Clean Energy and Water Technologies (CEWT)
CRT Transition Pathway Integrating Biomethane

Purpose
This note sets out a clear and credible transition pathway integrating biomethane into CEWT's Carbon Recycling Technology (CRT). The pathway reflects thermodynamic reality, policy robustness, and industrial operability, enabling immediate emissions reduction while progressing toward a fully closed industrial carbon loop.

Phase 0 – Biomethane-Enabled CRT-Ready Operations
The transition begins with certified biomethane sourced from anaerobic digestion, landfill gas, or wastewater treatment. Biomethane is used as the initial carbon carrier fuel for firm power and industrial energy, delivering immediate reduction in fossil carbon use. At this stage, MRV systems and sustainability certification are established, ensuring transparent accounting of biogenic carbon flows.

Phase 1 – Hybrid Carbon Loop Formation
In parallel, CO■ streams are captured from biomethane upgrading and combustion exhaust. These CO■ streams are combined with renewable hydrogen to synthesise recycled-carbon renewable natural gas (RNG). Biomethane, recycled RNG, and a declining share of fossil gas may be blended during early transition, rapidly reducing net fossil carbon input.

Phase 2 – CRT Carbon Recycling Dominance
As CRT capacity scales, recycled CO■-derived RNG becomes the dominant fuel. Carbon throughput is no longer constrained by biomass availability, and the system operates as an engineered, closed carbon loop. Biomethane remains as a strategic stabiliser and optional feedstock where waste-derived carbon is abundant.

Phase 3 – Mature CRT Platform
In the mature configuration, CRT provides firm, zero-emission energy using recycled carbon and renewable hydrogen. Biomethane is retained selectively for integration with waste systems and, where appropriate, to enable net-negative emissions through biogenic CO■ capture and storage or mineralisation.

Strategic Advantages
This phased pathway avoids technology lock-in, enables early deployment, preserves export competitiveness under CBAM, and aligns with natural carbon cycling principles. Biomethane provides Nature's closed loop at small scale; CRT industrialises this loop at scale without land constraints.

Conclusion
By explicitly integrating biomethane into CRT's transition pathway, CEWT delivers a pragmatic, scalable, and thermodynamically honest route to deep decarbonisation across power, green iron, and other hard-to-abate sectors.