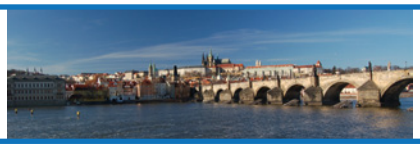
Self-Power Communities (SPC) for African Countries

WE CONSIDER ELECTRICITY AS PRIMARY IMPULSE FOR IMPROVEMENT OF LIFE QUALITY ANYWHERE IN THE WORLD

Part of African Green Vibrant Economy

5P for RES



Prague - **P**roject - **P**ortfolio - **P**lanning - **P**latform
for Renewable Energy Sources
Self-Powered Community Business Knowledge Transfer

ČKD ENERGY
ČLEN SKUPINY ČKD GROUP

BRESSON

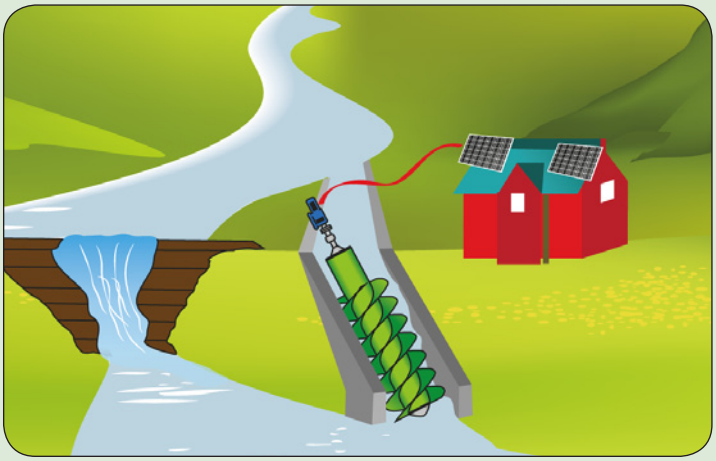
HVM PLASMA

MADRY

Water energy

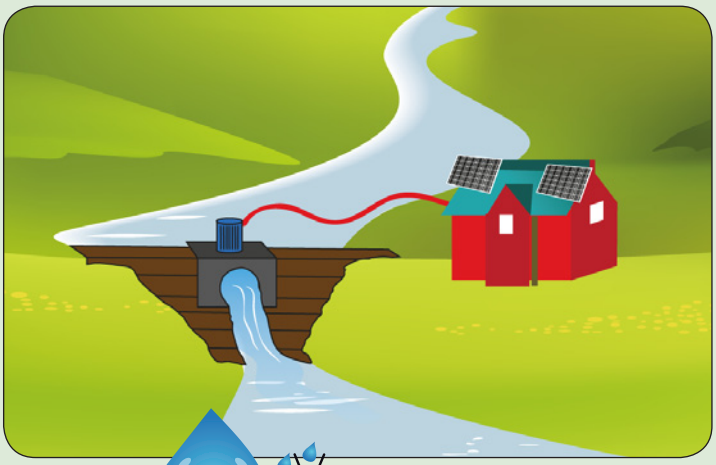
Screw Turbine 5 - 500 kWe; Suitable solution for streams and rivers in valleys with gentle gradient of the water flow

- Water gradient 1 - 10 m
- Water flow 0.1 - 10 m^3/s
- Friendly to water environment
- Demanding on construction work (water drive)



Micro hydro-turbine for SPC (Tynec, Francis, Kaplan) 5 - 500 kWe; suitable solution for streams and rivers with varying and substantial gradient of water flow

- Water gradient about 10 m
- Water flow 0.1 - 10 m^3/s
- Small and effective solution
- Demanding construction work (weir or dam).

