2025 Georgia Cleantech Innovation Outlook

How 5 trends will impact Georgia, its communities and companies in the coming year

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Introduction

Georgia was a focal point in the national cleantech conversation in 2024 with many asking during the election run up, can the state continue its incredible cleantech progress if federal policies change? It is unfortunate that many of these stories missed the groundswell of activity in a cleantech community that is growing a durable ecosystem to build cleantech products, businesses and workforce. 2025 will test the ecosystem in many ways, but the work done in 2024 has it ready to thrive.

So, let's envision what 2025 will bring for cleantech innovation in Georgia. The Georgia Cleantech Innovation Hub is providing its view on five cleantech trends that will impact innovation in the state in the coming year.

1. Impact of a New Administration:
Uncertainty gives way to questions about how cleantech will fare with new policy imperatives?

Corporate Market-Making
More than 50 companies have joined the carbon reduction advanced market commitments (AMCs), what does this mean for Georgia-based corporates and innovators?

AI Everywhere, All at Once
AI is driving a boom in data center buildout; will it accelerate or impede the energy transition?

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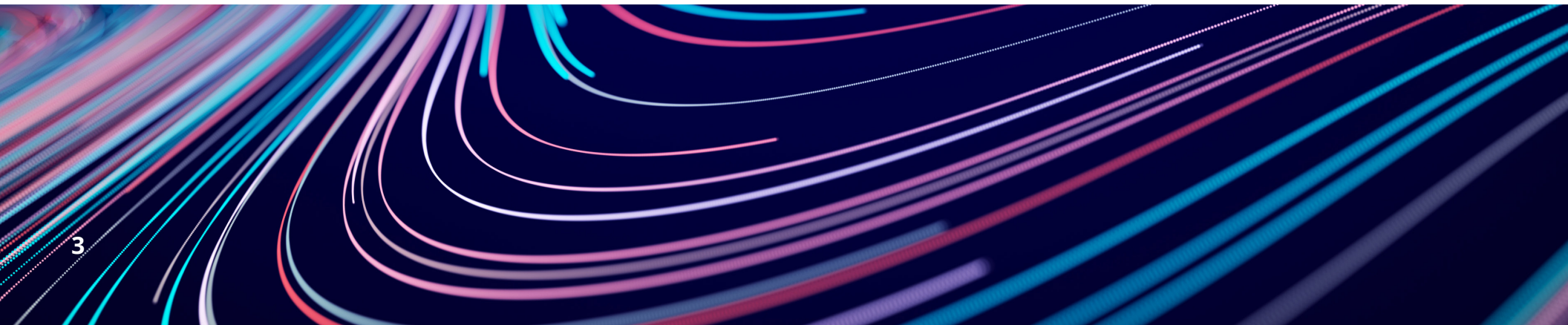
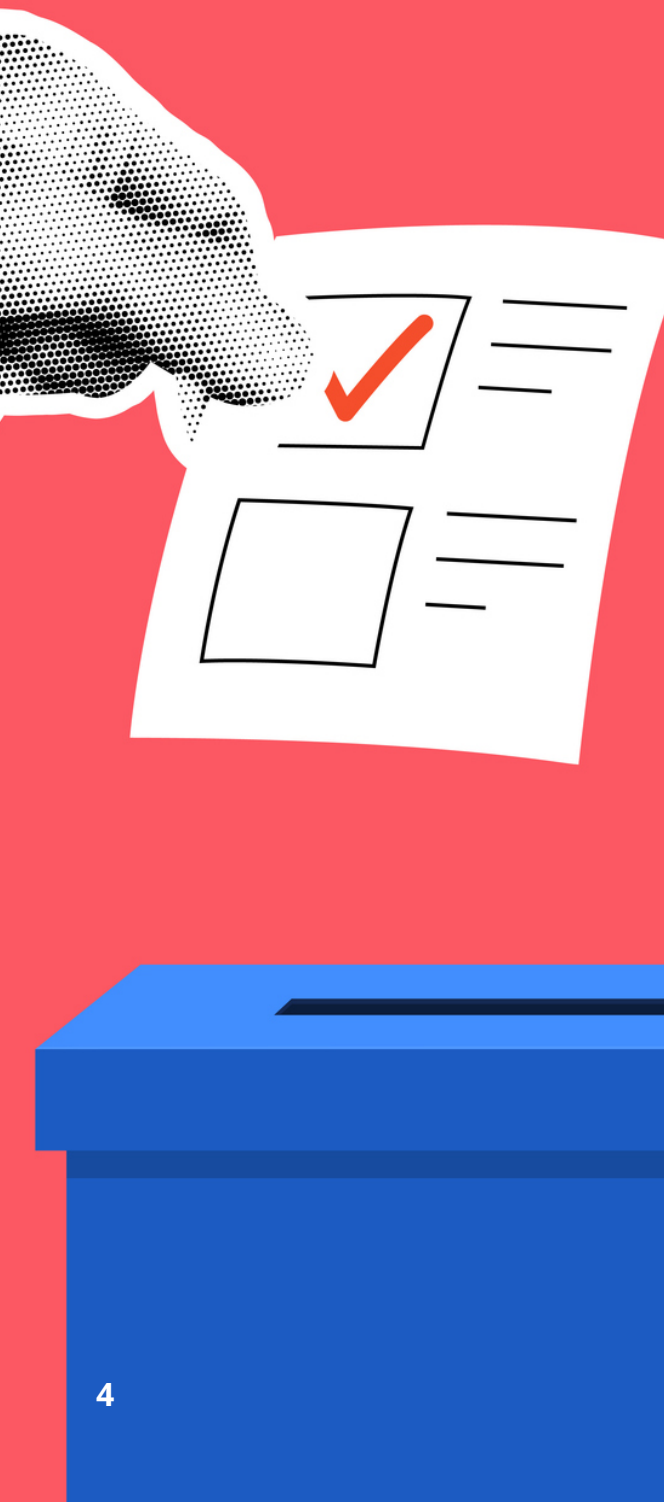
Another year of record temperatures and devastating storms, can cleantech help communities adapt and come back stronger?

