



Provincia di Viterbo



Università della Toscana



Comune di Acquapendente



Associazione Culturale
Punti di Vista



Provincia di Savona

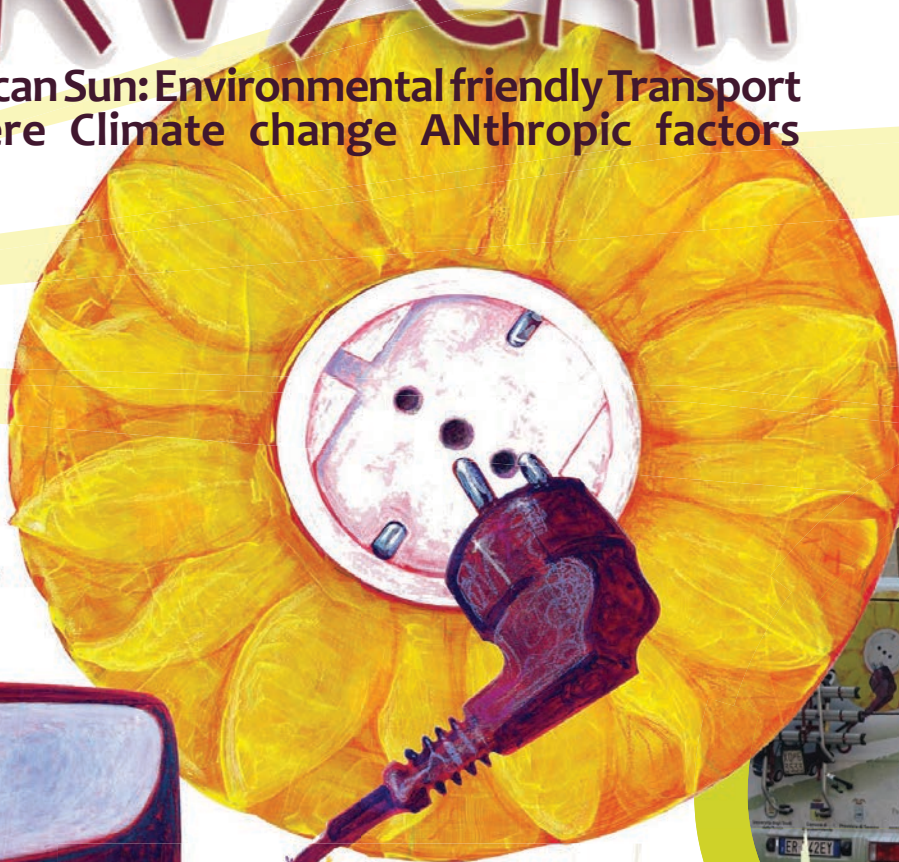
LIFE 08 ENV/IT/425



progetto realizzato con il supporto
dello strumento finanziario LIFE+
dell'Unione Europea

ETRUSCAN

**Under The Etruscan Sun: Environmental friendly Transport
to RedUceSevere Climate change ANthropic factors**



Sustainable mobility &

an experimental project for
demonstrating feasibility of
alternative energies for sustainable mobility
and the promotion of the territory

Environmental Governance



www.Lifeetruscan.eu

ETRUSCAN

Under the Etruscan Sun.
Environmental friendly Transport to RedUce
Severe Climate change ANthropic factors

a local governance experience for alternative mobility with renewable energy

ETRUSCAN is a sustainable mobility project with a strong local development component: this local initiative, originating in the Province of Viterbo, where the ancient Etruscan population had settled in central Italy, aims to demonstrate the use of alternative energy produced from renewable sources available on place for both urban and extra-urban mobility.

The project was carried out in the provincial territory, characterized by a strong agricultural and touristic vocation, by many volcanic lakes (including the largest volcanic lake in Europe, lake Bolsena), thermal waters, coastal beaches, fertile and hilly terrain and numerous Etruscan and Roman archaeological sites. The importance of a project that enhances and valorises public transport is particularly high in the area considering that Viterbo is the 4th province in Italy with the highest motorization rate, with 744.2 cars per 1,000 inhabitants.*

This figure and the great natural and archaeological value of the area have inspired the main objectives of the project, namely to promote the use of renewable energy for public transport, to reduce traffic and the impact on the atmosphere and climate, at the same time reducing the negative impact of the dispersal of vegetable oils in the environment and in particular in the lake waters. The project aimed at addressing mobility through the development of a territorial public transport model, ensuring the use of abundant solar power characterizing the Tuscia region, and the transformation of a non-hazardous waste present in every home and released into the environment or into the drain, causing high economic, water treatment (electricity for purifying contaminated water from oil) and environmental costs (oil poured in the soil creates barriers to oxygen, affecting the aquatic habitat and land fertility). To create fuel from exhausted oil represents a solution for the following mentioned three problems because it allows:

- To reduce the use of fossil fuels, which cause greenhouse gas emissions considered the main cause of anthropogenic climate change
- To reduce the cost of fuel, since part of it can be replaced by vegetable oil. However, according to the law, at the time being, fuel must still contain some hydrocarbons.
- To reduce the release of oil into the sewage and ultimately in the environment.

