الأكاديمية العربية للعلوم والتكنولوجيا والنقل البحري

Arab Academy for Science, Technology & Maritime Transport

AASTMT Carbon Emissions Reduction and Sustainability Progress Report (2022-2023)

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Report Overview:

This report outlines AASTMT's progress toward reducing its carbon emissions and advancing sustainability initiatives. It provides detailed updates on the university's efforts in renewable energy, waste management, climate resilience, and sustainability education during the years 2022 and 2023. The report also tracks AASTMT's progress toward its 30% carbon reduction target by 2025 and long-term commitment to achieving carbon neutrality by 2040.

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Table of Contents

1 Executive Summary

In 2022 and 2023, AASTMT demonstrated its continued dedication to climate action and sustainability by making notable progress toward reducing its environmental impact. This report outlines the key achievements made in carbon emissions reduction, renewable energy expansion, and enhancements in sustainability education and research.

By the end of 2023, the university successfully lowered its carbon footprint by 4.6% from 2022 emissions and by 7.2% from 2021 emissions, bringing the total reduction from 2019 levels to 30%. This keeps AASTMT on track to meet its 30% carbon reduction target by 2025 and move forward toward the updated goal of a 50% reduction by 2040. Significant reductions were achieved across Scope 1, Scope 2, and Scope 3 emissions, particularly through improvements in energy efficiency.

Renewable energy use on campus expanded notably, with solar energy meeting 24% of the university's needs by 2023, up from 21% in 2022. This accomplishment supports AASTMT’s goal to source 25% of its energy from renewable sources by 2025 and aligns with Egypt’s national target of reaching 40% renewable energy reliance by 2040.

In sustainability education, climate change and sustainability modules were integrated into 90% of undergraduate programs by 2023. Over 7,000 students engaged in climate-focused workshops and projects, reinforcing AASTMT’s commitment to educating future climate leaders. Research in renewable energy, sustainable transport, and climate resilience also expanded, with 15 new projects launched in 2023.

The university’s community engagement initiatives, including partnerships with local governments, underscore its proactive role in regional climate action. AASTMT’s forward-looking approach to sustainability demonstrates its commitment to both immediate and long-term goals, ensuring a meaningful contribution to the global sustainability movement.

2 Introduction

2.1 Purpose of the Report

This report serves as an update on the Arab Academy for Science, Technology, and Maritime Transport's (AASTMT) ongoing efforts to reduce its carbon footprint and advance sustainability initiatives. It documents the university's progress toward the interim targets set in the **AASTMT Climate Policy**, focusing on the years **2022 and 2023**. The report aims to provide detailed insights into AASTMT's carbon emissions, renewable energy initiatives, waste management improvements, and sustainability education programs. By presenting updated data, this report tracks AASTMT's advancements toward its **30% carbon reduction goal by 2025** and its **long-term commitment to achieving a 50% reduction in carbon emissions by 2040**, in alignment with national energy goals.

2.2 Scope of the Report

The scope of this report encompasses AASTMT's carbon emissions across Scope 1, Scope 2, and Scope 3 for the years 2022 and 2023. This includes:

- Scope 1: Direct emissions from university-controlled sources such as transportation and refrigerant use.
- Scope 2: Indirect emissions resulting from purchased electricity.
- Scope 3: Indirect emissions from activities such as waste management, paper consumption, and water usage.

In addition to emissions data, the report covers progress in expanding renewable energy sources, particularly solar power installations—as well as improvements in energy efficiency and waste reduction initiatives. The integration of sustainability into the university's academic curriculum and research programs, alongside **community engagement activities**, is also highlighted to provide a comprehensive view of AASTMT's sustainability achievements and ongoing contributions to **global climate action**.

3 Overview of Previous Emissions (2018-2021)

To assess AASTMT's progress in reducing carbon emissions and achieving sustainability, it is essential to establish a baseline using emissions data from 2018 to 2021. This period serves as a

foundation for measuring future reductions and allows for a clear comparison with emissions data from 2022 and 2023.

The following Table 1 presents the emissions across Scope 1, Scope 2, and Scope 3, using the Greenhouse Gas Protocol's framework. These figures provide insights into direct and indirect emissions, helping to identify key areas for improvement.

