

Τσικανδυλάκης Μανόλης Μηχανολόγος μηχανικός

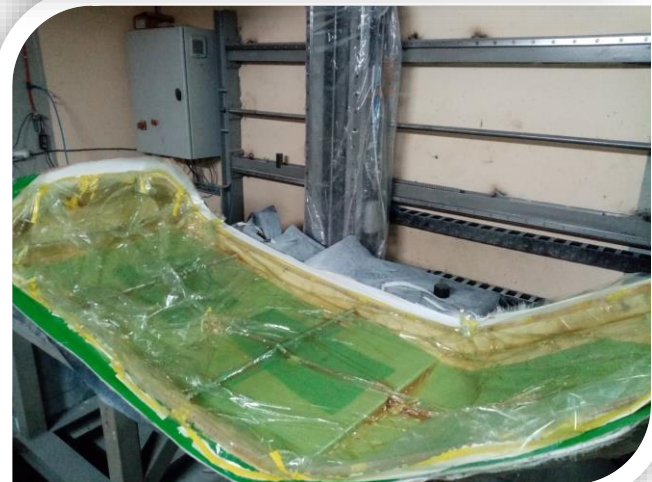
- **Μηχατρονικές εφαρμογές**
- **Ενέργεια**
- **Ηλιακά οχήματα**



www.enermech.gr

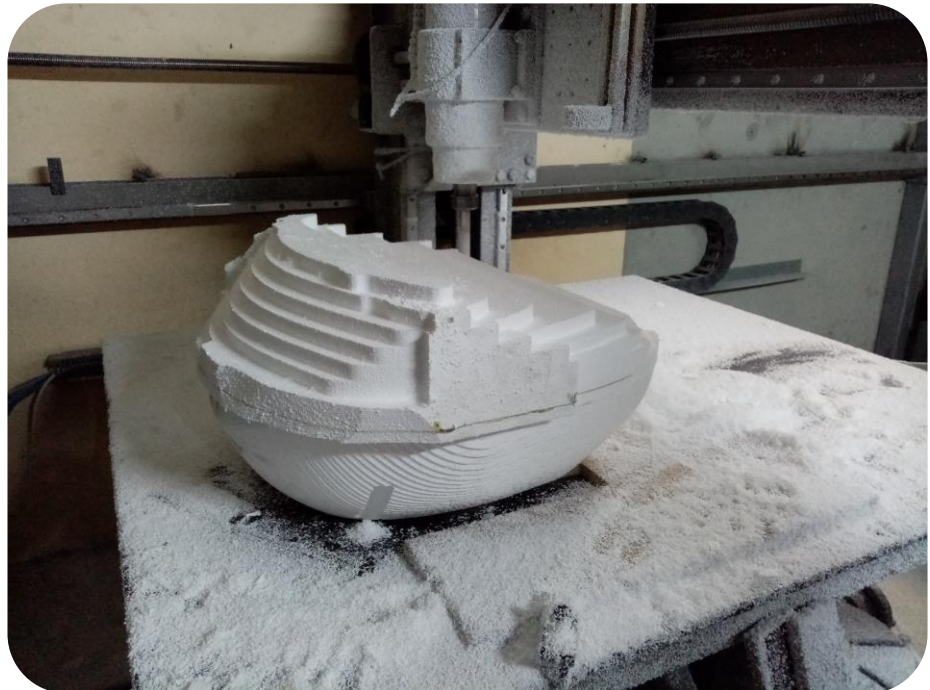
Δραστηριότητες

Δραστηριοποίηση από το 2007 στις Ανανεώσιμες Πηγές Ενέργειας και στη σχεδίαση – κατασκευή μηχανημάτων και μηχαντρονικών εφαρμογών



Υποδομές

- Μεγάλο CNC ρούτερ κατεργασία 3800 x 3000 x 2800 mm
 - CNC φρέζα
 - CNC Plasma
 - Τόρνος
 - Συγκολλήσεις TIG MIG
 - 3D Printer
 - VR technology
-
- 3D CAD software
 - VR technology
 - 3D scanner



Ηλιακά οχήματα

Από το 2010 αναπτύσσουμε τα ηλιακά οχήματα Sunnyclist αναζητώντας καινοτόμες λύσεις για τη βιώσιμη κινητικότητα.

L7eC Project

σε συνεργασία με το πολυτεχνείο Κρήτης,
την εταιρία CommonsLab και το
βιομηχανικό σχεδιαστή Ρούλιο Μιχάλη.



