RESILIENCE
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Annapolis and Anne Arundel County

FINANCIAL CLOSE OUT REPORT

Climate Change and Sustainability Study Tour

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Executive Summary

This report presents key findings from the Climate Change and Sustainability Study Tour (Sweden Study Tour), where leaders from Anne Arundel County, the City of Annapolis, and the State of Maryland explored cutting-edge sustainability practices shaping a cleaner, more resilient future. Funded by the Resilience Authority of Annapolis and Anne Arundel County through $75,000 in grants from the MHE and Denker Foundations, this weeklong Study Tour brought regional leaders together to engage with global experts and examine successful sustainability models firsthand. Sweden, a recognized leader in climate action, is on track to achieve carbon neutrality by 2040, driven by progressive public policies and innovative market strategies.

Participants met with researchers, architects, landscape designers, technical experts, urban planners, government officials, and entrepreneurs, focusing on critical areas such as:

- Sustainable transportation, including electric ferry technology.
- Climate-neutral construction and retrofitting buildings for energy efficiency.
- Emissions offsetting through carbon capture innovations.
- Waste-to-energy solutions for reducing environmental impact.
- Public-private partnerships that drive climate action and economic resilience.

The Study Tour aimed to explore scalable sustainability practices that could be adapted for Anne Arundel County and the City of Annapolis. Key areas of focus included:

- Advancing electric ferry technology and expanding sustainable transportation options.

- Retrofitting existing infrastructure with climate-friendly solutions to enhance resilience.
- Developing communities that balance environmental responsibility with quality of life.
- Strengthening public-private partnerships to accelerate local climate initiatives.

By leveraging the insights gained from this experience, Annapolis and Anne Arundel County can apply proven sustainability strategies to enhance climate resilience, drive innovation, and position the region as a leader in environmental stewardship.

Why Sweden

Sweden stands as a global leader in harmonizing sustainability with human well-being, effectively merging research and practical applications. The nation excels in carbon neutral development, revitalizing old industrial areas into energy-efficient, low-cost housing linked by electric public transportation. Committed to achieving a fossil-free transportation sector by the end of the decade, Sweden is making significant advancements in public transit, electric vehicles, and supporting infrastructure, including a network of electric ferries.

The country's sustainable transportation initiatives are extensive and multifaceted, aimed at significantly reducing carbon emissions while promoting eco-friendly alternatives. Key elements of these initiatives include:

- *Electric Public Transportation:* Sweden has made substantial investments in electric buses and trams, which are now widely deployed in urban areas. This transition not only decreases reliance on fossil fuels but also mitigates urban air pollution.

- *Electric Ferries*: Sweden is at the forefront of pioneering electric ferry technology, particularly in coastal cities. These innovative vessels reduce emissions and enhance connectivity across waterways, benefiting both transportation and tourism.

- *Infrastructure Development:* The country has established a robust network of charging stations for electric vehicles (EVs), making it easier for residents and visitors to opt for electric options. This infrastructure includes charging points along highways and in urban centers.

- *Bike-Friendly Cities*: Many Swedish cities prioritize cycling by developing dedicated bike lanes and promoting bike-sharing programs. This encourages residents to use bicycles for short-distance travel, thereby decreasing car dependency.

- *Integrated Mobility Solutions*: Sweden adopts a holistic approach to transportation, seamlessly integrating public transit, cycling, and walking. This comprehensive system promotes sustainable choices and alleviates traffic congestion.

- *Policy Support*: The Swedish government enacts strong policies and incentives to encourage sustainable transportation, including subsidies for electric vehicles, investments in green infrastructure, and stringent emission regulations.

Sweden's approach to sustainable development and redevelopment is defined by a commitment to integrating environmental, social, and economic factors into urban planning and community development. Key aspects of this holistic approach include:

- *Climate-Smart Urban Planning:* Sweden employs progressive urban planning practices that prioritize sustainability. This involves the creation of climate-smart cities that feature green spaces, energy-efficient buildings, and sustainable transportation options, all aimed at enhancing the quality of life for residents.

- *Retrofitting and Repurposing*: Many existing structures undergo retrofitting to meet contemporary energy efficiency standards, thereby reducing emissions while preserving historical architecture. Redevelopment initiatives frequently focus on transforming aging industrial areas into vibrant communities that offer affordable housing, retail spaces, and public amenities.