Table 1: AASTMT Carbon Emissions from 2018 to 2021 (kg CO2-e)

Year	Scope 1 (kg CO2-e)	Scope 2 (kg CO2-e)	Scope 3 (kg CO2-e)	Total Emissions (kg CO2-e)
2018	1,244,230.50	1,240,286.52	98,997,739.78	101,482,256.80
2019	1,374,252.42	1,151,281.20	152,068,847.38	154,594,380.99
2020	972,551.04	869,471.36	87,130,328.87	88,972,351.27
2021	1,561,942.92	1,008,256.20	112,858,633.63	115,428,832.75

As shown in Table 1, Scope 1, Scope 2, and Scope 3 emissions fluctuate over the four-year period, with the highest total emissions recorded in 2019. This data provides a critical baseline for measuring AASTMT's progress towards reducing emissions and achieving its long-term sustainability targets.

4 Emissions Overview for 2022-2023

Scope 1 emissions, which encompass direct emissions from university-controlled sources, include fuel usage for the campus transport fleet and emissions from refrigerant leaks in air conditioning and refrigeration systems. In 2022, AASTMT recorded 1,300,000 kg CO2-e in Scope 1 emissions, which represents a modest reduction from previous years. This reduction was primarily driven by the electrification of a portion of the university's vehicle fleet, reducing reliance on fossil fuels. Scope 1 emissions decreased further to 1,150,000 kg CO2-e in 2023 due to continued efforts to replace fuel-dependent vehicles and improvements in refrigerant management.

Scope 2 emissions arise from indirect emissions due to purchased electricity. In 2022, Scope 2 emissions were 950,000 kg CO2-e, reflecting a substantial decrease from previous years due to the

installation of 250 KW of solar panels. By 2023, the university reduced Scope 2 emissions further to 925,000 kg CO2-e, sourcing 40% of its total energy consumption from solar power and other renewable sources.

Scope 3 emissions account for indirect emissions from activities such as waste disposal, water usage, and paper consumption. These emissions represented the largest share of AASTMT's carbon footprint, but significant reductions were achieved, with Scope 3 emissions totaling 110,000,000 kg CO2-e in 2022 and decreasing further to 105,000,000 kg CO2-e in 2023 due to improved waste management and reduced paper consumption.

Table 2: Summarizes AASTMT's total carbon emissions for 2022 and 2023 compared to the previous baseline period:

Year	Scope 1 (kg CO2-e)	Scope 2 (kg CO2-e)	Scope 3 (kg CO2-e)	Total Emissions (kg CO2-e)
2022	1,300,000.00	950,000.00	110,000,000.00	112,250,000.00
2023	1,150,000.00	925,000.00	105,000,000.00	107,075,000.00

As shown in Table 2, the total emissions for 2023 reflect a steady decrease by 4.6% from 2022 emissions and by 7.2% from 2021 emissions, with a notable reduction of 30% from 2019 which witnessed highest emissions. These reductions demonstrate AASTMT's commitment to meeting its 30% reduction target by 2025 and its long-term goal of carbon neutrality by 2040.

5 Renewable Energy and Energy Efficiency

5.1 Renewable Energy

Over the course of 2022 and 2023, AASTMT made significant strides in transitioning to renewable energy sources, with a particular focus on solar power. The university expanded its solar infrastructure to reach almost 215 kW in 2022/2023. This helped supply 24% of the university's total energy needs in 2022/2023.

This growth was made possible through further investments in renewable energy infrastructure and improvements in the maintenance and operation of existing solar installations. However,

recognizing the challenges in reaching 100% renewable energy, AASTMT has revised its long-term target to 40% renewable energy by 2040, in line with Egypt's national energy strategy, which aims for 42% renewable energy by 2040.

5.2 Energy Efficiency

In addition to expanding its use of renewable energy, AASTMT implemented a series of energy efficiency measures to reduce overall energy consumption across the campus. One of the most impactful initiatives was the replacement of 95% of conventional lighting with LED lighting systems by the end of 2023. This transition led to a significant reduction in electricity consumption, as LED lighting uses up to 75% less energy than traditional lighting.

The introduction of smart building management systems also played a critical role in improving energy efficiency. These systems allowed for real-time monitoring and optimization of energy use in major campus buildings, reducing electricity waste and improving operational efficiency. Additional energy-saving technologies, such as energy-efficient HVAC systems and motion-sensor lighting in common areas, contributed to an overall 13.6% reduction in electricity use compared to 2018 levels.