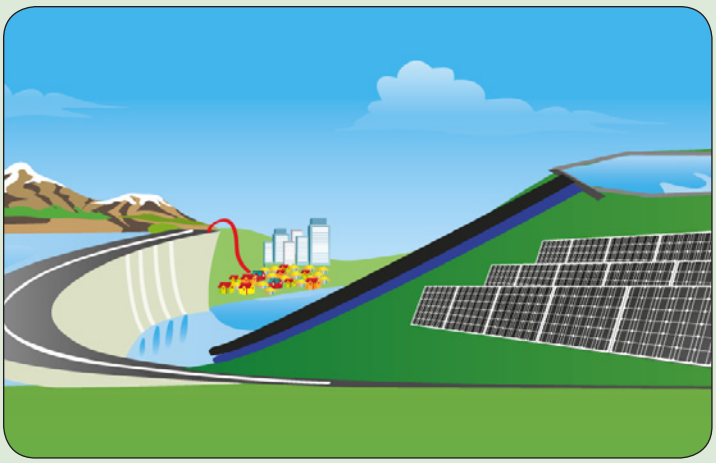


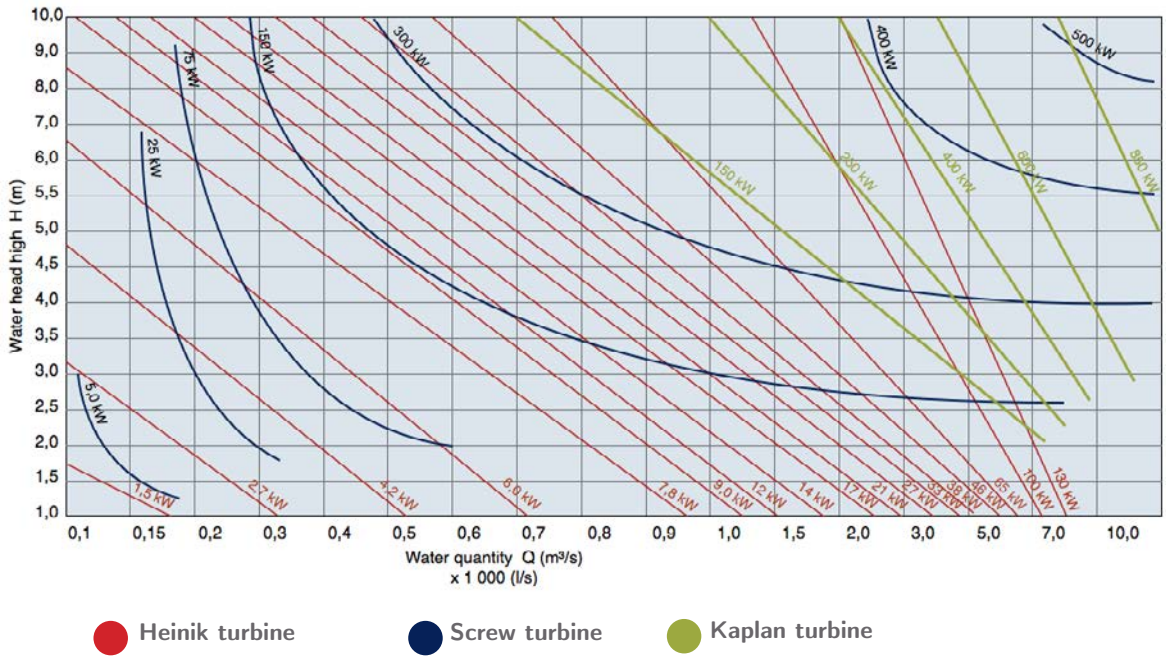
Mini hydro-turbine for SPC (Francis, Kaplan) more than 500 kWe; suitable solution for rivers with more abundant water flow. Effective solution to water dams.

- Water gradient more than 10 m
- Water flow more than 10 m^3/s
- Effective solution for water retention
- Demanding construction work (dam)

Water pumping hydro-plants and raining water retention.

Solution connecting several functions of water and potential of hydro-power and solar power. All known principles of hydro-dynamics and hydro-power technology are applied here in order to strengthen stability of electric power grid supply. For example, authors of such a project should already start preparatory work to take advantage of the suitable landscape of the industrial zone to develop a comprehensive solution for regulation of dynamically growing demand for electric power and water.





