIP@TAMARINDOGROUP.COM

US: +1 (917) 3103 307

UK: +44 (0)207 100 1616

WWW.AWORDABOUTWIND.COM

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