



REPUBLIC OF SERBIA

Ministry of
Environmental Protection



*Empowered lives.
Resilient nations.*



CLIMATE SMART URBAN DEVELOPMENT CHALLENGE

INNOVATIVE SOLUTIONS AND BUSINESS MODELS

United Nations Development Programme



GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET



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INNOVATIVE SOLUTIONS AND BUSINESS MODELS



<http://inovacije.klimatskepromene.rs/>



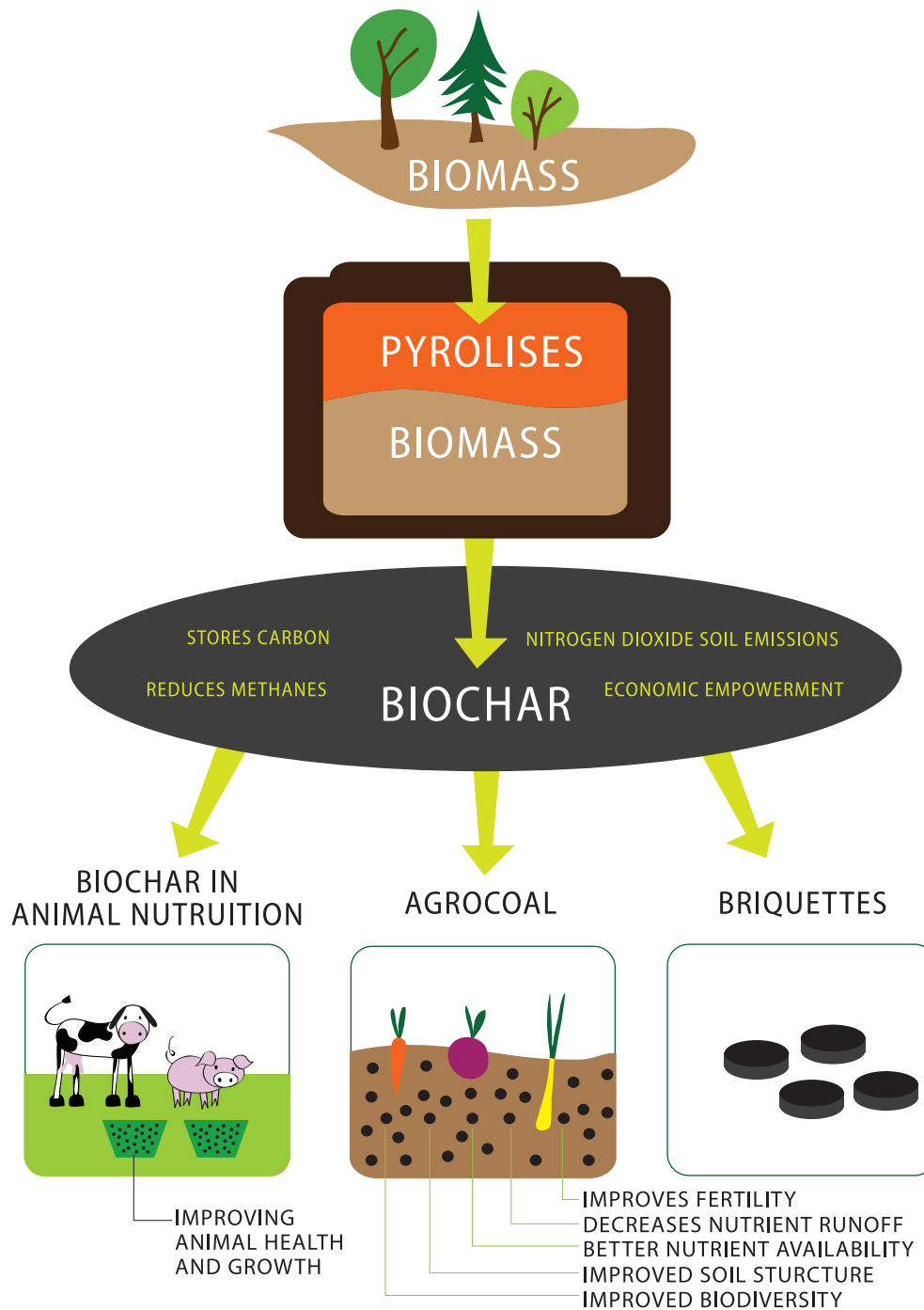
PRODUCTION OF RENEWABLE ENERGY AND SIMULTANEOUS CO₂- SEQUESTRATION FROM THE ATMOSPHERE DUE TO BIOCHAR PRODUCTION AND APPLICATION

Lead partner:
Basna Ltd. Cacak

www.basna.net



The Project presents a new technical solution to reduce CO₂ in the atmosphere and generate energy from biomass by producing biochar with the use of the pyrolysis process of wood and wood residue. The biochar will be used in an innovative way for animal feed and as the soil supplement, thus contributing to the combined reduction of methane production from manure. In that way, the positive effects of biochar are cumulative, such as improving animal health and growth, and increasing the fertilizing value of manure. The project's benefits are multiple: economic empowerment (it triggers a new industry in the rural area), support to organic agriculture, etc.





POLYURETHANE FOAMS - END OF WASTE

Lead partner:
Jugo-Impex E.E.R. Ltd.

