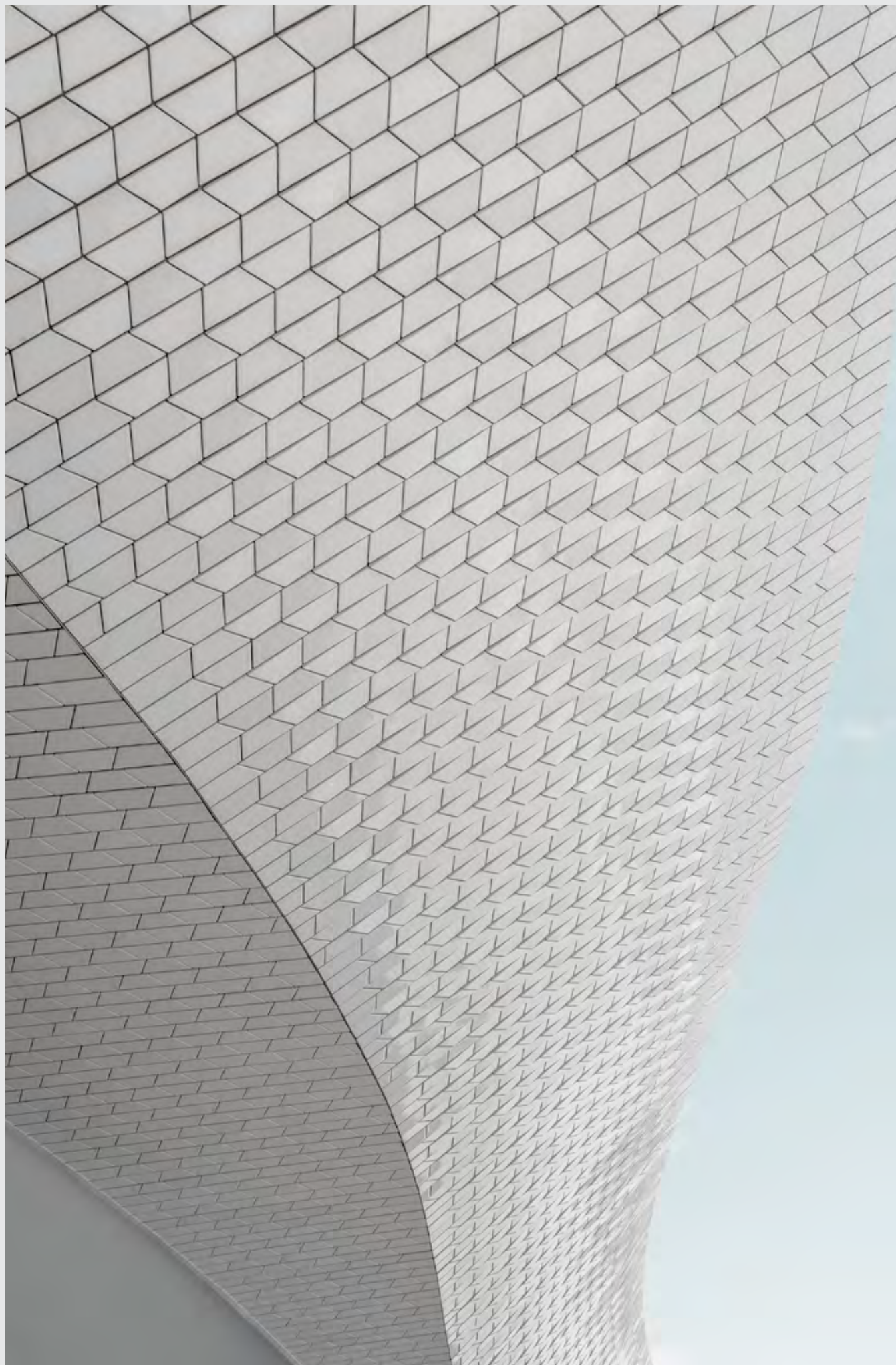


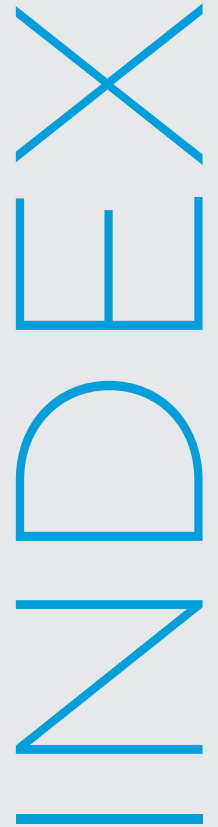
CHEMICAL

HARNESSING THE INNOVATION ECONOMY

INNOVATIVE
TECHNOLOGIES
WITHIN
**CHEMICAL
ENGINEERING**







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ABOUT VALUER.AI

Valuer is a powerful data-driven platform for corporations, accelerators and venture funds. We provide an end-to-end innovation pipeline that helps you identify market opportunities, prioritize your strategic initiatives, discover startup matches, engage with them, and scale at speed.



IN THIS REPORT:

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IDENTIFYING TRENDS AND NEW BUSINESS MODELS WITHIN THE CHEMICAL INDUSTRY

In this report, you will find an overview of the abilities of the Valuer Platform Subscription for the Chemical industry. This industry report serves as a compact edition, showcasing our end-to-end innovation solutions - **Innovation Themes** and **Innovation Radar**.



INNOVATION THEMES: **IDENTIFYING TECHNOLOGIES**

Using AI to Identify Chemical Related Technologies

Using the Innovation Themes tool, Valuer processed the data of over 500.000+ startups to create a custom Chemical technology landscape, and discover relevant hotspots.

The 1000 startups most relevant to Chemical are then identified. Next, the startups are clustered, and the startup descriptions are processed by NLP to find patterns unrecognized by tags and regular search mechanisms.

Simply put, the platform identifies similarities, which results in subgroups with a high degree of relevance to the Chemical industry (see color codes on the cluster illustration, Image 1).

