

# ENERGY CENTER



FACULTAD DE CIENCIAS  
FÍSICAS Y MATEMÁTICAS  
UNIVERSIDAD DE CHILE

December 2015

# Academic Initiative FCFM

## HISTORY



INSTITUTO  
SISTEMAS COMPLEJOS DE INGENIERIA



CENTRO DE  
MODELAMIENTO  
MATEMATICO  
UMI U. DE CHILE-CNRS





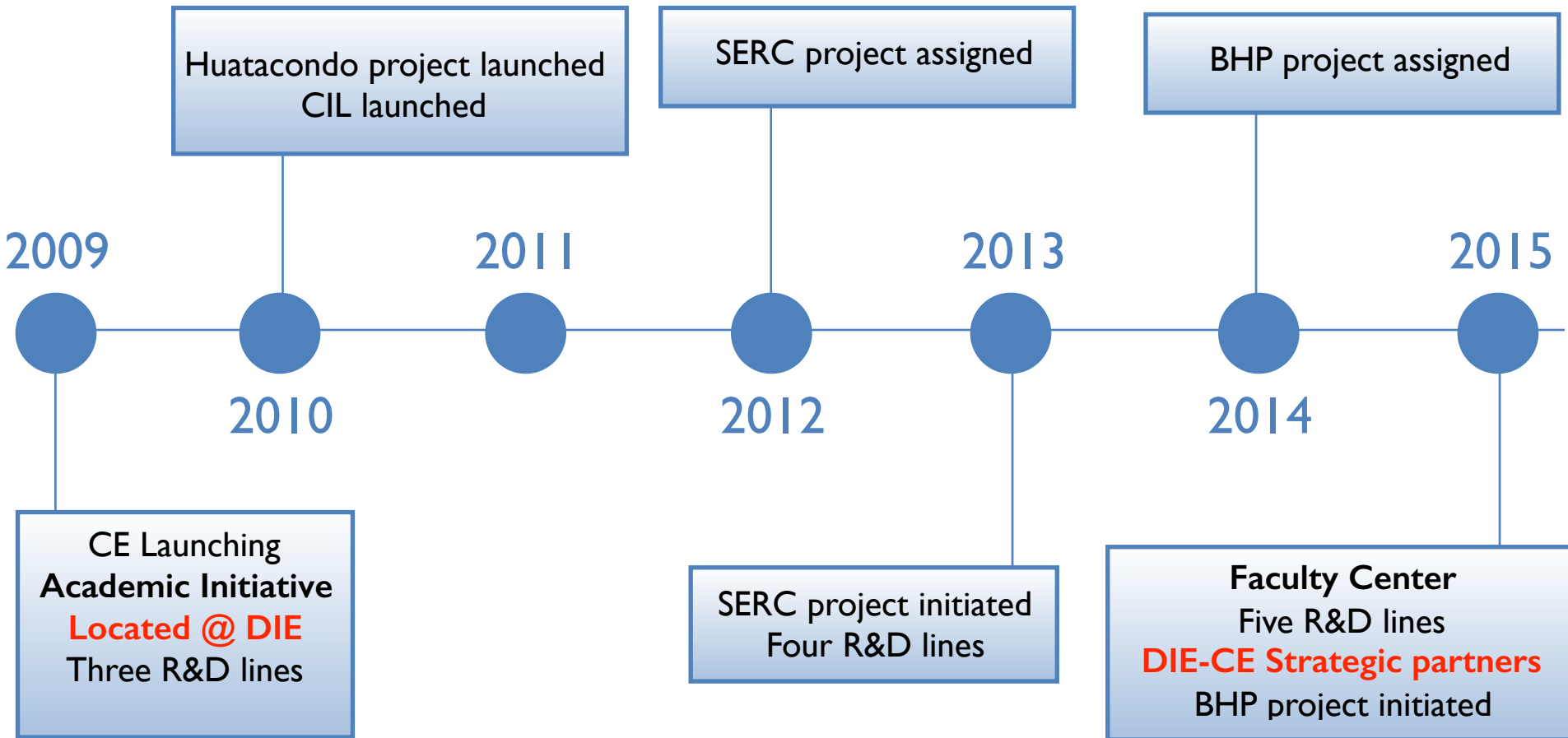
### Mission:

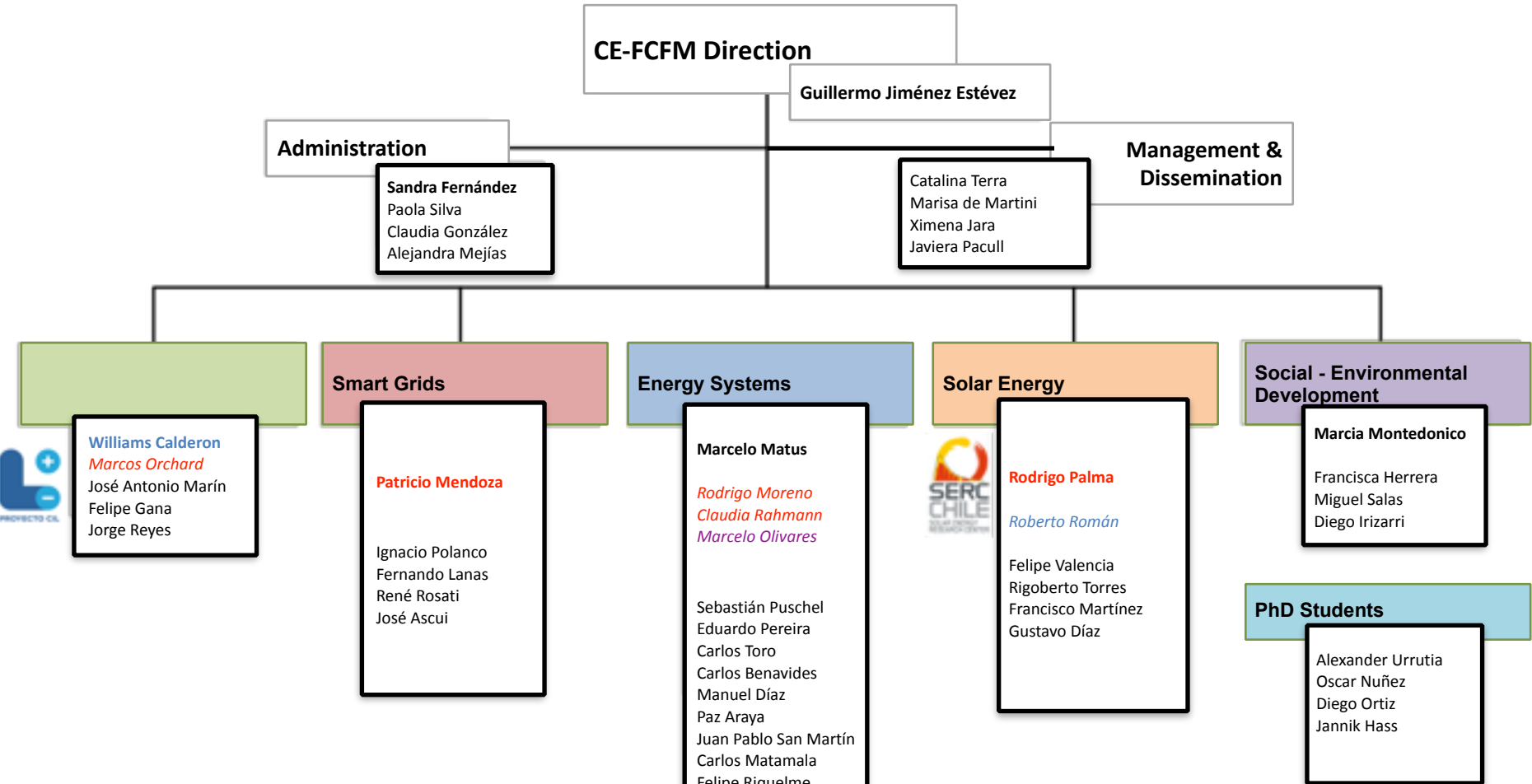
to contribute to the **development and international competitiveness of the Chilean** energy sector by introducing **novel, high-quality technical solutions**. Comprised primarily of faculty and students from the University of Chile, it collaborates with various other educational institutions but also extensively with industry **to deploy its best technologies in the productive sector**.

### Vision:

Credibility and reliability as base to become a regional benchmark making use of technological innovation in energy issues.

# TIMELINE





Academics: 8  
 PhD (non academics): 2  
 Masters Eng: 7  
 Masters Soc & Enviroment: 2  
 Electrical Engineers: 8

Mechanical Engineers: 2  
 Chemical Engineers: 1  
 Industrial Engineers: 1  
 Designers: 1  
 Anthropologist: 1

Sociologist: 1  
 Geographer: 1  
 Administrative: 4  
 Journalists: 2

PostDoc: 1  
 PhD students: 4

# FUNDING SOURCES (2009-2015)



## Public Sector

- CNE
- **Ministerio de Energía**
- **Ministerio de M. Ambiente**
- SEC
- EFE
- CIFES
- Codelco
- Minera Gaby

## Private companies

- **Colbún**
- Transelec
- Pacific Hydro
- AEE AG
- Chilquinta Energía
- CDEC-SING
- **CDEC-SIC**
- Hidroaysén
- GDF-Suez
- Gas Atacama
- Energía Andina
- Valhalla Energy
- **E-CL**
- **Enel Green Power**
- Editec
- Nissan Marubeni
- **Cía. Minera Doña Inés de Collahuasi**
- Megared
- Entel
- **Fundación Chile**
- Fundación Avina
- ACERA