Emergence of Sustainable Aviation Fuel (SAF) Hubs
Minnesota and Pittsburgh have created public-private partnerships to advance local production of SAF, is Georgia next?





1. Impact Of A New Administration

The election cycle created uncertainty for much of 2024. Players throughout the cleantech value chain have worked tirelessly to take full advantage of the Biden administration's programs like Creating Helpful Incentives to Produce Semiconductors (CHIPS), Bipartisan Infrastructure Law (BIL), and Inflation Reduction Act (IRA), while wondering what a change in administration could mean. With November's results now certain, companies are leaning into strong fundamentals that are resilient to changes in policy.

Evidence of the Trend

There is a clear consensus that the incoming Trump administration, along with majorities in both houses of Congress, will pull levers that ultimately suppress cleantech demand, cut its incentives, and reduce regulation and imports. Most, but not all, of these actions will slow development and deployment of cleantech. The risk to the IRA and its grant, loan, and tax incentive programs (~$400B in total), is most tangible, yet, most believe that there is not enough support in Congress for a complete overhaul. Consensus says that emissions-limiting regulations (especially GHG), participation in global climate treaties, and limits on fossil fuel extraction and export are most at risk. Tax incentives, while also at risk, are believed by many to be safe, however, their implementation may be slowed.

While the focus of many has been trained on what may happen to the IRA, perhaps the most impactful and uncertain driver of progress is interest rates. Tariffs and broad-based tax cuts could reignite inflation and reverse the recent interest rate cuts by the Federal Open Market Committee. A high interest rate environment will negatively impact investment into cleantech projects and companies. For example, Wood Mackenzie analysis shows that a 2% increase in the risk-free interest rate has a 20% increase to the levelized cost of energy for renewables, versus only 11% for a combined cycle gas plant.

How will it impact Georgia?