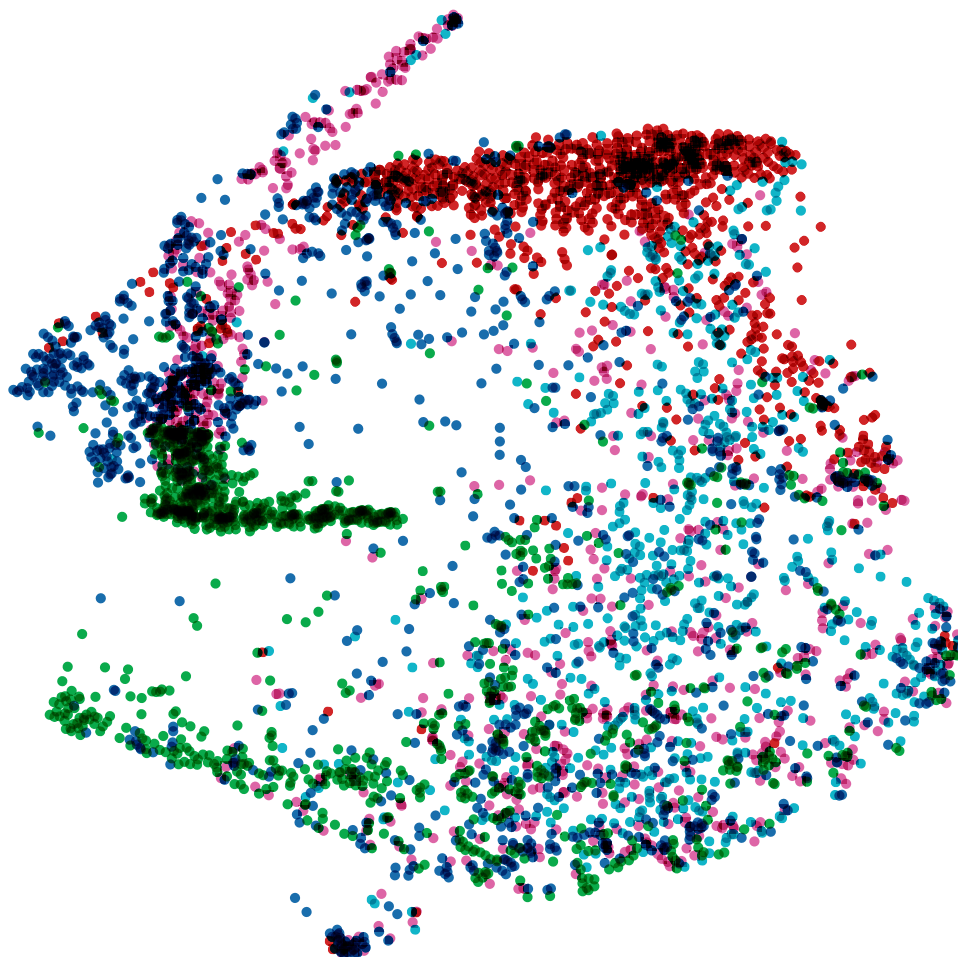


Image 1

- Organic Chemistry
- AI Prediction
- Chemical Recycling
- Plastic Innovation
- Agrochemicals

INNOVATION THEMES: UNCOVERING TRENDS

Grouping & Clustering Startups from Different Chemical Areas

Image 1 shows clusters of startups that are colored by their sub industry. The closer the dots, the closer the sub-industry startup solutions.

The visual allowed Valuer to make simplified conclusions based on 1024 dimensions. As this model is 2D, the illustration is limited, meaning some dots appear more distant from their projection areas.

THEMES AND STARTUP TRENDS

The platform can draw several insights from the clustering, including:

- **Organic chemistry** is the most dispersed in the cluster of the Chemical Themes and particularly has a strong connection to Chemical Recycling, which also appears to be highly dispersed across the realms of Agrochemicals and Plastic Innovation. This suggests that organic chemistry and recycling techniques of chemicals have been applied to the field of agriculture and new material.
- **The cluster of AI Prediction** is primarily scattered between Organic Chemistry and Plastic Innovation, which may indicate opportunities for structural collaboration between the startups in these two areas to adopt new technologies to improve productivities.
- **All five clusters** exhibit certain connections among themselves, with an expectation that AI Prediction and Agrochemicals do not show clear intersections with each other, which also leaves a possibility for future business development.

INNOVATION THEMES: PRIORITIZING TRENDS

Finding Relevant Chemical Focus Areas

The Valuer AI Platform uses four parameters to assess the clusters' relevance, importance, and innovativeness:

- **Success potential:** The AI platform uses historical data from each startup to evaluate the group's overall chance for future success.
- **Market opportunity:** The AI platform analyzes the startups' technology descriptions to estimate the group's overall potential to generate profit and sustainable businesses.

- **Degree of fit:** The AI platform uses Natural Language Processing to grade how well a cluster of startups aligns with the customer's challenges.
- **Innovation:** The AI platform looks for original and previously unseen combinations of business models and technologies in order to grade how generally innovative is the cluster.

RANKING THE FIVE CHEMICAL FOCUS AREAS

The platform ranks results to find the most suitable area of focus for our customers. In this case, it uses the four parameters (Success, Market, Fit and Innovation) to rank the Chemical clusters of startups.

Based on the highest ranking area, Plastic Innovation, Valuer used this area to base the Innovation Radar search off of, and identified one matching startup (see page 10).

