

December 10, 2019 e-Hike and e-Hikelink Clusters "Communicating, Autonomous and Electric Vehicle Technologies and Services (CAEVS) Workshop "

Final Report

A- National CAEVS Technology Strategy Proposal:

In the new term CAEVS workshop, Technology Strategy proposal issued at the workshop held on May 14 was renewed with a small change in vision that will highlight the strengths of our country in basic strategic areas.

Vision Proposal:

"To be a Global Research Focus with Original Technologies and Innovative Services in Communicating, Autonomous and Electric Vehicle Technologies and Services and To Be Among the Leading Countries In The Global Market"

Key Strategic Areas:

- 1- Clean and Easy Transportation in Cities
- 2- Efficient Freight Transport, Logistics
- 3- Safe Transportation
- 4- Turkey's CAEVS Must Focus Research
- 5- Turkey's CAEVS Global is among the first three countries in the market

Sub-Strategies for Basic Strategic Areas:

Sub-headings in the main strategic areas mentioned are given below in line with the recommendations of the working groups. The sub-headings will not cover all study subjects in the relevant field, and especially the details that should be pioneered according to the strengths and opportunity analysis determined by the working groups. Working groups have been established by means of questionnaires to realize these sub-strategies.

These working groups are listed below:

1- Clean and Easy Transportation in Cities:

- 1.1-City-specific, lightweight, innovative autonomous, communicating electric vehicle
- 1.2- Pioneering work for SAE4-5
- 1.3- Urban logistics distribution vehicles and systems
- 1.4-Integrated, efficient, clean, smart public transport vehicles and systems
- 1.5- Flying city vehicle systems
- 1.6-Intelligent transportation systems
- 1.7- Innovative services

Especially for traffic congestion in Istanbul, (there are different transportation typologies such as minibus, bus, metrobus, rail system, ferry, taxi and private vehicle), companies that are very advanced in software, electronics and automotive taking the environment as a strength and innovative methods for the problems in this environment can bring different technologies and unique solutions globally. Activities in accordance with the Sustainable City Mobility structure and the developing entrepreneurship ecosystem should be used.

Under the leadership of Istanbul Okan University UTAS and MARKA, TAYSAD, Established with the partnership of TESID and YASAD, OPINA "Open Innovation Autonomous Vehicle Technologies Development and Test Center "and TOSB Under the coordination of Istanbul Okan University, Kocaeli University, Koç University, MARKA, Sabancı University, TAYSAD and TUBITAK TUTEL CAEVS-INNOHUB, which is planned to be established in partnership, are important opportunities.

Turkey is a pioneer in the production of buses, minibuses

2- Efficient Freight Transport, Logistics

- 2.1- Intelligent convoy systems
- 2.2- Clean, electric heavy goods vehicles
- 2.3- Smart roads
- 2.4- Innovative logistics optimization systems

Heavy vehicle production and development in our country and the strong logistics sector constitute an important starting level for innovative work in this field.

3- Safe Transportation

- 3.1- In-vehicle passenger and driver health safety systems
- 3.2- Collision detection and prevention systems
- 3.3- Post-collision emergency systems
- 3.4- Software security
- 3.5- Public transport security systems

4- Turkey's CAEVS Must Focus Research

- 4.1- Establishing a CAEVS research platform
- 4.2- Being active in EU projects
- 4.3- Establishing test tracks for CAEVS
- 4.4- Preparation of CAEVS simulation systems
- 4.5- Increasing and monitoring R&D funds in the field of CAEVS

4.6- Centers of excellence and research in the following areas establishing partnerships

- ✓ Communication systems
- ✓ SAE4-5 level software and artificial intelligence
- ✓ Sensor fusion technologies
- ✓ Innovative Sensor Development
- ✓ specific raw materials that can be found in Turkey, sustainable battery cell systems development
- ✓ Innovative Energy and Battery Management systems
- ✓ Battery packaging systems
- ✓ Electrical machines, power and control units
- ✓ Light and efficient electric vehicle design

