

# PARTNERS, SPONSORS & MAIN SUPPLIERS

With the realization of LAMPO<sup>3</sup> Protoscar has reached a new top level of CleanCar Design and Engineering. Thanks to the experience with its predecessors LAMPO and LAMPO<sup>2</sup>, Protoscar made its dream become reality: for the first time a pure electric 2+2 coupé features a purpose designed chassis built around its electric components.

The LAMPO<sup>s</sup> have now been tested for more than 40.000 km on circuits and streets all over Europe. Since the results are more than promising, LAMPO<sup>3</sup> could now be further developed in a micro series, the LAMPO<sup>3</sup> GT. Compared to the prototype LAMPO<sup>3</sup>, important further technical developments have been prepared in order to meet the needs of the micro series: a new 42 kWh battery pack, a lighter and stiffer chassis and the interior already have been designed.

I would like to thank all of our faithful and new partners, sponsors and suppliers for their support and interest in joining such an ambitious project. The collaboration between Protoscar and these companies has surely been enriching for all participants in many ways.

More details of the new developments of LAMPO<sup>3</sup> will be unveiled at the Geneva Motor Show 2012 (Booth 5141, hall 5).

Marco Piffaretti

#### Very special thanks to:

Josef, Fredy, Dr. Philipp, Axel, Alex, Klaus, Pietro, Roland, Vasco, Denise, Thomas, Markus, Luca, Giorgio, Franca, Stefano, Paula, Giovanni, Giacomo, Olympia, Dario, Luca, Sandro P., Sandro M., Mauro, Martin, Peter, Roberto, Tania G., Sven, Christian Simona, Enzo,...

... from Switzerland, Germany, Austria, Italy and France.

#### ABB (Asea Brown Boveri Ltd)



ABB (www.abb.com) is a leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 124,000 people.

ABB applies its competence to develop the infrastructure technologies needed to make widespread electric vehicle use a reality. ABB's involvement in the LAMPO project focuses on the electrical grid and charging system. For example for the Geneva International Motor Show 2011 ABB provided the advanced off-board DC fast charge station. Able to deliver as much as 100 kW charging power to the vehicle, this solution also simultaneously manages the grid voltage and ensures power quality in the grid is actively improved. The unit demonstrated in Geneva is a part of ABB's product range of charging solutions that include fast, ultra fast and regular charge stations. ABB is working with Protoscar to demonstrate DC fast charging technology in the LAMPO<sup>3</sup>, offering 10 minutes refueling for 100 km.

ABB's contribution to the electric vehicle infrastructure is more than a century of experience in grid architecture, and several decades in power electronics. Through the application of the smart grid technologies, ABB develops the infrastructure needed to connect electric vehicles to the grid and helps make sustainable mobility a reality.

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# **Akasol Engineering**

## Innovative technology from Germany for Lithium Ion battery systems



Akasol Engineering develops and produces innovative systems and solutions for mobile and stationary Lithium Ion energy accumulators for the automotive, commercial vehicle, railway and shipbuilding industry, as well as the wind energy, hydropower and solar power sectors. The company has more than 20 years of experience in developing battery systems for mobile and stationary applications. In the mobile sector in particular, Akasol Engineering is one of the most recognized development and manufacturing companies for high-performance applications such as sports cars, motorboats, yachts, city buses and other commercial vehicles with hybrid or electric drives.

# Lampo<sup>3</sup> GT battery system

For the Lampo<sup>3</sup> GT Akasol Engineering supplies a liquid cooled 18M AIBAS (Akasol Intelligent Battery System) with 42,3 kWh energy storage and up to 324 kW discharge power at a weight of less than 350 kg including a safe automotive certified battery case, hydraulic and electric installation, liquid coolant, thermal insulation, main connector box, BMS and SCU.

The battery system is equipped with 18 awarded and automotive certified AIBAMs (Akasol Intelligent BAttery Module), which come with twelve quality assured High Energy pouch cells. Each cell is monitored and controlled by an advanced Battery Management System on module level, which assures a safe and reliable operation.

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# **Alpiq E-Mobility**

In Charge of E-Mobility



Alpiq is committed to a secure, ecological energy future – based on renewable energies and energy efficiency. Alpiq has been engaged in e-mobility for several years and, through Alpiq E-Mobility AG, is able to develop and offer comprehensive, innovative infrastructure solutions for modern mobility, tailored to customers' needs.

We see electric and electric pluggable vehicles as a promising solution to reduce CO2 emissions and to improve energy efficiency in the transport sector.

