ALCUE NET – Latin American, Caribbean and European Union Thematic Workshop on Renewable Energies and Energy Efficiency

CONACYT - Consejo Nacional de Ciencia y Tecnología
Mexico City - October 24th – 25th, 2013

Working document 1.

ALCUENET activities in Renewable Energies

To advance in the objectives of the project, the implementation process has been organized around different thematic areas, one of them addressing Societal Challenges through action in the Energy thematic priority of the Joint Initiative for Research and Innovation components.

The activities within ALCUE NET in the Energy thematic area, and more specifically in Renewable Energies, are aimed to lead up to the implementation of specific activities expecting to eventually evolve into a full bi-regional cooperation platform or net involving all relevant stakeholders and undertaking support activities ranging from foresight to agenda setting and actual joint instrument implementation in the energy theme.

At the operational specific level ALCUE NET is contributing to support the S&T bi-regional dialogue throughout the organization of this first *ALCUE NET European-Latin American Workshop on Renewable Energies* focused in renewable energies and energy efficiency, particularly, in validating topics for cooperation in solar energy (photovoltaic and thermal), wind and bio-energy, as well as in defining further bi-regional priority areas for pilot activities in energy efficiency to finally contribute to implement the EU-LAC (European Union – Latin America and Caribbean) Joint Initiative for Research and Innovation (JIRI).

Workshop objectives

The workshop will be focused in renewable energies and energy efficiency, particularly, in validating topics for cooperation in solar energy (photovoltaic and thermal), wind and bio-energy, as well as in defining further bi-regional priority areas for pilot activities in energy efficiency.

a) re-validate priority areas/topics identified through previous expert consultations
b) identify additional priority areas for cooperation in energy efficiency
c) address and design top-down synergies, initiatives and measures

In the plenary sessions of the workshop an overview of the stage of the field, initiatives and issues related to the renewable energies will be introduced. Through making available such an overview,

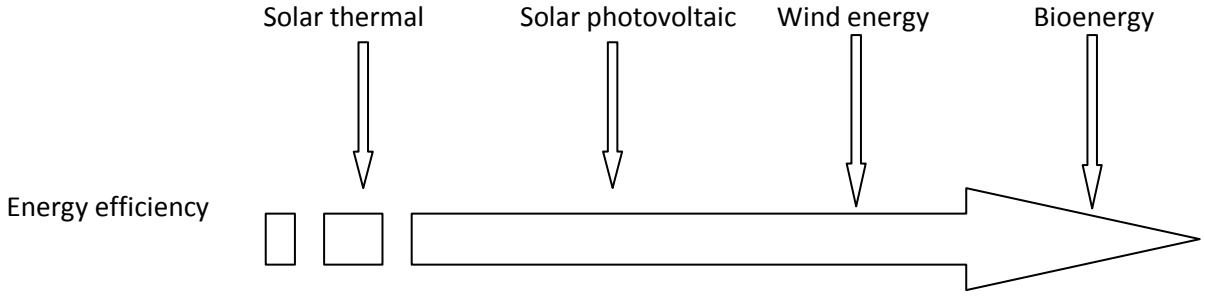
we aim at facilitating the exchange of ideas on the priority setting and the approach to energy efficiency for EU-LAC cooperation in ST&I.

In the first parallel working sessions, the participants will discuss on topics which are the result of previous work done by experts from the European Technological Platforms and discussed with experts from Latin American countries aimed at agreeing on action priorities for the cooperation between EU and LAC countries.

The areas and subareas to be covered are presented in the following pages. The analysis of these potentially common research priorities for EULAC cooperation will provide inputs for the EU-LAC SOM Working Group on Renewable Energies and will further be taken into consideration for the definition of bi-regional joint activities in renewable energies: solar energy -photovoltaic and thermal-, wind energy and bioenergy.

During second round of parallel thematic sessions, the ETPs recommendations for EU-LAC cooperation and the approach towards Energy Efficiency will be discussed. Two strategic approaches are proposed.

Approach 1: Related to four subareas – solar thermal, solar photovoltaic, wind and bioenergy – from which energy efficiency could be approached. This perspective is being considered at present in the "Integrated Road Map" that is being prepared by the EC as part of the strategy in the energy area.



Approach 2: The second perspective is related to the areas into which the energy efficiency might be approached from the point of view of the European Commission. These areas are related to energy efficiency in buildings; heating & cooling; industry aspects; products development, and other key areas which are presented in the Non-paper prepared by the experts who are actively collaborating in this project and who have been supporting the SOM Working Group in Renewable Energies.

Please refer to the ALCUENET Non paper on energy efficiency for the Working session 2: Strategic approaches to Energy Efficiency

- Integrated Road Map
- Lines of cooperation between European and Latin American institutions and organisms and selection/agreement on those on which specific initiatives can be developed

The discussions among the experts are aimed at collecting information on whether the priorities therein identified are of EU-LAC common interest. The results will be further reviewed and analyzed to determine the lines of cooperation between European and Latin American institutions and organisms.