During the previous Trump administration, Georgia reduced its carbon emissions by 8%, while growing its economy by 10%. Moreover, six of the state's most successful cleantech startups were born during those 4 years. National policies are clearly not the only driver of progress in decarbonization. Much of Georgia's progress toward becoming a leader in cleantech manufacturing will be unimpacted, and in some ways supported, by policies that disfavor imports. For startups, the story for the next four years will likely be different as they will likely feel the headwinds of a cleantech investment market correction that was inevitable based on the close of the most recent ZIRP-era. The bulk of the focus in Georgia's cleantech sector will likely expand from building cars, batteries, and solar panels to building the electric system infrastructure to meet the influx of data center capacity. The largest challenge will unfortunately still be uncertainty: how and when will changes to the IRA happen, how large and fast will the impact of tariffs on interest rates be felt, and what will the degree of response be from corporates that have major decarbonization targets on the horizon? We predict that the cleantech sector in Georgia will see corporations and local governments play a bigger role setting direction and following action plans founded on the already strong long-term fundamentals.

Resources to learn more

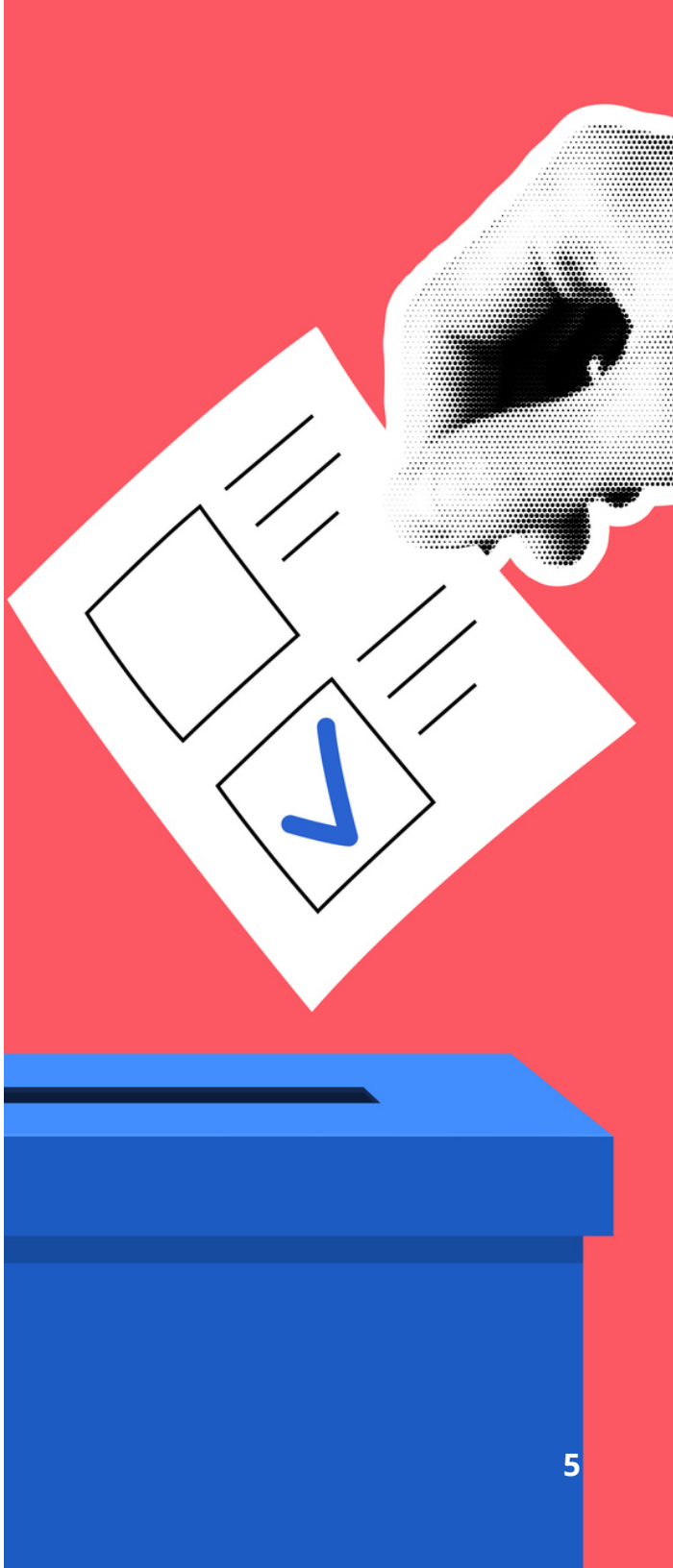
How Trump's Second Term Could Derail the Clean Energy Transition