The range of use of turbines for SPC (Heinik, Francis, Screw, Kaplan)

The chart gives the basic overview of hydro-power potential for SPC. It represents a quick orientation in searching for the relation between the required output of hydro-power (in kWe) and the potential of the given site with energy potential of the nearby water flow (m^3/s or m of gradient). The basic information from the chart and from hydrology, geography, and geology of the given site might allow for arriving to the costs necessary for implementation of such project (in USD) and arriving to an economic characteristic of building and operating such project (in USD/1 KWh.)

Examples of application

We selected examples from the Czech Republic demonstrating feasibility and return on investment of the above-mentioned hydro-power technology. (web. Štěchovice, Dlouhé stráně, Gess, HVM Plasma)

Solar energy

Small Solar Power (SPP) plants for mixed RES solutions

With output capacity:

- About 100 kWe (thin film technology is recommended)
- Less than 1 MWe (standard PV products on the market can be used)

Suitable for mixed application (biomass, hydro-power, wind, thermal and other renewable energy sources) for communities away from central power grid. These are standard solutions, now commonly used (PV panels, converters, structure.)

Solar Generators (SG) for building (thin film technology is recommended)

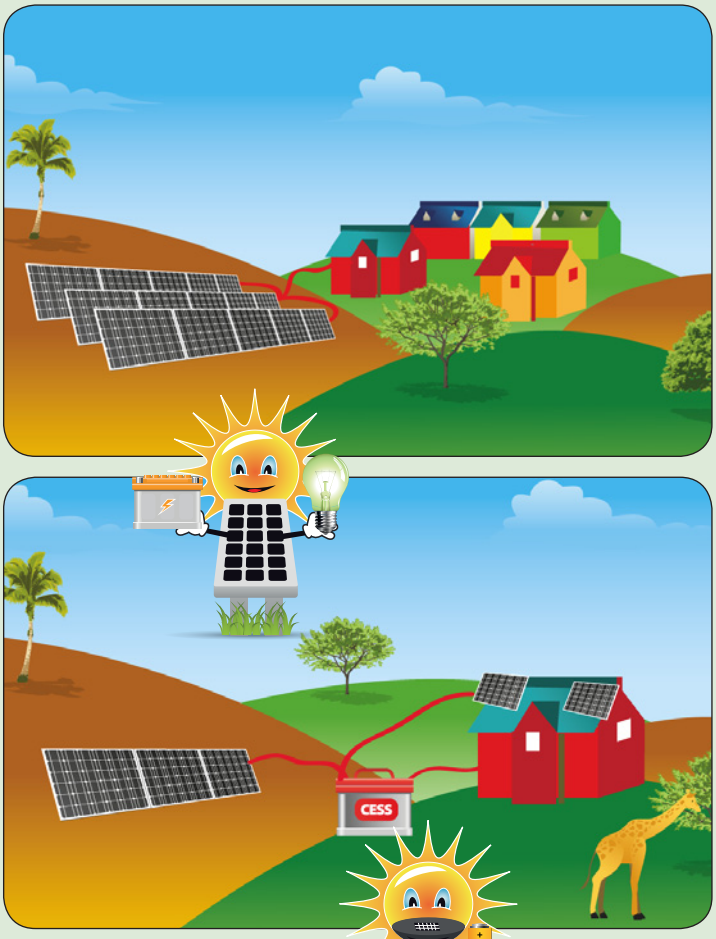
- About 10 kWe
- Less than 100 kWe

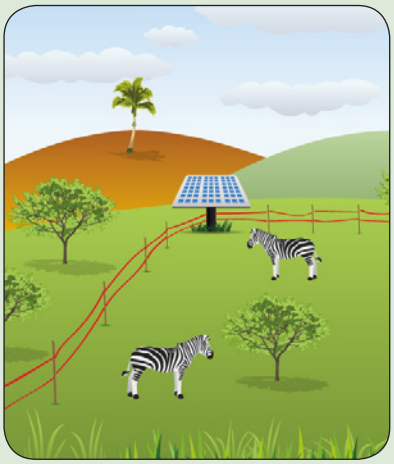
Suitable for use of PV solar thermal panels on roofs of houses allowing for use of electric power as well as hot water. This solution is focused on households (residential real estate) and smaller free-standing communal facilities (schools, hospitals and other communal service facilities). Hybrid panels for generation of electric power and heat are under development.

