

Tides of Independence: Could the UK Turn the Sea into Power, Hydrogen and Salt?

A thought piece by OPEXA

Rethinking Energy Independence

The UK is surrounded by vast, untapped marine energy, yet most of the focus remains on wind and solar.

What if the sea itself could power our future, not only through turbines, but through an interconnected system that also produces **green hydrogen** and **usable salt** as by-products?

At OPEXA, we have been exploring how **tidal power**, **desalination** and **hydrogen production** might combine into a self-sustaining coastal model.

This is not presented as a solution, but as a **thought experiment in circular energy thinking**.

Tide → Power → Water → Hydrogen → Salt

The concept in simple terms:

1. **Tidal energy** generates electricity that is predictable, local and constant.
2. A portion of that electricity powers **desalination**, turning seawater into freshwater.
3. The freshwater feeds **electrolysers** to create **green hydrogen**.
4. The resulting brine, rich in **salt**, can be repurposed rather than discarded – for **road de-icing**, **industrial feedstock** or even **mineral recovery**.

In essence, a single coastal system could produce multiple benefits: clean power, hydrogen and salt.

It is not a detailed blueprint yet, but could it become one?

Why Tidal Energy Might Be the Perfect Match

Unlike wind or solar, **tides are predictable** many years in advance.

This matters because electrolysers, the machines that split water into hydrogen and oxygen, work most efficiently when supplied with a steady flow of energy.

Perhaps tidal systems, with their natural rhythm, could provide a **more stable foundation** for hydrogen production than wind alone.

Could our coastlines become natural, clockwork energy hubs?

Reusing the Salt: A Hidden Circular Opportunity

Desalination produces a salty by-product that is often viewed as waste. But what if that **brine** became a resource instead?

Local councils spend millions each winter importing rock salt to keep roads safe. Coastal plants could supply **liquid de-icing brine**, created as part of the hydrogen process, which would be cleaner, cheaper and local.

The same salt stream might also serve **chemical industries** or support **battery material recovery**.

Could “salt circularity” become an unexpected revenue stream in the green hydrogen economy?

Would It Work Better in Some Areas?

Probably.

Regions with strong tidal flow, industrial hydrogen demand and winter road needs could benefit most.

Potential examples include:

- **Orkney**, already home to marine hydrogen trials
- **Anglesey and North Wales**, near the proposed Energy Island project
- **Teesside and the Humber**, with heavy industrial reuse potential
- **The Severn Estuary**, where strong flow meets infrastructure readiness

Each could adapt the same model differently, depending on geography, industry and community.

Should we start thinking regionally about energy independence rather than nationally?

Why This Conversation Matters

This is not about promoting a single technology. It is about exploring **joined-up thinking**.

The UK has natural advantages in **tidal energy** and **coastal industry**. Perhaps the opportunity lies in connecting existing technologies and value streams in new ways.

For instance:

- Clean energy that powers hydrogen production
- Desalination that supports both hydrogen and salt reuse
- Local economies that retain more value within their regions

Could we move from talking about “renewable projects” to building **renewable systems**?

Over to You

This is not a polished proposal. It is a **provocation for discussion**.

Could a **tidal, hydrogen and salt circular model** play a part in UK regional energy independence?

What technical, financial or policy challenges would need to be overcome?

And who is already exploring these kinds of integrated ideas?

We would love to hear your thoughts, examples or alternative perspectives.

The tide has always been reliable.

Could it become the backbone of our clean energy future too?