



ACESOL | ASOCIACION CHILENA DE ENERGIA SOLAR



INTERSOLAR SOUTH AMERICA

August 26th, 2014
Sao Paulo, Brazil

Status and Prospects of the Chilean Solar Market

Engr. Francisco Leiva
Vicepresident ACESOL
vicepresidente@acesol.cl



ACESOL | ASOCIACION CHILENA
DE ENERGIA SOLAR

Contents

- ACESOL: Corporate profile.
- Interconnected Systems.
- Solar energy resources of Chile.
- Regulation of Non Conventional Renewable Energies (ERNC).
- Potential Market of Thermal Solar Energy.
- Potential Market of PV Solar Energy.
- Current status of NCRE (ERNC) projects.
- Success Critical Factors.
- Initiatives to boost and develop Chilean Solar Industry.
- ACESOL's Vision.
- Chile: Businesses Environment.

ACESOL (www.acesol.cl)

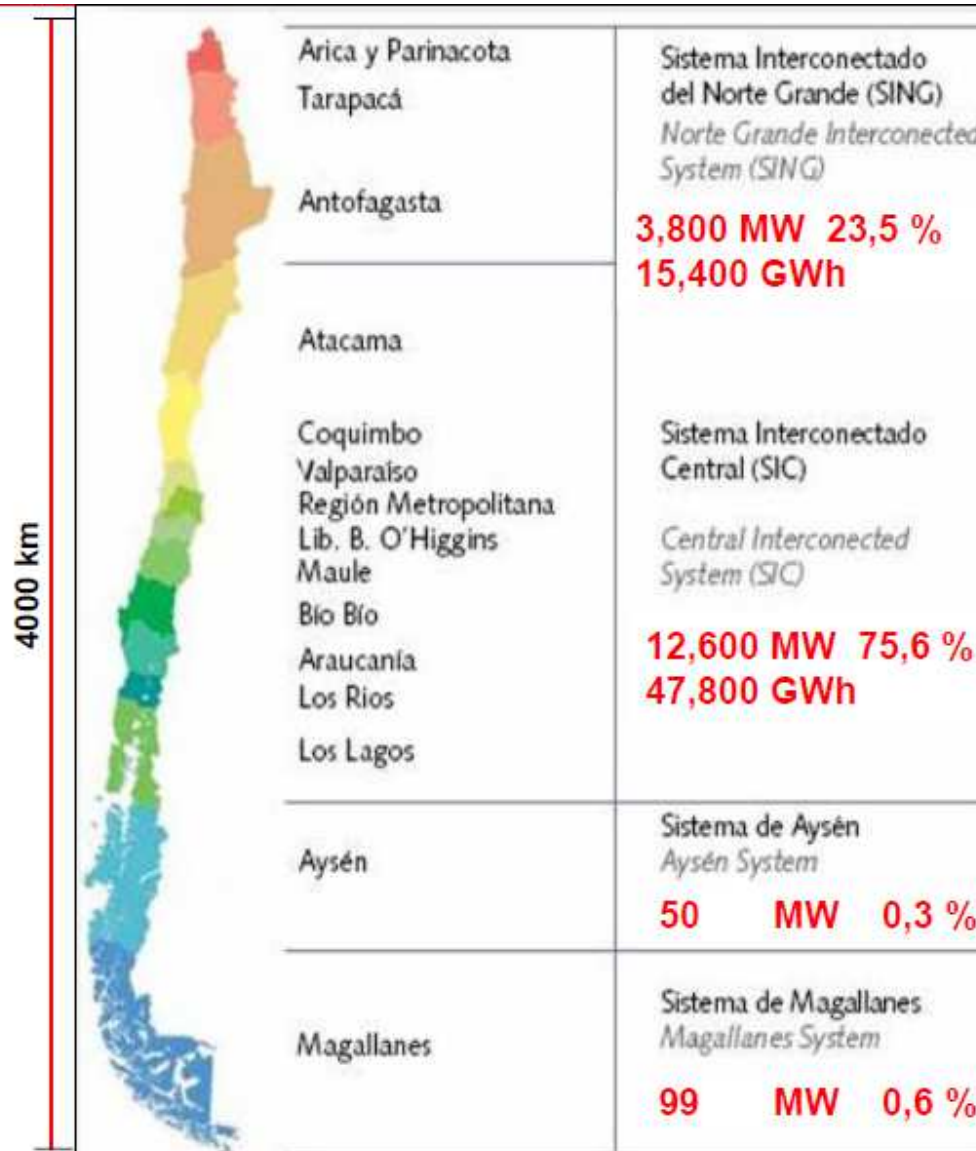
- Chilean Association of Solar Energy Companies (Thermal and PV).
- Core objective: Promote and massify the right use of Solar Energy in the country.
- Main tasks:
 - Support designing and implementation of public policies.
 - Diffusion.
 - Capacities and skills generation.
 - Knowledge generation and sharing.
 - Promote installations.
 - Alliances with stakeholders.
 - Alliances with International Associations.
- > 50 Associated companies.