Impact on Emissions of a New Administration

Green Banks and the New Administration High

Interest Rates and Cleantech - Utility Dive

High Interest Rates and Cleantech - WEF



2. Corporate Market-Making

Market uncertainty remains one of the biggest entry barriers for many innovators and investors in cleantech. Without clear expectations on specifications, price, and volume it is difficult to encourage suppliers (startups, corporates, investors) to even attempt to create a product that should exist, but doesn't yet. Advanced Market Commitments (AMC), which have been successfully utilized in areas such as vaccines in the pharmaceutical sector, are an emerging tool to give entrepreneurs and investors the confidence to invest in nascent markets. AMCs are unique because they credibly signal demand for a tangible product without picking a winning technology, creating an incentive for broad-based innovation. There are many incentives for coalitions of buyers to create AMCs, including streamlined due diligence and contracting, access to leading research and technology scouting and vetting. Corporate market-making has been pointed to as a key lever to continue cleantech progress amid the changing landscape for federal funding and incentives.

Evidence of the Trend

Across the globe, there are currently dozens of AMCs and AMC-like buyer coalitions, including the First Movers Coalition, Sustainable Aviation Buyers Alliance, RE100, and the Climate Group's Concrete Zero and 24/7 Carbon-Free Coalitions, which focus both on more mature technologies like electric vehicles and renewable energy to more emerging technologies like green cement, aluminum, and steel. In the areas of carbon removal and reduction projects, more than 50 companies (including Georgia headquartered, Delta) have joined three AMCs to drive both the speed and scale of these deployments:

- The LEAF Coalition, launched in 2021 by non-profit Emergent, has since assembled over $1 billion in purchase commitments for avoided deforestation carbon credits
- Frontier, started by Stripe in 2022, has pooled more than $1 billion in purchase commitments for durable carbon dioxide removal by 2030
- Symbiosis Coalition, the newest group, has pledged to purchase 20 million nature-based carbon removal credits by 2030.

How will it impact Georgia?

Is there a cleantech product category (e.g., low carbon cement, circular bio-plastics, waste-derived critical minerals, or climate-resilient crops) that would be ripe to develop in the state if it was pulled by an AMC or AMC-like program led by the state's leading corporates? With over 37 Fortune 1000 Companies headquartered and many more with major business or manufacturing hubs in the state, Georgia has local demand with global scale. The state also boasts the Drawdown Georgia Business Compact (DGBC), a non-profit that is perfectly positioned to be a convenor of collaboration on an AMC. AMCs are tools that are just at the beginning of their deployment and we expect them to have an outsized impact on cleantech innovation in 2025 and beyond.

Resources to learn more

Major Climate Advanced Market Commitments

How an AMC Would Accelerate Green Industrial Products

How to Start an AMC (long-read)

3. AI Everywhere All At Once

Everyone has probably heard some crazy stat in the past year about AI and the pressure that it is currently and will continue to put on the world's electric grids. AI's electrifying growth, when coupled with the energy transition, sets up a paradoxical dual between an immovable object and an unstoppable force. Two things have become clear; difficult decisions that could slow or speed the energy transition will need to be made soon, and there is a clear signal for innovation needed to address this challenge.

Evidence of the Trend

A ChatGPT query uses roughly 10X the amount of energy of a traditional Google search query. Therefore, the growth in data processing infrastructure and grid capacity is not a surprise. Barclays estimates that in ~10 years data centers may account for almost 10% of US energy consumption roughly equal to energy usage today to power all residential space heating and cooling. According to Georgia Power, the total pipeline for new data center load by the middle of the next decade is nearly 31GW, which for context is 3X larger than the state's record peak energy demand. Of that ~75% (23.4MW) is still in early development (technical review), while the remaining ~7.5MW either has either been contracted or requested electric service. While some argue that not all of this capacity will be built, the approach to tackling this unprecedented load growth will be debated throughout Georgia Power's Integrated Resource Planning process in the coming year.

How will it impact Georgia?

