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# Green Chemistry Challenge Awards: 2026 Informational Webinar

**Edmond Lam, PhD**
**Assistant Director, Green Chemistry Institute**

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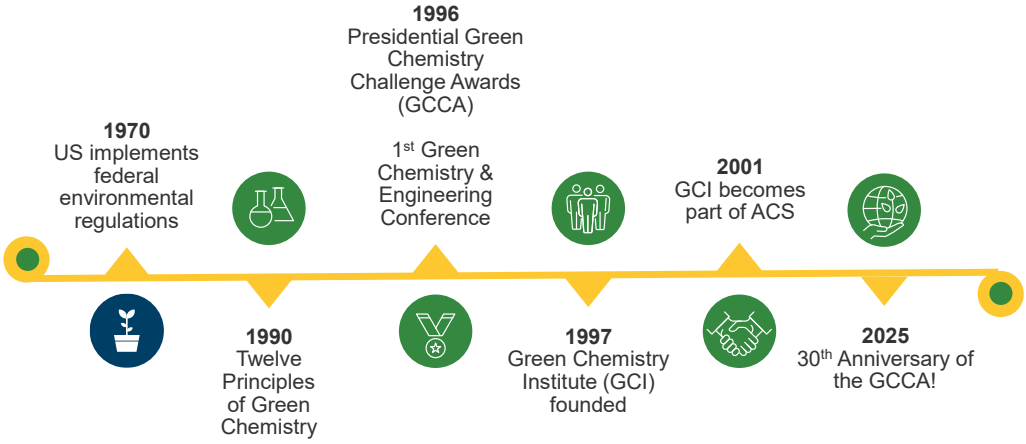
Green chemistry is the design of chemical products and processes that reduce or eliminate the generation of hazardous substances.

Since 1996, the American Chemical Society (ACS) and the U.S. Environmental Protection Agency (EPA) have worked together to establish and promote the Green Chemistry Challenge Awards (GCCA), which recognize innovations that advance the environmental and economic benefits of green chemistry.

***Building on this strong foundation, the ACS continues to support and celebrate outstanding achievements in green chemistry through these prestigious awards.***

# History of the Green Chemistry Challenge Awards




Through 2025, over 1800 nominations have been received, recognizing **150 winners**.




# Environment Impact of the Awards

**Eliminated 830 million**
pounds of hazardous chemicals and solvents.


**Prevented 7.8 billion**
pounds of carbon dioxide releases to air.

**Saved over 21 billion**
gallons of water.

## Benefits of green chemistry include improvements in:

Human health through
- Cleaner air and water,
- Increased safety for workers
- Safer products and food for consumers

Environmental quality based on reduced use of harmful chemicals, and lower potential for global warming, ozone depletion, and smog formation.

Business bottom line from higher yields, more streamlined processes, reduced waste, better performance, increased sales, and improved competitiveness.




## Three decades of celebrating American innovation.

Four GCCA-winning companies from throughout the years shared what the awards mean to them, their business, and the planet.

*"We're honored to be recognized as part of the Green Chemistry Challenge Awards. These recognitions help to further foster our culture of innovating for a greener future. They have spurred the invention of new technologies, highlighted gaps in existing chemistries, and reaffirmed the importance of developing the most sustainable processes."*
***-Merck & Co., Inc.***

columbia FOREST PRODUCTS

Headquartered in Greensboro, NC with 15 facilities employing 2,200 people

- Received the GCCA in 2007 for implementing a soy-based plywood assembly technology in wood panel production that replaced formaldehyde — a known human carcinogen.
- Technology developed through an academia-industry partnership with **Professor Kaichang Li at Oregon State University**.
- The new product helped CFP compete against an influx of imported products, transformed plywood production, and offered an economic benefit to soy farmers whose product was in over-supply.

Credit: Columbia Forest Products

*"In late 2024 Columbia is forecasted to ship its 200 millionth sheet of PureBond® soy-bonded plywood. It is a proven solution today which got an important boost through recognition bestowed to us by the EPA, of which we are still quite proud."*

***Chris Groves, Director of Innovation, Technology and Adhesives.***



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EASTMAN

Headquartered in Kingsport, TN with 15 operating sites in the U.S.