Associated companies

- Thermal and PV Solar Energy areas.
- Equipment Importers and distributors.
- Producers or Manufacturers (only TSE).
- Executors, installers, EPCs.
- Engineers, Advisors and Consultants.

Interconnected Systems

Installed capacity in the country

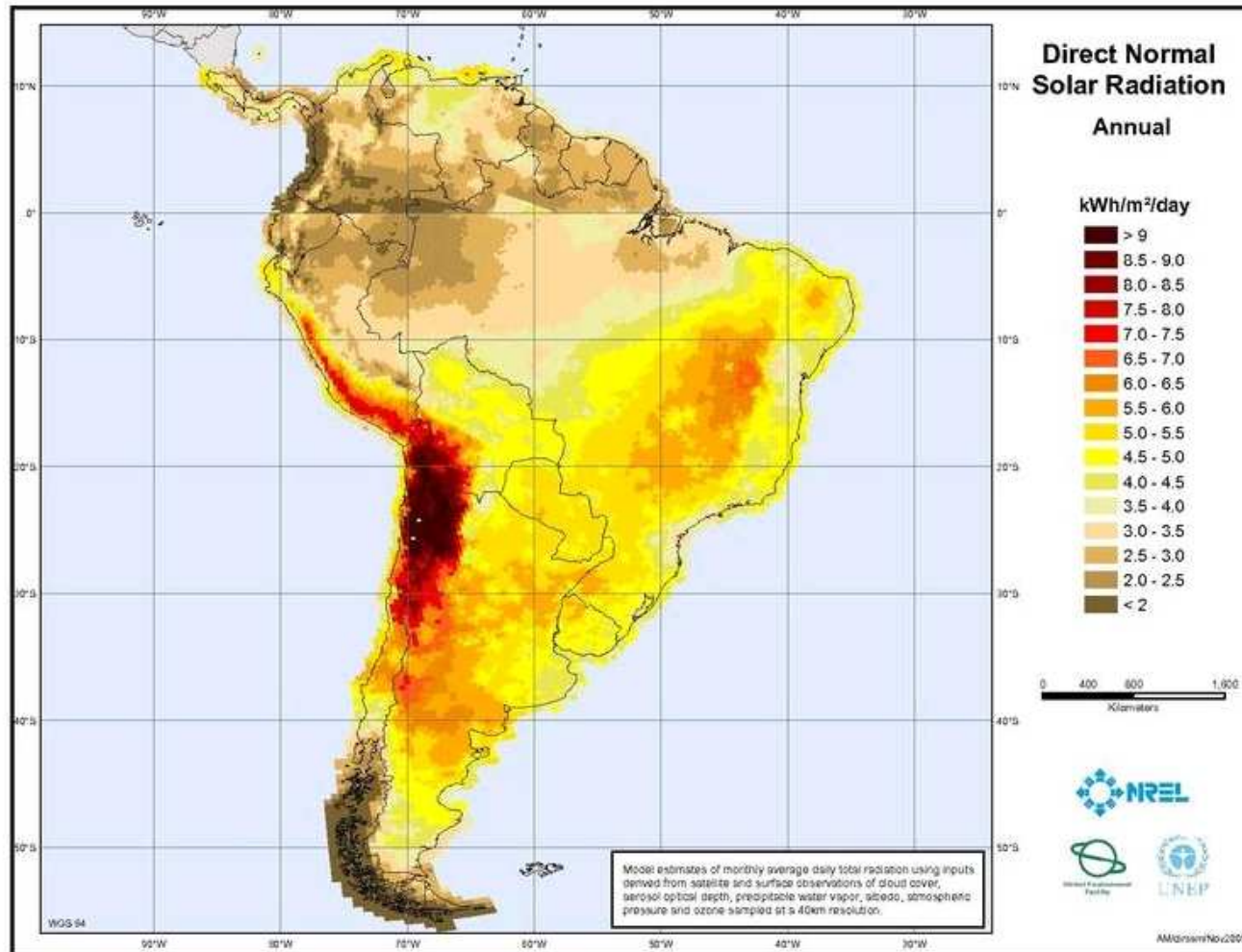


Source: SERC Chile
www.sercchile.cl



ACESOL | ASOCIACION CHILENA DE ENERGIA SOLAR

Solar Energy Resources - Chile

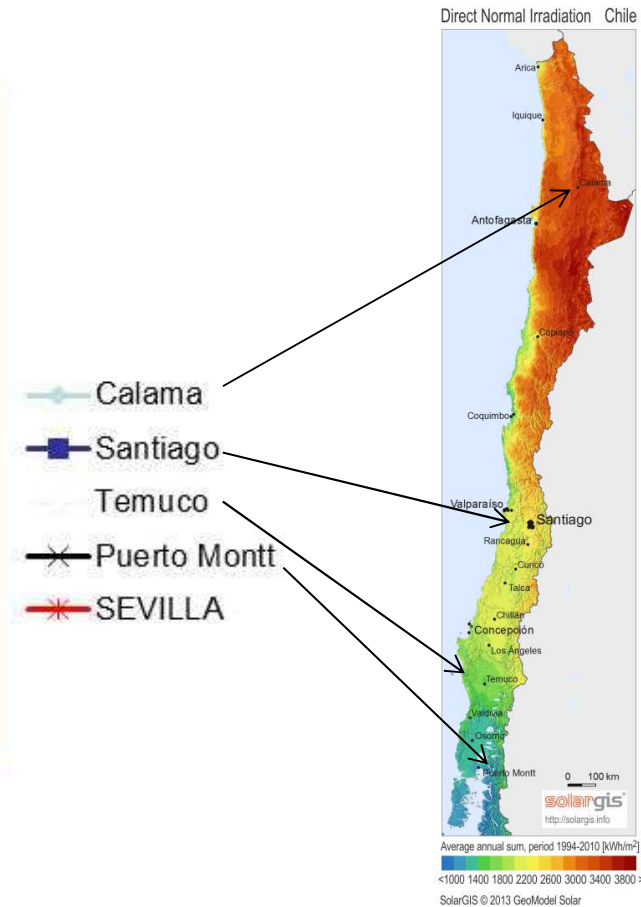
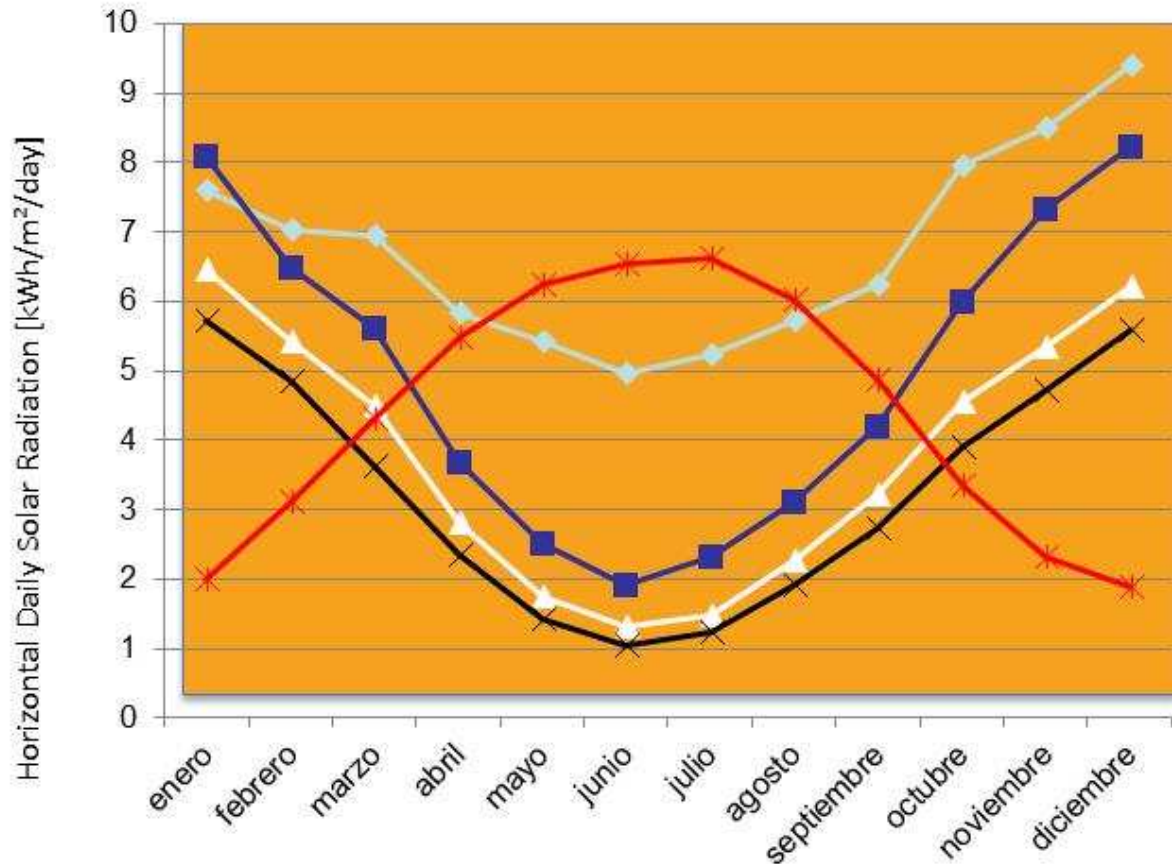