The speed with which the potential demand ramps is impressive. By 2028, over half of the 31GW (16.8GW) data center load could be live. That is approximately double the amount of renewable-battery storage hybrid capacity that was deployed in the US in all of 2023. It is hard to imagine any scenario where all of that load growth is met by new low carbon generation alone. Undoubtedly, some of the demand will be delayed or not materialize, but innovation in many forms will need to fill the gap. In the built environment, there will need to be faster, more targeted and cost effective ways to deploy energy efficiency and distributed energy resources across residential, commercial and industrial facilities. New models and forms of 24/7 carbon free energy, especially nuclear, will need to be piloted to support the later stages of the ramp. AI and ML will be a central technical component of many of these cleantech solutions. Data center energy efficiency and flexibility will need to be pushed even further and the resource intensity of AI-based algorithms will need to be improved. There is likely no economically feasible solution that completely avoids new fossil generation, however, systematically pulling every innovation lever mentioned above could accelerate the energy transition in the state and beyond.

Resources to learn more:

Large Load Economic Development Report from 2023 Integrated Resource Plan

AI as a Driver of Climate Action

4. Cleantech As Resilience

Holistically addressing climate change requires both reducing emissions and preparing for its unavoidable impacts. Traditionally, deployment of cleantech solutions addresses emissions reduction, while resilience solutions buttress against the unavoidable impacts. Cleantech gets the lion's share of attention and funding, leaving resilience solutions historically underfunded despite the devastating human impact of extreme heat, flooding, wildfires, drought, and long-term power disruptions. Another year of record high temperatures, intermittent drought, and intense flooding in the Southeast has highlighted the need to accelerate deployment of resilience solutions. Cleantech solutions are increasingly being viewed and valued for their ability to provide resilience in the near-term, especially in communities with greatest need.

Evidence of the Trend

Investments into climate adaptation technologies make up only 4-5% of global cleantech funding, and by 2030, the annual financing gap for adaptation globally could reach upwards of $212B. On a purely per capita basis, the US's share of the adaptation finance gap would be ~$10B annually. The Biden Administration's massive one-time, $6B investment into community climate resilience last year certainly put a solid dent in the gap, but closing the gap on an annual basis in the US would require a still larger and more consistent effort. Beyond the immense human impact, underinvestment in adaptation solutions has a significant economic impact as well. A record for the number (28) of climate disasters that cost the United States over $1 billion was set in 2023, and Georgia felt the impact of as many of these events last year (14) as it did during the entire decade of the 90's. A billion-dollar disaster now happens nearly every three weeks on average in the US compared to once every four months during the 1980s.

How will it impact Georgia?

Storms, extreme heat, drought and related power disruptions directly impact millions of Georgians every year. Actors within the state are already taking action toward deploying cleantech solutions that have both near-term impacts on resilience and long-term impact on decarbonization.

- Extreme heat management: Blue Frontier partnered with Waffle House and Southern Company to bring desiccant cooling to rooftop units to drop temperatures and flatten energy profiles.
- Storm resilience: Groundswell has partnered with multiple organizations throughout Atlanta to deploy solar plus storage microgrid powered resilience hubs.
- Drought: Controlled-environment agriculture (CEA) is the fastest growing agribusiness line in the state with major operators like CoxFarms, Gotham Greens, and others growing produce via highly resource efficient processes.
- Power Disruptions: Smart Wires has partnered with Southern Company and Georgia Tech to demonstrate the company's Dynamic Line Rating technology which can reduce grid congestion and related outages.

Resources to learn more

Funding for cleantech (mitigation) vs. resilience (adaptation)