- Won in 2009 for the GEM™ technology which saves energy, avoids hazardous reagents, and reduces solvent use compared to conventional manufacturing processes, creating more sustainable cosmetics ingredients.
- The technology improved quality, yield, cost, and environmental footprint.
- The GCCA enabled Eastman to reach new customers and resulted in a scale-up of the program.

Credit: Eastman

*"The technology is still in use, and the revenue is measured in millions. The GCCA was important to the company, and the sustainability initiatives have only grown since then. It marked the beginning of a journey, and in the past 15 years we have become a world leader, especially in the chemical industry, of being a model in sustainability."*

***Stephanie Clendennen, Technology Fellow at Eastman.***



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CODEXIS®

Headquartered in Redwood City, CA

- Won GCCAs in 2006, 2010, and 2012 for innovative enzymatic processes replacing conventional syntheses for some of the world's best-selling medicines.
- The greener alternatives have environmental benefits including waste reduction, energy savings, reagent reduction, and elimination of rare metals.

Credit: Codexis

*"The economic competitiveness of our biocatalytic routes is demonstrated by the fact that the corresponding enzymatic processes for those molecules have become the preferred manufacturing route over conventional processes"*

***Stefan Lutz, Ph.D., Senior VP, Research at Codexis.***

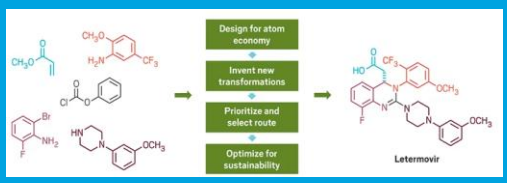




MERCK

Headquartered in Rahway, NJ with 10 R&D facilities in the U.S.

- Merck has been recognized eleven times by the GCCAs (the most of any company) for their work in developing green and sustainable processes for their compounds, resulting in increased yields, reduced waste, and removal of hazardous reagents and solvents.
- The awards have helped Merck continue to recruit top talent who share a passion for sustainability and have the skills to push the field forward in new and inventive ways.




Credit: Merck

*"We believe it's our responsibility to bring medicines and vaccines to people in a way that sustains a healthy planet, including lowering the environmental impact of our products and packaging. The GCCAs have highlighted the benefits of having a green and sustainable science framework that applies green chemistry principles and quantitative sustainability metrics and goals to our scientific processes."*

***Kevin Maloney, Head of Process Chemistry at Merck.***

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# How do you win a GCCA?





## Scope of the Program

1) It must be a **green chemistry** technology with a significant chemistry component.
2) It must include source reduction.
3) Its sponsor must be an **eligible entity.**
4) It must have a **significant milestone** in its development within the past five years.
5) It must have a significant U.S. component.
6) **NEW for 2026:** It must fit within at least one of the **seven focus areas** of the program.

## Scope: 1) What is Green Chemistry?

For the purposes of these awards, green chemistry is the design of chemical products and processes that reduces or eliminates the use or generation of hazardous substances.

- Green chemistry applies across the lifecycle of a chemical product, including its design, manufacture, use, and ultimate disposal.
- Green chemistry reduces pollution at its source by minimizing or eliminating the use of hazardous chemicals, feedstocks, reagents, solvents, and products.





## Scope: 2) Who Are Eligible Entities?

- Companies, individuals, academic institutions (including state and tribal universities and their representatives), non-profit and not-for profit organizations and their representatives are eligible for Green Chemistry Challenge Awards.

- Federal scientists are ***NOT*** eligible to apply for this award, but can be a partner in the research.

## Scope: 3) What is Source Reduction?

According to the Pollution Prevention Act of 1990 (PPA), the term “source reduction,” also known as Pollution Prevention or P2, means any practice which:

1) reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and
2) reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants. The term includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.



## Scope: 4) What are Significant Milestones?

A green chemistry technology must have reached a significant milestone within the past five years. Some examples are:

- Critical discovery made
- Results published
- Patent application submitted or approved
- Pilot plant constructed
- Technology implemented or launched commercially

## Scope: 5) What is a Significant U.S. Component?

- A significant amount of the research, development, or other aspects of the technology must have occurred within the United States.