* Istat 2012

THE PARTNERSHIP

The Project Coordinator is the Province of Viterbo. The population of the Province counts 315,000 inhabitants in 60 municipalities, covering an area of about 3600 km².

www.provincia.viterbo.gov.it

The Tuscia University, founded in 1979, participated in the definition of the technical aspects of the initial project, and during the implementation the University monitored the technical issues and equipment of the two hybrid buses, organizing the use of its own bus for University students.

www.unitus.it

The Municipality of Acquapendente, located at the north end of the Lazio region and Province, has created and supervised the development of an information point, coordinated the research of local agreements for the processing plant (to convert exhausted oil into biofuel), and promoted tourism through the selection and development of itineraries and educational tours by bus.

www.comuneacquapendente.it

The cultural association "Punti di Vista" (Points of View), established in 1996 and active in education for sustainable development, the promotion of local territorial knowledge and social tourism, has facilitated the creation of the partnership, the initial definition of the project, the development of communication, training initiatives, debates and internal monitoring required by the project.

www.conventobolsena.org/associazione_en.html

The Province of Savona has participated as an observer throughout the entire project, organizing local presentations with the aim of analysing the replicability of the intervention on its territory.

www.provincia.sv.it

Initially a private company from Liguria, responsible for the bus construction, was also member of the partnership, but during the first year the company withdrew from the project, because its location required a significant financial commitment at a time of global crisis. First, the partnership tried to engage another company in the partnership for the development of the buses, without success, and finally external assistance was negotiated with various technicians, operating in central Italy, specialized in setting up mechanical and electronic components. The additional costs were supported by the Province of Viterbo and the Tuscia University, both public institutions, that remain each one owner of one of the two hybrid buses.

www.Lifeetruscan.it



This technical and experimental initiative aimed to create two hybrid bus prototypes powered by electricity from photovoltaic sources and biodiesel from recycled cooking oil. Two buses with an innovative design, created in a vehicle workshop, assembling existing components in a new and original way, are now operating on the Tuscia territory. Because of the archaeological and natural

heritage of the area, the two buses offer a service for students from the Tuscia University, helping to reduce the traffic of private vehicles; for the students of the schools of the Province they represent a chance to travel in the local area through alternative and intriguing routes.

ETRUSCAN is also a project of territorial governance, with demonstrative and educational objectives. The project aimed to create a local energy production model and local resources management that could ideally achieve the closed cycle production. Two photovoltaic stations have been set up to generate electricity from solar energy and to charge, in a virtually autonomous way, the electric motors of the two ETRUSCAN buses. Their sizing is still well above the charging needs of the buses at the current time, and the excess energy is therefore released into the network.



COLLECTION OF WASTE OILS

Following the start of ETRUSCAN, the Province of Viterbo, by coordinating resources and initiatives, has requested and received from the Lazio Region funding to carry out the collection of used vegetable oils from households on the territory. 320,000 5l cans with microchip were purchased (equal to the number of households which will receive the cans) and 150 containers of 220l were installed at the waste collection sites of the 60 municipalities of the Province.



The project has also promoted the installation of an exhausted vegetable oil reforming plant. At the same time the Province of Viterbo has initiated a project to collect exhausted vegetable oil from households with the future goal of conveying the collected oil in the system and generate non-fossil fuel for buses.

ETRUSCAN is a local project that is projected into the global dimension. The global biodiesel production between 2000 and 2011 has increased by over 25 times. In Italy, the production increased moderately of only 7 times, while consumption increased from 0 to 31 barrels per capita per year- 11,200 barrels is the total production.

The imbalance between production and domestic consumption differs at European level: 177.690 barrels per capita produced, and only 343.8 consumed.

Production is growing as well as the demand. For now, however, it is almost entirely first-generation biodiesel, produced from raw materials (crops) and not waste.

The growth of world production is negatively impacting food security especially in poor countries and in developing countries where energy companies have practiced land-grabbing, water control, deforestation and monocultures not intended for food (with the resulting intensive use of pesticides and fertilizers that deplete and contaminate the soil), but only for the production of biodiesel (or bioethanol, which grows even more rapidly in production and consumption).

ETRUSCAN ENERGY

towards the production of local renewable energy

ETRUSCAN has chosen to use fried oil instead of biodiesel from raw materials so as not to negatively impact on social and environmental conditions. As a matter of fact the production on large plantations is contributing to the poverty of farmers who are affected by the agricultural change without receiving financial benefits, and becoming vulnerable to global market fluctuations. The use of waste oil subtracts land to agricultural production for human and animal consumption, plus transforms agricultural areas in the impoverished monoculture plantations. This incredible series of negative impacts of biofuels is slowly gaining the attention of media and public opinion.

ETRUSCAN has helped to disseminate this kind of information and related data through seminars, website and participation in public events. It is important to underline that the direction taken by the global market in less than ten years predominantly favoured large investors for the production of biofuels, with systems located mainly in poor countries, considered as natural and human resources to be exploited rather than potential markets. This direction seems unlikely to be inverted in the next ten years either: investments for II generation biofuel plants are totally different from those of I generation, and are dependent

**Every year in Italy
are utilised**

**1.400.000t
of vegetable oil**

**corresponding to
ca. 25Kg per capita**



**150.000t
from
households**

**55.000t
from
businesses**

**40.000t
from
food industry**

**20% of the oil consumed
becomes a leftover
returning to the environment
as a non hazardous
special waste**

**280.000t
per year is the overall
quantity of vegetable
waste oil in Italy**

or 5KG per capita

on advanced technology still very expensive, therefore is unlikely that such conversion will take place in those countries suffering the greatest impact in the short term. This unsustainable paradoxes of the first generation biodiesel model (and biofuels in general), is precisely what ETRUSCAN aims at overcoming, proposing a different model, consisting in the experiment conducted, in the replication of the energy governance as well as the construction of hybrid vehicles. In fact, not only the majority of the production is currently from agricultural crops, reason why they should be referred as agrofuels; but the transformation remains concentrated in a few large industrial plants, adopting an environmentally unsustainable production model related to the energy-consuming archaic oil extractive industry. This shows that there is no full innovation compared with the low impact that the concept of biodiesel (and biofuels in general) entails. ETRUSCAN project proposal which aimed at using wasted cooking oil, locally collected to create biofuel and to be used on site is technically an easy and simple model if scaled at the local provincial level. Although the collection and processing of local cooking oil cannot solve the entire oil transportation needs of the community that provides the raw material, it can open the way to the combination of

'light' models to meet local needs - while on the other side mobility needs and possible responses need to be rethought as well.

As ETRUSCAN uses transesterification, having chosen to use wasted vegetable oils as raw material, other solutions - such as some local authorities are already trying to adopt - may recur to pyrolysis for solid urban waste, and the two systems can be combined for higher quantity of resulting energy.



