



## **REQUEST FOR APPLICATIONS**

**Greentown Labs** requests applications for innovative ideas to disrupt the plastics, energy storage and recycling value chains to enable a circular economy. The Circularity Challenge is a program in partnership with BASF, one of the world's leading chemical companies with more than \$60B in sales in 2018. In line with its corporate purpose to create chemistry for a sustainable future, around 122,000 BASF employees contribute to the success of customers in nearly all industrial sectors and almost every country in the world. Believing that disruptive solutions for circular economy must be jointly addressed along the value chain, this program is supported by Stanley Black & Decker, a leading global diversified industrial and member of BASF's value chain that shares the vision for a more sustainable future.

**Selected Circularity Challenge awardee(s) are eligible for the following awards and benefits:**

- Acceptance into Greentown Launch, a six-month accelerator program for start-ups at Greentown Labs
- Partnership and/or potential investment from BASF by the end of the program
- Access to select BASF testing capabilities, global technical facilities and expertise
- Exclusive access to the Greentown Labs and BASF networks
- \$25,000 in non-dilutive grant funding
- Desk space at the Greentown Labs Global Center for Cleantech Innovation
- Potential access to BASF-sponsored bench in Greentown's wet lab
- Potential for joint [ISO-standardized eco-efficiency analysis](#) with BASF
- Opportunity to connect with multiple stakeholders across industries, including BASF customer and special program affiliate Stanley Black & Decker.

### **Why a Circularity Challenge and what we're looking for:**

Circular economy is much more than waste management. The aim is to close cycles and use products and resources in the best way possible across the entire value chain. The circular economy model has been gaining ground in politics, industry and society over the last years. Behind this idea is a shift away from the linear model of "take-make-dispose" to a system of closed loops powered by renewable energy. The chemical industry and its innovations can lead the way in this change. BASF is already applying circular economy [in a number of ways](#).

Circular economy thinking, however, cannot be restricted to a company's own operations. It needs to run across the value chain to embrace and provide value to customers and suppliers, and in many cases might require completely new business models and new partners.



This program intends to create a collaborative environment to creatively explore, pilot and develop such disruptive approaches to circularity, joining forces between corporates at different positions in the value chain (BASF and Stanley Black & Decker) and the innovative startup ecosystem.

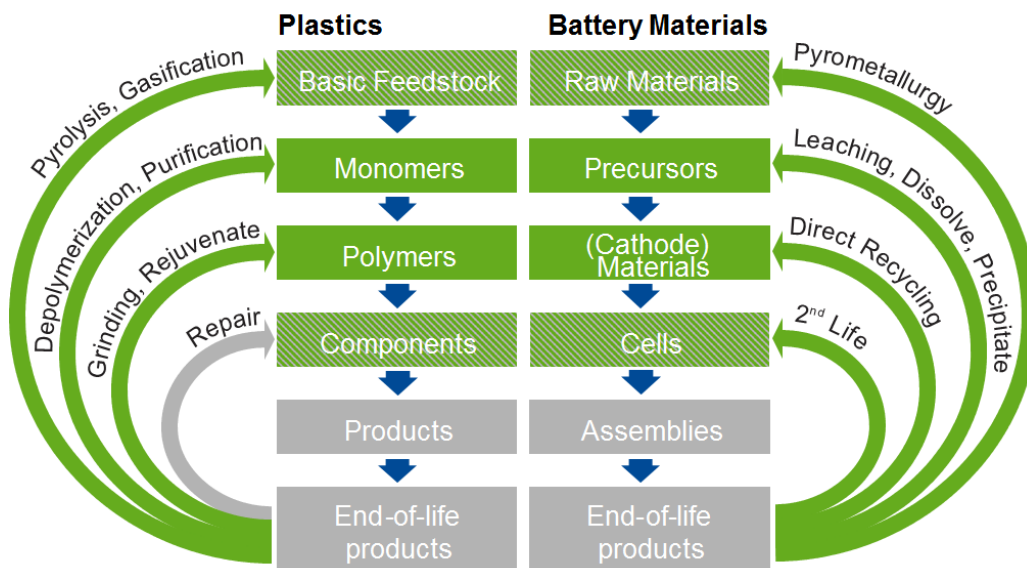
We are looking for start-ups, with a proof of concept solution, that creatively enable circularity for plastics or battery materials or provide digital tools for circularity in general.

**Program Scope**

In circular economy, loops of different “size” can be defined that allow feeding products or materials back instead of disposing them. Generally, the most efficient (and smallest loop) could be “repair & reuse”, while the most generally applicable could be a wider loop that takes a material apart into its building blocks, which can then be used to again produce virgin grade materials.