Trends	Success	Market	Fit	Innovation	Total Average
Organic Chemistry	74	66	78	54	272
AI Prediction	89	87	67	83	326
Chemical Recycling	67	85	75	89	316
Plastic Innovation	90	91	87	95	363
Agrochemicals	65	87	89	76	317

INNOVATION RADAR: FIND BEST MATCH STARTUPS

Discover Matching Chemical
Related Startups

1 STEP: REQUEST

Submit a Radar request through an interactive form on the Valuer platform. This kick-starts the matching process. The request is used to discover relevant startups from our database, web crawling and a crowdsourcing network.

With the data from the Innovation Themes, companies can choose the area most relevant to their needs and run the Innovation Radar to find best-matching startups, or new business models.

A regular Radar result produces three to five best-matching startups every 30 days. For this Chemical analysis, we provide an example of one startup found through our Innovation Radar (see page 10).

DISCOVER BEST-FIT CHEMICAL STARTUP MATCHES

With a Valuer subscription, the Innovation Radar is facilitated on a monthly basis with the following steps guiding you from request to results:

**Pause an active Radar at any point during your subscription and start a new Radar with your Innovation Themes results.*

DEFINING THE RADAR'S OBJECTIVE:

Identify new technologies and solutions that brings innovation to the plastic industry to recycling to extract chemicals and improve sustainability

LEVEL OF PRODUCT/ MARKET FIT ACHIEVED:

IDEA STAGE

PROTOTYPE/MVP

LAUNCHED

SCALING

2 STEP: FEEDBACK & VOTING

A first round of startup examples are presented on the platform. By liking, disliking, and commenting on these results, you optimise the selection algorithm. For optimal feedback, include 10 to 20 internal stakeholders to give feedback on the startup examples.

YES

NO

STARTUP X

Startups with technologies focused on waste up-cycling of plastic into useful chemicals.

YES

NO

STARTUP Y

Startups that use an AI and ML approach to build new compounds of plastic.

3 STEP: RESULT

A group of matches are on the platform with enriched data points and articles carefully curated, analyzed, and enriched by the platform and our Technology Analysts. This analysis is ideal for strategic workshops and agendas to showcase the benefits of identifying external innovation for your organization. Repeat and adjust your Radar every month.

RESULTS

NAME

VIEW

NAME

VIEW

NAME

VIEW

NAME

VIEW

REPEAT

ADJUST

REPEAT

GREENMANTRA TECHNOLOGIES

GreenMantra Technologies is a clean technology company that upcycles discarded plastics into multi-purpose polymers.



BUSINESS LOGIC

PRODUCT CONCEPT

The company's patented and proprietary technology is based on a thermo-catalytic depolymerization process. The process shortens the plastic chains of landfill-bound plastic waste, converting it into polypropylene, polyethylene, and styrenic polymers. By upcycling the waste, the process improves the end-properties of the resulting polymers and broadens their use potential. GreenMantra's product portfolio includes the CERANOVUS® A Series of waxes and specialty additives, as well as styrenic polymers.

BUSINESS MODEL

GreenMantra is a cleantech company aiming to promote circular economy for plastics. Because the plastic waste used as feedstock by the company undergoes chemical modification, the resulting products can be sold to other markets in addition to plastics. Clients include industrial manufacturers utilizing bitumen/asphalt and plastic manufacturers using polyethylene or polypropylene, as well as manufacturers from the ink and coatings market. Currently, GreenMantra works with clients in North America and the Middle East, with expansion in Europe underway.



SUMMARY

GreenMantra Technologies is a Canadian startup upcycling post-consumer and post-industrial recycled plastics into polymers for industrial applications.

The startup's proprietary depolymerization technology generates polypropylene and polyethylene waxes and specialty additives as end-products.

GreenMantra has been listed among the world's top 100 companies in clean technology by CleanTech Group in 2017.

According to Markets and Markets, the global post-consumer recycled plastics market is projected to grow at a CAGR of 5.7% between 2019 and 2024, reaching a value of \$10.2 billion by the end of the forecast period.