- *Community Engagement:* Public participation is fundamental to Sweden's redevelopment strategy. Citizens are actively involved in decision-making processes, ensuring that redevelopment projects reflect community needs and values.

- *Integrated Resource Management:* Sweden emphasizes the importance of closed-loop systems that minimize waste and promote resource reuse. This includes converting waste into energy and advancing circular economy principles in both residential and commercial sectors.

- *Policy Framework*: The Swedish government fosters sustainable development through policy frameworks that incentivize investment in green technologies, sustainable practices, and responsible land use. This includes providing financial incentives for developers who prioritize sustainability in their projects.

Overview of the Visit

The Study Tour provided a unique opportunity for local leaders to explore cutting-edge sustainability initiatives and learn from one of the world's foremost leaders in climate action and urban resilience. Over the course of a week-long program, participants engaged with researchers, architects, landscape designers, technical experts, urban planners, government officials, and entrepreneurs, gaining firsthand insight into Sweden's successful approach to sustainability. The Study Tour examined key strategies, including the electrification of public transit, climate-neutral construction, carbon capture for emissions offsetting, and waste-to-energy innovations that create a closed-loop system. With Sweden on track to achieve carbon neutrality by 2040, participants observed various policy frameworks that supported economic development while advancing sustainability goals — demonstrating that profit and environmental responsibility can go hand in hand.

DAY 1 | The first day of the Annapolis and Anne Arundel County delegation's Study Tour to Sweden set the stage for a week of learning and engagement with global sustainability leaders. The delegation began with a briefing session that provided an overview of Sweden's climate policies, urban development strategies, and commitment to achieving carbon neutrality by 2040. Experts from Sweden's environmental agencies and research institutions shared insights into the nation's success in integrating sustainability into policy, infrastructure, and economic growth. The delegation explored Slussen and Hammarby Sjöstad, two premier examples of Stockholm's approach to sustainable urban development. During an afternoon bike tour led by landscape architects, the Delegation saw firsthand how these areas integrate environmentally neutral construction, innovative water management, and alternative transportation solutions to create livable, climate-resilient communities. Slussen, a major redevelopment project, showcases flood resilience, pedestrian-friendly design, and improved transit connectivity, while Hammarby Sjöstad stands as a global model for eco-friendly urban planning, featuring energy-efficient buildings, green spaces, and waste-to-energy systems.

DAY 2 | On the second day of our Study Tour, the delegation delved into Sweden's advancements in sustainable maritime transportation, focusing on electric ferry technology. The Study Tour engaged with leading manufacturers, notably Candela, to explore innovations that could inform the region's initiatives to implement zero-emission ferries connecting Annapolis, Baltimore, and the eastern shore. The day began with a comprehensive tour of Candela's production facilities, guided by Nakul Virat, Chief Commercial Officer, and Brigitte Junker, Global Sales and Policy Representative. The Study Tour observed the manufacturing processes of Candela's electric hydrofoil vessels, which are designed to revolutionize waterborne transit by enhancing efficiency and reducing environmental impact. The Study Tour had the opportunity to experience a test ride on Candela's P-12 Shuttle, an electric hydrofoil ferry. This vessel employs hydrofoil technology, allowing it to glide above water, thereby minimizing drag and energy consumption. The day provided valuable perspectives on integrating cutting-edge electric ferry technology into Maryland's transportation infrastructure.

DAY 3 | On the third day of the Study Tour, the delegation explored Stockholm's leadership in energy-efficient buildings and sustainable urban design. With Sweden's ambitious goal of achieving net-zero greenhouse gas emissions by 2040, the City has become a model for integrating green infrastructure, climate-neutral solutions, and smart growth principles into urban planning. The delegation visited Hötorgshus 2, a major retrofitting project that demonstrates how older buildings can be transformed into energy-efficient, sustainable structures. By incorporating waste heat recovery systems, smart thermal networks, and electrification initiatives, Stockholm is leading the way in reducing emissions from the built environment. These strategies align with efforts in Annapolis and Anne Arundel County to modernize infrastructure while preserving historic architecture. A tour of Stockholm Royal Seaport, one of Europe's most sustainable urban development projects, provided insights into climate-neutral housing, waste-to-energy systems, and fossil-fuel-free district heating. This large-scale initiative integrates green roofs, permeable surfaces, and nature-based solutions to manage stormwater while enhancing livability. The project demonstrates how public-private partnerships and policy-driven incentives can accelerate sustainability efforts.