Islander

ηλιακό ποδήλατο



SUNNYCLIST is a **hybrid electro solar - pedal power vehicle** (L7eC category).

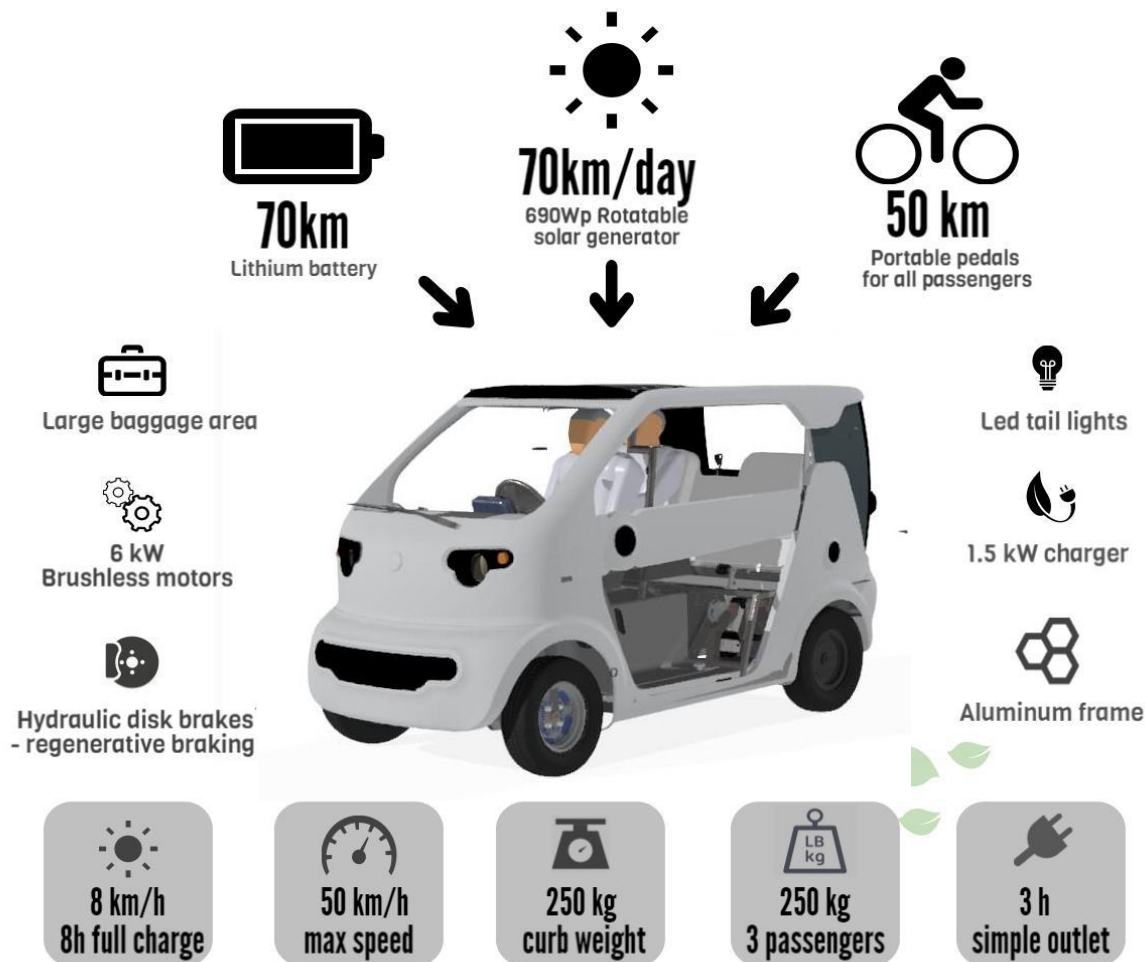
It **moves with electricity**, which is stored in a **lithium battery** that can charge from **solar power** at any time, even when traveling, from **electricity** at parking position or from **passengers** when they pedal.

Though a **big and rotatable photovoltaic generator** and a **powerful motor** it can carry three passengers with their luggage and reach 80 km/h with a unique driving rang.

In normal conditions the **three energy sources, solar power, energy storage and muscle power**, can contribute **symmetrically**.

This energy synergy makes **SUNNYCLIST** the **most economical environmental and autonomously powered vehicle ever built**.

Triple power for endless flexibility and freedom!



