Introducing the project REGSA – Promoting Renewable Electricity Generation in South America

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Hochschule für Angewandte Wissenschaften Hamburg
Hamburg University of Applied Sciences

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UNIVERSIDADE DO SUL DE SANTA CATARINA
Aqui o seu futuro acontece

Universidad de Chile

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Research and Transfer Centre
„Applications of Life Sciences“

Hochschule für Angewandte Wissenschaften Hamburg
Hamburg University of Applied Sciences

4 Departments: Life Sciences ,Technology & Computer, Economics & Social Studies, Design & Media

5 Competence Centres: interdisciplinary, across all departments

CC4E: Competence Centre for Renewable Energy and Energy Efficiency

Key themes are **renewable energy**, **water**, **climate** and **sustainable development**
We are worldwide active and run a set of projects
We cover the whole project cycle: from application to management and reporting
We specialise on technology transfer and applications of techniques, as well as networking

REGSA DIREKT Small Developing Island Renewable Energy Knowledge and Technology Transfer Network JELARE CELA RENET

REGSA

Promoting Renewable Electricity Generation in South America

Project REGSA

Promoting Renewable Electricity Generation in South America

Project is funded by the European Union.

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REGSA Promoting Renewable Electricity Generation in South America

Rationale

- Apart from environmental benefits, **Renewable Energy** offer great **potential for the local socio-economic development.**
- As Renewable Energies can be **produced locally**, they provide a wide range of **local jobs opportunities** (from high-skill to low skill, from high-tech to agriculture), foster **local investments** and reduce the **dependency on importing of fossil fuels**.
- Potential for **electrification of rural and remote communities**
- Most countries have strategies and plans to foster renewable energy generation, however, the actual implementation is hampered by a **wide range of legislative, financial, political and technological problems**.
- REGSA projects provides support to the **policy makers, decision makers, energy providers , private sector** and **citizens** to overcome the barriers for **increasing use of renewable energy for electrical power generation in South American countries.**

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Promoting Renewable Electricity Generation in South America

Partners overview

Hochschule für Angewandte Wissenschaften Hamburg
Hamburg University of Applied Sciences

GERMANY

UNIVERSIDAD CATÓLICA BOLIVIANA SAN PABLO
VERITAS IN CARITATE
MCMLXVI

BOLIVIA

CHILE

UNISUL
UNIVERSIDADE DO SUL DE SANTA CATARINA

BRAZIL

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Promoting Renewable Electricity Generation in South America

Objectives

Overall objective of REGSA

- contribute to the increasing use of renewable energy for electrical power generation in South American countries.

Specific objectives of REGSA

- To identify and disseminate the technical and socio-economic potential of renewable energy power generation in SA
- To raise awareness and support the regional dialogue of key public and private actors and decision-makers about renewable electricity generation in SA
- To support selected pilot communities/regions in the development and implementation of viable renewable electricity generation projects.

www.regsa-project.eu

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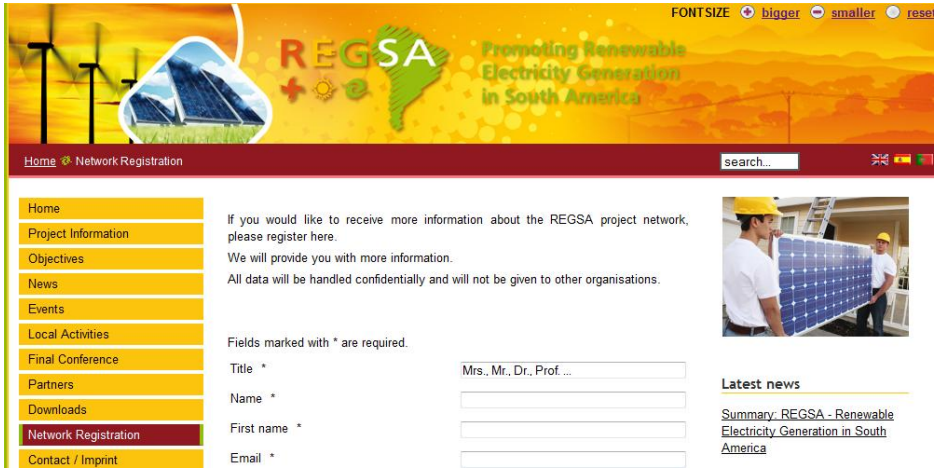
Activities