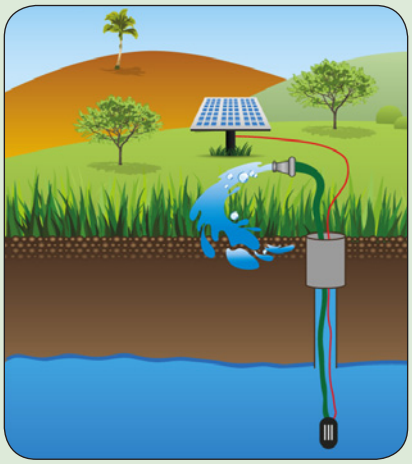
Solar Generators (SG) for other applications: less than 10 kWe (thin film technology recommended)

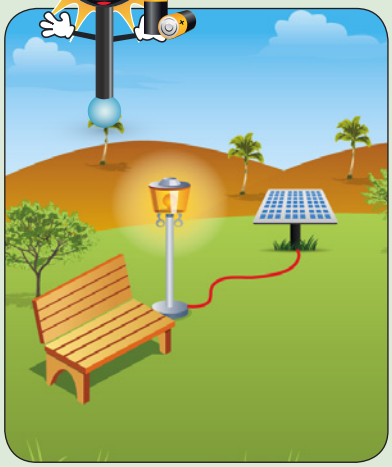
- Agriculture needs (e.g. simple lanterns, SG fence for livestock)
- Water pumping (SG pumps for drinking, supply water)
- Public lighting (SG streets lights, public places, market, etc.)

Suitable everywhere where is a sun shine and storage of electric power is available and environmentally acceptable (i.e. suitable type of batteries.) Given examples indicate the great variety of existing use of SG for rural and urban settlements anywhere in the world.





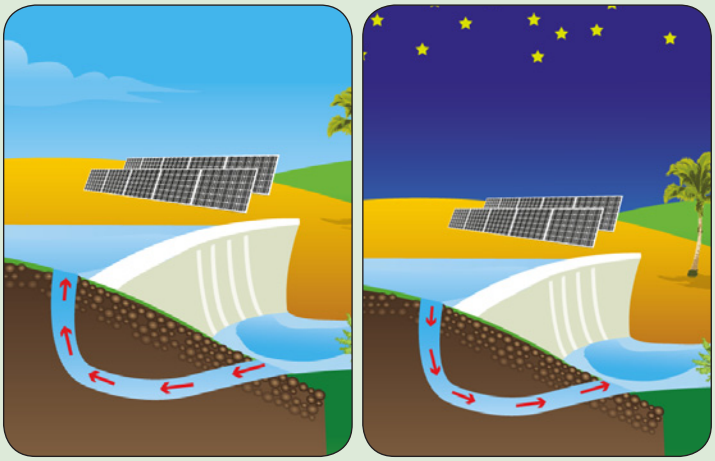




Storage (aaccumulation) of electric power by using photovoltaic and hydro-power technology:

- Output of about 100 kWe (simple earthfill dams retaining water for power generation during night).
- Output about 1 MWe (small concrete dams with water retention for power generation during night and other functions: drinking water supply, water for irrigation, etc.)