Τεχνολογία

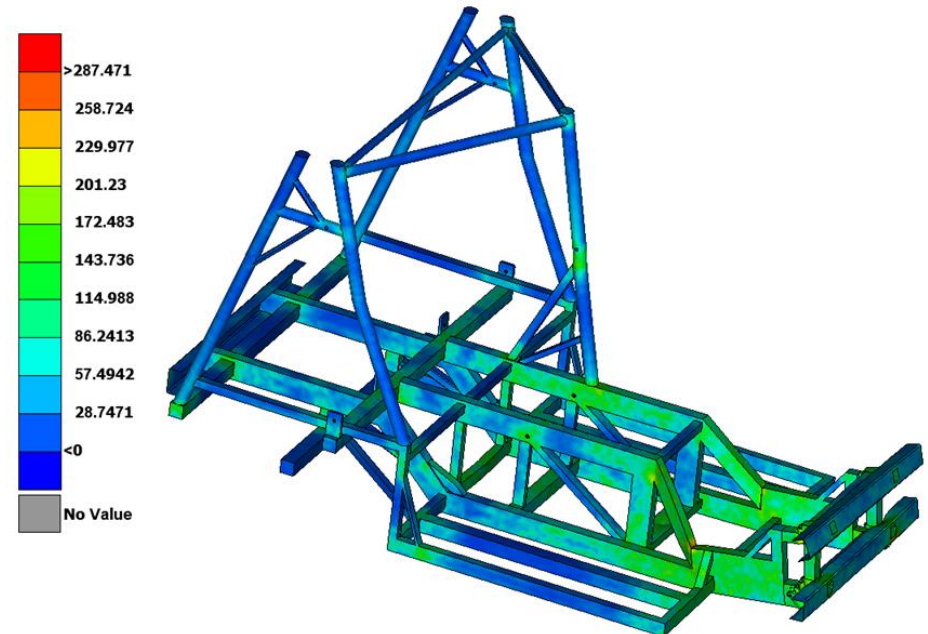
New function mode dictates design.

Key function: Three energy sources synergy- symmetry

Technology benefits

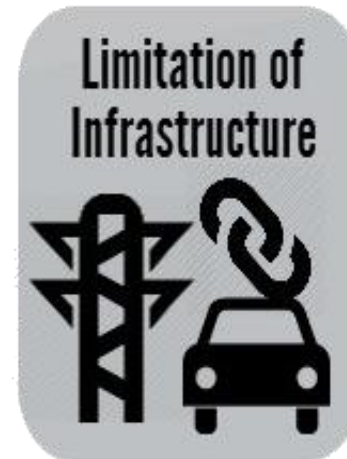
- Energy efficiency (21% for PV cells)
- Energy flexibility-autonomy
- Extended driving range
- Higher power density
- Small battery (quick charge if connected)
- Longer lifetime
- Light design

Removable portable pedal generators



1. Simplicity - reliability
2. Easy removing pedals.
3. Electronically adjustable cadence
4. LCD Monitor. Power – calories – time – cadence.
5. Easy passenger height adjustment

Το πρόβλημα



Consumers have no solution to transport without

- polluting environment. Transport accounts for a third of all energy consumption.
- spending more and more money.

In addition

- Conventional and especially electric vehicles are **limited by infrastructure**
- **human health** impacts of urban mobility causes social effects.

Electromobility is on the way which should overcome the remaining barriers:

bulky and expensive batteries, charging cost, charging infrastructure, long charging time, low driving range and green electricity supply.

Urban 2-seater hybrid electro-solar-human power vehicle

SUNNYCLIST Introduces an innovative transport mode:

The **autonomous automobile powered by renewable energy sources**

Three functions: Depending on share of solar and human charging it can work as
a) solar vehicle, b) electric vehicle, b) Hybrid electro-solar and optional human power

For most populated markets globally SUNNYCLIST can satisfy daily needs for urban **transportation offering daily 30 to 70km with no energy or environmental cost**, independent from infrastructure and promoting healthy living