- Baseline Study on Renewable Energy Generation
- Renewable Electricity Generation Scenarios
- Pilot Action – Renewable Electrical Energy Communities
- Awareness raising & Dissemination Activities



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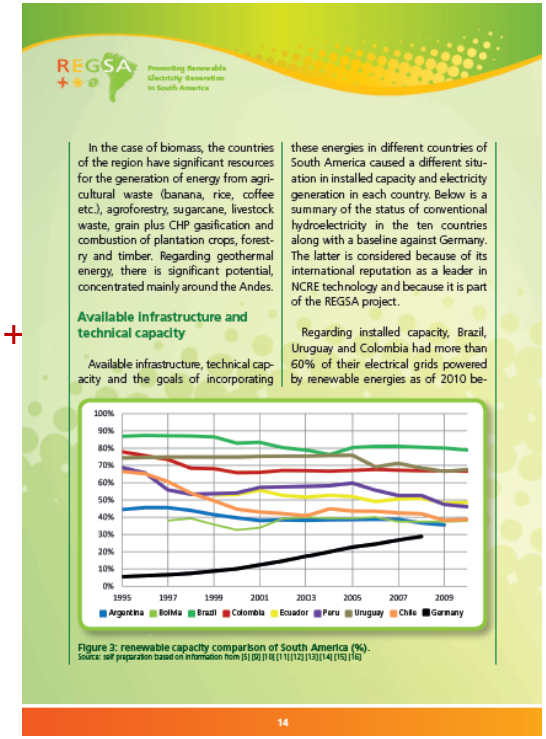
Baseline Study

Comparative analysis of political/ institutional framework and RE infrastructure of 10 SA countries + Germany



identify weaknesses and opportunities to consider in order to promote the massive integration of RE in the region.

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Baseline Study

6 SA and 8 EU **Best-practice cases** for the integration of renewable energy in electricity grids

Successful experiences that may be replicated in other countries as key tools for the integration of RE in power grids

10 GERMANY

Biogas production in Rottweil-Hausen region-Baden-Württemberg

GERMANY

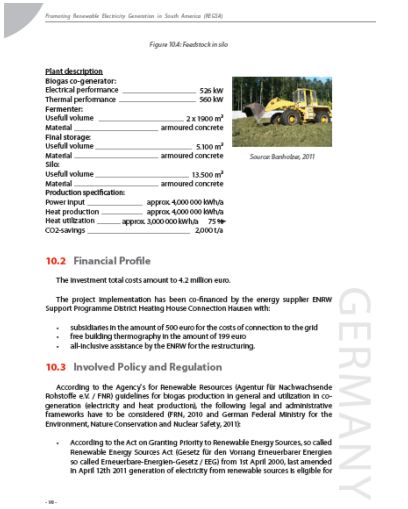

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Figure 10.4: Feedstock in silo

Plant description

Biogas co-generator:
Electrical performance ____ 526 kW
Thermal performance ____ 560 kW
Fermenter:
Usefull volume ____ 2 x 1900 m³
Material ____ armoured concrete
Final storage:
Usefull volume ____ 5.100 m³
Material ____ armoured concrete
Silo:
Usefull volume ____ 13.500 m³
Material ____ armoured concrete
Production specification:
Power input ____ approx. 4,000 000 kWh/a
Heat production ____ approx. 4,000 000 kWh/a
Heat utilization ____ approx. 3,000 000 kWh/a 75 %
CO2-savings ____ 2,000 t/a

Source: Bankhofer, 2011

10.2 Financial Profile

The investment total costs amount to 4.2 million euro.

The project implementation has been co-financed by the energy supplier ENRW Support Programme District Heating House Connection Hauses with:

- subsidiaries in the amount of 500 euro for the costs of connection to the grid
- free building thermography in the amount of 199 euro
- all-inclusive assistance by the ENRW for the restructuring.