EU-LAC cooperation on bioenergy

Working session 1. Review priority areas-topics, training and recommendations *(Discussions and elaboration of recommendations on bioenergy – agree on focus for biomass – energy/bioeconomy thematic areas.*

Common specific subareas for EU-LAC cooperation on bioenergy

The identified research subareas for potential collaboration in bioenergy are:

1. Biomass availability and supply
2. Conversion processes
   2.1. Heat and/or power production
   2.2. Biofuels for transport
3. Markets and regulatory framework
4. Sustainability

Common research priorities for EU-LAC cooperation on bioenergy

1. **Biomass availability and supply:** The general opinion among experts is that, although there is a considerable potential for biomass feedstock production in LA (also for export to the EU), biomass availability (both residues and areas for the cultivation of energy crops taking into account non-competition for agricultural land, non-irrigated production and high biodiversity conservation) in LA has not been assessed yet. Therefore, biomass availability and logistics is a very relevant topic for specific research that could be addressed in joint EU-LA cooperation.

   Research priorities on biomass availability and supply:

   1.1. Harmonization of methodologies to assess the potential for biomass production in LA including environmental and socio-economic aspects and limitations, including the development of availability-cost curves for different sources of biomass (energy crops, forestry and agriculture residues, wastes) and geographical locations; development of interfacing systems analysis (supply-demand, market interdependencies, impact of policies)

   1.2. Development of new high-yield agricultural and forest systems based on the breeding of crops and trees optimized for biomass production for multiple uses.

   1.3. Development of efficient biomass logistic systems (harvesting/collection/storage) for different conversion concepts at different, appropriate scales

   1.4. Development of efficient harvesting and collection systems for agro-forest residues and wastes to increase biomass availability

   1.5. Production of algae at a competitive cost within the context of bio refinery concepts

2. **Conversion processes** for heat and/or power and biofuels production: Regarding conversion technologies experts agreed to prioritize research activities in the technologies for producing liquid biofuels for transport rather than technologies for producing heat and power.

   2.1. Research priorities on conversion processes - Biofuels for transport:

   2.1.1. Improve current conversion processes to their full potential (biodiesel, bio ethanol from starch-sugar) for valorisation of waste streams, higher GHG reduction, increased flexibility for different raw materials and lower cost

2.1.2. Research on advanced technologies for biofuels production, especially if residues are used as feedstock. Develop thermo chemical and biochemical conversion processes with feedstock flexibility for different lignocellulosic biomass (BtL, LC bio ethanol, biome thane, biohydrogen
2.1.3. Develop integrated bio refinery concepts making full use of a variety of biomass feed stocks to obtain bioenergy, biofuels and high-value bio products
2.1.4. Conversion processes of algae within the context of biorefinery concepts
2.1.5. Demonstrate at pilot and industrial scale the reliability and performance of new technologies

2.2. Research priorities on conversion processes - Heat and/or power production:

2.2.1. Improvement and innovation on design and performance of biogas digesters (
2.2.2. **D**evelopment of energy-efficient and cost effective technologies for biogas and syngas upgrading
2.2.3. Identify optimal gasification conditions for different biomass fuels, demonstrate reliable operation of gasification CHP
2.2.4. Increase system efficiency and reduce emissions (e.g. particulate emissions) from stoves, boilers and CHP plants from micro to large scale
2.2.5. *H*ybrid systems. Integration with other renewable technologies (e.g. solar thermal, geothermal, etc), for both heat and power generation

3. Markets and regulatory framework

3.1. Research priorities related to markets and regulatory framework:

3.1.1. To transfer long-term experience of European standardization bodies for setting up biofuels standards in LA
3.1.2. To transfer long-term experience of European standardization bodies for setting up biofuels standards in LA

4. **Sustainability:** There is a general consensus about sustainability of biomass production and use being a key issue in LA. Strategies and policies are needed to ensure the economic, sustainable and equitable future development of bioenergy in the region. Research is needed to understand the different perspectives of biofuel sustainability, especially with regard to ethical issues, national energy security, subsidies schemes for agricultural products, trade barriers and poverty reduction. This is important to ensure the efficiency and acceptance of biofuel certification schemes in a global biofuel market.