DAY 4 | The delegation traveled to Gothenburg, Sweden's second-largest city, to engage in discussions on climate-neutral construction and urban sustainability challenges. With Sweden aiming to achieve net-zero greenhouse gas emissions by 2045 and Gothenburg setting an ambitious target of a near-zero climate footprint by 2030, meetings focused on how the city's building and property industries are collaborating to reduce climate impacts and meet these goals.

The delegation participated in a workshop on climate-neutral construction, a crucial strategic focus area for Gothenburg to reach its climate objectives. The City's Municipal Council has partnered with the construction and property industries, along with research communities, to innovate solutions for sustainable urban development. This partnership is encapsulated in the Gothenburg Platform for Climate-Neutral Construction, launched in August 2022. The platform seeks to unite these sectors to drive forward solutions in energy-efficient buildings, low-carbon materials, and sustainable urban planning. A key highlight of the day was a presentation by Nina Jacobsson Stålheim, Head of Development for Ecological Sustainability at Framtiden, Gothenburg's public housing company. Framtiden manages 75,000 dwellings and is currently building 40% of new housing in partnership with the City. Nina's extensive experience in driving sustainability efforts was invaluable, as she discussed how Framtiden is implementing climate-neutral construction practices, leveraging partnerships with the private sector to reduce carbon footprints, and advancing ecological sustainability through innovation.

DAY 5 | The delegation focused on Gothenburg's Green City Zone, an ambitious initiative designed to create an emission-free transportation system by 2030. This transformative project is aimed at testing and developing new technologies and solutions for vehicles, infrastructure, and sustainable mobility. The delegation learned about the various components of this world-first initiative and how it is being implemented with the collaboration of major stakeholders, including Volvo Cars and other key players in the transportation and energy sectors. The delegation had the opportunity to hear from Johan Löfvenholm, CEO of Lindholmen Science Park, who introduced the broader context of the Green City Zone and its future mobility goals. Hans Pohl, Program Manager for the Future Mobility Initiative in the U.S., provided insights into how the Green City Zone is collaborating with other regions, including the U.S., to foster sustainable transport systems. A key part of Gothenburg's efforts is the ElectriCity project, which focuses on the electrification of public transportation. The delegation met with Lars Bern, Project Manager of ElectriCity, to discuss the integration of electric buses, trams, and other transportation systems into the city's public infrastructure. The initiative is working toward reducing emissions and providing accessible, sustainable options for urban mobility. Additionally, Lisa Walldal and Camilla Rydenskog from Västtrafik, the region's transportation company, spoke about their role in improving maritime transport and how sustainable city development and mobility are being integrated in the Gothenburg region. Their work on creating sustainable ferries and other maritime solutions is particularly relevant for Annapolis and Anne Arundel County, which is exploring ways to implement zero-emission ferries in its waterway networks. The delegation then visited the Volvo Penta division. The delegation toured the Volvo Penta Test Center, where they learned about the

company's vision for sustainable marine applications including the electrification of ferries, energy storage systems, and microgrid solutions. The delegation was able to see firsthand the technology that is helping drive the transition toward zero-emission marine vessels, which could play a critical role in reducing carbon emissions on water, aligning with plans in the region for zero-emission ferries.

Key Takeaways from the Study Tour

The Annapolis and Anne Arundel County delegation's Study Tour to Sweden provided invaluable insights into sustainable urban development, transportation systems, and climate-neutral solutions that will guide future initiatives in Maryland. The trip offered firsthand exposure to innovative and integrated practices that blend environmental, social, and economic sustainability.

- *Innovative Transportation Solutions* ~ One of the most striking aspects of the tour was the extensive use of public transit and sustainable mobility options in Sweden. In cities like Stockholm and Gothenburg, public transit systems—primarily buses, trains, trams, and ferries—are the preferred modes of transportation, with cars being a secondary option. The delegation participated in bike tours, and experienced rush hour in metropolitan areas where biking is a major mode of transit. These experiences provided insight into how cities can successfully shift away from car dependence. Electrification of public transport, particularly electric ferries and hydrofoil ferries, was a key topic, aligning closely with Maryland's goals for zero-emission ferry plans. Sweden's use of advanced electric ferry technology and its commitment to creating emission-free transportation serve as a model for the Annapolis-Baltimore ferry routes.

