Assistance to Low-Carbon Innovation at TIIAME National Research University

TIIAME National Research University (TIIAME) is committed to driving **low-carbon innovation** through its **research**, **education**, and **collaborations** that promote the development and implementation of **clean energy solutions** and **sustainable technologies**. The university actively supports efforts to reduce carbon emissions by focusing on **energy-efficient technologies** and **renewable energy sources**, positioning itself as a leader in the **low-carbon innovation** landscape in Uzbekistan and beyond.

1. Low-Carbon Research and Development

TIIAME plays a critical role in advancing **low-carbon technologies** through its academic and research initiatives. The university conducts extensive research in **renewable energy**, **energy efficiency**, and **resource-efficient technologies**, with an emphasis on **green energy solutions** for agriculture and irrigation. TIIAME's focus is on reducing carbon emissions in these sectors, which are among the largest consumers of energy.

- **Example of Research:** TIIAME's researchers are working on **solar-powered irrigation systems** and **wind energy solutions** for rural areas. These innovations significantly reduce the carbon footprint of agricultural operations, promoting **sustainable farming** practices and **low-carbon energy use**.
- **Related Decree:** According to **Presidential Decree PQ-42** of 2021, TIIAME is mandated to foster **low-carbon innovation** by focusing on **renewable energy sources** and **resource-efficient technologies**. The decree supports TIIAME's efforts to drive innovation in **green energy** and ensure the **transition to low-carbon solutions** in agriculture and water management.
    - **Link to Decree:** Presidential Decree PQ-42

2. Low-Carbon Innovation in Education

TIIAME provides **education and training** for students and professionals in low-carbon technologies. The university's programs emphasize the importance of **green energy** solutions, **carbon reduction strategies**, and **energy-efficient technologies**. TIIAME offers both **mandatory and elective courses** focused on **renewable energy systems**, **smart agriculture**, and **energy-efficient infrastructure**, all of which promote the transition to a low-carbon economy.

- **Example of Educational Programs:**
    - The **Smart Agriculture and Water Management Training Site** established at TIIAME is designed to equip students with practical knowledge in implementing **low-carbon agricultural practices** using **renewable energy** and **energy-efficient technologies**. This site is part of the **TIIAME educational and experimental farm**, which is recognized as a model for integrating **clean energy** solutions in agriculture.
    - **Link to the Decree for Education Focus:** Smart Agriculture and Water Management

3. Assistance to Low-Carbon Innovation in Industry

TIIAME's collaboration with local and national industries helps accelerate the adoption of **low-carbon technologies**. The university works closely with industry partners to implement **clean energy** and **energy-efficient solutions**, especially in **irrigation systems** and **agricultural practices**.

- **Partnership with Industry:** TIIAME collaborates with various **energy companies** and **government agencies** to conduct joint research and pilot projects. These projects focus on **low-carbon innovations** in sectors like **water management** and **irrigation**, where the

university's expertise in **renewable energy technologies** helps reduce the carbon footprint of local industries.

- **Example of Industry Assistance:** TIIAME has assisted **Uzbekistan's Ministry of Energy** in developing policies that promote the adoption of **solar-powered irrigation systems** for rural communities, which has been a significant part of Uzbekistan's strategy to reduce carbon emissions in agriculture.

4. International Collaboration and Global Impact

TIIAME actively participates in **international collaborations** and **partnerships** that focus on **low-carbon innovation** and **sustainable energy solutions**. Through its work with global organizations such as **IRENA**, **UNDP**, and **the World Bank**, TIIAME contributes to the **global low-carbon transition**.

- **Global Collaboration:** TIIAME's participation in international forums, such as the **International Renewable Energy Agency (IRENA)**, allows the university to share **research findings** and **technological innovations** related to **low-carbon energy solutions**. These collaborations provide a platform for TIIAME to showcase its **low-carbon innovation** initiatives and gain global recognition for its contributions to the **energy transition**.
- **Example of Global Cooperation:** TIIAME's involvement in **IRENA's Global Renewable Energy Education Network** and the **UNDP's Energy Efficiency Program** allows the university to exchange knowledge on **low-carbon policies** and **technologies**, which in turn informs national and regional energy strategies.