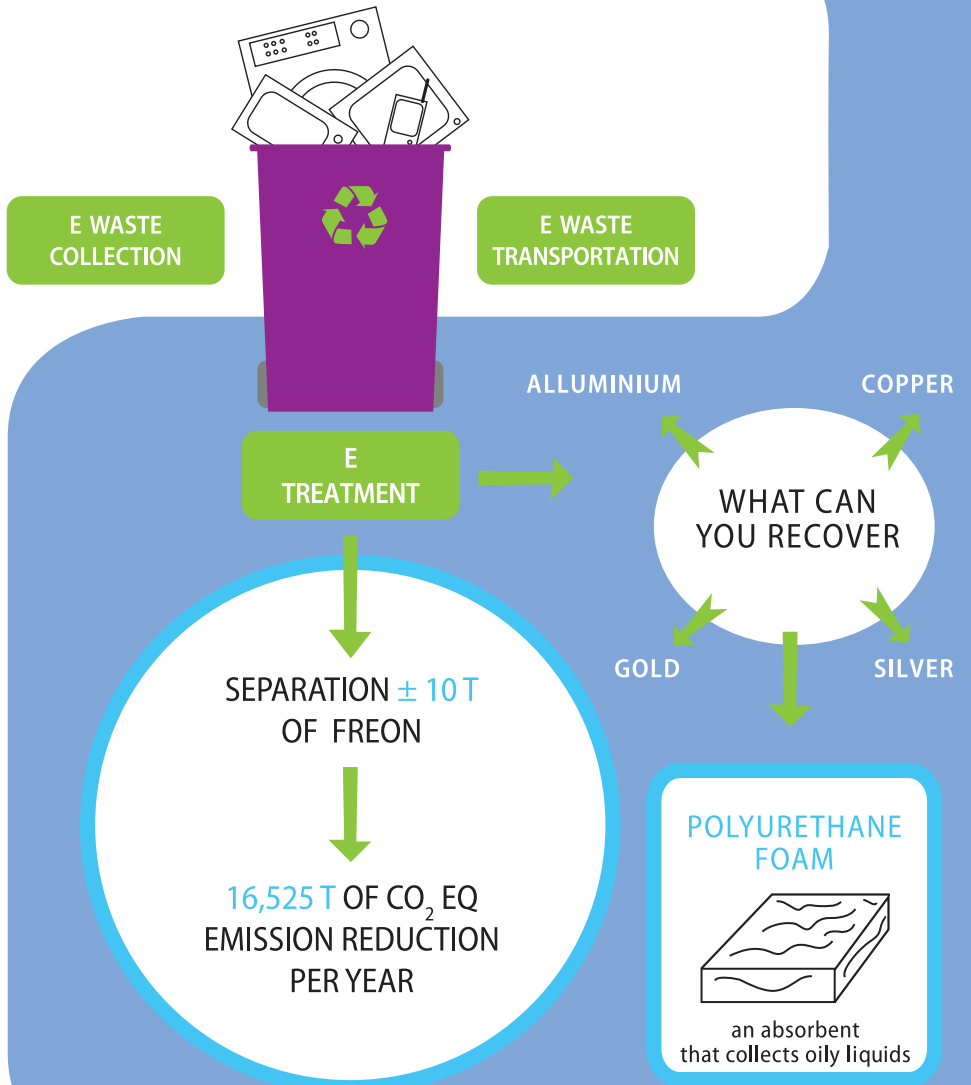
Other partners:
Waste Management Association
"Zero Waste Serbia"

www.ereciklaza.com

The project contributes to the efforts of promoting the circular economy (such as converting previous waste - namely cooling devices - into new raw material), thus directly reducing the release of one of the most powerful greenhouse gases into the atmosphere (the F-gases). In the first phase, separation of approximately 10 t of Freon will lead to 16,525 t of CO₂ eq emission reduction per year. Moreover, polyurethane foam which is left after the Freon is separated will be converted into a new product which shall become an absorbent that collects oily liquids such as gasoline and petrol, in case of their uncontrolled leaking into the environment (hence preventing unintentional burning of fossil fuel and related GHG emissions).

CIRCULAR ECONOMY

REDUCING THE RELEASE OF THE F - GASES



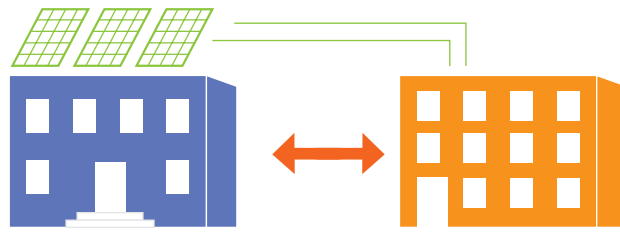


DEVELOPMENT OF INNOVATIVE BUSINESS MODELS FOR SOLAR ENERGY

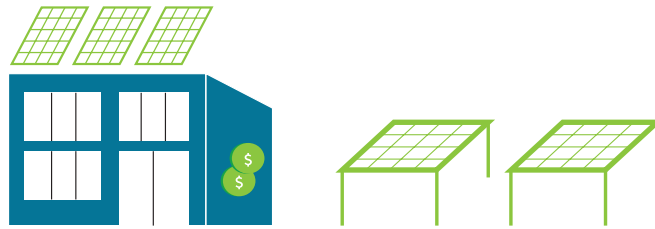
Lead partner:
Djordje Samardzija

djordje.samardzija@yahoo.com

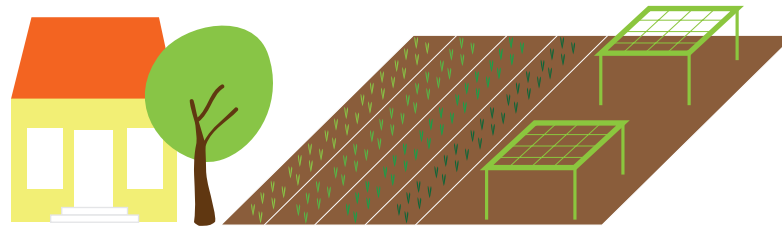
The project introduces a new business model for improving the renewable energy market in Serbia, in particular the solar power market. The pilot model will be promoted by constructing a pilot solar power plant (installed capacity of 100 kW) based on a model that enables the plant to operate without governmental subsidies. Different business models will be considered for promotion of solar energy market: selling electrical energy on the market, use of solar energy for supplying of irrigation system, use of solar energy for the local community needs. It also promotes the establishment of the Climate Change Training Center to train the interested parties on the use of renewable energy sources and their advantages.