## International Cooperation

- University of Capetown
- **South South Trust**
- **GIZ**
- **UABC**
- Ingenio Magdalena
- Alfa / Marco (EU)
- DAAD



CENTRO DE ENERGÍA

## Funding Calls Conicyt / Corfo

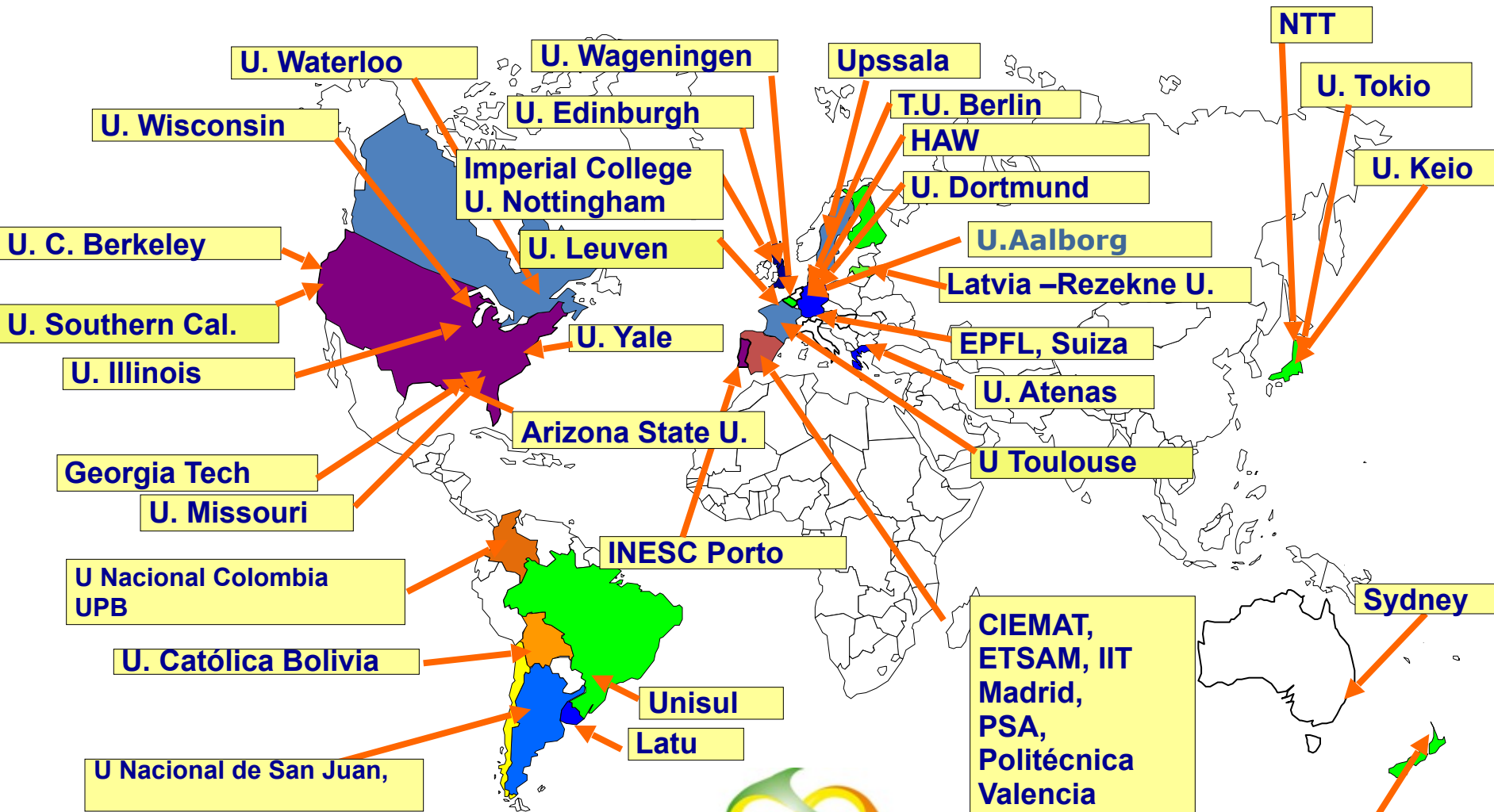
- **FONDECYT**
- **FONDAP**
- **CONICYT**
- **CORFO (Innova)**