Research priorities related to sustainability:
4.1. Further development of indicators and coherent methodology (i.e. LCA) to assess and monitor the three dimensions of sustainability: economic, environmental, social
4.2. Generate and collect data required and carry out sustainability assessment of existing and potential promising production chains (land, feedstock, process, fuel use) based on relevant, transparent and science-based data and tools
4.3. Evaluation of performance of institutional and regulatory frameworks in LA to develop alternative ways to ensure governance and compliance with sustainability goals

EU-LAC cooperation on solar photovoltaic energy

<u>Working session 1.</u> Review priority areas-topics, training and recommendations *(Discussions and elaboration of recommendations on solar photovoltaic energy)*

Common specific subareas for EU-LAC cooperation on photovoltaic energy

Five research subareas for potential collaboration in solar photovoltaic energy:

1. Solar resources prediction and monitoring
   - 1.1. Solar radiation components measurement for characterisation of solar concentrations systems.
   - 1.2. Performance evaluation of different PV technologies for different climate conditions.

2. Quality Assurance Procedures
   - 2.1. Codes, standards and regulations.
   - 2.2. Use of certified equipment and certification of equipments, certifications integration, installers´ harmonization (equipments and installers).
   - 2.3. Life cycle analysis LCA

3. Stand alone systems
   - 3.1 Micro-grids & hybrid systems
   - 3.2 Demand side management DSM
   - 3.3. Smart grids and intelligent inverters
   - 3.4. Systems Quality assurance of Solar Home Systems. SHS
   - 3.5. Water solar PV pumping and treatment

4. Advanced grid integration & large integration of PV in building areas
   - 4.1. Identification of potential areas for large PV plants deployment and demonstration (airport) or PV building integration
   - 4.2. Integration of PV in Smart Buildings
   - 4.3. PV for electrification of City suburb
   - 4.4. Grid Impact of PV systems

5. Capacity building
   - 5.1. Reinforcement and development of technical competence to ensure the PV systems quality and the evaluation of conformity on the whole chain.
   - 5.2. Capacity and expert training of human resources

EU-LAC cooperation on solar thermal energy

<u>Working session 1.</u> Review priority areas-topics, training and recommendations *(Discussions and elaboration of recommendations on solar thermal energy*

Common specific subareas for EU-LAC cooperation on solar thermal energy

With the aim of determining the lines of cooperation between European and Latin American institutions and organisms, the subareas have been split in two such as; basic research and demonstration projects.

1. Basic research common interests

- Studies of solar resources in Latin America including social, geographical, economic and industrial issues.
- Metrological standards
- Components and control systems
- Thermal energy storage (phase-change materials, fluid heat transfers, advanced systems, mechanical storage configuration)
- Development of critical concentrator materials (receivers, solar fields)
- Water-use footprint (desalinization, water treatment, toxicity treatments…).
- Solar thermal technologies in buildings.
- Training and scientific interchanges programs EU+LAC (doctoral and senior profiles)

2. Demonstration common activities

- R+D developments addressed to Latina American geographical needs (mirrors, electric systems, heat transmision fluids, receivers, solar fields, among others). Mainly Fresnel in Argentina and Dish Stirling in Mexico
- Direct Solar Steam (quality, purity…)
- Solar concentration thermal generation applied to both heating and cooling and electricity
- Improvement in the environmental and water-use footprint
- Solar Hydrogen production and other solar subproducts
- Hybridization systems (biogas, natural gas, biomass, geothermal)
- Distributed generation (low-medium installed capacity) in isolated areas.

EU-LAC cooperation on wind energy

<u>Working session 1.</u> Review priority areas-topics, training and recommendations *(Discussions and elaboration of recommendations on wind energy*

Common specific subareas for EU-LAC cooperation on wind energy

Identified research subareas for potential collaboration:

1. **Wind conditions**: three strategic objectives -resource, design condition and forecast- distributed into five research topics:
    a. Sitting of wind turbine generators in complex terrain and forested areas
    b. Wakes in and between wind farms
    c. Extreme wind speeds
    d. Knowledge of wind behaviour above 100m high
    e. Short term forecasting
2. **Manufacturing processes and operation of wind turbine generators**: the objectives of cooperation would be the optimization of logistic and production processes, and the attainment of an adapted and optimized Operation & Maintainance strategy.
3. **Small wind turbines**: efforts should be made to improve the related technology, and improve knowledge on resource and sitting, including the influence of buildings on distributed wind power potential.
4. **Wind energy integration**: harmonisation of grid code requirements, its planning, the development of technical and market mechanisms to improve electric system flexibility, and the spread-out of the smart grid concept.
5. **Capacity building and training**
6. **Environment and deployment**

Common research priorities for EU-LAC cooperation on wind energy

3. Wind Resource Assessment: computational tools, sodar and lidar technology
4. Wind Turbines: technology for regional fabrication
5. Removing barriers and promoting deployment and acceptance of wind energy: market obstacles, environmental issues, formation and training

Working session 2: *Strategic approaches to Energy Efficiency*

- Integrated Road Map
- Lines of cooperation between European and Latin American institutions and organisms and selection/agreement on those on which specific initiatives can be developed

(Please refer to the ALCUENET Non paper on energy efficiency)