



Promoting Renewable Electricity Generation in South America

Newsletter 5/2013



Welcome to the fifth REGSA newsletter



The REGSA (Promoting Renewable Electricity Generation in South America) project is a cooperation scheme involving universities from Germany and South America, specifically Bolivia, Brazil and Chile.

The aim of REGSA is to contribute towards increasing the use of electrical energy generated from renewable energy sources in South America as a way to improve environmental conditions and thereby enhance energy security and alleviate poverty in the project areas. Furthermore, it directly supports sustainable energy options in the partner countries. To achieve

this goal, new electricity grids are due to be established which will integrate the use of renewable energy as a source of electrical energy. These grids are to be developed especially in rural areas. In addition, extensive baseline studies, as well as scenario building on the topic of renewable electricity generation, will be carried out including political, technological and socio-economic aspects. Different activities to raise awareness and practical support will be undertaken to improve the planning and design of policy frameworks. Furthermore, infrastructure feasibility studies are planned, the results of which should eventually lead to the increased use of clean energy technologies. Finally, REGSA

will give direct support in the form of a feasibility study to three pilot communities by means of the pilot project Renewable Electricity Communities.

This will facilitate regional dialogue and capacity building, which can subsequently be used as a best-practice model for other regions in South America.

The REGSA newsletter gives an insight into the efforts made by the different partners. It reports news about their progress and gives an overview of upcoming activities.

Enjoy reading!
Veronika Schulte & Julia Gottwald



News from Germany

Handbook of Renewable Energy

Contributions are now being sought for the "Handbook of Renewable Energy", to be published by Springer, one of the world's top scientific publishers. The "Handbook of Renewable Energy" focuses on the emergent and rapidly growing renewable energy market. Its principal aim is to collect state-of-the-art technologies, approaches, methods and projects in the field of renewable energy, with facts, data and descriptions of trends from across the world. This peer-reviewed publication of

six volumes deals with existing and emerging technologies, and will be one of the most comprehensive reference tools on this topic ever produced. It will not only be an excellent resource for teaching and research, but will also foster innovation within the sector, serving as a catalyst for further development.

The Handbook of Renewable Energy is structured in six volumes of 20 contributions each. These are:

- | | |
|----------|-----------------------|
| Volume 1 | Hydropower |
| Volume 2 | Solar energy |
| Volume 3 | Wind energy |
| Volume 4 | Biomass energy |
| Volume 5 | Geothermal energy |
| Volume 6 | Wave and tidal energy |

Further details can be viewed at: <http://refworks.springer.com/RenewableEnergy>

On the basis of such positive and exciting prospects, we are now inviting qualified scientists to act as authors.

Suitably qualified scientists and practitioners are warmly invited to submit a 200-word abstract, also outlining the name(s) and full contact details of the author(s) and naming the volume for which their contribution is intended. The deadline for the submission of abstracts is 30 September 2013. Further details will be discussed with the authors whose contributions are accepted.

News from Bolivia

Bolivian pilot project

The Bolivian pilot project will be developed in the Community of Carmen Pampa, Nor Yungas, La Paz, specifically in the Rural Academic Unit (UAC-CP is the Spanish acronym) associated with the Catholic University in this rural community. This unit teaches: education, nursing, veterinary medicine, agronomy and rural tourism, and is intended to meet the needs of people living in surrounding rural areas. This community, and specifically UAC-CP, was chosen in order to achieve sustainability of the project, to introduce both residents and students to the care, use and maintenance of the equipment, and to properly train them in these skills.

The project intends to generate a supply of electrical energy from renewable sources, namely the hydraulic potential of the water supply from rivers near Carmen Pampa and solar radiation. The micro hydro and solar heating installations aim to reduce energy costs and replace an equivalent amount of electricity generated from fossil fuels available from



Source of waterfall



Water collection chamber



Filter tank

the national grid. The aim is to work with the departments at the Academic Unit working in production, specifically, to cover the electricity needs of their coffee production and pig farm. At the same time, it will increase the supply of thermal energy, in terms of hot water for bathing, improving the students' comfort.

Extent of project

Hydraulic potential

A water conveyance mechanism was identified upstream from UAC-CP, transporting water from a micro-watershed towards the community of Carmen Pampa. This micro-watershed has an area of approximately 1 km² and provides a flow rate of just over 2.5 L/s.

