

From Electrons to Molecules:

Why the Energy Transition Is Failing at the Interfaces

By Clean Energy and Water Technologies (CEWT)

A defining moment in our work on Carbon Recycling Technology came during a discussion where the phrase “perpetual” triggered immediate concern about perpetual energy.

What we were actually describing was something entirely different: perpetual carbon circulation.

That moment exposed a deeper truth about the energy transition.

TWO WORLDS. TWO MENTAL MODELS. ONE MISSING INTERFACE.

Across the industry, there is a clear separation of thinking.

Power generation culture:

- Treats fuel as an energy input
- Optimises heat rate, efficiency, ramping, availability
- Sees electricity as the final product
- Rarely treats fuel as matter

Chemical process culture:

- Treats carbon, hydrogen, nitrogen as valuable molecules
- Optimises stoichiometry, selectivity, yield, catalyst life
- Treats electricity as a cost or utility
- Rarely values timing or flexibility of electrons

Both worldviews are internally correct.

But they optimise different objective functions.

WHY THIS MATTERS

The energy transition is not failing because of a lack of technology.

We have turbines, electrolyzers, reactors, catalysts, storage, and digital tools.

What we lack is integration across domains.

The real failures occur at the interfaces:

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- between electrons and molecules
- between energy markets and chemical economics
- between engineering logic and policy design

CARBON IS NOT FUEL. IT IS A CARRIER.

Energy is never perpetual.

Matter can be cyclic.

Nature works this way:

- energy flows
- matter circulates

The challenge is not physics.

It is language, incentives, and institutional habit.

THE PATH FORWARD

The next phase of the energy transition will be led by those who can:

- design at the interfaces
- translate between disciplines
- align physics, economics, and governance

Energy flows.

Carbon cycles.

Value lives at the interface.