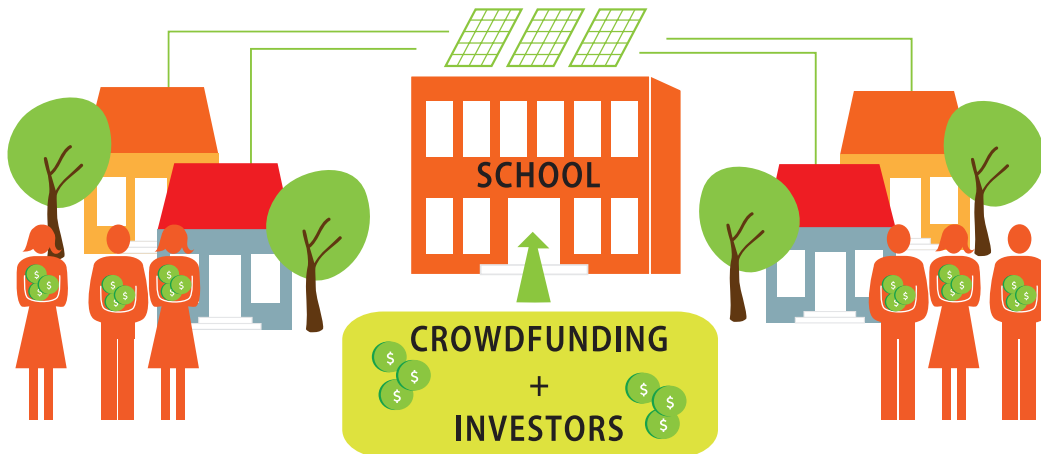
BUSINESS TO BUSINESS (B2B)

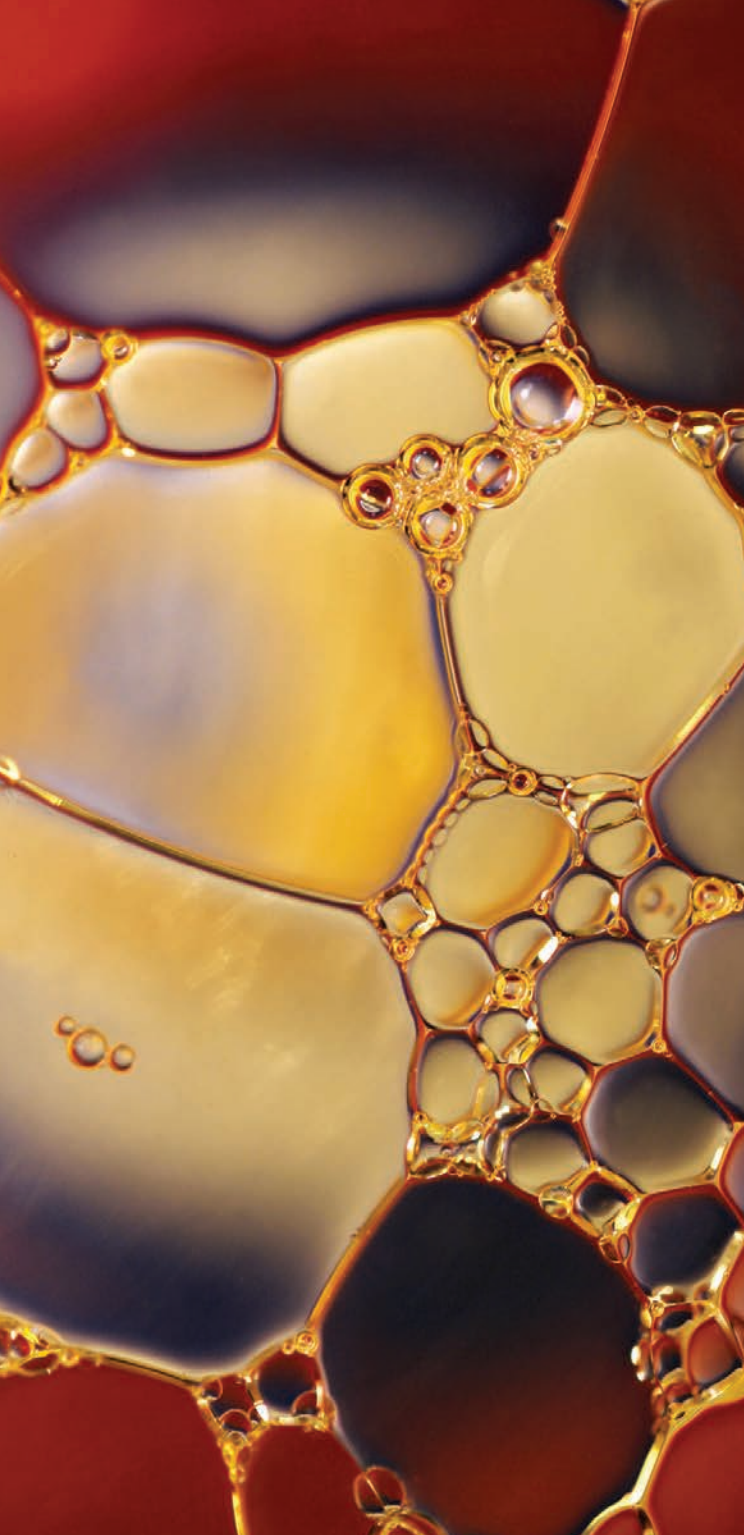


BUSINESS TO LOCAL SELF-GOVERNMENT



SOLAR IN AGRICULTURE





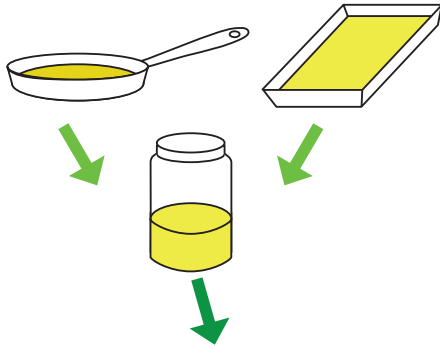
LESS GARBAGE, MORE HAPPINESS AND WELLBEING FOR ALL

Lead partner:
Eso Tron Ltd. Rumenka

www.esotron.rs

The project proposes an innovative business model to improve the existing practice of organic and inorganic waste separation, including new methods of organic waste treatment (for waste oils). It also introduces a new biobooster-based processing technology which will have several by-products (such as energy, hot water, fertilizer), instead of only one. The project has a high potential to reduce the GHG emission (up to 55.000 t of CO₂ during the lifecycle of the project) that would otherwise be generated from disposal of such organic waste to landfills.