10.3 Involved Policy and Regulation

According to the Agency's for Renewable Resources (Agentur für Nachwachsende Rohstoffe e.V. / FNR) guidelines for biogas production in general and utilization in co-generation (electricity and heat production), the following legal and administrative frameworks have to be considered (FRN, 2010 and German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 2011):

- According to the Act on Granting Priority to Renewable Energy Sources, so called Renewable Energy Sources Act (Gesetz für den Vorrang Erneuerbarer Energien so called Erneuerbare-Energien-Gesetz / EEG) from 1st April 2000, last amended in April 12th 2011 generation of electricity from renewable sources is eligible for

GERMANY

5 CHILE

The ESUSCON Rural Electrification Project

CHILE

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distributed renewable resources in the area, providing 24-hour electricity service. Because the village experienced problems with the water supply system, a management solution was also included in the microgrid. Additionally, a demand-side option to compensate the generation fluctuations due to the renewable sources was considered. The system is composed of two photovoltaic systems, a wind turbine, the existing diesel generator unit of the village (typical in isolated locations), an energy storage system (ESS) composed of a lead-acid battery bank (LABB) connected to the grid through a bidirectional inverter, a water pump and a DSM (load). Figure 8 summarizes the power schematic of this microgrid.

These elements are commanded by a central Energy Management System (EMS) that provides signals for optimizing their operation according to load and resources forecasts in order to minimize the consumption of diesel and keep the power quality indicators close to optimal values. Additionally, it includes a demand side management system, which sends to the customer visual information about recommended daily load profiles according to forecasted resource availability; actual consumption data is recorded and sent back to the EMS through smart metering (Palma et al., 2010).

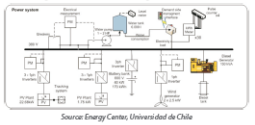
The following are the main goals of the EMS:

- Minimize the use of diesel
- Deliver active generation set points for the diesel generator, the ESS inverter and the PV plant
- Turn on and off the water pump in order to keep the elevated water tank level within predefined limits
- Send signals to consumers promoting behavior changes

In field implementation, the diesel generator and the ESS inverter have two configurable droop curves to follow the set points. Q-V and P-f droop curves are normally configured for typical operation states that change when receiving adequate signals from the EMS.

When the EMS turns on the diesel generator, it is convenient to start the LABB charge. In that case, the diesel generator is configured to work in isochronous mode (with infinite slope in both curves, takes all the variations between generation and load, following the rated values V_{RMS}, f_{RMS}) and the ESS inverter curves are configured to follow the charging profile of the batteries.

Figure 5.2: Renewable-based microgrid: Power schematic



Source: Energy Center, Universidad de Chile

CHILE

Activities

Renewable electricity generation scenarios

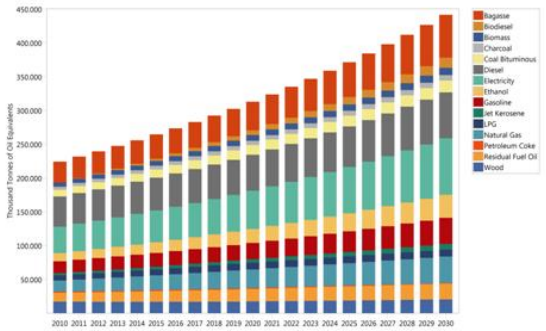
Bolivia, Brazil and Chile

Mitigation Scenario

Projections of electricity supply (2007-2025)

	2007		2015		2020		2025	
	GWh	%	GWh	%	GWh	%	GWh	%
Baseline scenario								
Thermoelectric	34.126	60,41%	49.321	60,52%	47.339	48,02%	73.710	57,42%
Hydroelectric	22.353	39,57%	31.130	38,20%	48.985	49,69%	52.402	40,82%
Geothermic	0	0%	589	0,72%	1.788	1,81%	1.788	1,39%
Wind	11	0,02%	460	0,56%	460	0,47%	460	0,36%
TOTAL	56.490		81.499		98.572		128.360	
Mitigation scenario								
Thermoelectric	34.126	60,41%	46.021	58,85%	43.988	46,44%	66.683	54,96%
Hydroelectric	22.353	39,57%	31.130	39,81%	48.940	51,67%	52.402	43,19%
Geothermic	0	0%	589	0,75%	1.788	1,89%	1.788	1,47%
Wind	11	0,02%	460	0,59%	460	0,49%	460	0,38%
TOTAL	56.490		78.200		94.716		121.333	