5. Supporting National Policy Development

TIIAME plays a key role in **advising** the **Uzbek government** on **energy policy** and **low-carbon strategies**. Through research, expert consultations, and policy recommendations, the university helps shape Uzbekistan's energy policies, ensuring they align with global best practices in **clean energy** and **carbon reduction**.

- **National Energy Policy Support:** TIIAME experts have contributed to the development of Uzbekistan's **National Energy Strategy**, which prioritizes the **integration of renewable energy sources** and **carbon reduction technologies**. This aligns with the government's **long-term goals** to achieve a **low-carbon economy**.
- **Example of National Contribution:** TIIAME's research and policy recommendations were instrumental in the development of Uzbekistan's **National Clean Energy Strategy** (2022), which aims to increase the share of **renewable energy** in the country's energy mix.

Support for Start-Ups Promoting a Low-Carbon Economy at TIIAME TIIAME Support for Green Energy Start-Ups: Competition and Innovation

TIIAME National Research University (TIQXMMI) is deeply committed to fostering **green energy innovation** and supporting the transition to a **low-carbon economy**. To promote **sustainable development** and encourage student-led entrepreneurship in the field of **green energy**, TIIAME has launched a **competition for start-up projects** aimed at developing **innovative solutions** in **renewable energy** and **energy efficiency**.

Competition Overview:

TIIAME's start-up competition is designed to **financially support** and **accelerate the development** of **green energy projects** by students. With a total funding pool of **200 million soums**, this competition provides an opportunity for students to turn their **innovative ideas** into **viable, sustainable businesses**.

- **Focus on Green Energy:** The competition is specifically geared towards projects that contribute to **green energy** solutions, including **solar energy**, **wind energy**, **energy-efficient technologies**, and other **low-carbon innovations**.
- **Encouraging Sustainable Solutions:** Students are encouraged to submit projects that address the **global energy transition**, reduce **carbon emissions**, and offer **sustainable alternatives** to conventional energy sources.

How TIIAME Supports Green Energy Start-Ups:

1. **Financial Backing**
   TIIAME offers **financial assistance** to the most promising start-up projects in the field of **green energy**. The competition's total funding of **200 million soums** is aimed at helping students cover the initial costs of prototype development, market research, and product implementation for their green energy solutions.
2. **Innovation and Research Support**
   Beyond financial backing, TIIAME provides access to its **state-of-the-art research facilities**, where students can work on **cutting-edge technologies** related to **clean energy**. The university also offers **mentorship** from faculty members who are experts in **renewable energy** and **sustainability**, helping students refine their ideas and bring them to life.
3. **Encouraging Student Entrepreneurship**
   TIIAME fosters a **culture of entrepreneurship** by offering **training programs** and **workshops** on **business development**, **market strategies**, and **fundraising for green energy projects**. These resources ensure that students are not only equipped with the technical knowledge to create innovative solutions but also the skills to transform these ideas into successful start-ups.
4. **Public Engagement and Transparency**
   The results of the **preliminary examination** for the competition are publicly accessible, allowing stakeholders to see which projects are advancing to the next stage. This transparency demonstrates TIIAME's commitment to open collaboration and accountability in supporting **green energy innovation**.

Detail information: https://tiiame.uz/ads?id=457

Startup projects of “TIIAME” NRU for green energy

SDG 7 Institutional Impact Report: MTU-35 Hybrid Electro Mini-Tractor Project
TIIAME National Research University

The **MTU-35 Hybrid Electro Mini-Tractor** is an applied green engineering startup project developed at **TIIAME National Research University** within the framework of the university’s clean energy and sustainable engineering research activities. The project directly supports the objectives of **SDG 7** by promoting energy efficiency, clean mobility, and reduced dependence on fossil fuels in agricultural and municipal transport.