Global gap in climate resilience funding

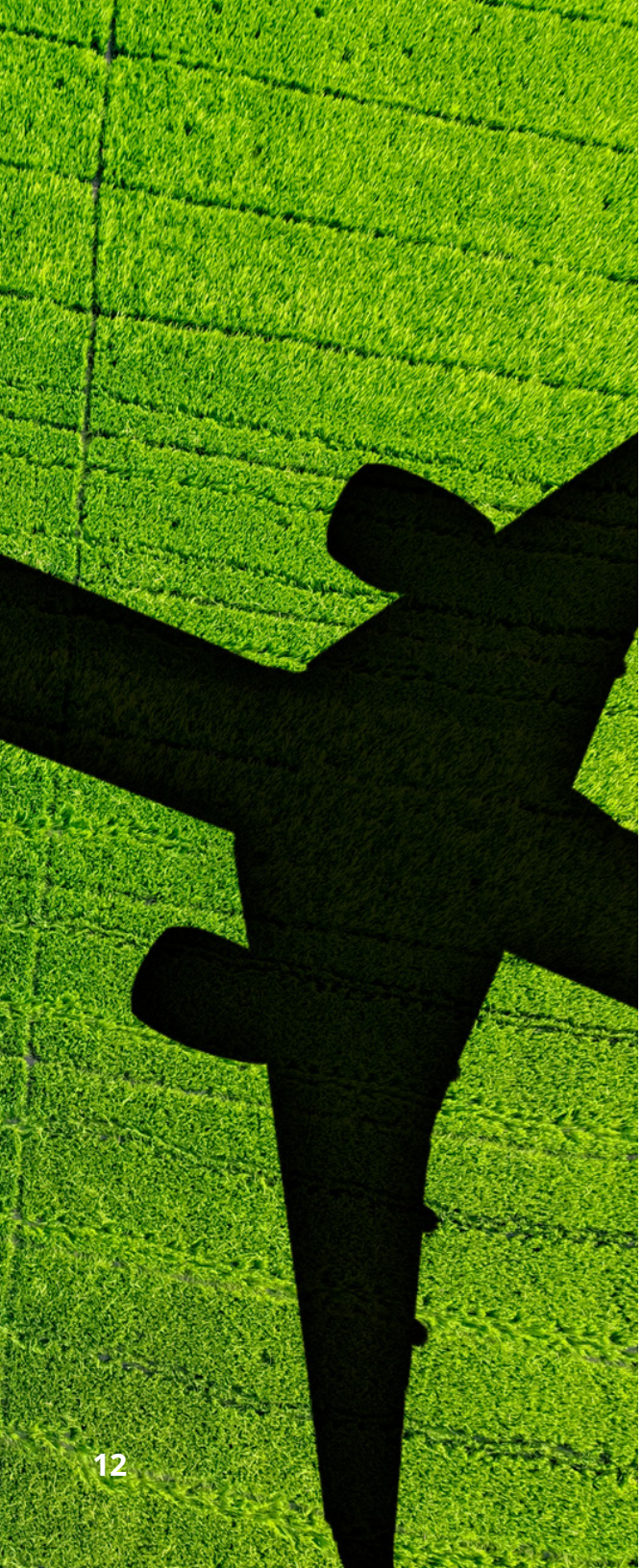
Billion dollar climate disasters in Georgia

Southern Company and Waffle House and High Efficiency AC

Example of Groundswell's Work on Resilience Hubs

Controlled-Environment Agriculture in Georgia

Smart Wires, Georgia Tech and Southern Company Pilot DLR



5. Emergence Of SAF Hubs

Aviation sits clearly with the cement, steel, glass, chemical, and heavy-duty transport sectors as the most challenging to decarbonize. Roughly responsible for 3% of global emissions, aviation has one clear lever for decarbonization, the reduction of emissions from aviation fuel primarily achieved through adoption of jet fuel derived from non fossil feedstocks, or sustainable aviation fuels (SAF). SAFs are categorized by their production process and like conventional aviation fuel, will likely be delivered to airports through existing pipeline infrastructure. Existing jet fuel delivery infrastructure has a strong influence on the type of SAF, specifically the sustainable feedstock from which it is developed, that will be used in a specific region and the emergence of hub-based models for SAF development.

Evidence of the Trend

State and regional collaborations on SAF have existed for over a decade, however, these efforts have been supercharged by the government-wide SAF Grand Challenge effort. A key thrust of the effort has been to build regional stakeholder coalitions. One such example is the Minnesota SAF Hub, which was launched in 2023 to create the supply chain that can produce and deliver SAF to the Minneapolis–Saint Paul International Airport at scale. Led by the Greater MSP Partnership, a non-profit, the hub connects organizations across the Minnesota's SAF value chain to speed supply chain development to support commercially-ready technology and also to prepare the region to commercialize new feedstocks, processing technology and conversion methods that will help to state to produce 100+M gallons of SAF annually beyond 2035. Since Minnesota's SAF Hub launch, a similar effort has been created in Pittsburgh.

How will it impact Georgia?