- *Sustainable Urban Design and Climate-Neutral Construction ~* Sweden's commitment to climate-neutral construction was evident during the delegation's visit to Royal Seaport and Gothenburg. These sites demonstrated how energy-efficient buildings, low-carbon materials, and sustainable community planning can transform previously polluted industrial areas into vibrant, livable communities. A standout feature was green infrastructure, such as waste-to-energy systems, which are used to generate heat and electricity from household trash, eliminating the need for landfills. Gothenburg's climate-neutral construction model emphasized the importance of retrofitting existing buildings and incorporating low-carbon, energy-efficient design into new developments, offering actionable lessons for the region's own redevelopment and retrofit strategies.

- *Collaboration and Leadership* ~ A critical theme throughout the tour was the power of collaboration between public and private sectors. Sweden's public-private partnerships were essential in advancing climate-neutral construction and sustainable urban development. Gothenburg's Green City Zone provided an example of how multiple stakeholders—government, industry, and research organizations—can work together to achieve ambitious climate goals.

- *Circular Economy and Waste Management* ~ Sweden's focus on circular economy principles provided an example in how waste management can be integrated into urban sustainability. The delegation observed waste-to-energy systems and closed-loop models, where materials are continuously recycled, reducing the need for landfills and minimizing environmental impact. These practices, along with Sweden's commitment to reducing waste and generating energy from it, were particularly inspiring and provided examples for local waste management and resource recovery initiatives.

- *Long-Term Vision and Climate Targets* ~ Sweden's ambitious climate targets—including achieving a zero net greenhouse gas emissions by 2045 and a near-zero climate footprint by 2030 for Gothenburg—highlight the importance of setting clear, long-term goals. These targets drive action and ensure that cities and regions stay on track to meet their sustainability objectives. As Annapolis and Anne Arundel County work towards their climate goals, Sweden's goal-setting process serves as a model for how to structure and drive local climate action.

Implementation of Learnings

Since returning from their Study Tour to Sweden, the delegation has been actively applying key insights from their visit, engaging in public discussions, and fostering additional collaborations with Swedish officials. The delegation has participated in public presentations, local meetings with Swedish officials, and follow-up surveys to help coordinate and inform future action. Examples of work and collaboration resulting from the tour and already underway include:

- Inspired by the City of Stockholm and Gothenburg, Anne Arundel County is exploring ways to integrate Environmental Social Governance (ESG) principles into its investment and evaluation framework and opportunities to align them with sustainability, equity, and long-term economic resilience.

- Building on Sweden's multimodal and integrated approach, Annapolis is taking steps to enhance its sustainable transit system in the deployment of two electric busses; launch of a small electric ferry connecting City Dock and Eastport and the potential feasibility of streetcar service and implementing "car-free" days in downtown areas to promote pedestrian-friendly urban spaces.

- Using Gothenburg's multi-tiered engagement strategy, the delegation is working with tourism, economic development, and private industry partners in moving toward an electric public transit system. This includes insights gained from Candela's hydrofoil ferries and Volvo Penta's maritime electrification.

- The Resilience Authority incorporated lessons from Stockholm Royal Seaport, a world-leading sustainable urban district, into two EPA Challenge Grant Applications: Glen Burnie Town Center Redevelopment to incorporate sustainable urban design, energy-efficient buildings, and green infrastructure and the City of Annapolis' Redevelopment and Connectivity Initiatives.

- On behalf of the City and the County, the Resilience Authority is seeking opportunities to work with the Stockholm Environmental Institute in the development of a locally informed decision-support tool that integrates; emissions data; action simulations and economic analysis to aid in capital investment and project planning.

- Inspired by Stockholm Royal Seaport's zero-waste principles, the Resilience Authority is working with the delegation, research and private sector partners in the incorporation of "zero-waste" solutions and soil amendments for stormwater management, carbon sequestration and ecosystem restoration.

- The delegation is exploring potential regional opportunities for carbon capture, storage, and sequestration as discussed with the Swedish Environmental Institute as strategies to support Maryland's greenhouse gas reduction efforts.

The delegation continues to collaborate with Swedish officials, engage stakeholders, and seek funding opportunities to further these initiatives. The Resilience Authority will continue to monitor implementation and continued collaboration among the partners.