45 researchers  
6 postdoc  
30 undergraduate  
30 graduate



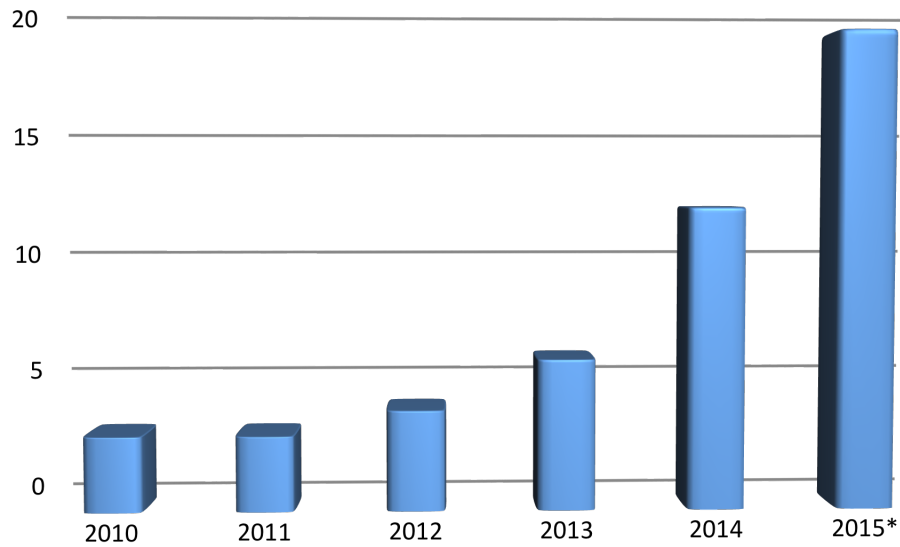
# ACADEMIC COOPERATION - INTERNATIONAL LEVEL



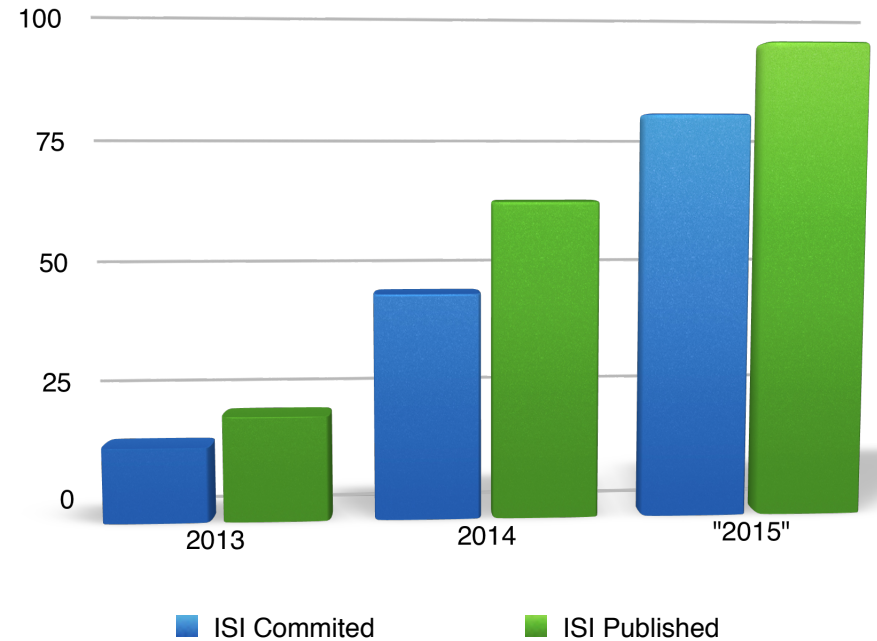




### ISI journals per year



### ISI journals per year - SERC Chile



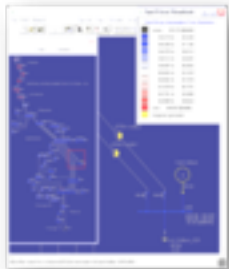


## Journals

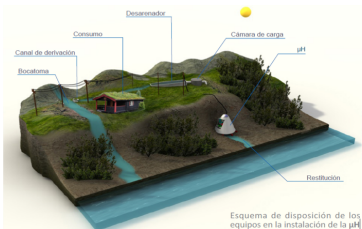
Energies	5
IEEE Power and Energy Magazine	5
IEEE Latin America Transactions	4
IEEE Trans. on Power Systems	4
IEEE Trans. on Power Delivery	3
IEEE Trans. on Smart Grid	3
Int. Journal of Electric Power and Energy Systems	2
Acta Mechanic	1
Applied Energy	1
Climate and Development	1
Electric Power Components and Systems	1
Energy Conversion and Management	1
Energy for Sustainable Development	1
Energy Policy	1
IEEE Trans. on Education	1
IEEE Trans. on Reliability	1
IEEE Trans. on Sustainable Energy	1
Journal of Environmental Management	1
Journal of Power Sources	1
Journal Renewable Sustainable Energy	1
Optimization and Engineering	1
Renewable and Sustainable Energy Reviews	1
Water Resources Research	1