- If the only aspect of the technology within the Unites States is product sales, the technology may not meet the scope of the program.



## SCOPE 6) NEW for 2026: Ten Award Categories

1. **Focus Area 1:** Greener Synthetic Pathway in the Synthesis of Pharmaceuticals
2. **Focus Area 2**: Greener Synthetic Pathway in Manufacture of Agrochemicals
3. **Focus Area 3:** Greener Synthetic Pathway in Manufacture of Specialty Chemicals
4. **Focus Area 4:** Product, Chemical and Process Design for Circularity or Degradability
5. **Focus Area 5:** Design and Manufacture of Materials for Energy Applications
6. **Focus Area 6:** Efficient and Impactful Valorization of Biomass
7. **Focus Area 7:** Design of Safer Chemicals

**Your technology must be in at least one of these Focus Areas**

8. **Climate Change** (for a technology in any of the seven focus areas that can prevent or reduce greenhouse gas emissions).
9. **Small Business** (for a technology in any of the seven focus areas developed by a small business having annual sales of less than $40 million, including all domestic and foreign sales by the company, its subsidiaries, and its parent company).
10. **Academic** (for a technology in any of the seven focus areas developed by an academic researcher).

### Focus Area 1: Greener Synthetic Pathway in the Synthesis of Pharmaceuticals

Recognizes innovative chemical pathways that reduce the environmental footprint of pharmaceutical synthesis.

- Bristol-Myers Squibb's synthesis of paclitaxel, using plant cell fermentation and extraction (2004).
- *Merck and Codexis' development of a greener synthesis for sitagliptin* using an engineered transaminase enzyme, replacing a high-pressure rhodium-catalyzed reaction (2010).

### Focus Area 2: Greener Synthetic Pathway in Manufacture of Agrochemicals

Highlights more sustainable synthetic strategies for the manufacture of pesticides, herbicides, fertilizers, or other agriculturally relevant compounds.

- *Dow AgroSciences' development of spinetoram*, an insect control agent synthesized using fermentation and low-toxicity solvents (2008).
- *Provivi's development of Provivi FAW™*, a pheromone product that targets the fall armyworm (2022).

### Focus Area 3: Greener Synthetic Pathway in Manufacture of Specialty Chemicals

Emphasizes environmentally preferable synthetic methods to produce high-value, lower-volume chemicals such as flavors, fragrances, colorants, personal care ingredients, electronics components, or performance additives.

- *Eastman Chemical's solvent-free biocatalytic process for cosmetic and personal care ingredients* (2009).
- *QD Visions' Greener Quantum Dot Synthesis for Energy Efficient Display and Lighting* (2014).

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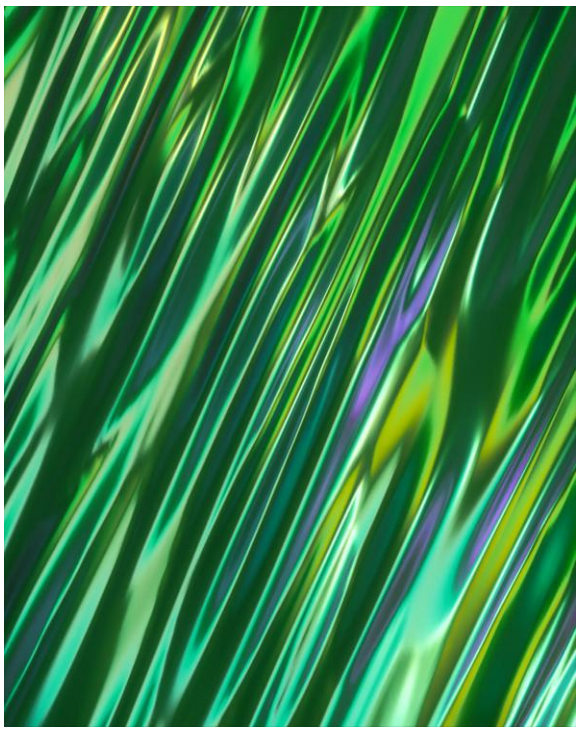
### Focus Area 4: Product, Chemical and Process Design for Circularity or Degradability

Chemical technologies that enable circular material flows or ensure that products break down into benign substances at the end of their useful life. Submissions should address both functional performance and end-of-life fate, with lifecycle thinking embedded in the design.