Regeneration plant for exhausted vegetable oils. Property of the Province of Viterbo and installed near Acquapendente.

THE BIOFUEL PRODUCTION PLANT

The Provincial Administration of Viterbo has installed a plant for the production of biodiesel from cooking oil (OVE- EWC code 200125). Initially positioned at a local waste disposal site, due to the normative change it had to be transferred to another building owned by the Province itself and is now located on the Provincial Road Torre Alfina, at 0,850 km in the municipality of Acquapendente (VT).

The transformation unit is made in the UK (Green Fuels mod. Fuelmeister 3). At the time of publication of this report the approval from the Ministry of Economic Development is still pending.

The system is modular; it is placed on a cement base within a containment tank made from cement blocks. The system is sealed and has no emissions of any kind. The process involves:

- * Heating the exhausted vegetable oil, up to the required temperature (60-65C);
 - * Oil transfer to the reactor. The heated oil is pumped into the reactor until the predetermined amount.
 - * Manual dosing and reaction of methanol and sodium methylate. Separation of the glycerin. The mixture of biodiesel and glycerin is pumped through a separator that separates glycerin in a lower chamber, while the lighter biodiesel passes over a dam to end up in a pit from which it is pumped to the storage container.
 - *Purification process with Amberlite™. Biodiesel is transferred to a compensation tank, heated and ventilated with atmospheric air, while biodiesel is shaken to remove the methanol from it. Biodiesel is then measured through a sealed column containing the ion exchange resin Amberlite™ to remove soap.
- The methanol is recovered and reused.

If technical aspects are quite straightforward, technical, bureaucratic issues related to the production and use of biodiesel from vegetable exhausted oils are hardly so.

1) A first general difficulty for Europe lies in the fact that biodiesel from waste is treated as all the first-generation biofuels, and therefore a limit of 7% for vehicle use is set, with the remaining 93% characterized by traditional diesel - even in the presence of engines that tolerate higher percentages.

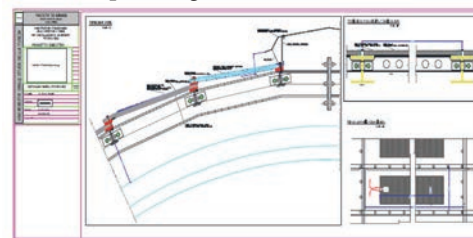
2) The second difficulty lies in the authorization process, both in its length and duration required. During the project, the approval procedures for reforming plants were controlled at central level, therefore the inspection had to be submitted again when the project was already in progress. Even if one of the two plants purchased is in perfect technical and working condition, it is still not operating at the end of the EU funded project. To cope with this situation, biodiesel is purchased, but the goal remains to activate the production, for achieving the full demonstrative and innovative content.

The aspiration to be able to achieve sustainable small scale biodiesel production in the territory for the local territory is a first step towards a more global vision of energetic democracy, where the off grid approach is not only contemplated, but systemically given, refined and adjusted for the sake of the environment and consumers.

Although this is the most difficult part to achieve, it is certainly the most innovative element of energetic governance that the ETRUSCAN model is experimenting and disseminating. A second plant was acquired by the Tuscia University in the setting up of a Centre for alternative energies and is used to research for the optimization of the transesterification reaction in order to obtain biofuel.

A PHOTOVOLTAIC ROOF IN VITERBO...

The photovoltaic system has been realized on the barrel vaulted roof of the Tuscia University in Viterbo, former Faculty of Agriculture, Via S. Camillo de Lellis in Viterbo. When projecting the recovery of the vaulted roof, the use of insulated photovoltaic and shielding panels has enabled to develop an energy production and saving system. The PV generator of 11.42 kWp, made of amorphous modules, fully integrated in the two vaulted roof structures, has also led to an improvement of the energy performance, and provided an opportunity for waterproofing needs.



above: roof cover system with insulation and photovoltaic

below: the photovoltaic plant on the roof of former School of Agraria



The construction of the photovoltaic system was realized together with the waterproofing roof of the former Faculty of Agriculture, improving the well-being of people using the building especially during summer months. The project favoured a drastic reduction of energy use for heating, switching from 6996mc / year to 3294 cubic meters / year of gas. The plant produces 30172Kwh and allows a direct saving of 14.6 tonnes of CO₂, which, even though the overall design of ETRUSCAN does not consider a comprehensive climate change mitigation indicator, represents a contribution to the reduction of environmental damage..

...AND ONE IN ACQUAPENDENTE

This second plant was installed in via M.G. Cutuli in Acquapendente (VT).

The photovoltaic field is exposed 0° South and with a tilt inclination with respect to the horizon of 30°.

This position was found to be the most appropriate for maximising the energy production capacity (shadow reduction: 0,95). The plant was installed on a building with no restriction in referende to landscape protection.

Thanks to this intervention previous cover in asbustus was eliminated and substituted.

The photovoltaic generator is composed of 52 Sensol Modules 230W each in polycrystal.

Production over 6 months	27947 kwh
Emissions saved	-11,5 t di CO ₂
Nominal power	11.96 KWp
N° of modules	52
N° of rows	6
N° of modules per row	9
VMP tension at 25°C	269,1 V
IMP at 25°C	7,7A x 2 = 15 A
total surface	1640mm x 992mm x 52= 84,6m ²

TWO HYBRID BUS PROTOTYPES

ETRUSCAN has created two hybrid buses, with thermal as well as electric motor traction. They were built on the original design with a body built specifically to contain motors and components assembled from existing assets and from commercial vehicles.

The buses were assembled in a workshop in the province of Terni, and then tested, approved and registered. Both have different design characteristics but quite comparable performances.

One of the buses will remain property of the Province of Viterbo and the other of the Tuscia University, and will serve school students of the Province, tourists and University students, promoting local knowledge with a low environmental impact public transport (the university 'shuttle') instead of using private transport for most of the movements related to university life.