5- Turkey's CAEVS Engaging Global as one of the leading countries in the market

5.1- Innovative Production Infrastructures for CAEVS

5.2- Expert training platform and education system in the field of CAEVS establishment

5.3- Funding entrepreneurship studies in the field of CAEVS and accelerating

5.4- Ensuring that CAEVS entrepreneurs open up abroad

B- Technological Strategy Roadmap Stages and Targets:

The strategies outlined above are quite comprehensive and it is very difficult to navigate in a short time all. First of all, the goals for the next 5 years should be determined. HORIZON 2020 calls and HORIZON Europe reports also gives direction to the targets in the field (Annex 1). In the workshop, it was decided to carry out important developments in the following areas in the next 5 years by examining the above points and the call of interest and strategy plans.

1- Clean and Easy Transportation in Cities:

In this area, the following projects have been considered.

1.1- Innovative and Flexible Integrated to the Sustainable City Transport System New Generation Communicating, Autonomous and Electric Urban Passenger and Freight Transport Tool (M1, N1) Development:

This tool should have the following features

- ✓ Modular and Flexible internal structure compatible with different usage purposes
- ✓ Modular battery system compatible with the purpose of use
- ✓ Connected and autonomous systems, smart battery and energy management 20% additional range with support of systems
- ✓ Security at minimum EURONCAP 4 level
- ✓ Cost is the same as for same purpose vehicles

- ✓ Intelligent systems that use parking spaces and charging stations in the most optimal way
- ✓ Autonomous systems at minimum SAE 3 Level

1.2- Communication, Autonomous, Electric Bus development studies

1.3- Innovative Services for Clean and Efficient Transport in Cities Development: BIGG calls in this area, Ecosystem development studies, Cooperation between Incubators and Technology Transfer Offices and (Annex 2) OPINA and CAEVS-INNOHUB projects will also have important contributions. According to the development of these projects can be decided.

In addition, Istanbul Okan University in cooperation with ERTICO in studies to improve start-up studies in the fields will be found. (Annex 3)

2. Efficient Freight Transport, Logistics

2.1- Communicating, Autonomous and Electrical System applications energy 20% increased efficiency, heavy truck development studies

2.2- Close range, optimized, safe convoy development studies

3. Safe Transportation

3.1- Integrated with in-vehicle passenger and driver health safety systems developing collision detection and prevention systems

4. Turkey's CAEVS Must Focus Research

Developing innovative products and technologies, especially in the following areas will be important. In addition, OPINA and CAEVS-IINOHUB Projects taking will make an important contribution in this regard.

4.1- Developing an efficient, light and integrated motor with drive system, In-wheel and independent (8 \$ / kW, 1.4 kW / kg, 4kW / L, 95% efficiency)

4.2- Energy and Power Density improved battery packs, (90 € / kWh, 240Wh / kg, 500Wh / L, 470W / kg, 1000W / L, in 20 min recharge time for 70-80% SOC, Cycle time 1000, Useful battery life for 500,000 kms)

4.3- Advanced Artificial Intelligence and Software security Research for SAE4 and 5Level Autonomous vehicles

4.4- New generation battery cell for existing mines in our country development studies

4.5- Establishing an effective communication system between 5G and vehicles

4.6- Development of sensor-integrated or sensor-assisted paint and plastic

5. Engaging in Turkey as one of the leading countries CAEVS global market

5.1- It is important to start OPINA and CAEVS-INNOHUB projects will contribute

5.2- Opening calls for interest SAYEM and at least two projects for each call development (1.1, 1.2, 2.1, 2.2,3.1,4.1, 4.2, 4.4.6)

5.3- Opening calls for research related to 4.3 and 4.5 and supporting studies

C- Working Method:

The above mentioned targets should be reached by 2025. For the calls of interest SAYEM and by establishing working groups for research studies, preparations will be made for these calls. OTEP and UTAS will provide coordination in this regard..