- Design of materials with tunable degradation profiles or compatibility with chemical recycling streams.
- Development of polymers or additives that enhance mechanical or enzymatic recyclability.
- Creation of modular product formulations that allow for easy separation and reuse of components.
- Design of alternatives to persistent organic pollutants (e.g., fluorinated compounds).



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## Focus Area 5: Design and Manufacture of Materials for Energy Applications

This category focuses on materials or processes that contribute to clean energy generation, storage, or efficiency while aligning with the principles of green chemistry and engineering.

- Use of earth-abundant elements in battery components to replace critical minerals.
- Cleaner synthesis of catalysts or membranes used in fuel cells or electrolyzers.
- Safer solvents and manufacturing approaches for photovoltaic or battery electrode materials.
- Low-temperature, high-efficiency fabrication processes for energy devices





## Focus Area 6: Efficient and Impactful Valorization of Biomass

Chemical processes that efficiently convert renewable biological feedstocks (e.g., lignocellulosic biomass, food/agriculture waste, algae) into valuable products while minimizing environmental burden.

- *DuPont's microbial production of 1,3-propanediol* from corn starch (2003).
- *Columbia Forest Products development of environmentally friendly adhesives for wood composites from soy flour (2007)*.

## Focus Area 7: Design of Safer Chemicals

The rational chemical design of functional and economically viable commercial chemicals with reduced or eliminated inherent hazards to human or environmental health, including acute and chronic toxicity, flammability, and reactivity.

- Functional chemicals that eliminate known carcinogens, reproductive toxicants, or endocrine disruptors while maintaining performance.
- Substances that are inherently safer in the event of spills or accidental exposures.
- Use of computational tools or structure–activity relationships to predict and reduce hazard early in development.

- *Kraton Performance Polymers' development of NEXAR™ polymer membrane technology* for purification of salt water by reverse osmosis (2011).
- *Dow Chemical Company and Papierfabrik August Koehler SE for developing a thermal printing paper* which eliminates the need for chemicals used to create an image, such as bisphenol A (BPA) or bisphenol S (BPS) (2017).

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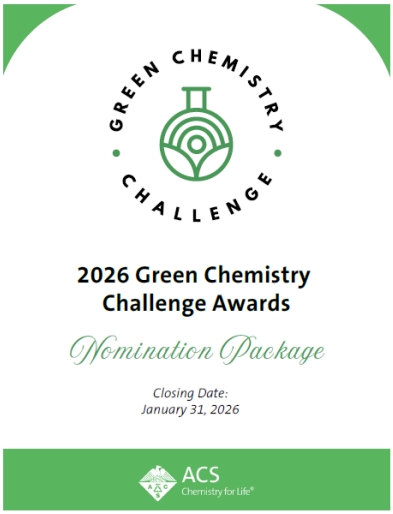
# How to apply?

## 2026 GCCA Competition

The nomination package for the 2026 award cycle will be published exclusively on the ACS website. https://www.acs.org/green-chemistry-sustainability/funding-and-recognition/gcca.html

For more information: gciawards@acs.org







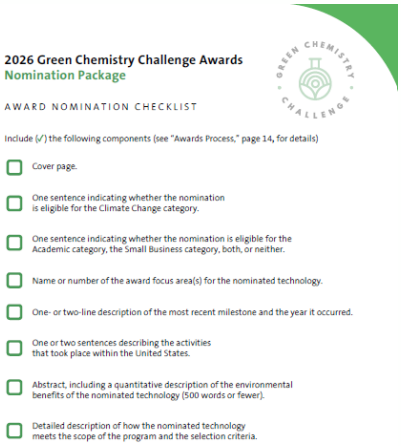
## How to Apply?

| Key Dates | |
|---|---|
| Submission window opens | **October 1, 2025** |
| Submission window closes | **January 31, 2026** |

- There is ***NO*** *application fee.*
- Refer to the nomination package for preparing your nomination.
- Nominations must meet certain requirements, or ACS may reject them (**such as exceeding the 8-page limit**)
- Nominations must be submitted by email to gciawards@acs.org