The water conveyance mechanism discharges the water into a filter-tank about 200 m away from UAC-CP. The flow at this

point has an energetic potential which is tapped and can be used for any purpose; it is discharged at atmospheric pressure in to a sand filter and then transported through another piping system towards the aforementioned community.

The hydraulic potential at this point has been estimated at a total power of 1.2 kW of power in generation terminals for the month of October.

Energy substitution and savings

Following the pattern of weekly consumption registered during the energetic diagnosis, it is expected that a micro hydropower system would achieve 1.2 kW, replacing 61% of energy currently consumed. However, since the registered pattern does not represent the total energy consumed on Leahy Campus, it is estimated that the actual potential replacement is at least 15%.

Book "Generation of Renewable Electricity Scenarios" published in Bolivia

In the first quarter of 2013, the book "Generation of Renewable Electricity Scenarios" was published in Bolivia. The book is the Spanish-language version of the compendium of studies carried out by scheme members in Bolivia, Brazil and Chile regarding their countries' own energy matrices and considering an alternative scenario that includes input assumptions, as well as greater use of different types of renewable energies. The book also contains a comparative study of the three countries, which presents the current state of the three countries, clearly showing the stage of development of



Seminar "Renewable Energy in Latin American Countries"

each with respect to the use of renewable electricity, and also using estimates of the potential of further natural sources of energy to show the changes that can be achieved by integrating these sources into the energy mix.

The international project meeting was held in Bolivia from 22–26 April. There, the team met Mr Roderic McKenzie from the European Union, who was in Bolivia to



REGSA team at the international project meeting

monitor the progress and development of the project and concluded that the REGSA project meets the EU's expectations and recommendations.

As a part of that week, on April 26, the international seminar "Renewable Energy in Latin American Countries" took place, featuring presentations by colleagues from the partner countries. The seminar devoted space to the presentation of the project and made reference to the technology that is being developed within the framework of REGSA in Chile, showing the development of a method of charging vehicle batteries using renewable energy. It also made reference to the development of energy use in Brazil, showing the use of renewable energy in this country and its uses in various fields, as well as its degree of integration into Brazilian residents' daily energy use. Finally, in addition to these presentations, there was an explanation of projected energy scenarios for Bolivia, showing a snapshot of the results presented in the book.

Another activity that is taking place in Bolivia is the design and development of the pilot project to be implemented at Unidad Académica Campesina of Carmen Pampa's community, which is already defined and is due to be implemented in the near future. The project consists

of the installation of a micro hydro and solar heater, which will allow the reduction of energy costs due to the substitution of an equivalent amount of electricity generated from fossil fuels from the national grid. At the same time, the increase in the supply of thermal energy, in terms of hot water for bathing, will improve the students' comfort.



Generation of Renewable Electricity Scenarios

News from Brazil

REGSA pilot module project: Renewable Solar Generation and Energy Efficiency

Among the sustainability initiatives aimed at the socio-economic development of the population, education stands out. In Brazil, the REGSA pilot project focuses on renewable energy generation in the Municipality of Rancho Queimado (a rural municipality). In the words of Professor Norma Beatriz Camisão Schwinden: "The REGSA project in Brazil combines the production of sustainable energy, an intervention on energy efficiency and the dissemination of knowledge in order to promote a sustainable future".

Professor Luciano Dutra says: "The applied research project which forms a part of REGSA's pilot module in Brazil is being developed at Roberto Schutz Primary School with the installation of photovoltaic panels to meet the school's energy demand for lighting in all classrooms and the library, as well as providing a significant reduction in its electric power expenses and preventing the emission of 2,263 kg/year of CO₂."



Upgrading of lighting systems at Roberto Schutz Elementary School

Professor Suely Ferraz de Andrade points out that: "Associated with the implementation of a viable project of renewable generation, we are also implementing a project aimed at providing better visual comfort for the students whilst observing the principles of energy efficiency. After several measurements it was possible to



Pilot project team

identify low levels of lighting, especially in the classrooms and library, which are the most important places in the school. They highlighted the necessary upgrades of the lighting systems so that they met modern standards, meaning a retrofit was required. We developed a lighting project more efficient and appropriate to the needs of the school by replacing the old, inefficient lighting system that consisted of two 40 W fluorescent lamps and adopting then new, efficient equipments with light reflective fins composed of four highly efficient T5 14 W lamps, promoting higher luminous efficacy".