The vehicles were approved as M3 ecological "minibus" category for the transport of passengers as well as for people with disabilities. They can operate in urban areas (where the electric motor is preferable and sometimes mandatory as in the case of some historical centers) as well as extra-urban. The environmental impact of the vehicle is equal to zero in urban areas, where it is supposed to move only with the electric engine, and limited in extra-urban areas where driving is done with a heat engine fed with biodiesel. The construction of the minibus started from a 2300cc Renault Master powerplant, 107 kW including engine / transmission / differential - front suspension.

I bus Università della Tuscia

7,51 m

2,33 m

2,55 m

3670 kg

18 + 1 (driver)

1 front engine
about 40km with a full recharge
within urban settings

40 kW

300 Nm

Renault Master 2.3dCi
6 gears Euro 5
about 500 in urban settings
with full tank of 80 liters

107 kW

350 Nm (1500-2750 rpm)
pneumatic suspensions
with electric compressor

self-levelling
oleodynamicsuspensions

- Easy connection between electric engine and the mechanical shaft through toothed belt gears active also on electric drive

- chassis ground distance can be adjusted by the driver

- electric power break

- Power steering operating also in electric drive

II bus Provincia di Viterbo

7,51 m

2,33 m

2,55 m

3670 kg

18 + 1 (driver)

2 engines on back suspensions
about 40km with a full recharge
within urban settings

cadauno: 40 kW

300 Nm

combustion engine Renault Master 2.3dCi
6 gears Euro 5
about 500 in urban settings
with full tank of 80 liter

autonomy

power

max torque

front suspensions

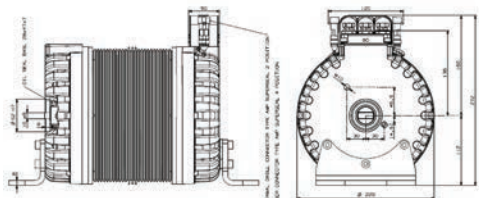
back suspensions

features

- Electric engine on each back wheel recharging batteries while driving

- chassis ground distance can be adjusted by the driver

- Power steering operating also in electric drive



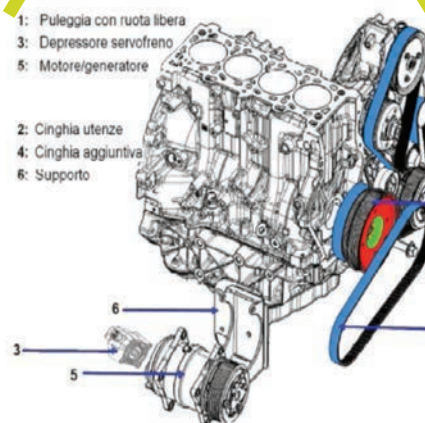
The hybrid bus of Tuscany University has an electric engine from FIMEA 22kW

Asynchrone electric engine	N50D1
Rated output 48Vdc* 2000rpm	11kW
Rated output 72Vdc* 3000 rpm	16.5kW
Rated output 96Vdc* 4000rpm	22kW
Max torque	120nm
Length mm	334
Diameter mm	220
Max efficiency	92%
Max speed	7500rpm
Mass	59Kg
Protection	IP65
triphas engine rated tension	64Vac
Max frequency	310Hz

*tension of the controller power supply



Bus I - Tuscany University
Transmission belt to recharge electric engine while combustion engine is operating



Bus I - Tuscany University
Scheme of the combustion engine connecting through the mechanical shaft to the electric engine: both engine are on the front



Bus II - Province of Viterbo
Both electric engines are on the back wheels

BATTERIES MANAGEMENT

The buses are equipped with the Battery Management System (BMS): The system allows charging of the batteries in an 'intelligent' way, optimizing the use of energy of the various components in relation to the charging level of each one.

The battery pack, positioned at the rear of both minibus, is composed of 25 batteries connected in series for a total voltage of 92 V. Each battery has a capacity of 200Ah and the charging and discharging system is electronically controlled via a BMS control that detects the voltage and temperature of each single cell and according to these proceeds to the best charging / discharging curve.

COMMUNICATING INFORMING DEMONSTRATING

...to transform

The communication aspect of a demonstrative project has an important role. In order to reach the different audiences multiple materials were created and distributed through different channels. From public administrators to school students, from University students to experts and advisors of mobility and vehicles, and finally citizens in a broad sense: over four years of conferences, public events, workshops, exhibitions and lectures have favoured the encounter of people, explaining the challenges of ETRUSCAN and its results, presenting its strengths and replicability.

Many opportunities have also allowed to clarify the limits - mainly bureaucratic-legislative - met during the implementation, which have reduced the possibility of achieving total independence from fossil fuel and the use of the shuttle buses for exclusive public service. The main message conveyed by the project is the following: another type of mobility is urgent and even possible, because climate change is a reality now also tragic in some places of the earth; this is strongly due to the lifestyle of a large part of Western population, the production of energy and industrial agricultural

products- in ways that not only pollute but include also climate altering gas emissions. ETRUSCAN has highlighted the need to conceptualize waste (showing the feasibility of the exhausted vegetable oil supply chain) as a resource, to be used in a non-polluting way for public services. Meetings between public administrations from different areas of Italy, which are forced to reduce fuel

costs to provide basic services (school, services for the elderly, auto service), were organized, researching together for technological and legal limitations existing to date to improve the governance of energy, waste, transport towards a greater energy democracy. Very stimulating reflections on alternative and ecologically virtuous models derived, included discussion on the possibility of reducing the absolute need of transportation (including fuel, focusing on its creation on the spot with renewable energy), the reduction of mobility needs and the increased opportunities for public non-polluting mobility.

ETRUSCAN presented the technical solutions of its shuttles to other hybrid vehicles manufacturers, sharing information with various audience groups, and with other groups who have undertaken the experimental use and production of biodiesel. The shuttles were presented and used by students, while providing a message on the reliability and independence of hybrid vehicles, and the importance of maximizing public transportation service over private transport. Young students were trained in school engaging in educa-

tional and fun experiences, using dynamic and role games specially created to convey information and responsibility to prepare and be prepared for change.