# Tips for Preparing a Competitive Nomination

1) Make sure you addressed every element of the Award Nomination Checklist on **Page 19 of the Nomination Package**
2) Your technology may fall under several **Focus Areas** for consideration
3) Compelling narrative to your technology
4) Make sure you address both the novel chemistry AND provide **quantitative data (metrics), figures and references** of environmental and economic benefits of your technology compared to incumbent technologies



2026 Green Chemistry Challenge Awards
Nomination Package

AWARD NOMINATION CHECKLIST

Include (✓) the following components (see "Awards Process," page 14, for details)

- ☐ Cover page.
- ☐ One sentence indicating whether the nomination is eligible for the Climate Change category.
- ☐ One sentence indicating whether the nomination is eligible for the Academic category, the Small Business category, both, or neither.
- ☐ Name or number of the award focus area(s) for the nominated technology.
- ☐ One- or two-line description of the most recent milestone and the year it occurred.
- ☐ One or two sentences describing the activities that took place within the United States.
- ☐ Abstract, including a quantitative description of the environmental benefits of the nominated technology (500 words or fewer).
- ☐ Detailed description of how the nominated technology meets the scope of the program and the selection criteria.





# What are the selection criteria?

| Selection criterion | Key questions | Example of things to include in the nomination |
|---|---|---|
| Science and Innovation | • Is this technology original?<br>• Is it scientifically valid? | • Describe the technology: include chemical figures, process schemes, and mechanisms/modes of actions.<br>• Has this work been published/patented? |
| Health and Environmental Benefits | • How does the overall risk (hazard/exposure) of your technology compare with competing technologies?<br>• Environmental benefits (reduced waste generated, decreased $CO_2$ emissions, using renewal resources, etc? | • Show test data<br>• Present metrics of your technology vs. current state-of-the art. |
| Applicability and Impact | • Broad applicability to many chemical processes?<br>• Large impact in a narrow area of chemistry<br>• Economic impact | • Does the technology address real environmental and/or human health benefits<br>• Commercial viability<br>• Transferable to other industry sectors |

## Judging Process

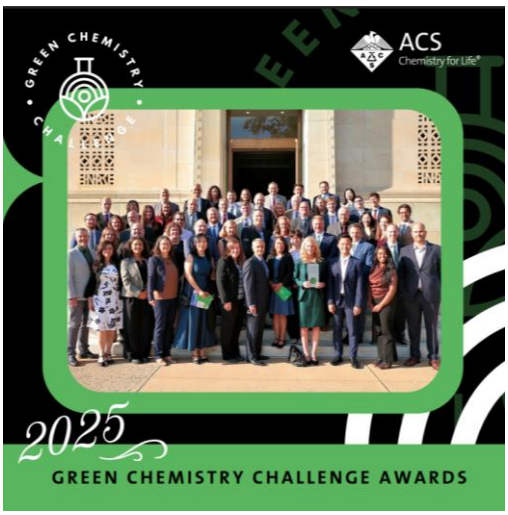
- Judges will evaluate each selection criterion, scored from 0-5 marks, for a total of 15 marks and to provide written comments on the nominations
- The ACS will then hold a virtual meeting with the judges to discuss the evaluations within their reviewing pool and come to consensus on a recommended nomination for an award.
- The judges, at their discretion, can recommend more than one winner or no winner for a category.

| Selection criterion |
| --- |
| Science and Innovation |
| Health and Environmental Benefits |
| Applicability and Impact |




## Green Chemistry Challenge Awards Ceremony

- The 2025 awards took place in Washington, DC on September 3, 2025 at the National Academy of Sciences.
- The **2026 winners** will be notified in early Q3 2026.
- The **2026 non-winners** will be notified a week after the 2026 GCCA Ceremony with optional reviewer feedback meeting in Q4 2026.
- 2026 winners will present their winning technologies at the **2027 Green Chemistry & Engineering Conference**.



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## Thank You! Any Questions?

**Edmond Lam**

gciawards@acs.org

https://www.acs.org/funding/awards/green-chemistry-challenge-award.html

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