Demand by fuels (Ktoe)



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Activities

Pilot Communities for renewable electricity generation

- **feasibility study** for RE project
- **Information events** and round tables for regional stakeholders
- **Capacity-building programme,** including training and coaching on technical, management and financial topics

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Pilot Project Bolivia

Unidad academica campesina Carmen Pampa

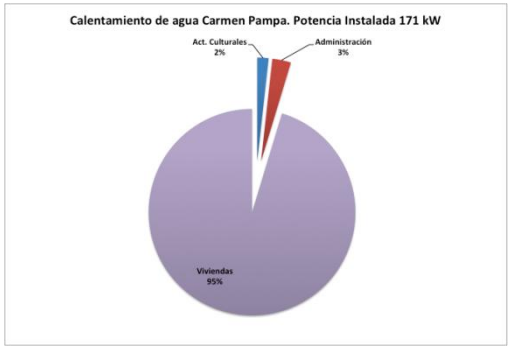
543 students - Two experimental production units: Coffee industry + Pig farm

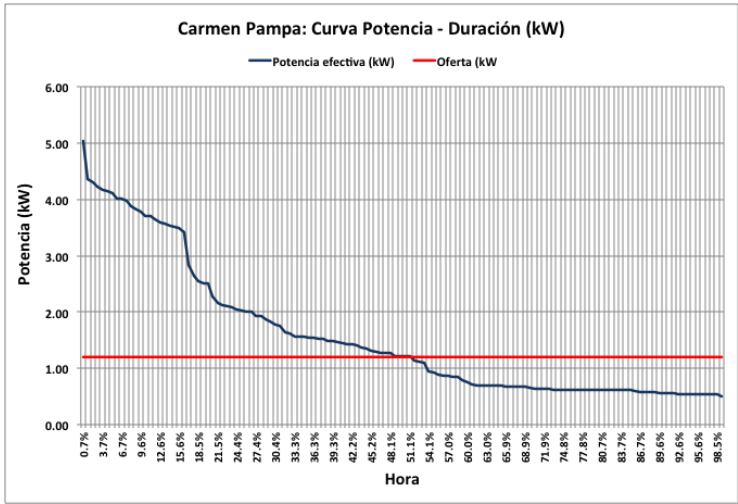
An energy system allows:

- Saving energy costs and improve the budget for experimental production activities.
- To improve the comfort of the students
- Reduce energy consumption from NIS

Through:

- Installation of a MCH sytem using the actual water community system
- Installation of termosolar system for water heating.





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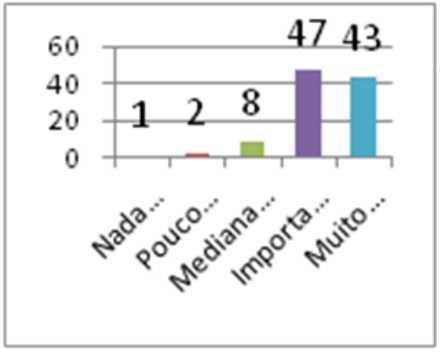
Pilot Project Brazil, RANCHO QUEIMADO