As a major player in the Swiss electricity sector, Alpiq aims to find solutions for an optimal integration of the electric vehicles charging infrastructure into the grid. We contribute to the concept and the development of an efficient and adapted country-wide network of standardized charging stations.

Our partnership with Protoscar and the sponsorship of LAMPO, LAMPO<sup>2</sup> and LAMPO<sup>3</sup> are in line with the Alpiq long term strategy of facilitating the introduction of electric vehicles in Switzerland. With this collaboration, we could already put on the market an innovative and smart solution for a home charging station.

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# **BRUSA Elektronik AG**

#### High-efficient power electronics for electric vehicles



Since BRUSA Elektronik AG was founded in 1985, it focuses on the development of highly efficient power electronics for electric mobility. The company belongs to its staff and has grown steadily due to careful business development. Today it is an acclaimed market leader in its field

#### System

Due to its extensive expertise and cutting-edge technology, BRUSA Elektronik AG develops high quality electrical systems, precisely matched to the application. Developing devices to control and convert electric energy according to customer's individual needs are both challenge and motivation for its staff.

#### Drive

BRUSA drive systems are specifically tailored to the needs of hybrid and electric vehicles. Liquid cooled motors and controllers paired with matched gearsets are designed for different types of vehicles, while their compact size accounts for the needs of individual packaging constraints.

#### Energy

BRUSA on-board battery chargers meet the applicable standards regarding safety and handling and are compatible with international standard outlets, so quick and safe charging is provided in any environment. The new award winning 22 kW on-board fast charger will bring fast charging to a new level!

#### LAMPO<sup>3</sup>

BRUSA Elektroinik AG contributes to the LAMPO project by supplying its latest drivetrain components for this full size four-seat sport-vehicle: The electric motors 3 x HSM1-10.18.13/150kW hybrid-synchronous with gearbox, the motor controllers 3 x DMC534/150kW, the Li-Ion battery 2 x EVB1 Li-battery packs 400V/16kWh based on prismatic Kokam cells, the battery charger NLG6/20kW and the DC/DC converter BSC624-12V/3.5kW.

The Highlight is the high power on-board charger: Charging time 1.5 hours for 2 batteries! The average range with two batteries is 200km.

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# CHAdeMO



CHAdeMO is a trade name of a quick charging method that this Association is proposing globally as an industry standard. "CHAdeMO" is an abbreviation of "CHArge de MOve", equivalent to "charge for moving", and is a pun for "O cha demo ikaga desuka" in "Let's Japanese. meaning have tea while charging" English. а in This standard, adopted on 15th March 2010, was developed jointly by the members of the CHAdeMO Association, hosted by TEPCO, electricity provider to the Tokyo region: the Association boasts more than 300 member companies, including car manufacturers and charger makers.

The evolution of efficient charging infrastructures across society should greatly benefit from recommending and standardizing the CHAdeMO Protocol as a global standard and seeking a speedy solution to common challenges by coordinating technologies of practical value.

Close inter-disciplinary fair alliances and collaboration between interested businesses and associations should also drive the efficient deployment of such activities. This is how the Association has come into being as a core of the work of developing quick charging infrastructures.

The DC quick charge system CHAdeMO is an off-board charging system, with cars acting as a master and the charger as a slave, that is functional, safe and a promising solution to overcome the range and the charging time problems. The intellectual property of CHAdeMO standards (the communication protocol and the plug/inlet geometry) is open and freely accessible to all CHAdeMO members.

With a typical capacity of 50 kilowatts, the CHAdeMO stations can charge 80% of the autonomy of a medium size EV within 30 minutes.

This year several manufacturers have already started the production of DC mixed quickcharge stations with CHAdeMO's specifications for their DC system. Up to now, more than 600 CHAdeMo charging stations have been installed in the world.

Protoscar believes in the future of the CHAdeMO standard. This is the reason why big efforts have been invested into the support of the Association. In more, LAMPO and LAMPO<sup>2</sup> have been the first European electric vehicles compatible with the CHAdeMO standard.

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# **Ernst & Young**

# **ERNST & YOUNG** Quality In Everything We Do

Ernst & Young is a global leader in assurance, tax, transaction and advisory services. Worldwide, our 152,000 people are united by our shared values and an unwavering commitment to quality. We make a difference by helping our people, our clients and our wider communities achieve their potential.

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In Switzerland, Ernst & Young Ltd is a leading audit and advisory company offering services with about 2,000 employees at 10 locations also in the area of tax and legal, as well as in transactions and accounting.

For more information about our organization, please visit www.ey.com/ch

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# **EVTEC AG (engineering and programming)**



EVTEC AG (Electric Vehicle Technologies) is a specialist for electro-mobility. The experienced and highly motivated team of engineers offers profound knowledge in conception, development and maintenance of prototypes and series products.