QUICK FACTS

LOCATION: Brantford, Ontario, Canada

FOUNDED: 2010

FUNDING: 29,250,000 USD

EMPLOYEES: 47

WEBSITE: greenmantra.com

SECTORS / SUBSECTORS

- SUSTAINABILITY
- SCIENCE & ENGINEERING
- MANUFACTURING
- RECYCLING
- WASTE MANAGEMENT
- CHEMICAL



MEET THE TEAM



JODIE MORGAN
CEO

Jodie Morgan has demonstrated leadership potential across various industries, working for specialty chemicals, food ingredients, pharmaceutical excipients, and serviced-based businesses. Prior to joining GreenMantra Technologies, she held top roles at SPI Holdings, Solazyme Roquette Nutritionals, and Pinova Holdings, among others. In her career, she has also served on the board of several companies, including GreenMantra Technologies. Morgan holds a BS in Mechanical Engineering from the University of Delaware and an MBA in Finance from the West Chester University of Pennsylvania.



MARTIN HUDSON
CFO

Martin Hudson brings over 25 years of experience in resource and manufacturing industries. He joined GreenMantra Technologies from the position of VP of Finance for a manufacturing company. Prior to that, he served as a CFO at Tornado Technologies Inc. and co-founded the environmental consulting company Tesera Systems Inc. Hudson holds a BSc in Resource Management from the University of Victoria and he is a Chartered Accountant from the Institute of Chartered Accountants of Alberta.



DOMENIC DI MONDO
VP of Technology and Business Development

Domenic Di Mondo has worked for GreenMantra Technologies for over eight years, starting from a position of R&D Manager, leading up to his current post in 2018. Di Mondo has completed a BSc in Physical Science with Honors, as well as an MSc in Inorganic Chemistry from the University of Guelph. He also obtained an Executive Certificate from MIT and a Certificate in Venture Finance from the Saïd Business School, University of Oxford.

CIRCULAR USE OF PLASTIC IS THE GREENMANTRA OF TOMORROW



Plastics are all around us. Due to the material's versatility and durability, the average consumer can find it in clothes, packaging, and bags in just one trip to the supermarket. However, despite its many applications, plastics pose a pressing issue for the environment. According to a 2019 KPMG report, every minute, more than a million plastic bags are thrown away after an average use of fifteen minutes. Since most plastics are non-biodegradable, they remain wherever they are thrown. The resulting waste often ends up in landfills or at the bottom of the ocean, endangering the entire ecosystem.

In the early 2000s, India had little to no existing measures to deal with plastic waste. At the time, Pushkar Kumar, a recent graduate from the Indian Institute of Technology in Roorkee, was faced with plastics being carelessly thrown, piled, and even burned. As a metallurgical engineer, Kumar saw vast potential in transforming discarded plastics into polymer additives for various industrial applications. To build on his idea, he started collaborating with his father, Dr. Anil Kumar, a professor of chemical engineering.

Jointly, they came up with a catalytic prototype technology that turns discarded plastics into multi-purpose polymers. Kumar took his family business idea to Canada, where he continued his studies and later founded GreenMantra Technologies. During the company's initial operations, he held the CEO position, whereas, in 2018, he took a more hands-off approach as a member of the Board. The company has since been run by Jodie Morgan, who was appointed the new CEO, and Domenico Di Mondo as VP of Technology.

“We are the first company in the world to upcycle post-consumer and post-industrial recycled plastics into synthetic polymers and additives that meet specific performance requirements for industrial applications. We are advancing a more circular economy where plastics are beneficially reused rather than landfilled,”

STATES THE TEAM.

A TECHNOLOGY THAT CONVERTS PLASTICS INTO MULTI-PURPOSE POLYMERS AND WAXES

The main concept behind GreenMantra’s patented thermo-catalytic depolymerization technology is that of chemical upcycling. Unlike conventional mechanical recycling, which results in plastics that have been sorted, melted, and extruded into small pieces, GreenMantra’s solution uses chemical upcycling to transform the plastic into new materials, i.e., polymers with shorter chains than the starting plastic molecule. As a result, the end-properties of the new materials are being enhanced.