WASTE EDIBLE OILS



ORGANIC WASTE



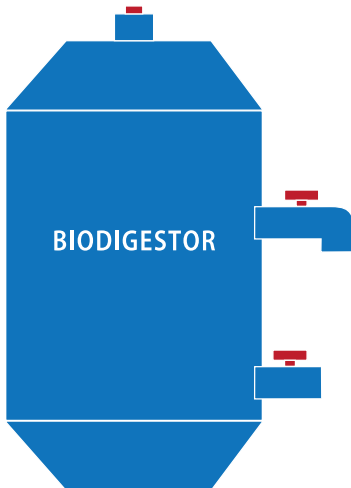
3548 CLIENTS



11700 t of WASTE

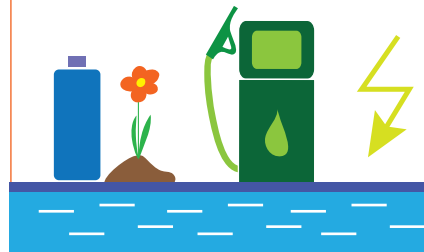


97% REUSE



NEW PRODUCTS

ENERGY
HOT WATER
FERTILIZER
BIOGAS/FUEL



REDUCE THE GHG EMISSION
UP TO 55.000 T OF CO₂
DURING THE LIFECYCLE OF THE PROJECT



INNOVATIVE RENEWABLE BIOMATERIALS AND BIOPOLYMER COMPOSITES BASED ON MICROBIAL EXPOLYSACCHARIDES AND WASTE FROM WOOD PROCESSING, PAPER AND AGRICULTURAL INDUSTRIES

Lead partner:

Faculty of Chemistry, University of Belgrade

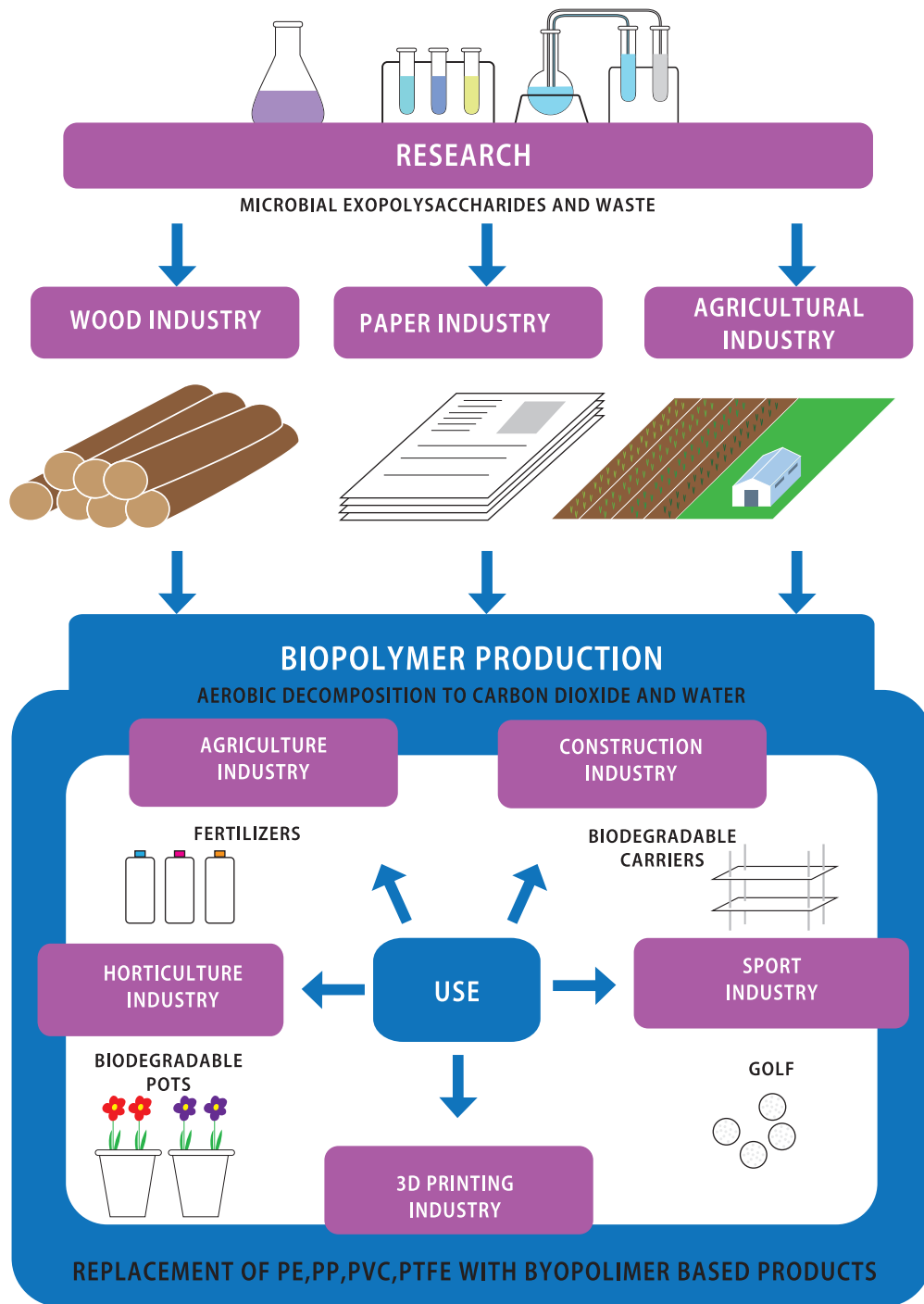
Other Partners:

Institute of Chemistry, Technology and Metallurgy, Belgrade

vbeskoski@chem.bg.ac.rs



The project introduces new materials, such as production of innovative biopolymer composites based on microbial exopolysaccharides and waste from wood processing, paper and agricultural industries, which could potentially replace some of the commercial plastics (fossil fuel derived plastics) in different areas of use. The main characteristic of the microbial exopolysaccharides is the aerobic decomposition to carbon dioxide and water: this is a great advantage over polylactate, and it reduces the GHG emission. Such production of environmentally friendly products will lead to additional environmental and economic benefits.