This step involved revising the wiring system and removing the inefficient, inadequate equipment to make the system more reliable. It now features twice the previous number of lamps.

This renovation also required redecoration of the school's interior, involving painting the walls and ceilings. The walls were painted light green and the ceilings white, providing better visual comfort in the school, and consequently bringing more benefits to the pupils' health. The actions carried out include improvements to lighting equipment, reduced electricity consumption and the improvement in the level of lighting in the school environment to meet technical standards.

As the climate in Taquaras is too cold in winter, passive warming is recommended all year. This can be achieved by solar heat-

ing water. In this case, we chose the option of installing a low cost system made with recyclable materials, particularly PET bottles and milk cartons. This meant the components need to be collected by the students, a task which involves the entire local community including embodying one of the premises of the municipality to encourage educational events in support of rural development and family.

Professor Baltazar de Andrade Guerra points out that: "These actions will generate a significant improvement in the quality of life of the 150 children attending the school. This implementation of an energy efficiency and electrification through solar energy ('solarization') project will make this school the first in the State of Santa Catarina (southern Brazil) to generate all of its own electricity using clean and renewable energy (solar).

The results achieved so far demonstrate that energy efficiency, combined with the use of a recognised sustainable energy source, can provide intense cultural change in the consumption of electricity and therefore should be increasingly incorporated into the everyday routines of all schools, since it strengthens the concept of sustainability.

At Unisul, REGSA is represented by professors José Baltazar Salgueirinho Osório de Andrade Guerra, Luciano Dutra, Norma Beatriz Camisão Schwinden and Suely Ferraz de Andrade.

News from Chile

CHILEAN PILOT PROJECT – ELECTRIC VEHICLE FOR RURAL COMMUNITIES (VESUSCON)

BACKGROUND

Huatacondo is a village of 75, primarily elderly, inhabitants, located 230 km south-east of Iquique in the north of Chile, and sits at 2,400 m above sea level. Huatacondo currently generates its own power using both renewable energies and a diesel generator. Around 70% of the existing houses are uninhabited, used only during holidays, on bank holidays and on some other important dates, such as the celebration of the Feast of the Assumption on 15 August.

The community carries out different subsistence activities including farming, where the most important crops are alfalfa and corn. Christmas pears, oranges and lemons are grown in the orchards and animals including pigs, goats, rabbits and guinea pigs are reared. The most useable of the village's energy-related natural resources are solar, wind and biomass. The village also has important tourism potential associated with proximity to petroglyphs, geoglyphs, a salt cascade and dinosaur tracks.

MOTIVATION

Nowadays, isolated rural communities in developing countries face infrastructure (roads, power, water) and logistical (food, fuel, waste) difficulties that make their daily subsistence even harder. However, in recent years, technological development has provided new tools that might help these types of communities to improve their standard of living. An example of this are micro grids (MG), which may be considered as electrical distribution systems containing Distributed Energy Resources (DER), such as distributed generators, storage devices or controllable loads that can be controlled and coordinated, either while connected to the main power network or while isolated. In fact, MGs have been implemented as a novel solution to the problem of power supply in isolated locations, which is the case of Huatacondo's MG, providing a continuous electricity service based on renewable energy. Nevertheless, whilst the power issue has been adequately solved, there are still other significant aspects that should be considered, such as fuel dependency and logistics. Given the remote location of this kind of town, fuel prices and logistics are primary problems for the population. In fact, local transportation is scarce and not at all efficient considering that people are not used to upgrading old

Forthcoming events

Conference and exhibition:

1st Latin American PV
10–11 September 2013
Santiago, Chile

www.pv-insider.com/latam/en-index.php

Symposium on micro grids

11–12 September 2013
Santiago, Chile

Conference and exhibition:

Intersolar South America
18–20 September 2013
Sao Paulo, Brazil

www.intersolar.net.br

8th conference on sustainable development of energy, water and environment systems

22–27 September 2013
Dubrovnik, Croatia

www.dubrovnik2013.sdewes.org

Trade fair:

The Green Expo 2013
24–26 September 2013
Mexico City, Mexico

www.ejkrause.com.mx

LIB-DUN:

International conference and exhibition on renewable energy
28–30 September 2013
Tripoli, Libya

www.lib-dun.ly

Trade fair:

Green Cities
2–3 October 2013,
Malaga, Spain

www.fycma.com

2013 WEC Daegu Congress

10–19 October 2013
Daegu, South Korea

www.daegu2013.kr

REGSA International Conference (REGSA – 2014)

VI Seminar of Interdisciplinary Research
International conference organised as part of the year "Germany + Brazil 2013–2014"

6–8 May 2014

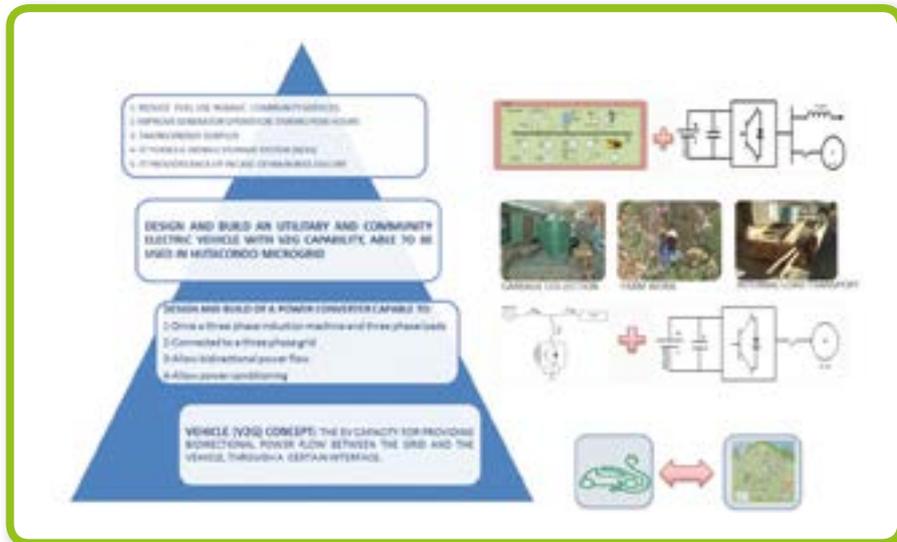
Florianopolis, Santa Catarina, Brazil

Call for papers is open.

For further information please visit the website:
<http://regsa-project.eu/en/international-conference-2014.html>



Huatacondo location



VESUSCON project proposal

internal combustion vehicles. Logistics are also difficult to maintain, and the supply chain is sometimes dependent on environmental conditions and scarcity may suddenly become a problem because of this aspect. This is the case for fuel supply, in addition to higher prices, scarcity appears as a factor that jeopardises all activities based on fuel consumption, which includes power supply.

Therefore, considering that MGs can provide a continuous power supply, they also make rural custom electric vehicles a potential alternative to vehicles run on fuel. This would overcome the problems of fuel and logistics, improve transportation, support other activities that may require cargo transportation and support local agricultural production. Finally, thanks to technological developments already achieved, the vehicle not only behaves as a system load, it can also contribute to the power supply (from its battery bank) and ancillary services to the MG network using the V2G (vehicle to grid) concept.

Taking into consideration the concept explained before, development of this concept is foreseen on Huatacondo's MG system, under the VESUSCON project name.

PROJECT OBJECTIVE

Under a participatory framework, to design, build, and implement a V2G

capable electric vehicle for use on the Huatacondo community's micro grid system.

PROJECT DESCRIPTION

The VESUSCON project pursues the design and construction of a V2G enabled electric vehicle for use on Huatacondo's MG system in the north of Chile. The aim is to investigate the social, cultural, economic and technical impacts of the introduction and use of this technology as a new way of generating electricity and powering a freight transport vehicle. To this end, the vehicle will have two operating modes. The first – base case – will be as an electric vehicle. In this mode, the village can use it for three primary tasks: transportation of cargo to and from small farms, transportation of household waste to the local landfill, and moving cargo within the village.

The second mode of operation will be networked, i.e. connected to the micro grid, which means the vehicle will not need an external charger to recharge its batteries and will use its own internal electronics instead. This will create both savings on implementation costs and a set of new capabilities that will improve the power quality and encourage more efficient use of energy.

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