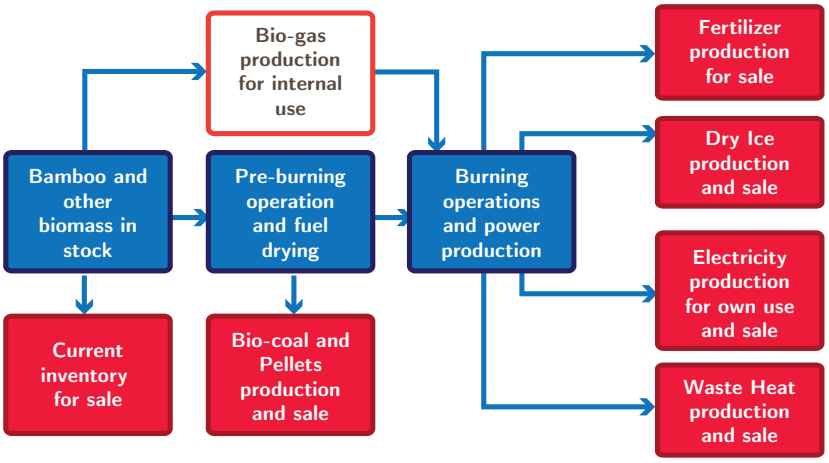
Suitable for any location with sun shine and the landscape allowing for building economically feasible facility for water retention. Water is pumped up into the higher water reservoir during daytime (when PV-generated electricity is available) and during night is using its kinetic energy to generate electricity as it is released back into the lower water reservoir.



Biomass energy

Biomass:

- Fast growing plants
  - Bamboo
  - Miscantus
  - Others
- Post harvest waste
  - Coffee, tea
  - Rice, sugar cane
  - Others
- Other bio-waste
  - Poultry droppings
  - Cattle dung
  - Others



Bioenergy is renewable energy obtained from material derived from biological sources. They include biomass, i.e. biological material used as a biofuel for conversion into energy (primary into steam and then to generate electricity). For biomass projects we are taping the knowledge and skills of energy sector of the Czech Republic's industrial base and the knowledge and skills of local partners in growing and using biomass (e.g. bamboo) to generate electricity.

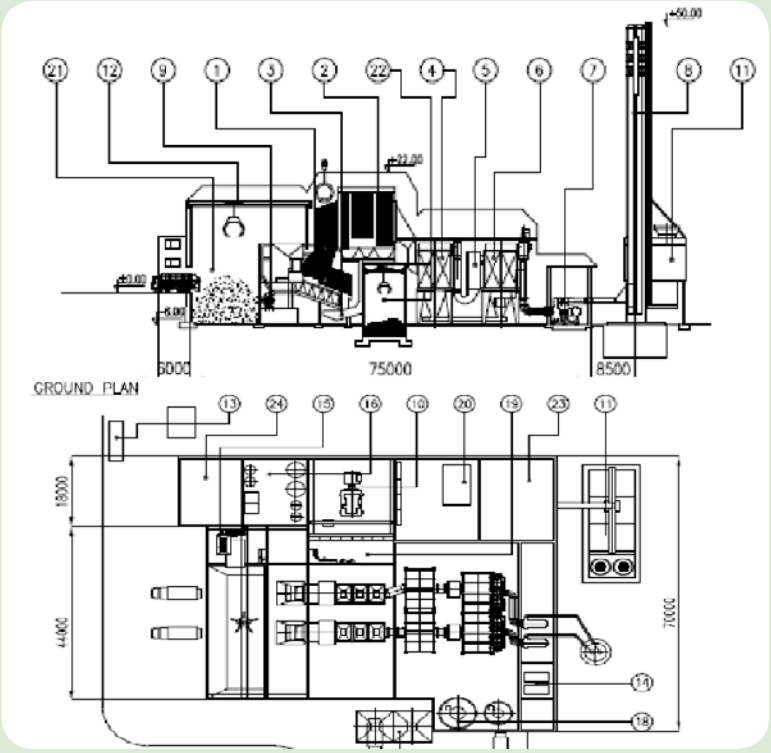
In cooperation with a local strategic partner, we offer delivery of services and technology for decentralized electrification of an area with electric power generating units based on renewable energy sources providing electric power 24/7, year around. The solution is built on using fast-growing plants, post harvest waste, and other bio-waste biomass and its conversion into steam and electric power.