**ELIBATT**, design and packing of Li-Ion cells for movility



**PLP**, software development and support for hydro-thermal coordination.



**MicroHydro Plug & Play**, technology packing for micro-hydro solutions.

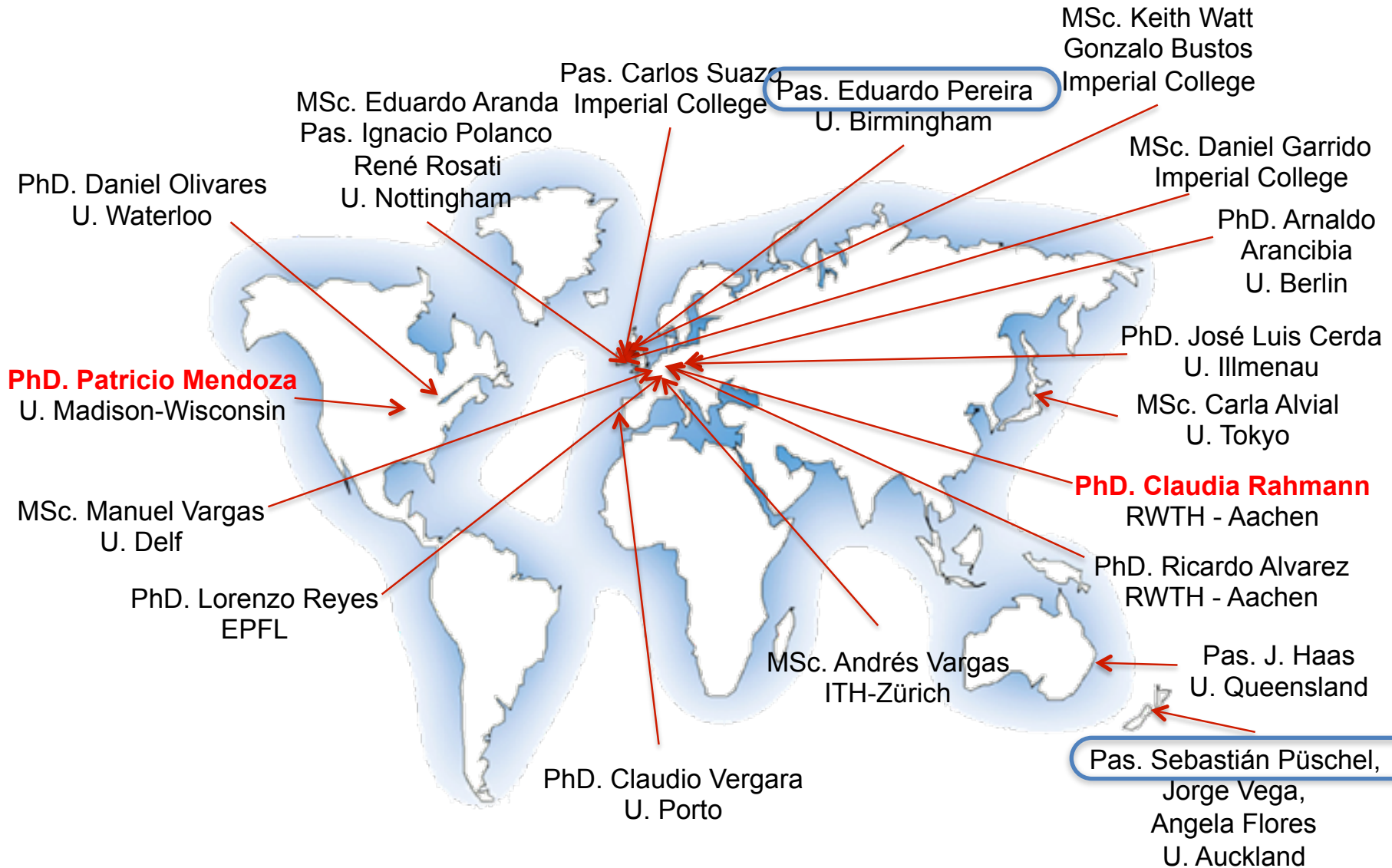




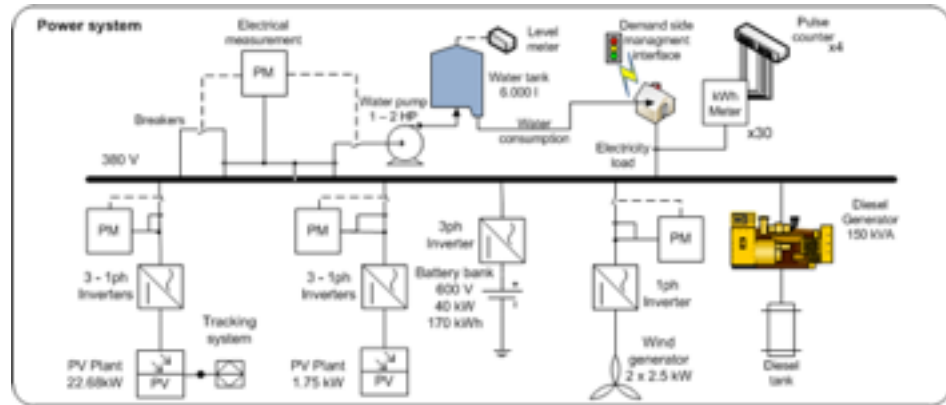
## Training / Education / Innovation / Research