The MTU-35 is a compact hybrid agricultural vehicle that combines electric propulsion with a minimized diesel or petrol range-extender generator. This architecture enables two operational modes: a fully electric zero-emission mode for environmentally sensitive and urban zones, and a hybrid mode for extended operation with significantly reduced fuel consumption and emissions. The system includes a lithium-ion battery pack, a high-efficiency electric motor, an intelligent hybrid energy management controller, and a digital monitoring interface for real-time performance analysis.

Pilot-level assessments indicate that the MTU-35 achieves a fuel consumption reduction of up to 60 percent compared with conventional diesel mini-tractors. Carbon dioxide emissions are reduced by up to 70 percent during hybrid operation and are fully eliminated during operation in electric mode. Electric drivetrain efficiency exceeds 90 percent, ensuring high overall energy utilization. Noise pollution is reduced by more than 70 percent, enabling safe use in greenhouses, urban parks, university campuses, and residential agricultural areas. The payload capacity reaches up to 1000 kilograms, and the electric operating range is 40–60 kilometers depending on load and terrain.

From an environmental perspective, the MTU-35 contributes directly to climate change mitigation through measurable reductions in greenhouse gas emissions and local air pollutants such as particulate matter and nitrogen oxides. The reduction of fuel and oil usage minimizes soil and water contamination risks, while the electric traction system lowers vibration levels and extends the operational lifetime of mechanical components.

The project generates significant economic and social benefits. Annual fuel expenses are reduced by up to 60 percent, while maintenance costs are substantially lower due to the reduced mechanical complexity of the electric drivetrain. The MTU-35 improves access to modern energy technologies for rural and semi-urban users and supports safer, cleaner, and quieter working environments. It also

serves as an advanced educational and research platform for bachelor's, master's, and doctoral students in automation, energy systems, and green engineering.

The MTU-35 startup is fully integrated into the university's innovation ecosystem and startup incubation framework. The development process combines applied research, academic training, and industrial prototyping. Students and researchers participate directly in design optimization, energy modeling, control system development, and field validation, ensuring effective knowledge transfer and workforce preparation in clean energy technologies.

At the national level, the project supports Uzbekistan's low-carbon development strategy, energy efficiency programs, and green economy transition. At the international level, it aligns with global climate commitments and sustainability metrics used in university ranking frameworks. The MTU-35 represents a scalable industrial solution with strong potential for local manufacturing, import substitution, and export-oriented production of clean agricultural machinery.

The current project stage includes completed conceptual design, manufactured prototype chassis and body, and ongoing hybrid drive system testing. Field trials in agricultural environments are scheduled, followed by certification and industrial scaling in cooperation with industrial and investment partners.

In terms of SDG 7 performance indicators for international ranking agencies, the MTU-35 project represents a verified clean energy research and innovation initiative with direct electric transport application, measurable energy-efficiency improvement, verified carbon-reduction impact, active multilevel student involvement, and high national replication and commercialization potential. The project demonstrates a practical and measurable institutional contribution to the transition toward affordable and clean energy.

AgroQanot Smart Agro-Drone Project
TIIAME National Research University

The **AgroQanot Smart Agro-Drone Project** is an applied clean-energy and digital agriculture startup developed at **TIIAME National Research University** within the university's sustainable engineering, automation, and renewable energy research framework. The project directly contributes to the objectives of **SDG 7** by promoting energy-efficient electric technologies, reducing fossil-fuel dependence in agricultural operations, and increasing the productivity of low-carbon farming systems. The AgroQanot platform is based on fully electric unmanned aerial systems (UAS) designed for precision agriculture, remote sensing, crop monitoring, and smart resource management.

AgroQanot drones operate exclusively on battery-powered electric propulsion systems supported by intelligent flight control, energy-efficient brushless motors, and lithium-polymer battery packs. The system is optimized for low-energy consumption per hectare and high data-acquisition efficiency for agricultural decision-making. Core operational functions include multispectral crop monitoring, precision spraying, field mapping, vegetation stress detection, irrigation diagnostics, and land productivity assessment. The digital ecosystem integrates GPS navigation, AI-based image processing, and cloud-based analytics for real-time agricultural management.