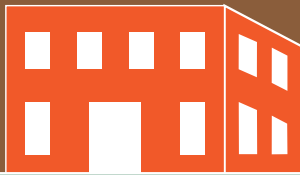
DEVELOPMENT OF INNOVATIVE SOLUTIONS IN THE AREA OF SMART LAND MANAGEMENT IN AGRICULTURE

Lead Partner:
Institute Mihajlo Pupin, Belgrade

Other partners:
Institute of Agricultural Economics,
Belgrade
Agricultural holding Nikola Loncar
Municipal Assembly of Stara Pazova

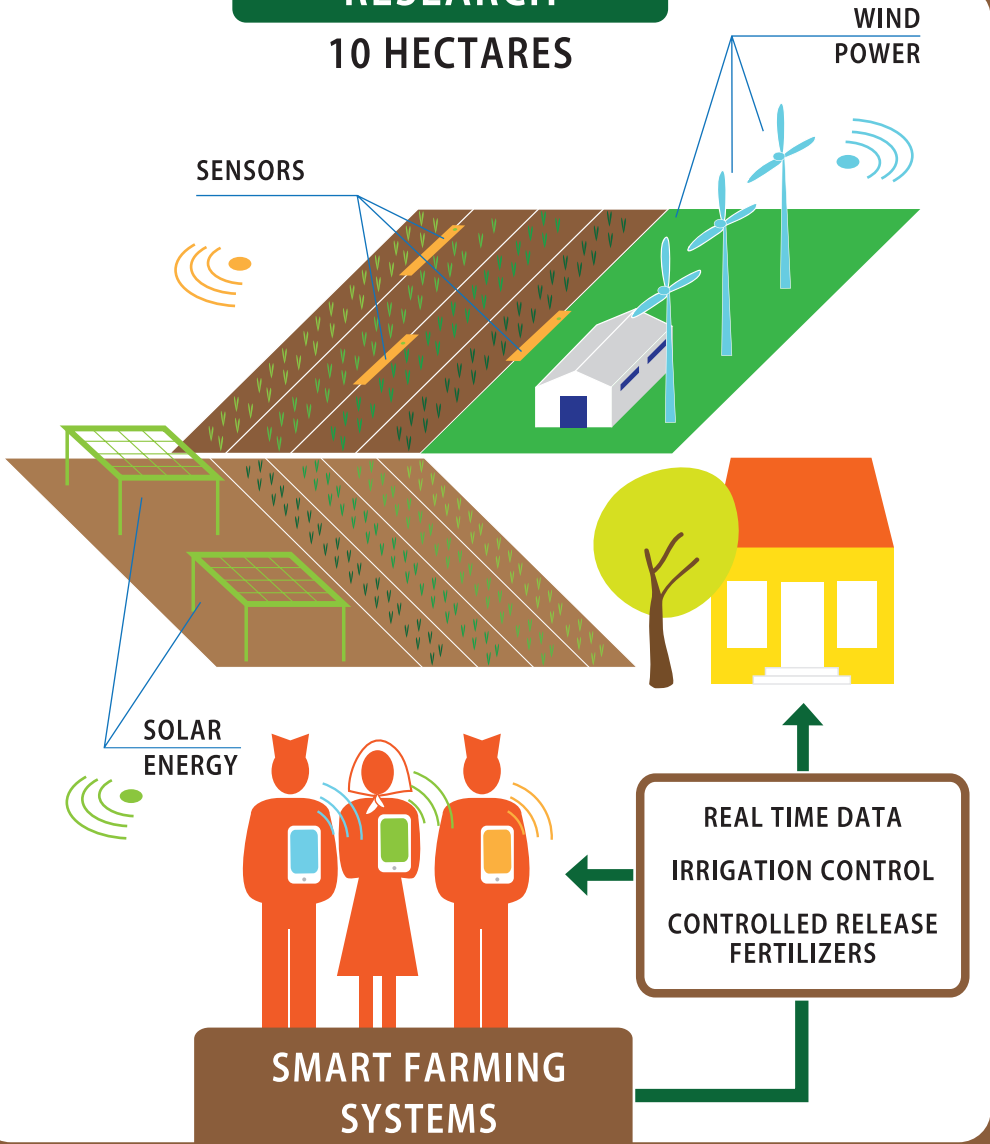
aleksandar.rodic@pupin.rs

The project promotes a multidisciplinary approach to smart and economically sustainable farming by applying an innovative technical solution that replaces the use of fossil fuels with renewable energy (solar energy and wind power). On a pilot agricultural holding of 10 hectares, the project will introduce a remote control system for the optimal management of natural resources (energy, soil, water). Therefore, the long-term GHG reduction impact is significant. The project will also organize workshops for all entrepreneurs who are interested in introducing this innovative system into their agricultural holdings.



RESEARCH

10 HECTARES



SENSORS

WIND
POWER

SOLAR
ENERGY

REAL TIME DATA
IRRIGATION CONTROL
CONTROLLED RELEASE
FERTILIZERS

SMART FARMING
SYSTEMS



LIQUID3

Lead partner:

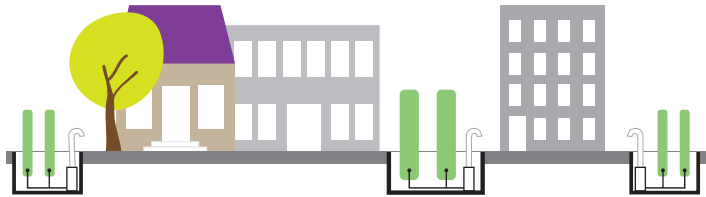
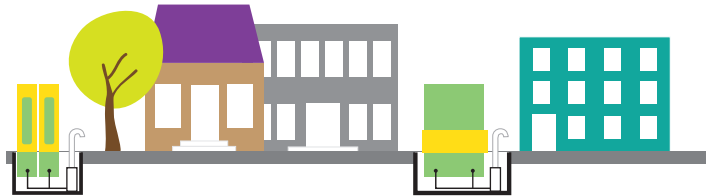
Institute for Multidisciplinary Research
(IMSI) Belgrade

