Why decommissioning planning is critical for renewable energy projects

Words: Richard Vann, Founder and Managing Director, RVA Group

As the UK's green goals gather pace, wind power is taking centre stage. But with a growing number of first generation turbines nearing the end of their operational life, how can asset owners tackle decommissioning with the same sustainability-driven mindset?

Appetites for green energy are growing, as the UK furthers its position as a 'clean energy superpower'. Central to this transition, offshore and onshore wind have become key focal points for policymakers, with initiatives like the Clean Industry Bonus and the Offshore Wind Growth Partnership pledging funds to support the development and expansion of new infrastructure.

This should be great news on the sustainability front, if managed correctly, paving the way for multi million pounds worth of investment for the sector, in addition to jobs, technological advancements, and local economic growth.

Yet, with many of our nation's wind turbines set to retire over the next decade, attention must also turn to what happens when assets reach the end of their operational life. Richard Vann, managing director at global decommissioning consultancy RVA Group, explores why decommissioning planning is critical, and shares key considerations for asset owners to ensure a safe, cost-effective, and environmentally responsible approach from the outset.

The challenge of ageing wind turbines

Wind turbine design has come a long way in recent decades, but many first generation models are now showing their age. With great improvements in technology and increases in size, older models are now moving into the later stages of their efficient operational life. And with many original manufacturers no longer operating, sourcing obsolescent parts is becoming increasingly difficult, leading to rising costs and falling energy output that simply can't keep pace with demand.

According to WindEurope, around 50% of the current cumulative installed capacity will reach the end of its operational life by 2030 in the EU. That's a staggering 78 GW of wind turbines, and growing, heading toward retirement. But for wind power to remain a truly clean energy source, its end-of-life impact must be as carefully managed as its initial development.

Green goals don't end when the turbines stop turning

As part of the initial design process, the end use for all plant and equipment items needs to be considered, with disposal the last resort. When the wind turbine reaches the end of its lifecycle, typically around 20 years after construction for a utility-grade model, an asset owner can take several courses of action. In the best-case scenario, assessing and upgrading key components can prolong the asset's safe operation beyond its original design life, driving greater efficiencies and curbing costs. Alternatively, with repowering, outdated turbines can be replaced in their entirety with newer, larger, and more technologically advanced models, allowing wind farms to boost output without the need to use up additional valuable land.

But these solutions aren't always viable. Sometimes, mothballing or permanently closing a site is the most responsible, and cost-effective, avenue.

When does decommissioning take precedence?

If a wind turbine's lifespan has already been extended, repowering is too costly, or the site conditions no longer support the installation of new technology, there comes a point where maintenance and upgrades are no longer viable. In these instances, decommissioning can help asset owners avoid escalating costs while safely removing outdated infrastructure.

But often, the need for decommissioning can arise well before a plant's twilight years. Due to their fundamental purpose, wind turbines are often located in areas exposed to extreme climates, meaning structural and mechanical failure are often part of the eventual demise, often occurring much earlier than expected, and causing enough damage that continuing operation simply isn't an option. Take a lightning strike, for example, not only can this prove costly and complex to repair, but it also poses a potentially serious hazard, resulting in an extended exclusion zone, rendering the site unsafe to access. Bringing the asset to a known state and efficiently removing it therefore becomes critical.

Decommissioning, then, isn't simply a consideration for the end of a turbine's life, but a recovery event. During the planning phase, comprehensive decommissioning plans must be embedded from the very start.

What to consider when decommissioning

Often mistakably viewed as a simple reverse of the construction process, decommissioning is a complex and multifaceted process. One that involves meticulous planning, often years before it takes place, careful coordination among stakeholders, adherence to stringent regulations, and a steadfast commitment to EHS excellence throughout.

It should be considered that the decommissioning, dismantling, and removal process may also be selective and not total. For example, if the location, access, avoidance of impact on turbines to remain operational, and other changes from the 'as built' site condition may significantly skew costs and programmes. Selecting one element out of a forest of others is not straightforward and brings other complexities and challenges.

Here are some of the key elements to consider.

Stakeholder engagement

Effective decommissioning requires involvement from a diverse range of stakeholders, including project developers, local communities, environmental agencies, and financial institutions. Engaging these parties early ensures all perspectives are considered, potential concerns are addressed, and the decommissioning process aligns with broader community and environmental goals to prevent roadblocks down the line.

Developed during the planning phase, the outline decommissioning scheme (ODS) plays a key role here, providing detailed information to gain regulatory approval and reassure stakeholders that every stage of the process has been carefully considered.

Covering methodologies for reuse, recovery or waste disposal, traffic management, environmental protection, and site aftercare, it sets out exactly how a site will be decommissioned, demolished, and remediated at the end of its life. Drawing on the construction environmental management plan (CEMP), the ODS also anticipates future decommissioning needs and ensures the site is responsibly returned to a safe and sustainable condition, whether restoring a greenfield site to its original state or continuing soil remediation on a brownfield site.

Financial planning

Renewable energy firms are experts at running sustainable power operations, but they're not decommissioning specialists, nor should they be expected to be. They cannot therefore know all possible routes and pitfalls a project could go down, which is why financial provisioning is equally critical. The preparation of a costed feasibility and options study addresses this knowledge barrier and empowers operators to make informed decisions.

A decommissioning valuation report (DVR) serves as a foundational document in this regard, determining a bond value for the decommissioning, demolition, and remediation costs outlined in the ODS, as well as any additional costs such as professional fees, project management, contingencies, and a five-year inflation adjustment, often required by planning regulations or landowners lease agreements.

In addition to bond value, the asset retirement obligation (ARO) is established to fulfil financial reporting requirements. The ARO represents the estimated future cost of decommissioning, recorded as a liability on the asset owner's balance sheet in line with local and international accounting standards. The ARO must be updated regularly to maintain accuracy and compliance, reflecting the evolving costs and responsibilities tied to the asset's lifecycle.

HSE excellence

Given the unique infrastructure and environmental conditions of each site, every decommissioning project demands a tailored approach to HSE. Working closely with site operators from the outset can help build the clearest picture. With a detailed inventory of all assets, including turbine towers, blades, overhead and underground cables, substations, access roads, and foundations, asset owners can formulate a better understanding of the appropriate method

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statements and risk assessments for each stage. For example, will specialised cranes and explosives be required?

Onshore, site integrity and ground conditions, particularly on brownfield sites, with a history of industrial use and potential soil contamination, also demand careful attention. Meanwhile, protecting marine life and maintaining the integrity of seabeds may be some of the biggest priorities for offshore decommissioning.

Circular material recovery

When designing, manufacturing, and installing a new plant, sustainability commitments should be built in as standard. In earlier models, end-of-life processes such as turbine blade reuse may not have been widely considered to date. However, each element should be carefully treated in line with the Waste Hierarchy, avoiding landfill and incineration in favour of more circular recovery processes, redesigned for recycling, sold on for reuse, or upcycled into new products.

Even if these options are not viable, mechanical, chemical, and thermal recycling processes offer an abundance of more responsible alternatives, not only reducing waste but keeping the commitment to clean energy as close to a closed-loop system as possible. This way, decommissioning doesn't undo the environmental progress made during a plant's operational life.

Supporting the renewable revolution

Whether it's a wind farm, solar farm, battery energy storage site (BESS), or static synchronous compensator (STATCOM), decommissioning renewable energy sites sustainably is equally as important as constructing them. By planning early, asset owners can ensure 'clean' power remains environmentally responsible and cost-effective throughout its entire lifecycle, supporting the UK's green goals.

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