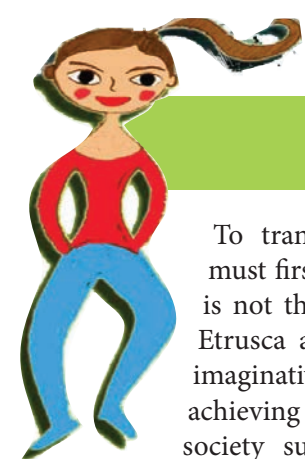
ETRUSCAN has created the website www.lifeetruscan.eu in which materials, articles, press releases and newspaper articles, video interviews, video recordings of meetings and various activities carried out were uploaded and published.

Despite having published promotional material, the dissemination of digital products and information was maximized in order to reduce the environmental impact of communication.



Some cards from the deck realised for the junior high school and high school students to play the "Environmental tribunal of Climate Change"





THE SUSTAINABLE WORLD OF ETRUSCA

To transform and realize we must first imagine and see what is not there yet ... The game of Etrusca aims at stimulating the imaginative capacity essential for achieving important changes in society such as climate change mitigation and adaptation. The sixteen illustrated panels that form a complex image, present with short texts and many interesting details the story of Etrusca: a young girl who lives in a world in which mobility is mainly collective, intermodal, electrical and through biofuels, the frying oil is collected and reused to make fuel. Etrusca rides the bike to school and picks up her snacks from the garden, characterized by solar greenhouses products; parents use the train and telecommute, and are happy to let their young daughter walk alone to the local dairy to buy cheese because the city center is pedestrian only. Etrusca lives in an area

where there are collective buildings with solar panels and wind turbines structurally inserted into the building, and the urban center is characterized by green areas, plants, roof gardens that insulate heat and transform carbon dioxide into oxygen, and integrate into the landscape. Etrusca uses various means of transport, the bike, the boat, but also the bus and cable car; in her world petrol is not used to power engines. Renewable energy is generated everywhere with small private and public plants that meet the local consumption needs and find their way into it. Etrusca also spends a lot of time outdoors and in the last 'panel' of this story she dreams of becoming a European Union Parliamentarian to contribute to land and natural resources protection and management.



LET'S MOBILIZE!

Are we really sure that today's youth identifies freedom and freedom of movement by having private new cars to go everywhere? And if their imagination was more complex, rich, focused on relationships with people? And if the new generations were very interested in the air quality and the environment, use of time, inclusion, the full use of technological progress for the

UN QUASI-MANIFESTO PER LA MOBILITA' SOSTENIBILE

Documento realizzato nell'ambito del progetto LIFE+ ETRUSCAN nel corso del workshop "MOBILITIAMOCI" 4-6 Giugno 2012. Convento S. Maria del Giglio, Bolsena (VT)

MOBILITIAMOCI!

www.lifetruscan.eu



WORKSHOP & MANIFESTO

benefit of a more inclusive and environmentally less problematic mobility? Many good practices useful ideas for those interested in territorial planning are contained in this quasi-Manifesto for Sustainable Mobility prepared by 18 young students and recent graduates from various parts of Italy who participated in the "Let's Mobilize!" workshop, sponsored by ETRUSCAN.



www.lifetruscan.eu

A QUASI-MANIFESTO FOR

We the youth, 18 students and professionals recently graduated, proceeding from different parts of Italy and walks of life, have been meeting in the Convento S.Maria del Giglio in Bolsena (Viterbo, Italy) from the 4th to the 6th June 2012 to improve our understanding and knowledge of the essential ingredients that shall always be present to promote a truly sustainable mobility.

We met each other as we all answered the call for participating to the residential workshop "Mobilitiamoci!" (Let's Mobilize!) which the Italian Cultural Association Punti di Vista promoted in collaboration with the Province of Viterbo within the project ETRUSCAN.

ETRUSCAN is a project to demonstrate the feasibility of the use of renewable energies for extraurban mobility; it is realised with the support of the financial instrument LIFE+ of the European Union.

Climate change, environmental destruction, global social injustice also powered by traditional mobility heavily relying on exploitation of petrol, all have reached such dramatic levels that we wish can be a unanimously recognised as a shared starting point for the Conference RIO +20.

Even the quality of life of the subjects around the top of the energy chain, the automobile drivers, can be considered fully positive. These considerations, in combination with

many others, shall incite us towards a change in our life-style as well as in the way societies are governed.

What we mainly understood is:

THERE IS NO SUSTAINABLE MOBILITY WITHOUT PROPER TERRITORIAL PLANNING.

For this reason we developed a sort of checklist that we are eager to share as an additional guideline for the public stakeholders involved in planning for mobility, traffic flows, and in general anthropized places.

We tried to define what are the basic values that can underpin a sustainable mobility considered alternative to the the existing one. We list them in the paragraph G, the last one, as we arrived to outline them by induction on a consensual basis, and not as an a priori stand. Among these values, ranks high the independence from fossile fuels.

In order to plan and design mobility, necessary precondition for creating solutions which are socially and environmentally sustainable, we need to start from real people, from their private lives, from their vital needs and from realistic consideration of economical means. Every planning exercise need to start by developing plausible profiles of the people that intends to serve, and

by attempting a -though temporary- self-identification with their daily lives. Among those profiles, the following shall also be including the following:

A. PROFILES

- Teenager – from suburban / rural side
- Girl / pupil at primary school / living in the center of town
- University youth, included foreigners and Europeans (as Erasmus students) / commuters or moving in from other towns and with no automobile
- Single mother
- Young worker (m/f)
- Local administrator
- Retired old person
- Tourist
- Vp of cultural elite
- Disable persone
- Children, toddlers and newborn babies
- etc. CONTINUE AND ADAPT AS APPROPRIATE AND NEEDED

B. TYPES OF CONDITIONING

existing in people's lives across a lifetime:

- working shifts
- family time needs (with variations, could be individual or enlarged family)
- available budget
- location and geography of the surroundings in relation to movements (where is the house, working place, the type of territory they are in, etc.)