ivan@imsi.rs

The project stands for a brand new biotechnological solution for air purification and CO₂ emission reduction in urban areas (at the source of emissions). The concept combines the technology of large photo-bioreactors systems that are used in the processing of industrial exhaust fumes (such systems do not fit into urban environments given their size and design), with compact models of photo-bioreactors that are used for commercial production of microalgae biomass and specific products, in this way combining the energy sector with agriculture. Photo-bioreactors are systems for cultivation of microalgae – photosynthetic organisms showing 10–50× higher CO₂ fixation efficiency compared to terrestrial plants. The capacity of LIQUID3 with the footprint of only 3 m² for CO₂ fixation is equivalent to 400 m² of lawns, resulting in more efficient use of public land. Financial viability of LIQUID3 is based on the production of microalgae biomass, which is used as fertilizer for public parks and for biodiesel production. Attractive LIQUID3 design will help to promote public awareness on the importance of innovative technologies and renewable energy sources for the sustainability of urban communities.

This would be a pioneering venture in Serbia, given that it can create a momentum for microalgae production in commercial purposes.

PHOTO-BIOREACTORS



PHOTOSYNTHETIC ORGANISMS SHOWING
10–50× HIGHER CO₂ FIXATION EFFICIENCY
COMPARED TO TERRESTRIAL PLANTS

MICROALGAE PRODUCTION



E-MOBILITY CLOUD CENTER

Lead partner:

National Electrical Vehicle Association

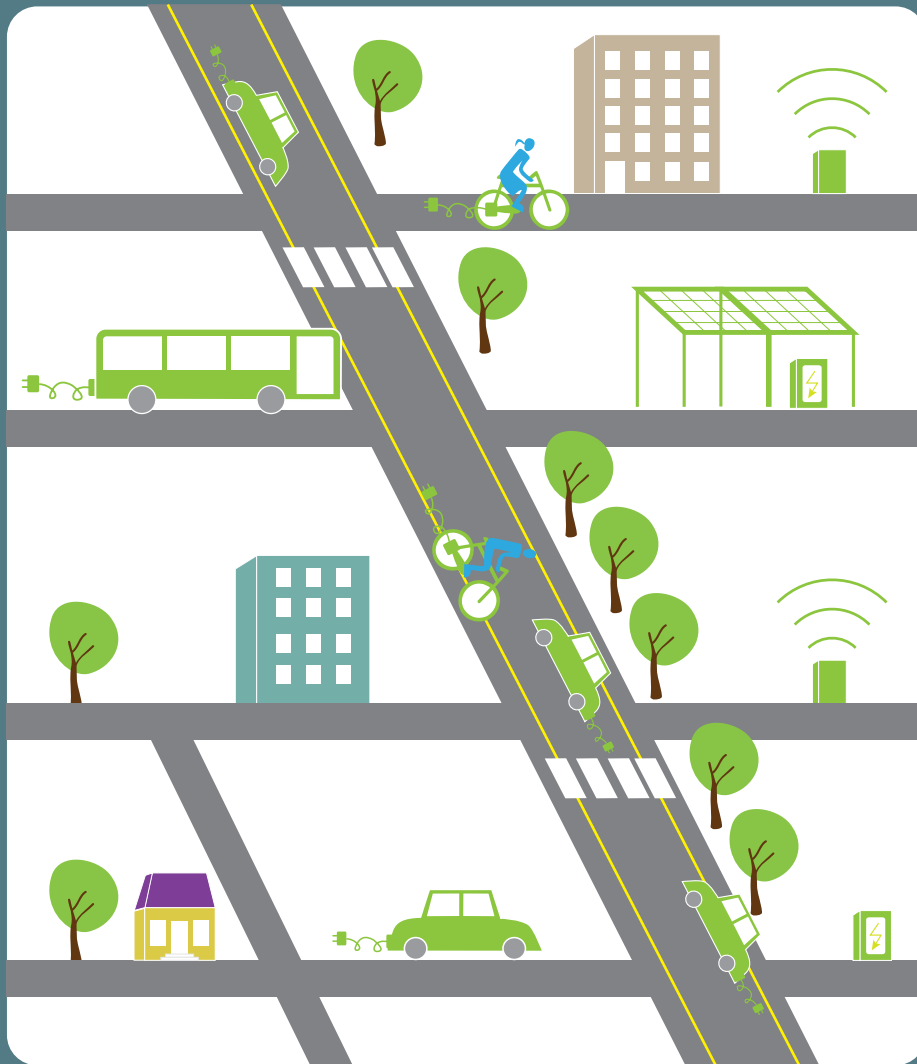
Other Partners:

Association of Electrical Engineers of
Serbia

www.naev.rs

The project aims to develop a cloud application/ open connection network, the e-Mobility Cloud Center, which will contain information about the exact location of e-vehicles charging stations in Serbia that use renewable energy sources -RES (green chargers). In this way, through iOS, Android and web apps, the software would serve as a “trip planner”. The information shared would also include the distance and navigation instructions to the nearest charger, characteristics of the charger and its plugs, working hours, booking possibilities, payment methods and other useful data. Moreover, three additional electrical chargers will be installed (each of 22 kW), which will be 100% clean green energy based on RES.

INFORMATION ABOUT THE EXACT LOCATION OF E-VEHICLES CHARGING STATIONS
IN SERBIA THAT USE RENEWABLE ENERGY SOURCES -RES (GREEN CHARGERS)



E-MOBILITY CLOUD CENTER

“TRIP PLANNER”