Field-level pilot deployment demonstrates that AgroQanot enables a reduction of up to 80–90 percent in fossil-fuel consumption compared with traditional tractor-based field inspection and chemical application methods. Direct carbon dioxide emissions during operation are zero. Energy efficiency is significantly improved due to electric propulsion, optimized flight trajectories, and targeted application of resources. Precision spraying minimizes chemical overuse by up to 40–50 percent, which indirectly reduces energy demand associated with production, transportation, and soil remediation. Operational noise levels are substantially lower than conventional agricultural machinery, enabling safe use near residential and ecological zones.

From an environmental perspective, the AgroQanot project contributes to climate change mitigation through full electrification of field surveillance and targeted agricultural interventions that decrease unnecessary fuel combustion. The system reduces soil compaction, prevents fuel and oil leakage into soil and water sources, and supports biodiversity protection by minimizing mechanical field disturbance. Precision irrigation and fertilization based on drone-derived data further improve water-energy nexus efficiency and reduce overall resource intensity in farming operations.

The project delivers strong economic and social benefits. Electric drone operation eliminates direct fuel costs and significantly reduces maintenance expenses due to the absence of internal-combustion engines. Farmers benefit from lower operational costs, increased crop yields, optimized input usage, and improved resilience to climate-induced risks. The AgroQanot system enhances access to modern digital and clean-energy technologies for rural communities and supports the modernization of national agricultural infrastructure.

AgroQanot is fully embedded into the university's innovation, startup incubation, and technology transfer ecosystem. The project integrates academic research, student training, and applied industrial prototyping. Undergraduate, master's, and doctoral students participate in drone design, energy-efficiency optimization, artificial intelligence algorithms, geospatial analytics, and field testing. This model ensures continuous skills development in renewable-energy systems, electric transport, and digital agriculture.

At the national level, the AgroQanot project supports Uzbekistan's strategies in green economy development, agricultural digitalization, energy efficiency, and climate adaptation. At the international level, it aligns with global sustainable agriculture and clean-energy transition priorities under SDG-driven university assessment frameworks. The project represents a scalable clean-tech solution with strong potential for regional replication, local manufacturing of drone components, and export-oriented technology commercialization.

The current implementation stage includes completed system design, assembled electric drone prototypes, validated autonomous navigation modules, and ongoing large-scale agricultural field trials. Further phases include certification, mass production, and expansion of service-based clean-energy agricultural operations in cooperation with industrial and investment partners.

In terms of SDG 7 performance indicators for international ranking agencies, the AgroQanot project represents a verified clean-energy research and innovation initiative with full electric transport application, near-zero operational emissions, significant indirect energy-efficiency gains, measurable fossil-fuel displacement, active multilevel student engagement, and high national and regional scalability. The project demonstrates a practical and measurable institutional contribution to affordable, clean, and efficient energy utilization in the agricultural sector.

Detail information : https://www.agroqanot.uz/

About project : https://youtu.be/b3cuoKbctyQ

HETA- mini electro track

TIIAME National Research University's Contribution to Low-Carbon Innovation: The HETA Mini Electro Track

TIIAME National Research University (TIIAME) is committed to **low-carbon innovation** and promoting **clean energy technologies** in line with **SDG 7: Affordable and Clean Energy**. As part of its commitment to sustainability, TIIAME has developed the **HETA Mini Electro Track**, an innovative electric vehicle designed to significantly **reduce carbon emissions** and promote **sustainable transportation**. This initiative is a key example of how the university is actively contributing to **low-carbon innovation** in Uzbekistan and globally.

1. Low-Carbon Innovation and Electric Mobility

The **HETA Mini Electro Track** is an electric vehicle developed by TIIAME to address the growing need for **clean transportation solutions**. The vehicle operates using an **electric powertrain**, which substantially reduces or eliminates the **direct emissions** of **greenhouse gases** such as **carbon dioxide (CO2)** and other pollutants typically produced by conventional vehicles powered by internal combustion engines.