- Participation as **Advisor / Co-advisor** in undergraduate and graduate theses, period 2010-2014 **(130)**
- Extension courses of electric sector regulation and renewable energies
- Specific courses to CONICYT and private companies **(10)**
- Symposiums/Conferences organizations (Chilecon 2013 and Symposium on Microgrids)
- Editorial committees: R.Palma (Segan, Elsevier), G.Jiménez (IEEE Trans. Sustainable Energy)
- Lithium Innovation Center
- Eolian 2, 3 y 4
- Corfo, Fondap, Fondecyt Projects

# OTHER CONTRIBUTIONS



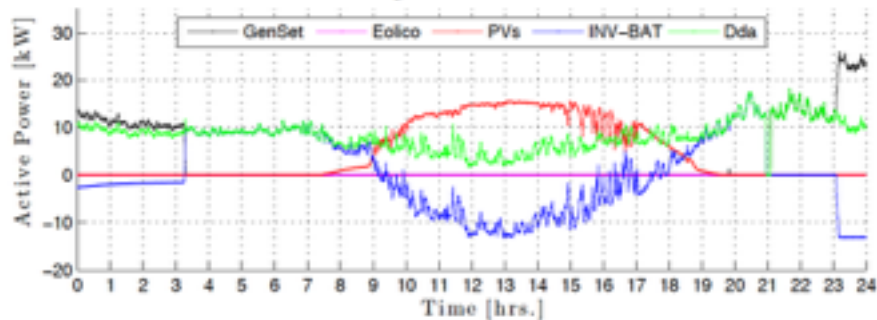
# HIGHLIGHTED PROJECTS- MICROGRIDS HUATACONDO



## Chile's first isolated microgrid

- 100 inhabitants, 10 hours of 100% diesel based supply to 24 hrs of energy supply.
- Community involvement —> Social SCADA, demand response, O&M.
- Technological development: EMS, PV tracking system, V2G, bird protective device