C. SPECIFIC ISSUES AND TRANSPORTATION PROBLEMS EXPERIENCED BY ACTUAL PEOPLE

quantity

- scarcity of public transportation
- excess of private cars not fit for urban setting occupying large portions of public spaces
- presence of architectonic barriers
- absence of intermodal integration among different transportation means
- scarcity of public funds in public transportation

quality

- inappropriate and dangerous driving
- lack of planned time coincidence among schedules of different public transportation rides and networks
- roads not well taken care of
- public transportation vehicles and infrastructures in bad conditions, included hygiene standards

N.B.: The issues listed in B and C can be identified and considered as baseline data to plan accordingly; but they can also be elements to reshape towards higher sustainability and wellbeing through participatory work and wide ranging policies.

SUSTAINABLE MOBILITY

D.

ACTUAL DAILY ACTIVITIES PERFORMED BY REAL PEOPLE

- Working
- Personal care of self and of others
- Creation and fruition of culture
- Purchasing stuff
- Entertainment and use of free time (w-e)
- Education and training
- Participation and social activities
- OTHER...

E.

PRACTICAL SOLUTIONS - WHAT TO DO -

It is important that practical solutions and initiatives for alternative mobility are exchanged and proposed in multiple spaces, and that good practices are replicated.

Until today many type of interventions have already been tested and they can be incorporated in (re)planning existing developed areas or areas of recent anthropization. Among those these shall be included:

- Pedestrian areas
- Bike lanes
- Bike sharing facilities
- Car sharing facilities
- Car pooling practice
- Collective taxi
- Utilisation of public and private vehicle with minimum environmental impact (included electric vehicles, tram, etc.) and progressive substitution of existing fleets
- Utilisation of sustainable fuels
- Incorporate pedibus and ciclobus for

students moving to and from school

- Make possible and easy transportation and mobility with animal traction
- Recognize, allow and easy telework
- Create a network of photovoltaic infrastructures for recharging electric vehicles and bikes
- Promote the use of electric vehicles and bikes
- Promote or at least not hamper initiatives using social network for on demand mobility service exchange
- Promote infomobility
- Mobilise public funding for sustainable mobility interventions that also aim at increasing occupancy and create jobs.

F.

PRACTICAL SOLUTIONS - HOW TO DO IT -

- Organize and take into practice situations for listening to citizens
- Re-organize information management systems of mobility by including in it the specificity of different profiles of users, explicating different needs and capacities
- Consequently, promote and develop infomobility accordingly
- Bring into existence modalities of PERMANENT PARTICIPATORY PLANNING, all along project phases. Keep relevant population always informed and up to date in project design and implementation, as mistakes and adjustments are possible in all phases.
- Offer a support to bottom up initiatives

proposed by citizens and groups

- Favour citizens' self-organisation through appropriate legal measures and through elimination of bureaucratic obstacles
- Aiming at transforming the experience of mobility into a PLEASANT one, particularly when using public transportation
- Planning while keeping INTERMODALITY between different transportation systems in sight, also combining public and private, mechanical and non mechanical solutions.
- Regular maintenance of infrastructure which shall be done in DURABLE materials
- Promote and set up monitoring groups also through the involvement of citizens
- Produce and disseminate good practices and lessons learned.

G.

CONSISTENT AND FUNDAMENTAL VALUES TO SUSTAINABLE MOBILITY

Sustainable mobility:

- is intrinsically connected to an energy supply chain fully renewable, clean and local.
- is structurally defined by the coexistence and by integration of different solutions and transportation modalities
- has as objective economic accessibility and democratic governance
- relies on people-centered planning
- aims at the quality of service and to the pleasancy of the experience, at comfort and it is inspired by a sense of humanity
- scopes for solutions conducive to the increase - not the loss - of job opportunities
- does not rely on predating resources,

wellbeing and environment from other populations

- optimizes the use of energy and materials, and avoids the environmental losses and wastes.

Each of these paragraph could be enriched and specified keeping into account the different realities in which they could be used as an aid to planning.

We think though that the concepts listed in this document account for the core set of elements to keep into consideration and develop in every experience of good planning and implementation of alternative mobility.



Participants to the workshop "Mobilitiamoci!" and to the write up of the Quasi-manifesto:

Pierluigi Abiuso • Fabio Castelli • Bernardo Crespi • Alesio Calicchia • Simone di Marco • Mirko Grilli • Lorenzo Ialongo • Morgan Ferranti • Giulia Ferroni • Valeria Fichi • Paola Morrone • Aurora Natalia • Eleonora Pugini • Anita Rizzi • Isabella Strippoli

Facilitator: Elena Liotta

Idea and coordination: Cultural Association Punti di Vista in collaboration with Provincia di Viterbo

ETRUSCAN IN ACTION



The two ETRUSCAN hybrid buses aim to reduce car traffic and the impact of mobility through the use of renewable energy and alternative fuel, but also to raise awareness of the Tuscia territory from which the project originates. In order to achieve this goal an Info-Point has been set at the historic Julia Tower in Acquapendente, with a space devoted to the project, information boards and leaflets, and operators available to hand out in-depth information on the project to visitors and schools and to book bus tours. A number of itineraries, suggested to schools and visitors, have been developed for less known destinations, in which the bus trip is combined with a walking tour. A substantial number of points of interest in the area have been

presented on an interactive map, published on the project website. Four itineraries have been selected addressing different audiences (families, seniors, hikers) to highlight the diversity of the province, which is one of the largest in Italy. The routes close to the capital, in the Tiber valley, and in the Maremma Laziale are available on paper in Italian and English. The dissemination events have always been accompanied by a presentation of the project's objectives - use of renewable energy and local sustainable mobility - ensuring the desire to promote the conservation of the area. The two buses are characterized by exclusive different uses, both free: the bus of the Tuscia University works as 'shuttle' for the students and staff of the University, that of the Province for employees and for the general public.