These efforts in renewable energy adoption and energy efficiency demonstrate AASTMT's commitment to reducing its carbon footprint and improving the sustainability of its campus operations. The combined impact of these initiatives positions the university to meet its short-term goal of 30% carbon reduction by 2025 and its revised long-term goal of 50% carbon reduction by 2040, aligning with both national energy strategies and institutional sustainability goals.

6 Sustainable Resource Management and Waste Minimization

AASTMT recognizes the importance of sustainable resource management in reducing environmental impact and supporting long-term climate goals. While not adopting a zero-waste policy, AASTMT is committed to minimizing waste and promoting sustainable practices through targeted waste reduction, recycling programs, and sustainable procurement.

1. **Waste Minimization Goals**

To advance sustainability, AASTMT has set measurable waste minimization targets, focusing on reducing overall waste generation by improving sorting, recycling, and waste reduction practices

on campus. Planned initiatives include establishing campus-wide waste management protocols and educating students and staff on responsible consumption.

2. **Recycling Initiatives**

AASTMT is expanding its recycling efforts to cover key waste categories, including paper, plastics, and electronic waste. Annual benchmarks are being introduced to measure progress, with recycling bins accessible across all campuses to encourage responsible waste disposal. Collaborations with local recycling facilities and environmental NGOs will also enhance these initiatives by ensuring collected materials are efficiently processed and reused.

3. **Sustainable Procurement**

AASTMT is committed to adopting sustainable procurement practices, prioritizing products that are recyclable, reusable, or minimally packaged. This initiative aims to reduce the amount of waste generated from purchased goods and contribute to the university's overall sustainability goals. As part of this effort, departments across campus are beginning to align their purchasing decisions with these sustainable guidelines.

4. **Awareness Campaigns and Engagement**

AASTMT is launching awareness campaigns to promote sustainable practices and encourage waste reduction behaviors within the campus community. Educational programs and workshops will focus on the environmental impact of waste, strategies for responsible consumption, and practical recycling habits.

5. **Pilot Programs and Milestones**

To build a sustainable framework, AASTMT is implementing pilot programs that test waste reduction strategies, such as cafeteria composting, with the potential to scale successful practices campus-wide. Key milestones for this initiative include:

- **2025**: Complete a comprehensive recycling assessment to identify priority areas for improvement.
- **2030**: Achieve a significant reduction in campus waste generation and expand recycling initiatives to all major waste categories.

- **2040**: Ensure that sustainable procurement policies are fully integrated across all departments, establishing campus-wide waste minimization programs and meeting ambitious reduction targets.

Through these initiatives, AASTMT is demonstrating its commitment to sustainable resource management, contributing to its Climate Action Plan goals and supporting a more sustainable future in alignment with Egypt's national environmental objectives.

7 Education and Research Initiatives

7.1 Climate Change Education

AASTMT has made substantial progress in integrating climate change and sustainability into its academic curriculum, ensuring that students are well-equipped to tackle environmental challenges. By the end of 2023, 90% of undergraduate programs had incorporated sustainability-related courses, covering key topics such as sustainable development, renewable energy, and climate adaptation. These courses have become integral components of the university's academic offerings, providing students across disciplines with the knowledge and skills necessary to address pressing environmental issues.

In addition to curriculum integration at the undergraduate level, AASTMT has further demonstrated its commitment to climate education through the introduction of the Master of Science Degree in Smart Environmental Management of Climate Change (SECCM). This program, accredited by the Egyptian Supreme Council of Universities, focuses on preparing students to address climate change challenges across Arab countries and Africa. The SECCM curriculum provides comprehensive coverage of topics related to climate resilience, renewable energy, environmental management, and sustainable development, equipping graduates with the skills and expertise to contribute to climate solutions on a regional and global scale.

Moreover, between 2022 and 2023, AASTMT hosted over 25 workshops and seminars on climate change and sustainability, attended by more than 7,000 students. These events provided practical knowledge and hands-on learning experiences related to sustainability practices, carbon footprint reduction, and the transition to a green economy. Through these workshops, AASTMT has fostered

a generation of climate-conscious students who are ready to engage in climate action and sustainability initiatives both within and beyond the campus.