Due to the network of manufacturing partners and suppliers in the field of electric and mechatronic components the best quality and efficiency can be guaranteed.

As an ETH Spin-off (federal institute of technology's Zurich) the affinity to advanced research is ensured. EVTEC supports current student projects such as Formula Student Electric and SunCar at various technical universities.

Beside car engineering EVTEC is working on infrastructure issues, such as Home and Public Charging. Therefore various solutions for AC and DC Fast charging were evaluated, developed and tested. To survey the load ability and lifespan of battery cells and systems suitable test benches are available.



## LAMPO<sup>3</sup> Project

EVTEC is the system architect for the entire electric system.

As such EVTEC was responsible the following works:

- Component evaluation
- Wiring harness design

A fully customised wiring harness consisting of signal (low voltage) and power connections (high voltage) was manufactured. All wires are labelled according a detailing schematic drawing.

 Vehicle control unit programming To suit all requirements and get the maximal flexibility a LAMPO<sup>3</sup> specific vehicle control software was implemented. Thus the huge number of sensors and actuators can be controlled. In total LAMPO<sup>3</sup> consists of 148 electric components such as battery

modules, motors, inverters, pumps and so on
Commissioning and testing
Based on the tight time schedule a Testbench for the Vehicle control unit was developed to begin programming work while the car is not finished.

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e8energy offers a cross-segment product and service portfolio in the field of electric mobility, against the backdrop of the exclusive use of renewable energies. The key aspects of the corporate actions at e8energy are eco-friendliness, carbon neutrality and sustainability.

The integral and sustainable functionality of electric mobility has already been proven with the establishment of a supra-regional charging infrastructure and the range of electric vehicles offered by Citroën. By integrating regional and supra-regional suppliers of renewable energy such as Greenpeace Energy and individually configurable charging products, every step from the power generation to the consumption is shown and implemented.

The developed charging products allow for a flexible adaptation to customer specifications and possible technical modifications with regard to the future. Due to the modular structure, it is possible to respond fast and flexible to any technical changes that might occur, concerning charging currents or plugs for instance. Alongside home and business solutions, there is a special focus on products for public use.

#### 8 reasons for the electric charging station by e8energy

- Supra-regional recognition
- Independence from electricity suppliers
- High security through secured flap
- Neutral accounting system
- Compliance of all safety requirements according to VDE/IEC norms
- Plug & Charge: payment through automatic authentication via RFID card
- Platform for future additional services (such as communication, navigational services, WLAN, remote car diagnosis)
- Full-size advertising space on the back of the case and customer card

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# **LEONI - Thinking in green technologies**



LEONI is a global supplier of wires, optical fibres, cables and wiring systems as well as related services for the automotive sector and further industries. The LEONI Group, which is market-listed in the German MDAX index, employs about 56,000 people in 34 countries and, with 87 subsidiaries, generated consolidated sales of € 2.96 billion in 2010.

As a developer and system supplier of cables and harnesses, LEONI offers a big range of products which is particularly tailored to customers' needs and requirements for use in electrical and hybrid vehicles since 1992. The product portfolio covers components for power distribution and protection in the high voltage harness, complex wiring of lithium battery systems as well as high voltage systems connecting the battery, power electronics, electric motor and further high voltage components. Electrical safety and electromagnetic shielding are the biggest challenges in the context of systems development.

LEONI has designed/equipped the high voltage wiring of LAMPO<sup>3</sup> with special shielded 600 V cables and optimized EMC cable glands.



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# LoSon (body developing and manufacturing)



LoSon is an aerospace composite manufacturer, with focus on designing and producing carbon fiber (CFRP) and glass fiber (GFRP) composite structures. LoSon offers the integrated competences from design to prototype and production:

- 3D Designing CFRP / GFRP components
- Structure simulation
- Molds development
- Project management
- Prototyping
- Production and assembling

LoSon has been created in 2005 by a group of young engineers, coming from sailing experience, who have had always in mind the need of continuous innovation. At the beginning the company production has been focused on sport components, as for example America's cup components.

Since then we have developed skills in aeronautic prototyping, as our target is to move the experience and the technology developed for aeronautic to automotive and design.

LoSon disposes of 200 square meter ISO 7 clean room, two autoclaves and 500 square meter devoted to the development of new products. The company, following its mission, is characterized by a strong team of engineering and designing, simulating and developing; the structure operates in strict connection with a strong network of suppliers coordinated by LoSon engineering, which let LoSon offer its costumer the chance of developing complex structure in a very short timing.