SOLAR PORTABLE ACCUMULATOR

Lead partner:
Telefon Inzenjering Ltd

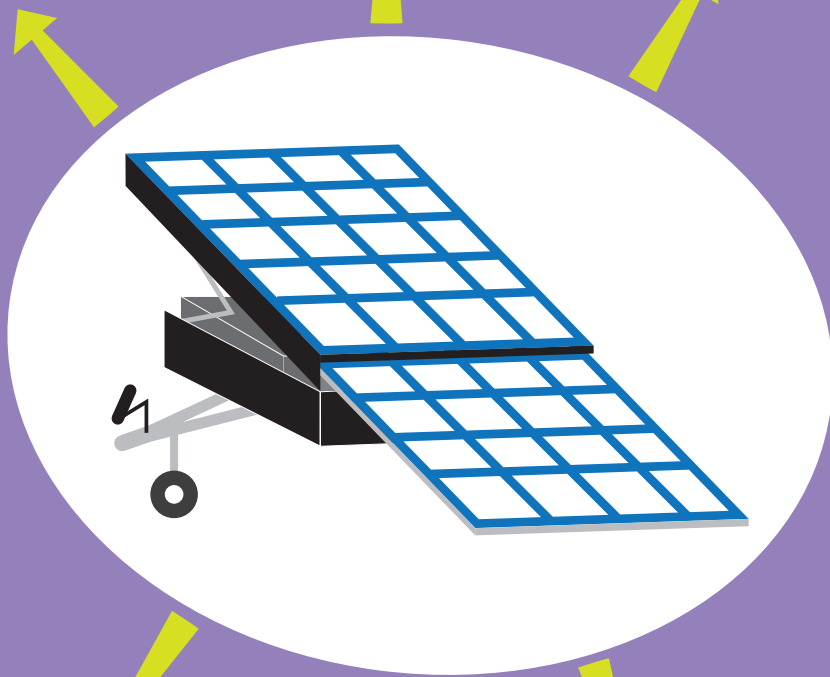
office@telefon-inzenjering.co.rs

The project provides an innovative technical solution for off-grid energy supply, combining the use of renewable energy sources, the increase in energy efficiency, and the GHG emission reduction. The mobile solar panels aim to replace the diesel-powered generators and can be used at remote and inaccessible locations, as well as during emergency interventions, at various outdoor manifestations, for irrigation, illumination and signalization, or in summer houses and cottages. The mobile solar generator is placed in a car trailer with a lid, which creates a stable unit safe for usage and transportation.

AGRICULTURE

CAMPING

RURAL AREAS



DISASTER SITUATIONS

OUTDOOR MANIFESTATIONS

PORTABLE SOLAR PANELS



SMART ENERGY INFRASTRUCTURE FOR PUBLIC LIGHTENING AND PARKING IN CITIES

Lead partner:
Meter & Control Ltd. Belgrade

www.meterandcontrol.com

The project promotes the new technical solutions for increasing energy efficiency in public lightening, remote heating and public parking sectors. Smart Lighting infrastructure for cities and municipalities is an innovative category of products, which consists of the system of smart sensors, public lights, decentralized control units and a centralized monitoring control and data acquisition (SCADA) as well as related new hardware and software platform and communication channels, smart meters ready to support new Smart Grid and Smart City integration and technologies. Total potential for GHG emission reduction in Serbia is 0.835 million tons of CO₂ equivalent per year.

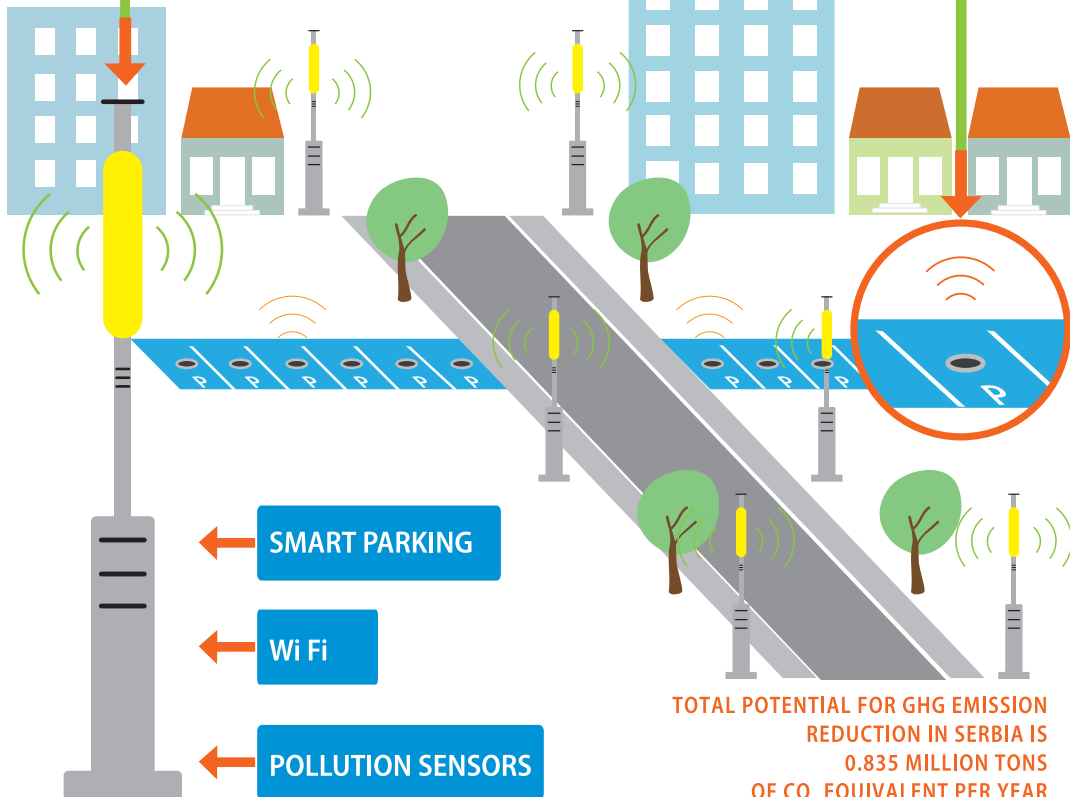
SMART CITY

SMART LIGHTING

SMART PARKING

75-85% LESS ENERGY
APPLICATION INTERFACE

CHECK
DIRECTIONS
PARKING



SMART PARKING

Wi Fi

POLLUTION SENSORS

TOTAL POTENTIAL FOR GHG EMISSION
REDUCTION IN SERBIA IS
0.835 MILLION TONS
OF CO₂ EQUIVALENT PER YEAR

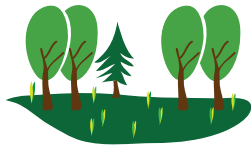


INNOVATIVE APPROACH TO PRODUCTION OF PELLETS FROM MEDICINAL HERBS

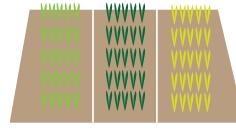
Lead partner: Sanicula Ltd.