7.2 Research Output

AASTMT has significantly expanded its contributions to climate change research through various projects, publications, and collaborative initiatives between 2022 and 2024. The university launched 15 new research projects focusing on key sustainability topics such as renewable energy technologies, sustainable transportation, and climate resilience in the Middle East and North Africa (MENA) region. These projects resulted in the publication of 10 research papers in international journals, further contributing to the global body of knowledge on climate change mitigation and adaptation strategies.

In addition to formal research projects, AASTMT has supported various graduate-level theses covering a diverse range of topics, including:

- Climate change awareness and actions within specific industries, such as maritime transport.
- Sustainable bio-remediation techniques using natural resources, like macroalgae, to tackle industrial pollutants.
- Agricultural resilience, including studies on enhancing crop resistance to heat stress through innovative biostimulants.
- Climate justice and social impacts, such as the effects of climate change on vulnerable populations, including women in rural communities.
- Environmental monitoring, such as spatial and temporal tracking of groundwater quality in coastal regions affected by climate change.
- Marine and air pollution mitigation, including research on port emissions and the biodegradation of plastics in marine environments.

These research initiatives have helped address critical issues such as pollution, agricultural sustainability, and social justice, advancing both scientific understanding and practical solutions for climate adaptation and mitigation.

AASTMT researchers also engaged in collaborative initiatives with universities and research institutions worldwide, fostering knowledge exchange and innovation.

Through its expanding research portfolio, AASTMT continues to play a leading role in both the regional and global sustainability movement, furthering the scientific discourse on climate change while actively contributing to practical solutions for addressing these challenges.

8 Student and Community Engagement

8.1 Student Participation

In 2022 and 2023, AASTMT actively engaged students in sustainability initiatives through various programs and events organized by the Deanery of Student Affairs. These initiatives encouraged students to participate in climate action projects, attend sustainability workshops, and contribute to the university's ongoing efforts to promote environmental stewardship. By the end of 2023, over 600 students had participated in these programs, taking part in activities such as recycling drives, energy audits, and tree-planting campaigns. These student-led events helped raise awareness and promote sustainable practices across the campus.

In addition to these organized events, students were involved in a range of sustainability projects, including waste management, renewable energy audits, and climate change research. These projects provided students with hands-on experience in addressing real-world environmental challenges, reinforcing AASTMT’s commitment to fostering a culture of climate leadership and environmental responsibility among its student body.

8.2 Community Outreach

AASTMT’s engagement with the broader community has been integral in advancing its climate action and sustainability goals in 2022 and 2023. The university has strengthened partnerships with local governments, working with municipalities on projects such as urban greening, waste management, and flood risk management. These efforts not only helped improve the climate resilience of local communities but also provided valuable hands-on learning opportunities for students involved in these initiatives.

AASTMT also conducted a series of community workshops aimed at raising awareness about climate change and promoting sustainable practices. These workshops, which covered topics such as waste reduction, energy conservation, and sustainable transportation, attracted over 1,500

participants from the local community. The university fostered a culture of sustainability in the surrounding region by encouraging dialogue and knowledge-sharing.

On the international stage, AASTMT actively participated in various events through its internationally funded projects. The university's involvement in these projects allowed it to contribute to global climate action discussions, sharing its best practices and learning from global leaders in sustainability. Through collaborations with universities in Europe and Asia, AASTMT worked on research projects related to climate resilience and sustainable development, leveraging the support of international funding to make a significant contribution to global climate solutions.

These student and community engagement initiatives reflect AASTMT's ongoing commitment to making a tangible impact on both local and international climate action efforts, fostering a culture of environmental responsibility and leadership.

9 Progress Towards Interim Targets

9.1 30% Carbon Reduction Target by 2025

AASTMT has made significant progress towards achieving its 30% carbon reduction target by 2025, based on emissions data from 2022 and 2023. By the end of 2023, the university had reduced its total carbon emissions by 30% compared to 2019 levels. This reduction was driven by key initiatives, including the expansion of renewable energy, the adoption of energy-efficient systems, and improvements in waste management and recycling programs.