LoSon has contributed to the LAMPO<sup>3</sup> project by developing the molds and components of the car body, mainly with high tech glass fiber prepreg with autoclave process. Molds and body have been developed in a very short timing, thanks to a very strict synergy with the LAMPO<sup>3</sup> project team.

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# Metaltool (mechanical workshop)

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**Metaltool** is a mechanical workshop – founded in 2001 by Dario Piffaretti – which offers various services and currently employs 11 specialists.

The workshop is characterized by widely using Electric Discharge Machining (EDM). This is a machining process that uses a series of electric discharges (sparks) to erode material from a workpiece. There are two types of EDM: wire-cutting and die-sinking. EDM is a key technology in the manufacture of high-performance molds as well as press tools for the series production of plastic, glass and metal parts and for the direct machining of complex precision components.

Metaltool realizes primarily:

#### 1. Tools for industries

- mechanical matrix for printing and overhauling
- tooling up
- general mechanical pieces
- assembling fitting
- fixing
- grinding
- plate tools
- milling

#### 2. Moulds

- pressure die casting
- shearing machine

The main application fields of Metaltool are:

- medical
- luxury zipper
- mechanical tools
- special and unique car components

Metaltool has contributed to the LAMPO<sup>2</sup> project by realizing and installing several different mechanical special parts. In particular it has provided:

- structural modification of the chassis in order to adapt it to the electric drivetrain
- realization of new mechanical parts needed for the new layout of the powertrain (e.g. a new front suspension ring in order to locate the front wheels drive axle)

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#### m-way

Vehicles and solutions for connected mobility



As experts for networked mobility, m-way is taking an active role in terms of designing the transformation of our society's mobility behavior. In addition to a carefully selected offer of attractive electric vehicles, such as e-bikes, e-scooters, e-motorcycles and electric cars, m-way offers infrastructure solutions, innovative online tools, accessories, and a comprehensive all-round service for a new means of mobility. Financing and insurance services are also a part of that. Green electricity certificates are an integral part of the vehicle offer, making the vehicles especially sustainable. As a Migros subsidiary, m-way is promoting the topic of new mobility alongside strong partners. For that reason, m-way is significantly engaged in e-car sharing projects, e.g. in collaboration with Mobility, SBB and Siemens.

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# **Nationale Suisse**



Nationale Suisse is an innovative, international and independent Swiss insurance group. In addition to providing attractive risk and pension solutions in the non-life and life fields for a discerning clientele, we strengthen and foster special competencies in our specialty lines. Here, Nationale Suisse is a niche provider characterized by outstanding expertise and an international network.

The art of insurance: this is the quintessence of our services. This core message stands for more than just knowledge and ability. For Nationale Suisse it also implies exceptional passion and the desire to pursue and implement our goals in an individual, successful and attractive manner. By "individual" we mean assuring satisfaction and fulfilling clients' wishes sustainably and unbureaucratically. By "successful" we mean creating added value in an innovative, efficient way. And by "attractive" we mean taking responsibility and putting quality-conscious, future-oriented Swiss reliability into practice.

Just like Nationale Suisse, Protoscar practices the art of building future-oriented vehicles with a passion. Lampo3 is a milestone in the construction of an innovative, efficient high-performance car that boasts sustainability through the use of state-of-the-art technology. It also comes with typical Swiss precision, aesthetics and elegance that inspires emotions.

Further information about Nationale Suisse can be found at www.nationalesuisse.ch

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# Q11 AG (spare parts, online distributor)



Q11 AG is one of the most successful spare parts retailer on the German E-Commerce market. The company was founded in 2000 and distributes spare parts out of the stockhouse in Zurich throughout Germany via parcel service.

According to the specific part identification in Germany, Q11 AG uses an in-house developed software which guarantees the customers a comfortable and correct product choice. High availibilities and a great level of service standards allowed Q11 AG to grow up to one of the most popular providers in the automotive after market.



To fulfill the requirements of its end consumers, Q11 AG is specialized on spare parts for all kind of passenger cars and motorcycles, tyres, cleaning and lubricant products. Q11 AG offers a wide range of brake parts, exhaust systems, filters, shock absorbers, clutches as well as steering and cooling products.

A central topic of Q11 AG's business implies that each offered item has to come up to the high technological demand of original equipment which is assured by exclusive and certified suppliers.

Q11 AG itself has been a pioneer in German E-Commerce 10 years ago and accomplished proving the potential of online part trading. The company is now proud to be placed one of the most innovative visionary clean cars, which will hopefully affirm the rightness of energy efficiency in automotive business.

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# **Rudolf Steiner Schools**



Total pedagogy from pre-school up to the end of high school level.