Green



2 t /year
CO2 Reduction

Economical



2500€/year
savings

Free



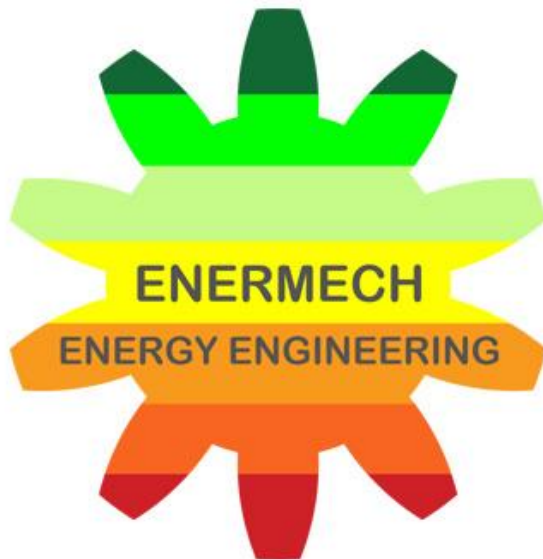
70 km/day
Autonomously

Fitness



3 passengers
pedal drive

Σας ευχαριστώ





THE REVOLUTION IN GREEN MOBILITY

SUNNYCLIST

The Market

Electromobility IS the next big thing.

Light electric vehicles will be the **strongest trend**.

Predicted situation in 2024: Electric vehicles **will increase to 90M** and **ultra light EV to 7M sales**.

Addressability

Main target market:

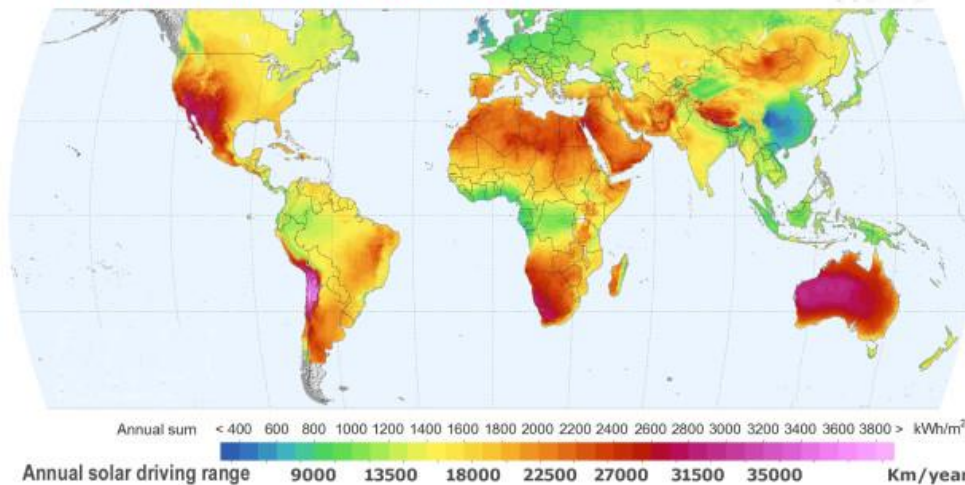
The big market of **urban transportation** / Individuals, small families, enterprises

Most relevant market segment for initial introduction :

Coast line tourist market. Ideal tool for leisure, vacation, touring as rental car or taxi. Less market barriers as end users are not the vehicle owners. (confirmed by conducted direct market research)

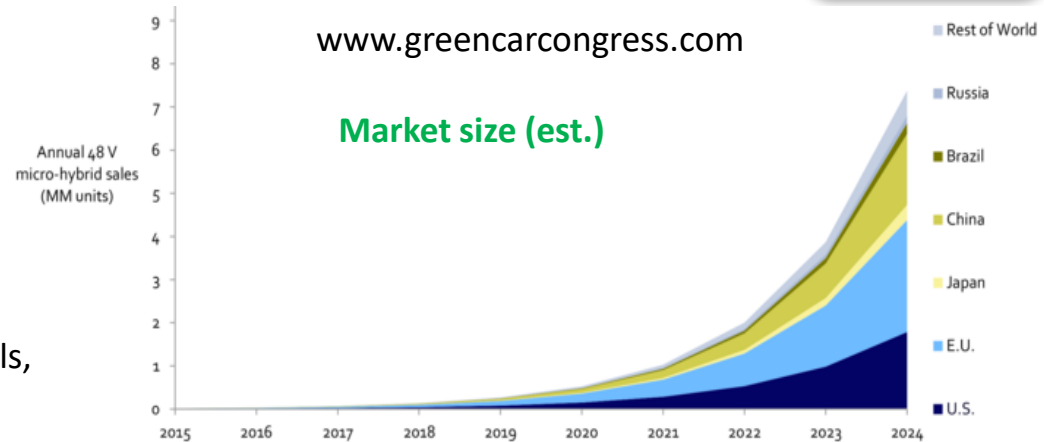
Developing markets. As Rickshaw/ opportunities: soft law, low consumer demands, existing market, emergency for green mobility and autonomous vehicles. (confirmed by the high interest of distributors)

WORLD MAP OF DIRECT NORMAL IRRADIATION



www.greencarcongress.com

Market size (est.)