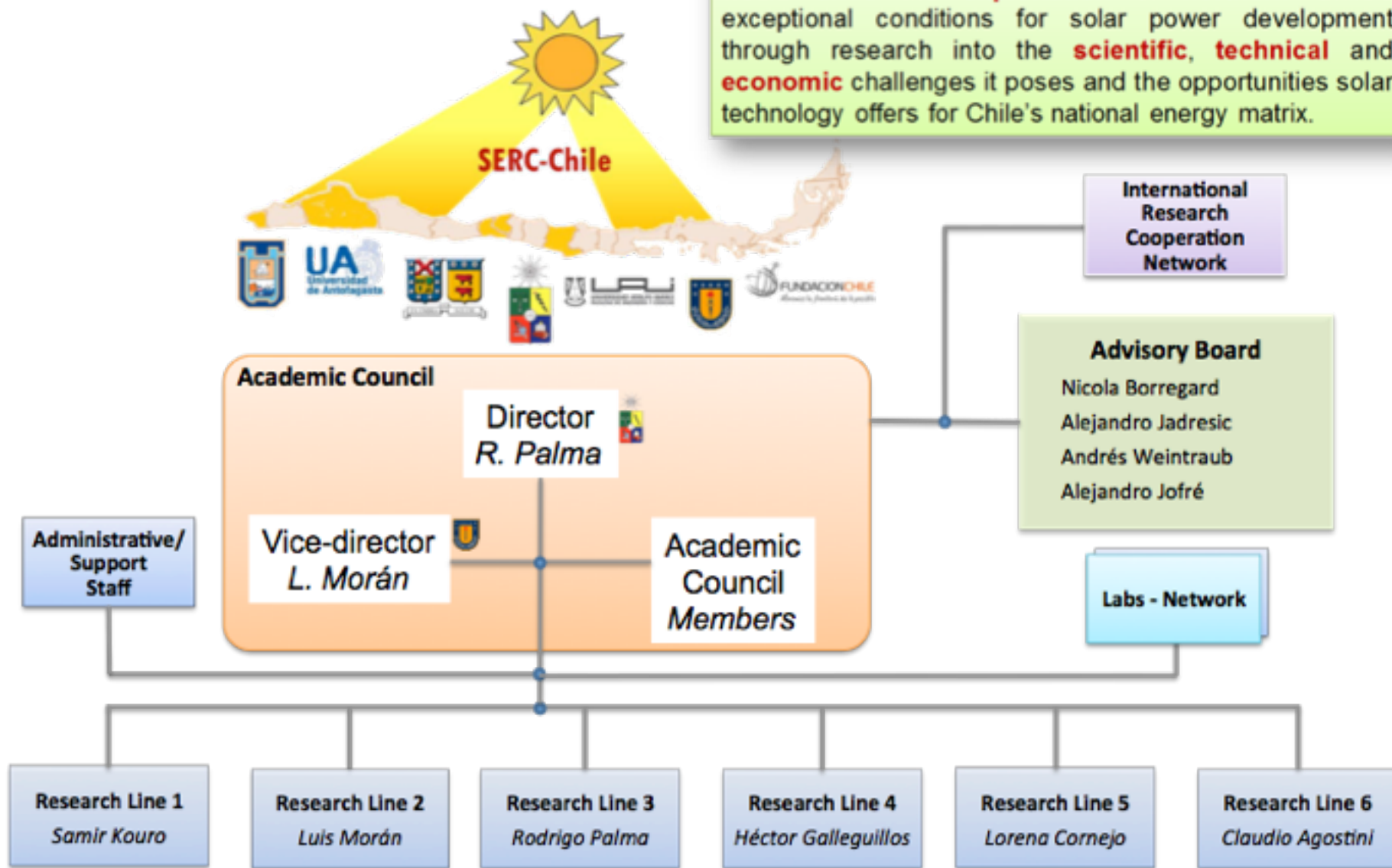
Day: 2014-09-29



# HIGHLIGHTED PROJECTS- SERC CHILE



To build a solid **base of knowledge** on **solar energy** that would **drive** the **exploitation** of **northern** Chile's exceptional conditions for solar power development through research into the **scientific, technical** and **economic** challenges it poses and the opportunities solar technology offers for Chile's national energy matrix.