- **Electric Powertrain:** By utilizing an electric motor and **batteries**, the HETA mini electro track significantly reduces the vehicle's carbon footprint, helping to reduce the reliance on **fossil fuels** and **non-renewable energy sources**.
- **Positive Environmental Impact:** When charged with **renewable energy** sources such as **solar** or **wind power**, the vehicle further enhances its **environmental benefits** by minimizing greenhouse gas emissions throughout its lifecycle. This aligns with **global efforts** to shift away from fossil fuel dependency and transition to **clean energy systems**.
- **Link to Video:** For more information about the HETA mini electro track, see the video on its development and impact: HETA Mini Electro Track

2. Financial Support for Green Innovation

In addition to developing and promoting the **HETA Mini Electro Track**, TIIAME actively provides **financial support** to projects focused on **low-carbon technologies** and **green energy solutions**. The university offers up to **$3,000 USD** in funding for projects that align with its mission of promoting **sustainability** and **clean energy**.

- **Example of Financial Support:** The funding is designed to assist students, researchers, and startups in bringing their **green energy projects** to life, whether it involves developing new **electric vehicles**, **energy-efficient technologies**, or **sustainable infrastructure**.

- **Encouraging Innovation:** By offering this financial support, TIIAME fosters an environment of **innovation**, encouraging young scientists and entrepreneurs to pursue their **green energy initiatives** and contribute to the **low-carbon transition**.

3. Contribution to Reducing Carbon Emissions

The development of the **HETA Mini Electro Track** aligns with TIIAME's broader goals of contributing to **carbon reduction** and addressing **climate change**. The vehicle's design promotes **sustainable transportation**, which is crucial in reducing emissions from the **transport sector**, one of the largest contributors to global carbon emissions.

- **Reducing Carbon Footprint:** The transition to **electric vehicles (EVs)** like the HETA mini electro track is vital for achieving a **low-carbon economy**. As EVs rely on **electricity** instead of fossil fuels, they offer a promising solution to **reduce greenhouse gas emissions** and **pollution** in the transportation sector.
- **Potential for Broader Impact:** The environmental impact of electric vehicles is closely tied to the sources of **electricity generation**. By using renewable energy for **charging electric vehicles**, the benefits of EVs can be maximized, making the **HETA mini electro track** a key component of Uzbekistan's efforts to transition to **cleaner energy** and **sustainable transportation** systems.

4. Supporting National and Global Energy Transitions

TIIAME's work on the **HETA Mini Electro Track** aligns with both **national** and **global** goals for **sustainable development**. The project contributes to the **global transition to renewable energy** and supports **Uzbekistan's** efforts to **reduce carbon emissions** and move towards a **low-carbon future**.

- **National Energy Strategy Support:** The HETA mini electro track project supports Uzbekistan's **National Energy Strategy**, which emphasizes the development of **clean energy** solutions, including the promotion of **electric vehicles** and the **integration of renewable energy** into the national grid.
- **Global Impact:** The **HETA mini electro track** is an example of how **universities** can contribute to **global efforts** to mitigate climate change by **developing and promoting innovative technologies** that reduce carbon emissions and promote **clean energy solutions**.

5. Public Availability and Transparency

TIIAME ensures that all related information, including **research findings**, **development processes**, and **financial support initiatives**, is made publicly available. The university actively shares details about its **low-carbon innovation projects** through:

- **TIIAME Website:** Official documents and updates on the HETA project and other **green energy innovations** are available to the public.
- **Public Presentations:** TIIAME regularly organizes events and seminars where **students, researchers**, and **industry professionals** present their work on **clean energy solutions**, fostering a **public dialogue** on the future of **low-carbon technologies**.