Geography


(share of solar charging up to 70km/Day):

Southern Europe, Middle East, Australia, Southern Africa, India, USA, Central America

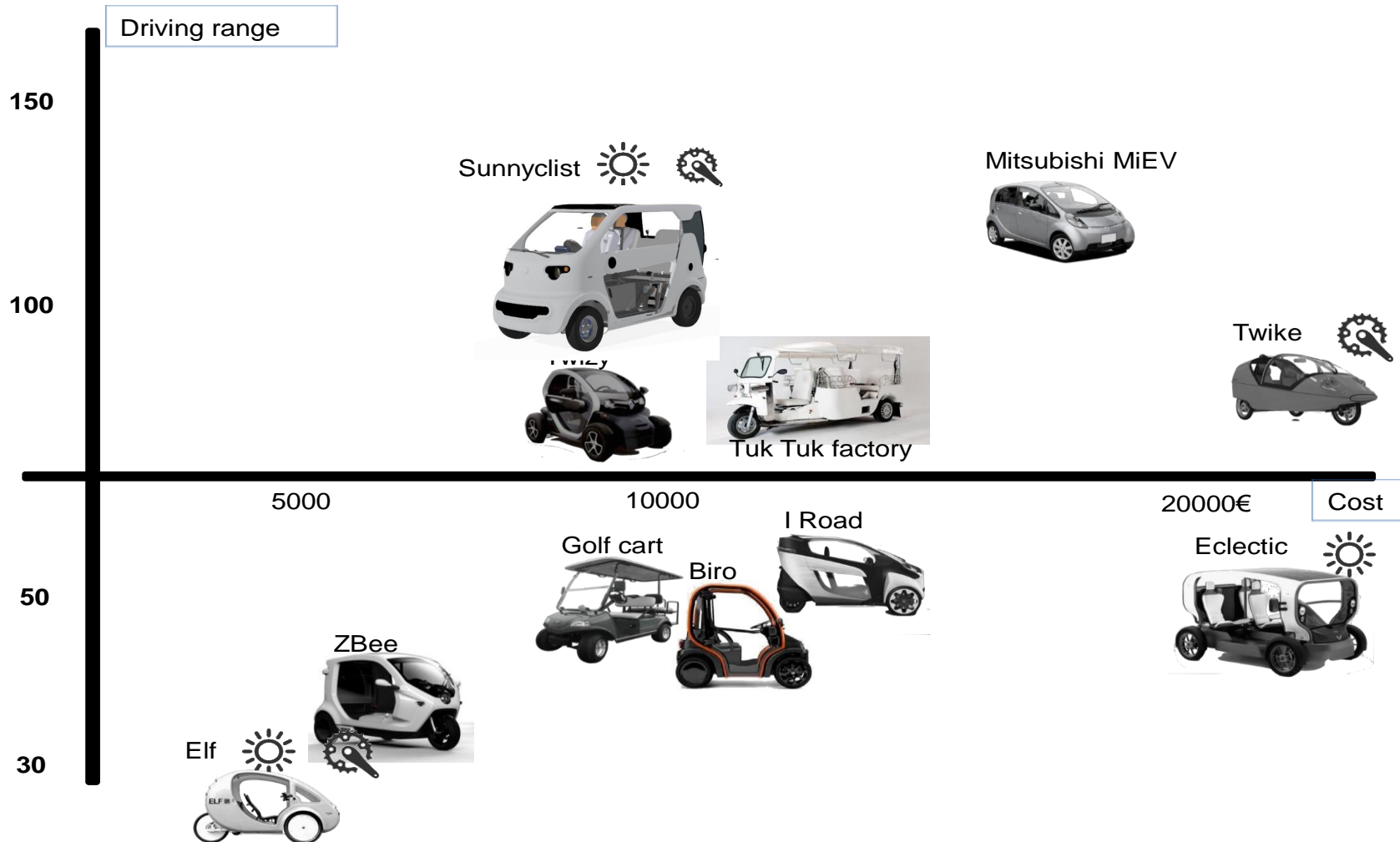
(share of solar charging 25km/d)