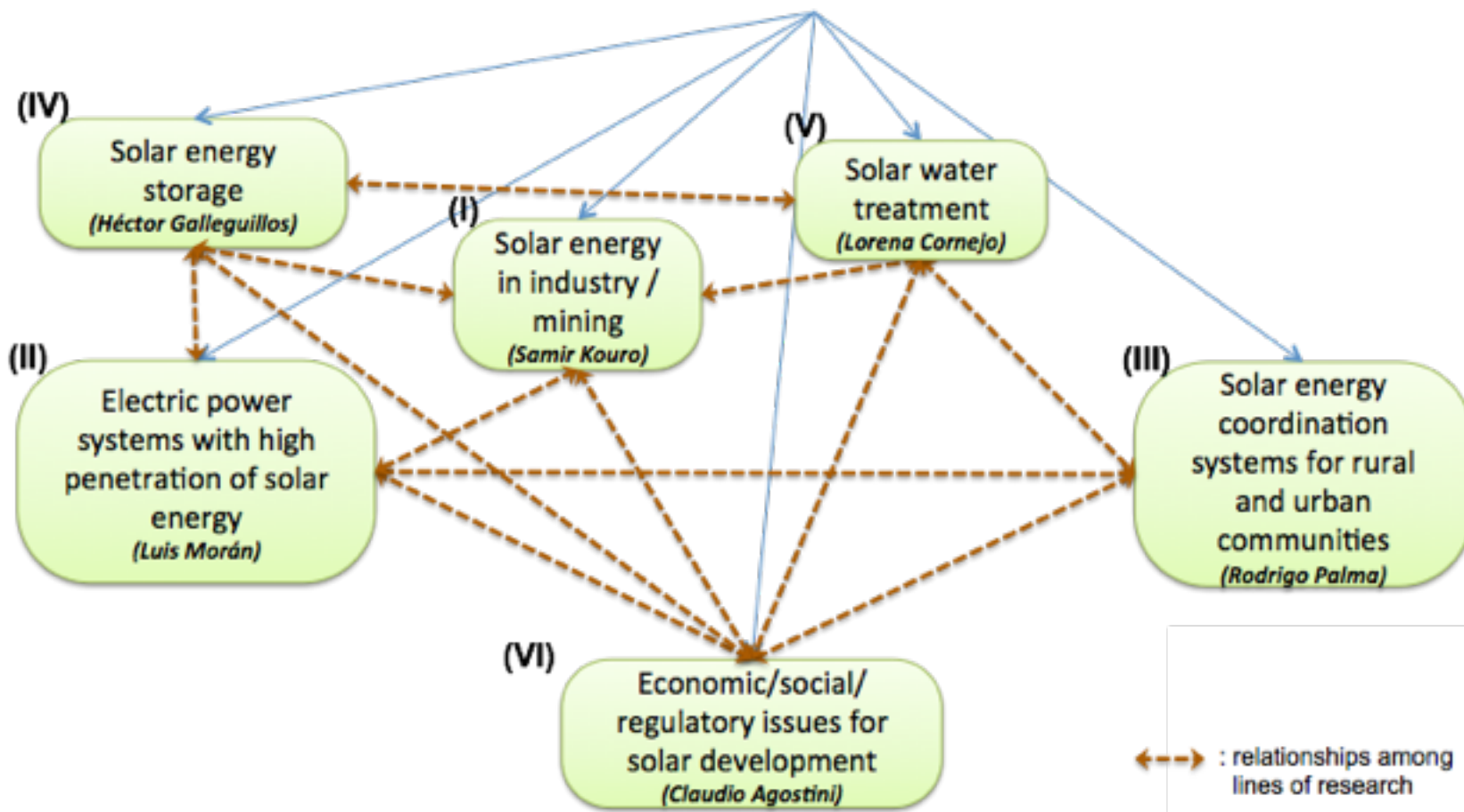
# HIGHLIGHTED PROJECTS- SERC CHILE



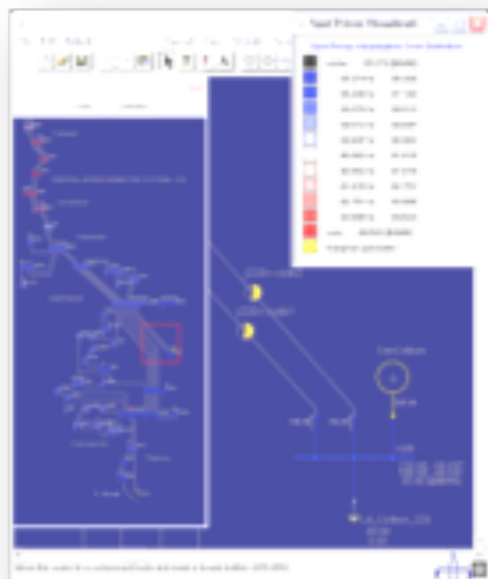
Exceptional conditions of northern Chile



## Research Lines



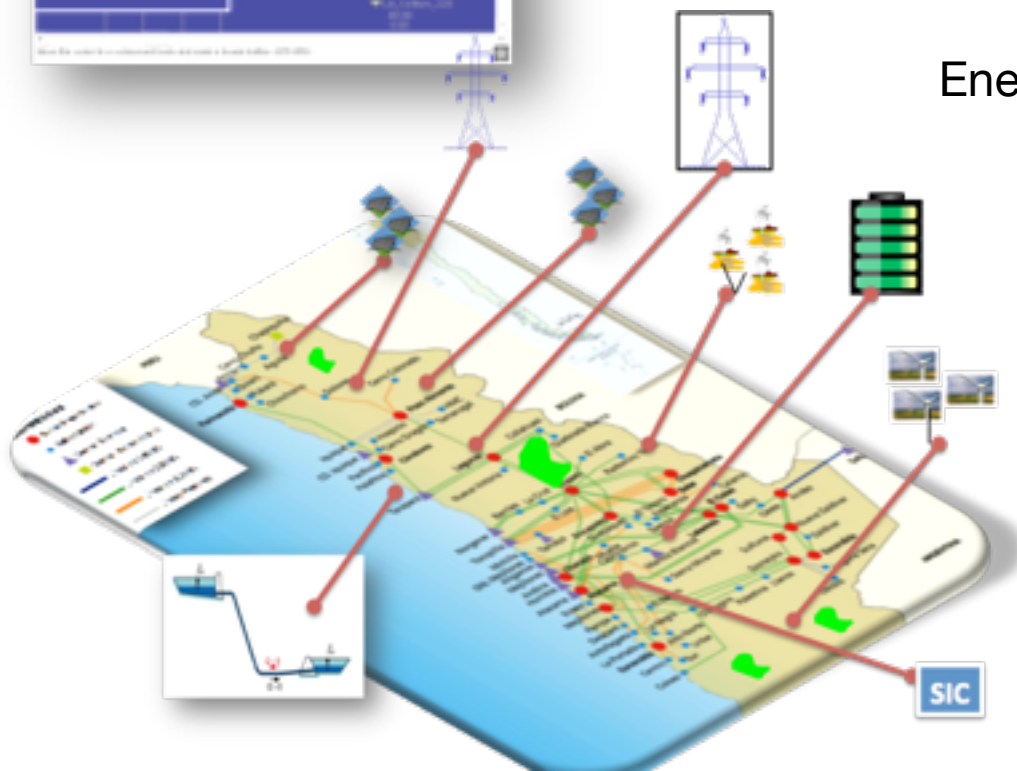




Development of decision support tools:

- Hydrothermal coordination —> PLP
- Renewable energy penetration: expansion planning, short term planning, unit commitment.
- Regulatory support: distributed generation, net billing, take or pay

Energy 2050: participative process



**ENERGÍA 2050**  
PROCESO PARTICIPATIVO POLÍTICA ENERGÉTICA

# HIGHLIGHTED PROJECTS- ELECTRIC VEHICLES



Lufke, 2004



Cuetazo RC, 2005



Aero 10, 2006



Eolian, 2007



Volkswagen, 2009



Eolian II, 2011



Eolian III, 2012



Eolian IV, 2014

# ENERGY CENTER THANKS !



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