Many agree that few places in the world have the proximity to demand, supply chain assets, diverse feedstock supply, and technology expertise that Georgia does, making it an ideal hub for SAF. What is more, multiple of Georgia's largest industry sectors (forestry, agriculture, aerospace, and logistics) and public/private institutions have a vested interest in the economic benefits that would accrue from becoming such a hub. The wheels are turning as well, in the second half of the year alone Georgia hosted a large gathering of SAF leaders in the Southeast, had the state senate complete a study on SAF and its impact on forestry, and won two grants to pursue SAF from the FAA. It is very likely that this momentum continues into 2025 and it would not be surprising to see a SAF hub emerge in Georgia in the near term.

Resources to learn more

SAF Technology Primer – US Department of Energy

Aviation Fuel Pipeline Infrastructure

Minnesota SAF Hub

Fueling the Future: Accelerating SAF in the Southeast

Georgia State Senate Report on Forestry Innovation and SAF

FAA Grants Impacting Georgia

> **"Given the potential scale of these projects, there are multiple billions of dollars in socioeconomic benefits for Georgia**
>
> -Ben Chambers, RYAM

6. How Did We Do

Last year, we made a number of projections about how macro trends would impact cleantech innovation in Georgia. So how did we do?

Collaboration at Scale: The Drawdown Georgia Business Compact continued to expand (now 68 members) and use its membership as a force-multiplier to corporate efforts to procure clean energy, protect forest carbon sequestration and accelerate the circular economy for plastics among others. Google, which has a major physical footprint in Georgia, joined the 24/7 Carbon-Free Coalition as a founding member to revolutionize clean energy procurement at a global scale.

Emergence of Alternative Funding Mechanisms: In April, the US EPA selected 8 partner organizations to deploy $20B in community-focused grants toward green banking products, which is supercharging this effort in the state. The Coalition for Green Capital (awarded $5.1B) highlighted setting a state green bank in Georgia as one of its priorities. Georgia Bright will be mobilizing a v2.0 for solar leasing for low and moderate income Georgians with $156M from the Solar for All program. The Freedmen Green Bank and Trust also looks to expand its work in the state.

Through Cycle Investing: We stopped short of predicting a unicorn valuation for a Georgia-based startup this year, which was prudent based mainly on market conditions. We also noted that there were plenty of dry powder around that would make investments in companies with stout revenue streams and good economics. Four of our local startups closed equity rounds this year, however, two of those were sizable raises by Johnson Energy Storage and Envirospark and there are several more companies looking to close rounds early next year.

Innovation at the Grid Edge: Plenty of action continues, albeit typically below the radar, including, but not limited to the following announcements:

- Veckta, an Engage portfolio company, announced a strategic partnership with Wellstar, to deploy energy efficiency and on-site generation
- GEFA has made $25M of its $250M DOE GRIP monies available
- Georgia Power has parted with Sense Labs to use its home energy monitor to support fault detection and vegetation management on the grid
- Cherry Street Energy received unanimous approval by the Fulton County Board of Commissioners to deploy energy storage at the Metropolitan Library completing a resilience hub there

From Announcement to Build to Production:

There were hiccups and celebrations, as Rivian paused construction of its Covington manufacturing plant in May, only to have announcements of the expansion of its relationship with Volkswagen and the conditional commitment for a federal loan from the DOE's Advanced Technology Vehicle Manufacturing (ATVM) program likely change that course. Hyundai accelerated startup of its electric vehicle factory near Savannah, LanzaJet began production of its first-of-its-kind ethanol-to-jet fuel plant, and Kia rolled the first EV9 off its line in West Point highlighting some major milestones in the state.

Resources to learn more

Veckta's Partnership with Wellstar

GEFA's First Traunch of GRIP Funding Opportunity

Georgia Power's Grid Edge Partnership with Sense

Cherry Street Energy and Fulton County Resilience Hub

Learn more about the Hub.

The Georgia Cleantech Innovation Hub endeavors to make innovation a driver of a robust cleantech economy that creates jobs in growth industries, commercializes technology that combats climate change and elevates people and communities throughout Georgia and the Southeast. In 2024, the Hub partnered with Cox Enterprises and gener8tor to launch a first-of-its-kind cleantech-focused accelerator in the state, and the organization has bold plans to expand its reach and impact in 2025.

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