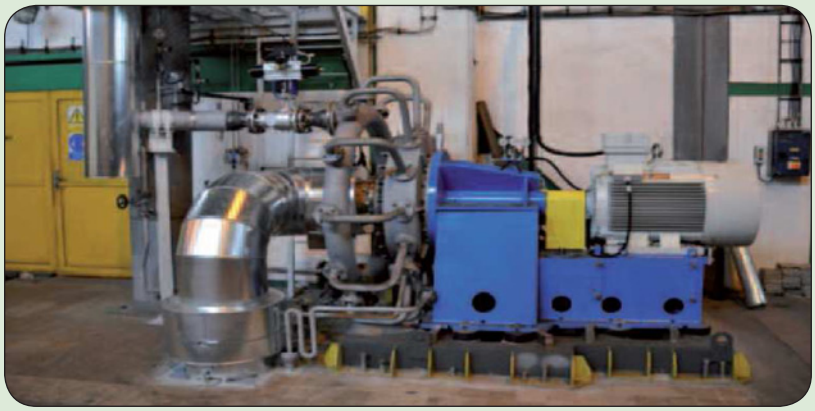
Example: The use of biomass it is not limited only to a conversion into electric power generation. With the potential of planting bamboo we propose to design the bamboo-growing fields in the way that the top quality bamboo is sold by SPC Utility as construction material and as material for making furniture and the rest to be used for generating steam and electric power.

We propose to use our technical assistance to transfer of the best practices within the SPC Concept, SPC Model, and SPC Project, to train local technicians and managers, for preparation of certification and accreditation programs, and implementation of control system and sustainability of operation of technology that we deliver.

Examples of application

We selected examples from the Czech Republic illustrating feasibility and economic return on investment of the above technology using biomass in production of energy (web. CKD, GWRD, Bresson, Enco Group)





Mixed energy

We offer delivery of technology and services for decentralized electrification with electric power-generating units (around 100kWe) using renewable sources of energy, 24/7, year around.

We offer cooperation in building independent energy systems (micro/mini grids) for distribution and sale of electricity that satisfy all needs in the place of its use, become a part of the environment in a sensible manner and respect the character of the landscape (i.e. small power-generating units) using locally available sources (biomass, solar power, hydro-power) to generate electricity and create jobs both during the construction as well as for operation of the systems.

For building micro/mini grids we offer delivery of power-generating units in the range of 1 kW to 600 kW each in configurations biomass, solar power, hydro-power (and other renewable sources) to achieve maximum success in given area.

We are interested in working on preparation of the proposal with participation of African and Czech experts in one team. We offer technical assistance with preparation of the logistics of project implementation, testing, and bringing the entire system into operation. We expect that local suppliers will deliver the majority supply of elements (poles, lines, electricity meters, etc.).

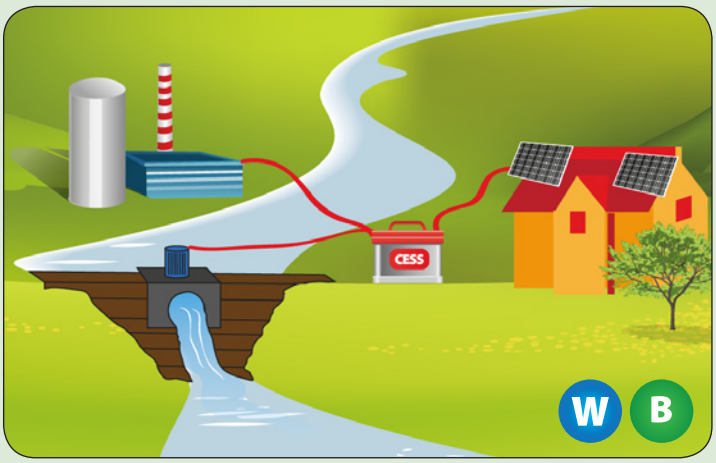
Examples of applications (W, B, S) are presented in individual illustrations and technical description is presented in detail in Technical Report.