- Scope 1 Emissions: Scope 1 emissions, which stem from direct sources such as transportation and fuel usage, steadily declined due to the electrification of campus vehicles and improved refrigerant management. By 2023, Scope 1 emissions were reduced to 1,150,000 kg CO2-e, contributing to the overall reduction in AASTMT's carbon footprint.
- Scope 2 Emissions: Investments in solar power installations significantly reduced Scope 2 emissions from purchased electricity. With 24% of the university's energy needs met by renewable sources by 2023, Scope 2 emissions fell to 925,000 kg CO2-e, further driving down the university's total emissions.
- Scope 3 Emissions: The improvements in recycling and reduced paper consumption, combined with reductions in paper consumption and increased recycling, led to a decrease

in Scope 3 emissions to 105,000,000 kg CO2-e by the end of 2023. This represented a substantial reduction in AASTMT's largest emission source.

Based on these achievements, AASTMT is on track to meet its 30% carbon reduction target by 2025. The continued implementation of renewable energy projects, energy efficiency measures, and waste reduction strategies will be crucial in reaching this interim goal.

9.2 Future Goals for 2030 and 2035

Looking ahead, AASTMT remains committed to achieving its long-term sustainability goals, with key milestones for 2030 and 2035 as follows:

- 30% Carbon Reduction by 2025: AASTMT successfully reduced carbon emissions in 2023 by 30% from 2019 emissions. To maintain this reduction by 2025, AASTMT plans to continue expanding its renewable energy capacity, with the goal of sourcing 25% of its energy from renewables by 2025. Additional solar power installations and the adoption of emerging clean technologies, such as wind power and battery storage systems, will play a key role in reducing energy-related emissions.
- 50% Carbon Reduction by 2040: By 2040, AASTMT aims to achieve a 50% reduction in carbon emissions compared to 2019 levels. This will involve further efforts in sustainable transportation, including a complete transition to electric vehicles on campus. Moreover, AASTMT will implement advanced smart grid technologies to optimize energy consumption and storage, as well as expanding renewable infrastructure to supply 40% of AASTMT energy demand by 2040.
- Sustainable Resource Management by 2040: AASTMT is committed to enhancing sustainable resource management practices by 2040. By 2030, the university plans to reduce landfill contributions by diverting at least 70% of waste through recycling initiatives and targeted reductions in resource use. By 2035, AASTMT aims to implement comprehensive recycling and resource optimization systems, focusing on reusing and repurpose materials to minimize the need for new resource extraction and support long-term environmental sustainability.

Through these targeted efforts, AASTMT is well-positioned to meet its 2030 and 2035 emissions reduction goals and continue advancing toward achieving its long-term sustainability targets.

Continued investments in renewable energy, energy efficiency, and waste management will enable the university to lead by example in the global fight against climate change.

10 Conclusion

In the 2022-2023 period, AASTMT achieved substantial milestones across its sustainability and climate action objectives, reflecting strong progress towards its interim and long-term goals.

1. **Carbon Emissions Reduction**: AASTMT reduced its carbon footprint by 30% compared to 2019 levels, driven by reductions across Scope 1, 2, and 3 emissions. Key initiatives included increasing the share of campus energy sourced from solar power to 40%, electrifying the vehicle fleet, and enhancing refrigerant management systems. These actions kept AASTMT on track to meet its 30% carbon reduction target by 2025.
2. **Renewable Energy Expansion**: Significant investments in solar power installations allowed AASTMT to meet a considerable portion of its energy needs with renewable sources, with solar now providing 24% of campus electricity. This progress aligns with AASTMT's target of sourcing 25% renewable energy by 2025 and builds a foundation for the university's 40% reduction target by 2040.
3. **Sustainability Education Integration**: AASTMT incorporated climate change and sustainability topics into 90% of its undergraduate programs, ensuring that students receive comprehensive education in environmental issues and solutions. Student engagement surged, with over 7,000 students participating in climate-related workshops and sustainability projects.
4. **Research and Community Engagement**: The university launched 15 new research projects focused on renewable energy, sustainable transportation, and climate resilience. Community engagement also saw growth, with collaborative programs with local governments and participation in global initiatives like the Race to Zero campaign, further cementing AASTMT's leadership role in climate action and social responsibility.

These achievements showcase AASTMT's commitment to climate resilience and environmental stewardship, positioning it as a model for sustainability in higher education.