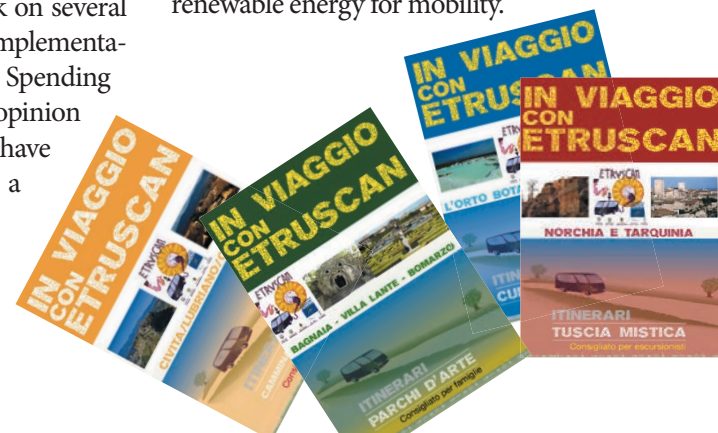


Etruscan Info-Point at the Torre Julia in Acquapendente: above the inside, and the entry by the road S.S. Cassia

During the design stage the two buses were thought as interchangeable in various functions and locations, but the Italian legislation provides for a very complex process regarding the registration and use by third parties compared to the registration for own use. In order not to waste valuable time during the construction phase of the bus, the first shuttle of property of the Tuscia University was registered for own use, thus allowing only the transportation of students and University staff. Initially, the same option was considered for the second bus, owned by the Province of Viterbo, in order to ensure the use by the end of the project (December 2013). However, the Province of Viterbo has opened a procedure to obtain a general use licence for third parties and driver. The difficulty of formalizing free public transport service in the existing legal framework have caused a huge impact in the timing of the project implementation. In particular, the change of the legal framework on several occasions, and especially the implementation of the 2012 decrees of Spending Review and the subsequent opinion of the Court of Auditors, have hindered the creation of a specific ETRUSCAN provincial institution, supposed to manage the bus and allow public use and service. The



University bus will be available to students for shuttle service, and the one of the Province will be dedicated to schools and - during school holidays - for groups of tourists, who will get to know the area with a low ecological impact. The circulating buses will remain identifiable as ETRUSCAN project's results for the graphics that distinguishes them and information materials produced, distributed both in hard copy and available on the website; they will allow and continue sensitisation and information about hybrid vehicles and the possibility of climate change mitigation through the use of renewable energy for mobility.



DAL DIARIO DI ETRUSCAN

www.Lifeetruscan.eu



LESSONS LEARNED

Relevant technological changes suggested in the event of a project replication are basically focused on the project component involving the construction of hybrid buses.

1. The two shuttle prototypes have different design, as different construction choices were carried out in the course of work, setting them apart from the original plan. The most viable option according to cost-benefit analysis is certainly the bus which will remain property of the Tuscia University (I bus). It was the first to be completed of the two prototypes: it has front wheel drive, a single electric motor placed in the front compartment to the left of the thermic engine, and connected directly to the gearbox of the vehicle. The other technological solution applied to the second prototype consists of two electric motors disposed on each of the rear wheels, characterized by a more intense work of customization and higher complexity in execution. However, this second model - once developed - also presents more reliability and power, and would allow for the elongation of the bodywork to include at least one more seats row (allowing for an extended capacity of 22 passengers).

2. A possible improvement of the first prototype, without consequences on the system, would be the inclusion of an greater power engine than the one currently used, which has 25kw: considering what's available on the market, one of 30 - 35Kw could be used.

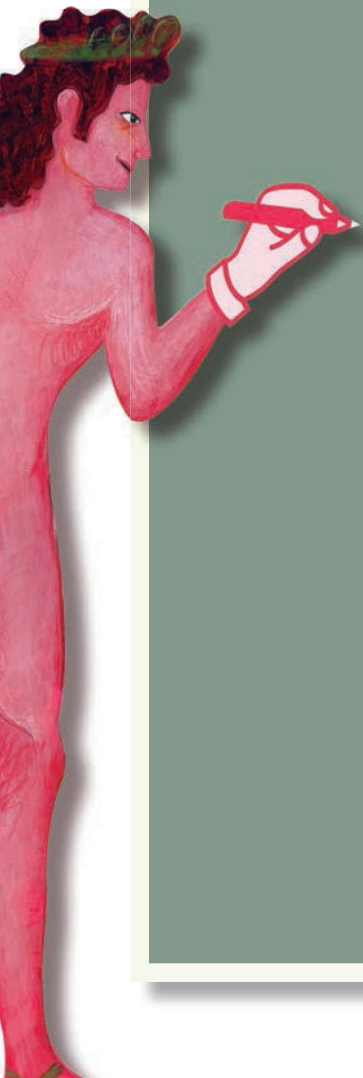
3. The electromagnetic clutches used were not those provided by the project, planned to be conic and hydraulically operated, but not available on the market and too long and expensive to build from scratch.

This caused many problems as the distance between rotor and stator should not be greater than 4/10 of a millimeter (if at 6 they would not work). The solution was found after many trials, and is however fully satisfactory: adjustable tapered bearings were inserted. Unless there is the possibility to invest in the construction of a prototype cone clutch, hydraulically operated, this solution can be replicated instead.

4. The suspensions of both prototypes were created with a hydraulic cylinder and with a single reinforcement at the top. In order to stabilize even more the vehicles another reinforcement was added to each one below. If the prototypes were replicated, it would be more appropriate to buy them directly with the double reinforcement, which among other things appear to be even lighter by about 70-80Kg compared to those with only one reinforcement.

5. The management software chosen is valid, should only be refined over time and adjusted during use. No substantial changes are needed, only adjustments (ex. speed of the rear wheels to differentiate during the steering, to achieve synchronicity of the wheels when curving).