Central and North Europe

Market competition

Competitor / features	Driving range km	Passengers	Max speed km/h	Battery capacity (kWh)	Power kW	Price €
Twike	80	2	85	6	4	26.000€
ELF	24	1	32	0,5	0,6	5.000€
Biro	50	2	45	4,8 (gel,48V)	4	11.000€
ZBEE	35	3	45	2	4	5.500€
Attiva B4.3	60	4	26	8.5	4	9.000€
Renault Twizy	80	2	80/45	6.1	13/4	8.200€+400€/y
 <p>THE REVOLUTION IN GREEN MOBILITY SUNNYCLIST</p>	60+	3	50	2	6	7.900€

Positioning I - The Sunnyclist Way



Positioning II - The Sunnyclist Way

Running Cost

Mitsubishi MiEV



Twizy



Tuk Tuk factory



I Road



Golf cart



Biro



Twike



Eclectic



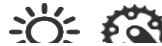
ZBee



Elf



Sunnyclist



Purchase Cost

5000

10000

20000€



18000€

120km



8500€

50



24000€

50

7



Free to drive



9000€

70

70

50



3000€/2,5t CO2

24000€

70

50



11000€

60



8000€

80



Running/Env. Cost



5000€

25

15

50



700€



50

Production procedure

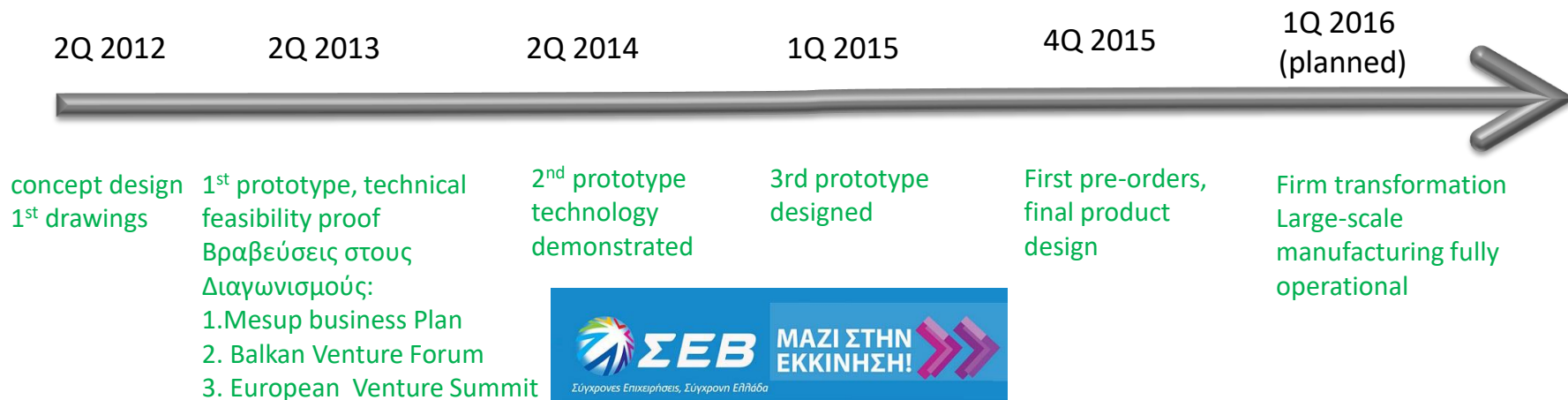
Hand made production for capacity up to 1000 vehicles/year

Infrastructure required: 1000sqm equipped with the following equipment:

1. Machinist lathe
2. Reamers
3. Automatic circular saw
4. Press brakes tubes to 50mm
5. Welding machine TIG
6. Three assembly benches
7. Fiberglass moulds
8. Frame calipers
9. Resin spray machine
10. Portable grinding and drilling tools
11. Micro – special tools
12. Paint oven



Our growth path



Current stage of development:

High technology readiness level. Field trials, route challenges pilot studies with intended end users, sampling and feedback conducted with great success.

Next stage:

Design study
Intelligent energy management system
interface development
Power train optimization
Type approval.

Design in progress

Σε συνεργασία με το Πολυτεχνείο Κρήτης, το νέο πρωτότυπο θα διαθέτει στιβαρό πλαίσιο αλουμινίου το οποίο έχει μελετηθεί με προσομοίωση Crash Test με τη χρήση εξειδικευμένου πακέτου λογισμικών της εταιρίας BETA CAE Systems S.A.