As a supplier at the materials level, BASF is looking for solutions that allow it to impact circularity from this position in the value chain, together with partners (such as Stanley Black & Decker) along the loops.

Enabling technologies for specific stages or across the circular economy value chains, such as digital tools for simulation, tracking or platforms, are also in scope.



**In scope**  
Out of scope



## **Plastics**

Plastics can have great benefits during their use phase. Prevention of food loss, lightweight construction in transportation, building insulation – all these applications drastically reduce resource and energy consumption during the life cycle. However, plastic waste, in the context of marine littering, is a major global challenge.

BASF is focusing efforts on plastics as performance materials, e.g. for light-weighting, insulation, or providing solutions to making plastics less susceptible to damage by UV light or oxidation, increasing their time of use. In addition, BASF has developed a leading portfolio of [biodegradable plastics](#) and is working on processes to use plastic waste as feedstock for new products ([ChemCycling](#)).

Solving the challenges for a sustainable circular plastics economy requires innovation along the value chain. Closing the loop for plastics is happening across industries and increasingly asked for by BASF's customers: Program affiliate Stanley Black & Decker, for example, is setting [stringent goals](#) for 100% of their packaging to be reusable, recyclable or compostable and incorporating post-consumer recycled content in their products and packaging.

To push the limits of classical recycling, the program seeks innovative solutions to close loops in the plastics value chain, such as:

- Advanced recycling technologies
  - for currently non-recyclable polymeric materials (including, but not limited to PETG, PVC, EPS),
  - for composite materials that cannot be separated and recycled today (e.g. Polyethylene/Aluminum laminates, or others)
  - mitigating contamination and degradation to ensure high quality recyclates (odor control, color removal, new additives such as compatibilizers or chain extenders to increase the performance of recycled plastics, ideally into the performance range of virgin materials)
  - boosted by tracer technologies for sorting efficiency
- Novel designs
  - of composites that can be readily separated (e.g. debonding on demand)
  - replacing complex composites with single material solutions for better recyclability, while maintaining performance (e.g. replacement of composite barrier layers, replacement of black light protection layers in milk bottles)
  - leveraging bio-degradable building blocks or additives
- Energy-efficient processes for depolymerization (including enzymes), pyrolysis or gasification to recover building blocks

## **Batteries**

Batteries are at the heart of a growing number of devices, from electric vehicles to stationary storage and outdoor equipment for work and play. The end of the life of a device does not necessarily indicate the end of usefulness for the battery that powered it. Modern batteries contain valuable metals that are costly to mine, disruptive to the environment and often incur a human cost on the people associated with metal extraction and mining. Therefore, it is imperative to ensure the most efficient, closed-loop system that utilizes the battery and its components to the fullest extent possible during and after use in a device.



BASF, a leader in battery materials, and program affiliate Stanley Black & Decker, a leader in power tools and equipment, seek to identify circular business models and battery technology that would extend the utility of the inputs used to manufacture batteries through multiple life-spans. The objective is to electrify products currently being powered by fossil fuels to leverage an increasingly green electric grid.

To increase the circularity of batteries and minimize wasted battery capacity and raw materials, we are looking for technologies that:

- Improve the collection of batteries/cells after initial use through innovative and new business models
- Improve how batteries/cells are analyzed to understand charge state and determine whether they should be reused, reconditioned, or recycled
- Revive a dead cell or battery without resorting to disassembly for recycling
- Enable direct recycling of battery materials (without leaching, pyrometallurgy etc.)
- Optimize recycling of valuable metals such as cobalt, nickel, lithium, etc.
- Create new batteries that can be reused, repurposed or recycled more often and more cost effectively

### **Digital Tools**

As true circular economies will in almost any case span multiple stakeholders across the value chain, complexity is increasing for both product design (considering all possible cycles and their environmental impact) as well logistics and business models. The most impactful decisions for overall sustainability in a value chain might not be immediately transparent for the actors and might require incentives or information. Steering a circular loop, e.g. as a materials supplier, might also need more and different data on product streams, energy inputs and economics than are available today.

Therefore, digital tools can be decisive to implement and manage new circularity business models and track progress in sustainability. This program is looking for creative ideas and solutions in this field, including:

- Digital platforms that enable new business models in circular economy
- Tools that help simulate and predict recyclability and guide designs
- Technologies that support tracking and reporting of value streams
- Approaches to make battery components or plastic parts smarter by incorporating IoT technologies for lifecycle management (e.g. to enable battery components or plastic parts to report status and reusability or recycling options)
- Methods that can detect possible contamination and detrimental ingredients in materials such as plastics or battery components, that are fed back into the loop.