36 schools in Switzerland, more than 70 kindergarten.

The Rudolf Steiner Schools create the prerequisites for personal active, inventive learning, they foster the individual **creativity** and develop the interest in one's fellow-beings and surroundings.

The three pillars of this pedagogy:

Head: to discover and understand the world and oneself

**Heart:** to meaningfully experience what one has recognised

Hand: to experience the manageability and alterability of life

This develops a feeling of consistency and a constructive relation to oneself and the environment.

#### Concept of education of the Rudolf Steiner Schools

The anthroposophical pedagogy's most important concern is to guide each child to achieve independent acting and judging as well as developing self-education. The trust in the innate will of each child to learn is based on the understanding that each human being indeed has a biological, social, religious or ethnic origin which considerably contributes to his life. However, beyond it, each human being has a spiritual origin which enables him to develop his innate impulses for an individually-biographic approach to life. The individuality and originality of each human being is based on his spiritual origin. This forms his human dignity.

The anthroposophy views the development of the human being as a process which is extremely open to the environment while simultaneously encouraging the physical development and maturity. The support and promotion of linking individual worldly experience and physical development is one of the major pedagogic tasks. Anything undertaken with the children on a methodical-educational level during the two first decades of their lives is based on their being accompanied appropriately, depending on their age, in the development of their individuality. The basis for the pedagogic work is given by the knowledge of the anthroposophy of humankind as well as that of the current pedagogic, medical and further research.

The highest aims pursued in a Rudolf Steiner School during the complete school curriculum are: a healthy relation to one's own body, assurance and purity in feeling, initiative, imagination and moral responsibility in acting, and independence in judging and thinking. These aims are linked to the belief that such qualified human beings dispose of all the essential requirements in order to actively contribute to the further development of social and cultural life.

The Rudolf Steiner Schools are politically neutral, they are generally humanly organised and are open to anyone.

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# SFOE (project support)

Schweizerische Eidgenossenschaft Confédération suisse Confederazione Svizzera Confederaziun svizra Bundesamt für Energie BFE Office fédéral de l'énergie OFEN Ufficio federale dell'energia UFE Uffizi federal d'energia UFE

The **Swiss Federal Office of Energy (SFOE)** is the office responsible for all questions relating to energy supply and energy use within the Federal Department of the Environment, Transport, Energy and Communication (DETEC).

The SFOE pursues the following objectives:

- It creates the necessary conditions for ensuring a sufficient, well diversified and secure energy supply that is both economical and ecologically sustainable.
- It imposes high safety standards in the areas of production, transportation and distribution of energy.
- It sets out to promote efficient energy use, increase the proportion of renewable energy in the overall energy mix and reduce the level of CO<sub>2</sub> emissions.
- It promotes and co-ordinates energy research and supports the development of new markets for the sustainable supply and use of energy.

The SFOE is proud to be one of the sponsors of LAMPO<sup>3</sup>!

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# Vitabella-Palazzetto (remote photovoltaic power plant)



**Vitabella-Palazzetto** is a farmhouse situated in Tuscany (Italy) where the sun is (nearly) always shining!

This is the reason why it has been decided to develop a remote photovoltaic power plant in that place. This photovoltaic plant has three goals:

- 1. to produce (more than) enough totally clean energy for driving our electric cars LAMPO and LAMPO<sup>2</sup>;
- 2. to become a sample to be copied, particularly as part of the electric-mobility solution;
- 3. to serve as a didactic tool for the guests of the farmhouse.

The photovoltaic plant is right now in the construction phase with the goal to have it in operation by May 2009, when LAMPO really needs its energy for participating in the EVS-Vinking-rally (570 kilometers from Oslo to Stavanger)!

The 260  $m^2$  thin film photovoltaic plant (amorphous silicon), which has a peak power of 16kW and a planned production of 16'800 kWh/year, is installed on the roof of an existing facility.

The manufacturer of the photovoltaic laminate, United Solar Ovonic, is the world leader in thin film solar technologies and the manufacture of thin film solar electric laminates. Distributed globally under the UNI-SOLAR® brand, the company's products are ideally suited for cost-effective solar roofing solutions because they are lightweight, durable, flexible, can be integrated directly with building materials, and generate more energy in real-world conditions. The solar plant of Vitabella-Palazzetto is installed by the Grosseto-based company TECNA.

Of course, all the guests of the farmhouse Vitabella-Palazzetto are very welcome to check the production of solar energy themselves, spending some absolutely relaxing holidays in the direct neighbourhood of Siena, Montalcino and the fabulous "terme di Saturnia".

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