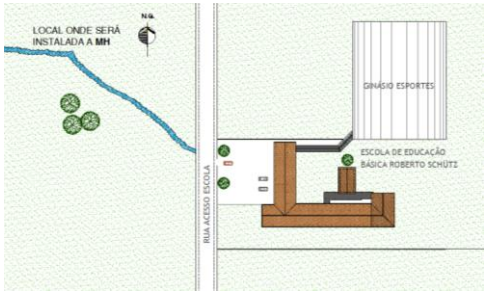
MICRO HYDRO / ENERGY EFFICIENCY STUDIES IN THE ELEMENTARY SCHOOL ROBERTO SCHÜTZ

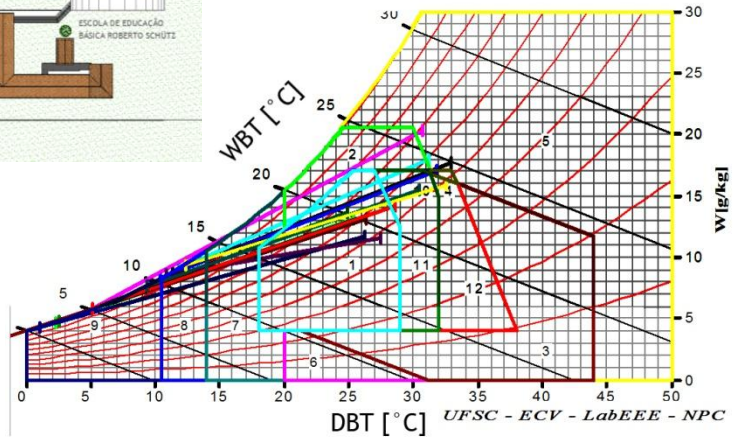
SOCIAL FEASIBILITY



HOW IMPORTANT DO YOU CONSIDER THAT THE ENERGY SUPPLY TO RANCHO QUEIMADO IS FROM CLEAN AND RENEWABLE SOURCES?

Valid interviews in this issue: 198
1% - nothing important
2% - Minor
8% - medium-Important
47% - Important
43% - very important





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Pilot Project Chile, Huatacondo

Renewable Energy for local rural transportation

1- To have a vehicle that allows diminishing fuel consumption for load transportation. It is design from and for local requirements.

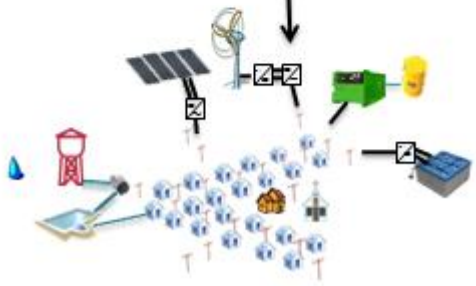
3- Broad (geographically) the possibility of deliver and receive energy.

Mobile Generator

EV

Specialized EV

Network connection



2- Create a bi-directional connection with the power system and explore its applications

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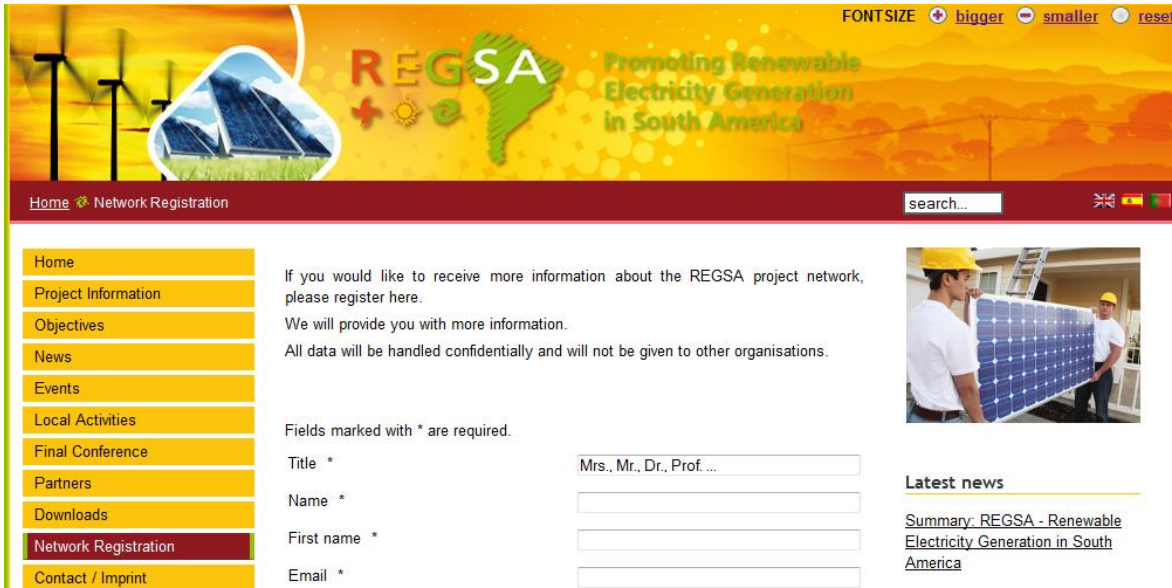

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Thank you for your attention!

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