www.sanicula.rs

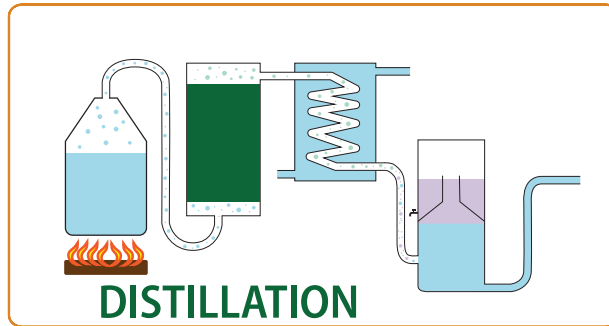
The project introduces the concept of a circular economy into the process of producing essential oils from medicinal herbs. During the distillation of medicinal herbs, remaining waste is cooked, partially dried and therefore presents good raw material for further processing, in order to obtain ecological fuel - pellets. By pelleting biomass produced as the by-product during the distillation of medicinal herbs would completely eliminate waste as a category in this production. The final product - the pellet will be used again in the distillation process instead of currently used fuel. The remaining pellets unused in the distillation process will be offered on the free market. Estimated emission reduction is 15,000 T CO₂ equivalent during the period of 20 years.



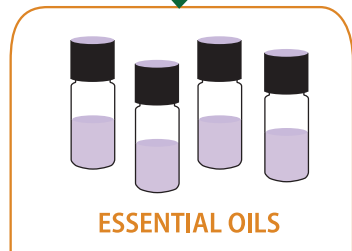
WILD HARVESTED HERBS



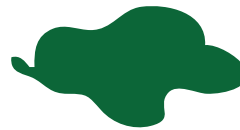
CULTIVATED HERBS



DISTILLATION



ESSENTIAL OILS



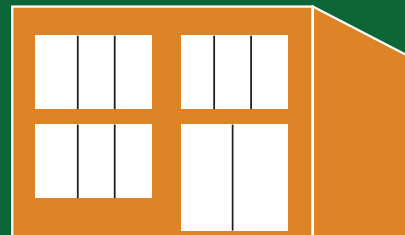
DRY DISTILLATION WASTE

PELLETS PRODUCTION

ESTIMATED EMISSION
REDUCTION IS 15,000 T
CO₂ EQUIVALENT DURING
THE PERIOD OF 20 YEARS.



Sanicula





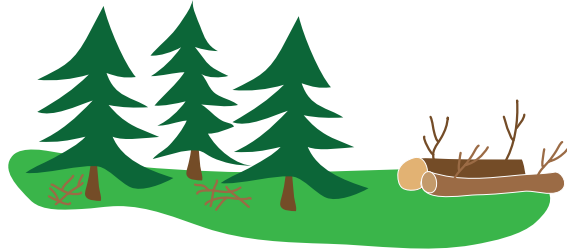
NEW APPROACH IN PRODUCTION OF HEAT AND ELECTRICITY FROM WOOD BIOMASS

Lead partner: Bioenergy Point Ltd./ GreenEnergy Point Ltd.

www.bioenergy-point.rs

The project aims at introducing a new approach and implementation of innovative technology in the production of combined heat and power by combustion of wood biomass. Heat energy will be used in the process of pellet production, with parallel electricity generation that will be sold to EPS at affordable prices. The project also introduces a new business model of cooperation with partners, associations, suppliers of raw materials, local agricultural holdings and local self-government. The plant will use biomass near the collection site, which will result in lower transportation costs and reduction of GHG emissions compared to a collection from distant parts of Serbia. A part of wood biomass will be obtained by extracting waste wood that endangers the work of Hydro-Power Plant "Djerdap".

**NEW BUSINESS MODEL OF COOPERATION WITH PARTNERS,
ASSOCIATES, SUPPLIERS OF RAW MATERIALS, LOCAL AGRICULTURAL
HOLDINGS AND LOCAL SELF-GOVERNMENT**

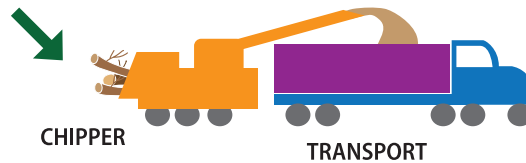


WOOD RESIDUES

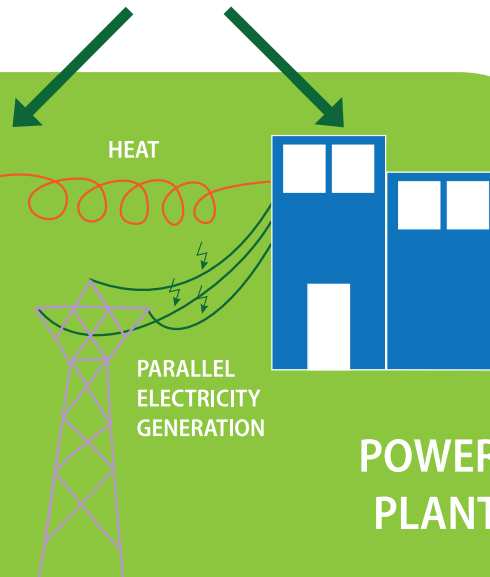
**WOOD RESIDUES FROM
HYDRO-POWER PLANT
DJERDAP**

**FURNITURE
PRODUCTION**

**LOCAL
SUPPLIERS
LOWER TRANSPORTATION COSTS
AND REDUCTION OF GHG EMISSIONS**



**PELLET
PRODUCTION**



**POWER
PLANT**

ЛОКАЛНИ РАЗВОЈ ОТПОРАН НА КЛИМАТСКЕ ПРОМЕНЕ
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МИНИСТАРСТВО
ЗАШТИТЕ ЖИВОТНЕ СРЕДИНЕ

Republic of Serbia
MINISTRY OF
ENVIRONMENTAL PROTECTION

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