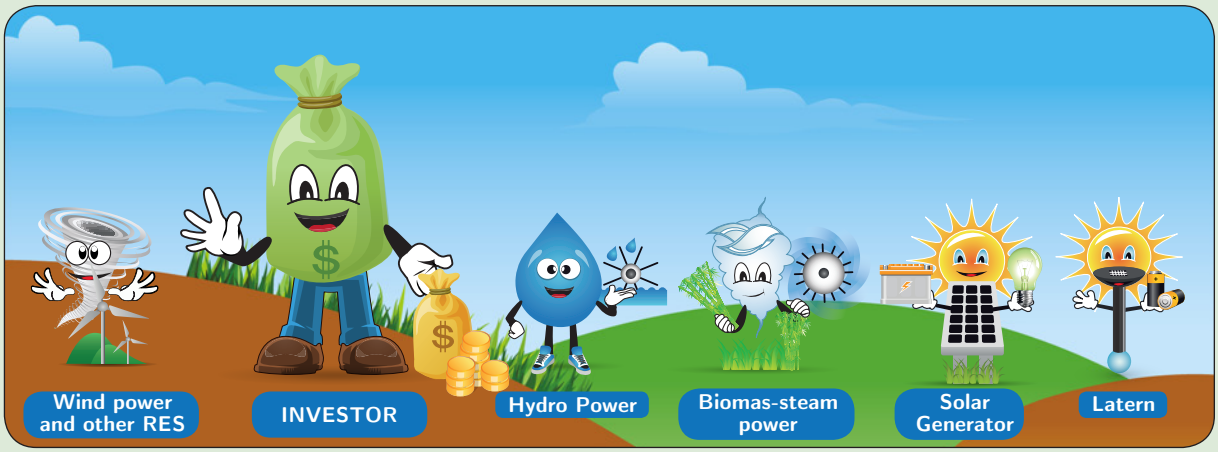
Due to general character of assignment concerning electrification of rural and peri-urban areas and for sufficiently detailed offer we created a SPC Model of combination of electric power sources and micro/mini grids for the entire area. The Model is following the two major criteria:

a) Dispersion of absorption capacity of end users reflecting the expected demand for electricity

b) Management of expected risks related to fulfillment of financial obligations created by usage of delivered electric power.

We are aware of the fact that the offer of technologies (W, B, S) is not exhaustive. Other possibilities also exist, for example those of wind and geothermal power plants. If the SPC Concept will prove itself - as we believe - to be the optimal solution for decentralized electrification needs. We would be looking forward more detailed requirements and at the same working with local partners to disseminate implementation of decentralized electrification in any other rural and peri-urban areas. Local industrial base will have a unique opportunity to lead this historical development and economy transformation as well as lifestyle quality improvement.





What we are offering:

The logistics and marketing material prepared in cooperation with local partners preparation for implementation of proposed technologies as well as its direct sale (to map local industry to get involve in installation of energy units and their maintenance).

Technical assistance concerning the technology, which is being offered for decentralized electrification of rural and peri-urban areas in your country.

If our approach to solution of decentralized electrification would be of your interest we are ready –after we get more detailed inputs – to prepare detail individual.

SPC Concept works within the logic of open pilot building blocks of electric power-generating units and distribution systems with the overall capacity given in the range between 2 to 3 MWe. Using the SPC Model, we propose for decentralized electrification and industrial development of rural and peri-urban areas the following pilot configurations:

- One source with the output of 1,400 kWe (B: 1200 kWe, S: 100 kWe, W: 100 kWe),
- Three sources of 100 kWe each in pair combinations of B/S/W, and
- One source of 500 kWe in any combination of B/S/W. The total power output of 1.5 MWe.

In the SPC Model we assume inputs and deliveries from other companies, especially from Europe.

The above-mentioned and installed energy units then become SPC Utilities (energy islands, or off-grid energy system). To strengthen trustworthiness of SPC Utilities to investors' new jobs tied to utility products and services are created (for an example see the diagram - biomass energy). SPC Utilities represent national energy infrastructure and should be build mostly by local companies.

Local partners in Africa countries will assume responsibilities for operating and maintaining SPC Utilities which are built as the result of this program that provides individual communities in rural and peri-urban areas access to reliable sources of electric power. Guarantees related to payment for delivered and used electricity are the best signal for any investor (including banks) to participate in project financing.

SPC Concept financing model is based on Revolving Funding mechanism