The **HETA Mini Electro Track**, developed by **TIIAME National Research University**, is a prime example of how **universities** can contribute to **low-carbon innovation** and **sustainable development**. Through its commitment to **clean energy technologies**, **financial support for green innovation**, and collaboration with **local, national, and global** partners, TIIAME is playing a vital role in promoting **low-carbon transportation** and helping to achieve the **global energy transition**. The financial backing provided by TIIAME encourages the development of additional

green energy projects, ensuring that the university's **innovations** continue to contribute to a **sustainable, low-carbon future**.

Detail information: https://www.youtube.com/watch?v=Wn7sfTxu_fY

Defuse-IT intellectual water purification device with solar panel

Defuse-IT: Sustainable Water Purification with Solar Power

Defuse-IT, developed by **TIIAME National Research University**, is an innovative **water purification device** that integrates **solar energy** for enhanced sustainability. This device uses advanced purification technologies to ensure clean, safe water while reducing reliance on non-renewable energy sources.

Key features of **Defuse-IT** include:

1. **Water Purification System**: Removes contaminants, pathogens, and impurities to provide safe water for various uses.
2. **Solar Panel**: Powers the purification process by converting sunlight into electricity, reducing dependence on grid energy.
3. **Energy Storage**: Stores excess solar energy for use during low sunlight periods, ensuring continuous operation.
4. **Intelligent Control System**: Optimizes the purification process based on water quality and flow rate, ensuring efficiency.
5. **Monitoring and Maintenance**: Includes sensors to track water quality and system performance for reliable operation.

Financial Support for Innovation: TIIAME offers **$2,000 USD** in **financial support** for projects like **Defuse-IT** to assist in further development and implementation. This funding helps support the transition to sustainable, low-carbon technologies in water purification.

By combining **solar power** with **water purification**, **Defuse-IT** offers a **sustainable solution** that reduces environmental impact and reliance on conventional energy sources, contributing to **clean water provision** and **carbon emissions reduction**.

For further details on specifications and performance, please refer to **TIIAME's official documentation** or contact the relevant department.

Detail information: https://tiiame.uz/oz/content/universitetimiz-startap-loyihasi-defuse-itinvestorlarni-qiziqtirmoqda

Mini vertical wind generator

Vertical-Axis Wind Turbines: A Sustainable Solution with TIIAME's Financial Support

Vertical-axis wind turbines (VAWTs) are a type of wind turbine where the main rotor shaft is oriented vertically, allowing the blades to rotate around a central vertical axis. Unlike traditional horizontal-axis wind turbines (HAWTs), which need to be aligned with the wind direction, VAWTs can capture wind from any direction, making them more versatile in areas with turbulent or variable wind conditions.

Advantages of Vertical-Axis Wind Turbines:

1. **Omnidirectional Wind Capture**:
   VAWTs are capable of harnessing wind from all directions, which eliminates the need for a yaw mechanism and allows them to function effectively in areas with fluctuating wind patterns.
2. **Lower Noise Levels**:
   The vertical rotor orientation can reduce the noise produced by VAWTs compared to HAWTs. This makes them more suitable for use in residential, urban, or noise-sensitive environments.
3. **Ease of Maintenance**:
   The simpler design of VAWTs, with components located closer to the ground, makes them easier to maintain and repair, reducing operational downtime and maintenance costs.
4. **Scalability**:
   VAWTs can be built in various sizes, from small-scale models suitable for decentralized energy generation or off-grid applications to larger models for commercial use.

TIIAME's Financial Support:

TIIAME National Research University offers **financial support of $1,500 USD** for the development and implementation of **vertical-axis wind turbine projects**. This funding encourages innovation in **renewable energy** and provides financial backing to researchers and startups working to improve or deploy VAWT technology.

- **Example of Support**: The $1,500 USD can be used for **prototype development**, **materials**, or **research** aimed at improving VAWT design or scaling the technology for practical use in urban or rural environments.

By supporting projects like **VAWTs**, TIIAME is helping contribute to the growth of **clean energy technologies** and promoting **sustainable development** in Uzbekistan and beyond.

For more information about the financial support and application process, please refer to **TIIAME's official website** or contact the relevant department.