



Aduro Clean Technologies

Aduro Clean Technologies is a chemical technology company based in London, Ontario, Canada. Founded in 2011, the company has developed an innovative technology platform that addresses environmental challenges.

Aduro's patented Hydrochemolytic™ Technology (HCT) is at the core of its operations, offering solutions for transforming plastic waste, heavy crude oils, and renewable oils into valuable resources.



Interview

with Eric Appelman
Chief Revenue Officer
Aduro Clean Technologies, Canada



Eric Appelman brings 35 years of experience in a variety of jobs and companies in the chemical industry. He worked with Unilever in their edible oils' business; he was technical director at Sigma Coatings and EVP for innovation, market development and corporate strategy at the Swedish multinational Perstorp. Most recently he was CTO and Marketing & Sales Director at Brightlands Chemelot Campus, the largest industrial innovation environment for the chemical industry in the world. He met Aduro at Brightlands and was immediately captivated by its unique technology, which offers big advantages versus more traditional recycling technologies.

Can you explain how Aduro's Hydrochemolytic™ Technology (HCT) works? Does the hydrogen that is utilised in this process also originate from a renewable resource?

HCT leverages catalysis to break down polyolefin molecules at significantly lower temperatures compared to traditional chemical recycling processes. We apply water with a catalyst that selectively breaks up the carbon-carbon backbones rather than cracking the molecules through thermal heating. At lower temperatures, it is possible to generate hydrogen atoms in situ, which assist in the conversion of hydrocarbon intermediates to stable saturated products. The ability to do those two reactions in a single stage is a fundamental differentiation in the industry.

These hydrogen atoms are generated from a reaction between water and organic hydroxy compounds such as ethanol, which are typically present in the waste feedstock and not by a separate process. Unlike conventional methods that require external hydrogen gas, this approach is more sustainable and can be entirely renewable.

How does HCT align with the EU's ambitious recycling targets?

One of the biggest hurdles in achieving the EU's ambitious recycling targets is the economic viability of the recycling process. Current recycling methods, both mechanical and chemical, primarily depend on pure plastic waste streams, which only account for 10–20% of total plastic waste. The remaining 80% are difficult to recycle cost-effectively. Aduro's technology displays a higher tolerance to contaminants and offers a viable pathway to processing these challenging waste streams, increasing the availability of recycled carbon and supporting the overall recycling economy.

What role do you see advanced recycling playing in a circular economy? Why are they not simply a substitution but an addition to mechanical plastics recycling?

While mechanical recycling is preferred due to its lower energy requirements and simpler processes, its efficiency is constrained by the purity of the plastic feedstock. Most plastic waste is a mix of many plastics and various materials, making it difficult to reuse through mechanical means. Advanced recycling technologies like HCT address this issue by breaking down waste into fundamental building blocks, allowing the re-synthesis of pure polymers. This complementary approach ensures that a much higher percentage of plastic waste can be effectively recycled.

What are some of the biggest challenges facing advanced recycling today? How important is policy support for the success of advanced recycling?

Despite its potential, widespread adoption of advanced recycling faces several challenges, including high energy consumption, costly post-treatment processes, and the need for high-purity feedstock similar to mechanical recycling. Additionally, many advanced recycling technologies have high capital costs and require large-scale operations to be economically viable. Aduro's Hydrochemolytic™ Technology is uniquely positioned to overcome these barriers by operating at lower temperatures, improving process efficiency, and reducing energy demands.



Policy support is crucial to recognizing advanced recycling as an essential component of the plastics recycling ecosystem. Mass-balance accounting methods with the exclusion of carbon lost due to energy consumption should be prioritized in regulatory frameworks and are likely to gain acceptance.

How does HCT compare in terms of energy efficiency with other recycling methods?

Mechanical recycling remains the most energy-efficient option when pure plastic feedstock is available. Dissolution recycling, another form of mechanical recycling, has slightly higher energy consumption.

Among advanced recycling technologies, Aduro's HCT stands out due to its lower temperature requirements, high yield, and reduced need for energy-intensive post-treatment. This makes it one of the most energy-efficient chemical recycling solutions available for polyolefins.

Are you also working on technologies for the recycling of other waste materials beyond plastics, e.g. agricultural waste?

While HCT is primarily designed for breaking down large hydrocarbon structures like polyethylene and polypropylene, it is also applicable to heavy crude oils (like bitumen) and on materials like rubber. However, it is not well-suited for biomass, as biomass consists largely of carbohydrates rather than hydrocarbons.



Why did you decide to become part of the RCI and how can the RCI profit from your membership?

Aduro Clean Technologies is committed to advancing sustainability and reducing reliance on fossil carbon through ongoing innovation and collaboration with policymakers, industry stakeholders, and recyclers. This prompted the company to join the Renewable Carbon Initiative in 2024.

Achieving high levels of circularity requires a combination of technologies, including waste collection, sorting, bio-based feedstock, and a balanced mix of mechanical and chemical recycling methods. It will not be a random combination but a carefully balanced one. RCI brings together many routes to circularity and companies like Aduro can support the overall goal of increasing the availability of renewable carbon for the chemical industry.

Forward-Looking Statements

This article contains forward-looking information and forward-looking statements (collectively, “forward-looking statements”) within the meaning of applicable Canadian and United States securities laws. All statements, other than statements of historical fact, are forward-looking statements and are based on expectations, estimates, and projections as of the date of this article. Forward-looking statements in this article include, but are not limited to, statements regarding the potential of Aduro Clean Technologies Inc.’s (“Aduro”) Hydrochemolytic™ Technology (HCT) to transform plastic waste, heavy crude oils, and renewable oils into valuable resources; the ability of HCT to operate at lower temperatures and with higher tolerance to contaminants compared to traditional recycling methods; the sustainability and renewability of hydrogen generation within the HCT process; the role of HCT in supporting EU recycling targets and the broader circular economy; the comparative energy efficiency and economic viability of HCT relative to other advanced recycling technologies; the anticipated regulatory acceptance of mass-balance accounting methods; the future development and application of HCT to other waste streams such as rubber and heavy crude oils; Aduro’s ongoing innovation and collaboration efforts through its membership in the Renewable Carbon Initiative (RCI); and the potential impact of policy support on the adoption of advanced recycling technologies.

These forward-looking statements are based on assumptions that management believes are reasonable, including assumptions regarding the technical feasibility and scalability of HCT; the availability and composition of feedstock materials; the regulatory environment; and market demand for sustainable recycling solutions. However, forward-looking statements involve known and unknown risks, uncertainties, and other factors that may cause actual results, performance, or achievements to differ materially from those expressed or implied by such forward-looking statements. These risks and uncertainties include, but are not limited to, technological challenges in scaling or commercializing HCT; changes in environmental regulations or recycling policies in Canada, the United States, the European Union, or other jurisdictions; market acceptance of advanced recycling technologies; competition from other recycling or waste management technologies; fluctuations in the availability or cost of feedstock materials; and general economic, market, and business conditions. Readers are cautioned not to place undue reliance on these forward-looking statements. Aduro disclaims any obligation to update or revise any forward-looking statements, whether as a result of new information, future events, or otherwise, except as required by applicable law.