### **Greentown Labs**

Greentown Labs is a community of bold, passionate entrepreneurs creating game-changing energy technologies that transform the way we live, work, and play. Located in Somerville, Mass., and founded in 2011, the Greentown Labs Global Center for Cleantech Innovation is the largest cleantech incubator in the United States, operating a 100,000 sq. ft. campus comprised



of prototyping and wet lab space, shared office space, a machine shop, electronics lab, and a curated suite of programs and resources. Greentown Labs is home to more than 90 startups that collectively employ more than 1,000 people and have raised more than \$350 million in funding. The incubators' mission is to provide startups with the community, resources, and space they need to solve today's biggest energy and environmental challenges. For more information, please visit [www.greentownlabs.com](http://www.greentownlabs.com) or on Twitter, Facebook, or LinkedIn.

### **Greentown Launch**

Greentown Launch is a six-month, industry specific, structured acceleration program designed to drive deals between entrepreneurs and corporate partners. Over the last three years, Greentown Labs has run three Greentown Launch programs that have resulted in investment and partnership deals for over 65% of startup participants and our corporate sponsors. We facilitate these deals through over 80 hours of intensive business training, hands on mentorship from industry experts and a unique model of startup and corporate relationship building. Beyond our unique partnership curation program, startups accepted into this program gain the ability to access our network of over 150 investors and over 40 corporate partners while gaining access to state-of-the-art lab, business and software tools including SOLIDWORKS, Altium, a machine shop, electronics equipment, wet lab, legal and marketing support.

The program is hosted at Greentown Labs' Global Center for Cleantech Innovation, one of the world's most renowned energy innovation hubs. Entrepreneurs selected for this program will receive paid desk space at Greentown Labs for the duration of the six-month program.

### **About BASF**

BASF Corporation, headquartered in Florham Park, New Jersey, is the North American affiliate of BASF SE, Ludwigshafen, Germany. BASF has more than 20,000 employees in North America and had sales of \$19.7 billion in 2018. For more information about BASF's North American operations, visit [www.basf.com](http://www.basf.com).

At BASF, we create chemistry for a sustainable future. We combine economic success with environmental protection and social responsibility. The approximately 122,000 employees in the BASF Group work on contributing to the success of our customers in nearly all sectors and almost every country in the world. Our portfolio is organized into six segments: Chemicals, Materials, Industrial Solutions, Surface Technologies, Nutrition & Care and Agricultural Solutions. BASF generated sales of around €63 billion in 2018. BASF shares are traded on the stock exchange in Frankfurt (BAS) and as American Depositary Receipts (BASFY) in the U.S. Further information at [www.basf.com](http://www.basf.com).

### **About Stanley Black & Decker**

Stanley Black & Decker is a \$14 billion revenue, \$20+ billion market capitalization, purpose-driven industrial organization. Stanley Black & Decker has 60,000 employees in more than 60 countries and operates the world's largest tools and storage business, the world's second largest commercial electronic security company, a leading engineered fastening business as well as Oil & Gas and Infrastructure businesses. The company's iconic brands include BLACK+DECKER, Bostitch, CRAFTSMAN, DEWALT, FACOM, Irwin, Lenox, Porter Cable and Stanley. Stanley Black & Decker is a company for the makers and innovators, the craftsmen



and the caregivers, and those doing the hard work to make the world a better place. Learn more at [www.stanleyblackanddecker.com](http://www.stanleyblackanddecker.com).

### **Partnership with BASF**

Partnership with BASF can open the door to the following resources:

- Access to top talent and business unit leadership as you refine your business model and/or product
- Access to customers across BASF's related business areas, especially Stanley Black & Decker as the program affiliate
- Access to more than 100 research and development and 8 R&D centers across the globe
- Access to BASF sustainability experts and potential for joint [ISO-standardized eco-efficiency analysis](#)
- Access to further talent and resources from BASF that will be matched with your team to provide support throughout the six-month program (and beyond pending the success of your venture within the Greentown Launch program)

### **Application Tips**

- Define your solution and the problem it addresses as clearly as possible
- Disclose the status of any intellectual property (IP) relevant to your submission. Do not submit confidential information in the application process. Should you be selected as an awardee, your IP will be fully protected throughout the process
- If your application progresses through the selection process, you must be available for Skype interviews and in-person interviews after the close of the Round 1 application deadline

### **Contact**

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