As a feedstock, GreenMantra Technologies uses a 100% post-consumer and post-industrial plastic destined for landfill sites. Using the proprietary catalytic depolymerization technology, GreenMantra produces its CERANOVUS® A Series. This series comprises polypropylene and polyethylene, which are mainly converted to waxes and other specialty polymer additives. CERANOVUS® A line find many uses, including asphalt roofing and roads, plastic composites, and polymer processing. The polymers also have potential use in lubricating oils and fuels.

Targeted clients include industrial manufacturers utilizing bitumen/asphalt and plastic manufacturers using polyethylene or polypropylene. Small, dark pellets of the product are bagged and delivered to manufacturers via rail, truck, or for international customers, sea freight.





According to the company's VP of Technology, Domenico Di Mondo, this technology helps its clients become both more sustainable and more efficient.

“Across all of our customer base, GreenMantra products help manufacturers improve the performance of their products, increase process efficiency, and reduce formulation costs. At a very small level—of just 1-5%—our products allow manufacturers to regain their manufacturing speed and enhance the end properties of their products,”

ASSERTS DI MONDO IN AN INTERVIEW.

In 2017, GreenMantra partnered with Sun Chemical, one of the world's largest producers of printing inks and pigments, to tailor the technology to upcycling polystyrene foam. As of 2019, the company offers styrenic polymers in their portfolio to be used in the ink, coatings, and insulation markets.

GREENMANTRA RECOGNIZED IN AN INCREASINGLY COMPETITIVE MARKET

The partnership with Sun Chemical is just one example of the recognition conferred on GreenMantra Technologies. Throughout its journey, it has been supported by the public and private sectors alike. In addition to an established relationship with several private investors, including CleanTech investors ArcTern Capital, Cycle Capital, and Closed Loop Fund, the startup has attracted investments and grants from several government institutions as well— the Business Development Bank of Canada, BioIndustrial Innovation Canada, and FedDev Ontario, among others. Since its inception in 2010, the company is estimated to have amassed upwards of \$30 million in investment capital.



“We’re excited to join the ARAP and work with our fellow members to educate the value chain about innovative technologies such as ours and how these technologies will help solve the problem of plastic waste,”

STATED JODIE MORGAN, CEO OF GREENMANTRA TECHNOLOGIES.

They closed the latest investment in February 2020. GreenMantra Technologies and two other companies were selected as winners of the Canadian government’s plastics innovation challenge, receiving a \$1 million grant. The winners were selected to help the government reduce plastic waste as part of its drive to ban many single-use plastics by 2021.

On top of its investor recognition, GreenMantra Technologies has collected several awards. In 2019, it was named Top Growing Company by Globe and Mail and Innovator of the Year by the Canadian Plastics Industry Association. In 2017, the company was listed among the world’s top 100 companies in clean technology by CleanTech Group, a leading industry research firm.