6. Finally, to improve the project implementation it would be better not to contract external providers for electronics, brakes etc. The identification of a single partner or a technical contractor would be a far more efficient option and would allow a more rapid and reliable coordination, less expense and time, greater control by the project management.



FINAL REMARKS

- There is a strong demand for energy democracy of people willing to change towards more sustainable life and mobility styles. To enable this change, initiatives of alternative energy for mobility should create and provide not only different technical solutions, but a model of alternative energy management. To replicate interventions such as a ETRUSCAN can represent a means of improving energy democracy through small scale production, decentralized, without intermediaries, more resilient, allowing environmentally and globally more efficient production, management and consumption models, towards KM0.

- Guaranteeing simplified rules for (at least) local authorities to (re) generate resources for the community from non-hazardous waste, reducing damage and costs related to disposal, and producing added value through the production of non-polluting fuel with little ecological impact to be used for community services, would be a powerful choice not only to reduce emissions, but to effectively stimulate behavioural change through concrete examples to verify throughout the supply chain, facilitating the emergence of a more 'profound and more 'extensive environmental consciousness. Preventing this from happening, limiting the capacity to manage waste or install small biofuel production plants for the advantage (also) of local governments, contributes to mixed signals about the real will to change the current structure of oil dependency, and does not change the drift - caused by existing laws - of the dangerous monopolistic appropriation of all types of waste management by large economic organizations, purely profit-oriented, with an

extractive approach (extraction and value dislocation), even in areas presented as alternative and green.

- Simplify the rules for public service vehicle management in the case of local government initiatives. If a vehicle is approved as safe, why should there be any restrictions on the type of user? Interventions in favour of alternative mobility must include-among other things - the improvement of public transport and in turn increase circulating vehicles, qualitative characteristics and response to the real movement, exchange and intermodality needs. If a public institution invests in demonstration projects it can not be perceived and categorized as a private competitor, but rather as a forerunner to transport and mobility needs - from individual to collective.

what would facilitate replication

A simplification of relevant rules for the various aspects and activities of the project would be essential for a wide duplication and replication of ETRUSCAN. The minimal interventions suggested would be to:

- include distinctions in the plant authorization process with respect to the production capacity of the plant, simplifying rules for systems with limited production capacity
- provide incentives for public institutions wishing to address the problem of exhausted vegetable oils and at the same time produce biofuel for their own vehicles
- provide simplified authorization for individuals and families who want to experience self production
- revise the thresholds allowed at European level for the use of second-generation biofuels in biodiesel blends.

ETRUSCAN IN NUMBERS

Period of time: from 1 January 2010 to 31 December 2013 (developed over four years with no cost extension request)

- Total budget equal to € 2,634.016 with an expected EU contribution of € 1,287.449
- 2 different hybrid bus prototypes, consisting of 18 seats each, built, registered and circulating
- 2 large PV systems over a total of 203mq that have in the period between September 2011 and December 2013:

- Produced 58119 KWh of electricity
- allowed to save 27t of CO2 emissions;

The 2 PV systems are producing an annual average of 13.000KWh, and annually save approximately 5,7t of CO2 emissions; their operation is planned until 2040

- 2 biodiesel plants of exhausted vegetable oil
- 1 operational info point
- 20 public events (meetings and press conferences)
- 8 presentations stands at local events and 2 national shows on environmental issues

- 2 international presentations
- 4 specialized workshops of 3 days each
- 600 primary schools students informed about climate change, mitigation and the objectives of Etruscan
- free university 'shuttle' used by at least 15,000 passengers-students in the first six months of service
- 1 set of 3 educational games on climate change
- over 50,000 webpage visitors (an average of 4,000 different visitors per year)
- 3 Video produced
- 25 press releases
- 3 radio interviews to Etruscan staff, 5 presentations on local TV
- 2 articles on national newspapers
- disseminated over 40 interventions-presentations, produced a video presentation and about 30 short interviews.

For additional information and for downloading materials and publications: www.lifeetruscan.eu - etruscanlife@gmail.com

Provincia di Viterbo, Sett. Ambiente, via Saffi 1 Viterbo 01100, tel. +39 0761 799066

InfoPoint ETRUSCAN, via Torre Julia De Jacopo Acquapendente 01021 (VT), tel. +39 0763730065

The project ETRUSCAN ENV 08/IT/425 was realised with the support of the financial instrument of EU Life+

Since 2007 LIFE+ is the EU frame programme on environment. It covers two main sectors: environment protection and conservation, included energy efficiency, and climate change mitigation and adaptation. Eligible projects can be experimental and demonstrative (as ETRUSCAN was), focused on dissemination of good practices and on communication, for each sector. The new 2014-2020 plan introduced new possible measures, as capacity building, preparatory projects, integrated projects, technical assistance. Every year call for proposal are launched and projects selected according to availability of resources.

For info and forms: <http://ec.europa.eu/environment/life/>

This publication was realised by the Cultural Association Punti di Vista in collaboration with the Province of Viterbo and of Tuscia University. The contents of this publication do not necessarily reflect official position of European Union or of European Institutions, but only represent those of the authors.

A special thank to all those who made ETRUSCAN possible, and in particular to:

Jacopo **Agostini**, Sabrina **Aguiari**, Alberto **Bambini**, Barbara **Bertola**, Oriana **Bisti**, Paolo **Boldrini**, Marco **Burchielli**, Grazia **Cagnucci**, Giulia **Camerlengo**, Sonja **Cappello**, Maurizio **Carlini**, Sonia **Castellucci**, Marzia **Dini**, Alessandra **Espis**, Egisto **Fede**, Vincenzo **Gareri**, Antonella **Lisi**, Lavinia **Maisto**, Mauro **Marchionni**, Paulo **Melo**, Clara **Mezzetti**, Alessandro **Pozzi**, Amalia **Salvatore**, Flaminia **Tosini**, Fabio **Tognetti**.

Printed by Tipografia Quatrini

Marzo 2014