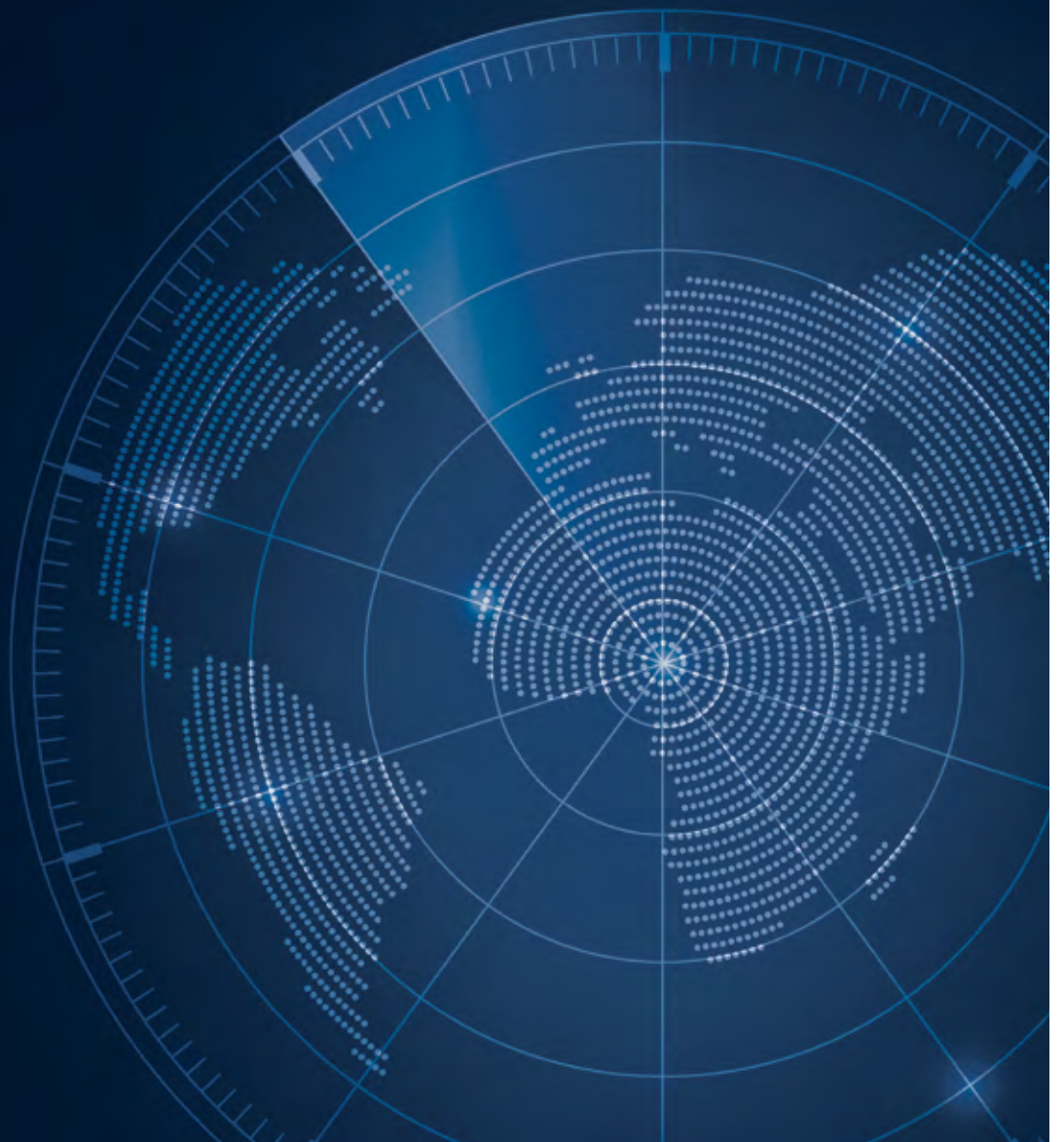
The company also continues to expand its list of partnerships, joining Closed Loop Partners’ Advanced Recycling Innovator Program (ARIP) in July 2020. As part of the framework, GreenMantra Technologies will work with nine partners on the Advancing Circular Systems for Plastics Initiative. Prior to this, the company joined the Advanced Recycling Alliance for Plastics (ARAP) in April, together with prominent members Chevron Phillips Chemical and Ravago Recycling Group.

GreenMantra Technologies has joined a growing pool of companies looking to develop circular economy solutions for the plastics industry. According to recent research published by Markets and Markets, the global post-consumer recycled plastics market is projected to grow at a CAGR of 5.7% between 2019 and 2024, reaching \$10.2 billion by the end of the forecast period. The report identifies tech advancements and changing plastic waste management laws as the main drivers of market growth.

In line with this, GreenMantra plans to harness the growth of the market to expand its operations internationally, particularly in Europe and the Middle East, as well as to purpose and refine its technologies for use in more sectors.

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