Potential:

- **1,190,000 Há.**
- **High solar radiation**
- **Sky clarity**

- **PV: 240 GW**
- **CSP: 154 – 476 GW**

Solar Radiation (some chilean cities and Sevilla-Spain)



Chile's Solar Map

- <http://ernc.dgf.uchile.cl/Explorador/Solar2/>
- Detailed public information on Chilean solar resources.
- Maps generated from atmospheric models and satellites data for the period 2003-2011 with a spatial resolution of 1 km.
- Use Handbook of the Solar Resource Explorer.
- Elaborated by Geophysics Department of the University of Chile by petition of the Ministry of Energy and GIZ.



Chile's Solar Resource Tables

- http://www.labsolar.utfsm.cl/index.php?option=com_content&view=category&layout=blog&id=11&Itemid=11
- Solar resources are presented in tables format by localities and months of the year.
- Available a digital book entitled “Irradiancia solar en territorios de la República de Chile”.
- Elaborated by Mechanics Department of the Technical University Federico Santa María by petition of the UNDP, Government of Chile, GEF and Energy National Commission (CNE).



Regulation of Solar Energy Projects

- **DFL N°4/20018** : General Law of Electric Services.
 - **Decreto 327** : DFL N°4 regulation.
- **Ley 19300**: Approves General Bases of Environment .
 - **DS 95 del 2001** : Law 19300 regulation.

Regulation of Solar Energy Projects (2)



Thermal Solar Energy projects

- **Ley 20365 :** Establishes tax exemption with respect to thermal solar systems.
- **Decreto 331 :** Regulation of the Act 20365.



Regulation of Solar Energy Projects (3)



PV Solar Energy projects

- **Ley 20257:** Introduces modifications to the General Law of Electric Services with respect to the electric generation with sources of non conventional renewable energies.
- **Resolución 1278 exenta:** Establishes norms for the Act 20257 adequate implementation.
- **Ley 20571 :** Regulates the payment of electricity tariffs of the residential generators.
- **Ley 20571 regulation :** It is currently in draft status.

http://cer.gob.cl/archivos/2014/febrero/guias/Guia%20de%20Gestion_%2001.pdf



Demand for solar energy-based solutions: Causes

- High cost of energy.
- Electric energy intensive use.
- Independency searching.
- Knowledge of current possibilities.
- High solar radiation available.



Thermal Solar Energy Potential Market

<http://www.renenergyobservatory.org/portal/documents/Renewable%20Energy/Solar/Solar%20Thermal/country/>

MINISTERIO DE ENERGÍA- PNUD
DANDILION ENERGIA Y MEDIO AMBIENTE

17

Tabla N° 10: Proyección global por Uso

USO	m ² CST/año			TOTAL	
	2012	2013	2014	m ² CST	%
Viviendas Usadas					
- Viviendas usadas altos ingresos	15.747	20.074	24.402	60.222	18,1%
- Viviendas sociales	3.000	3.000	3.000	9.000	2,7%
Subtotal viviendas usadas (m²)	18.747	23.074	27.402	69.222	20,8%
Viviendas Nuevas					
- Proyectos inmobiliarios sin FT	1.249	1.452	1.934	4.635	1,4%
- Proyectos inmobiliarios con FT	19.572	22.744	30.306	72.622	21,8%
- Viviendas sociales	500	1.000	1.500	3.000	0,9%
Subtotal viviendas nuevas (m²)	21.322	25.195	33.740	80.257	24,1%
Comercio					
- Establecimientos educacionales	1.380	1.759	2.139	5.278	1,6%
- Instalaciones deportivas - gimnasios	1.355	1.728	2.100	5.183	1,6%
- Hoteles - restaurantes	716	913	1.110	2.739	0,8%
- Hospitales - Clínicas	2.091	2.665	3.240	7.996	2,4%
Subtotal comercio (m²)	5.542	7.065	8.588	21.196	6,4%
Industria (m²)	2.242	2.858	3.474	8.573	2,6%
Otros (m²)	2.720	3.467	4.215	10.402	3,1%
Gran Minería (m²)	17.500	51.400	74.200	143.100	43,0%
TOTAL (m² CST)	68.072	113.060	151.619	332.751	100,0%

Fuente: Elaboración propia

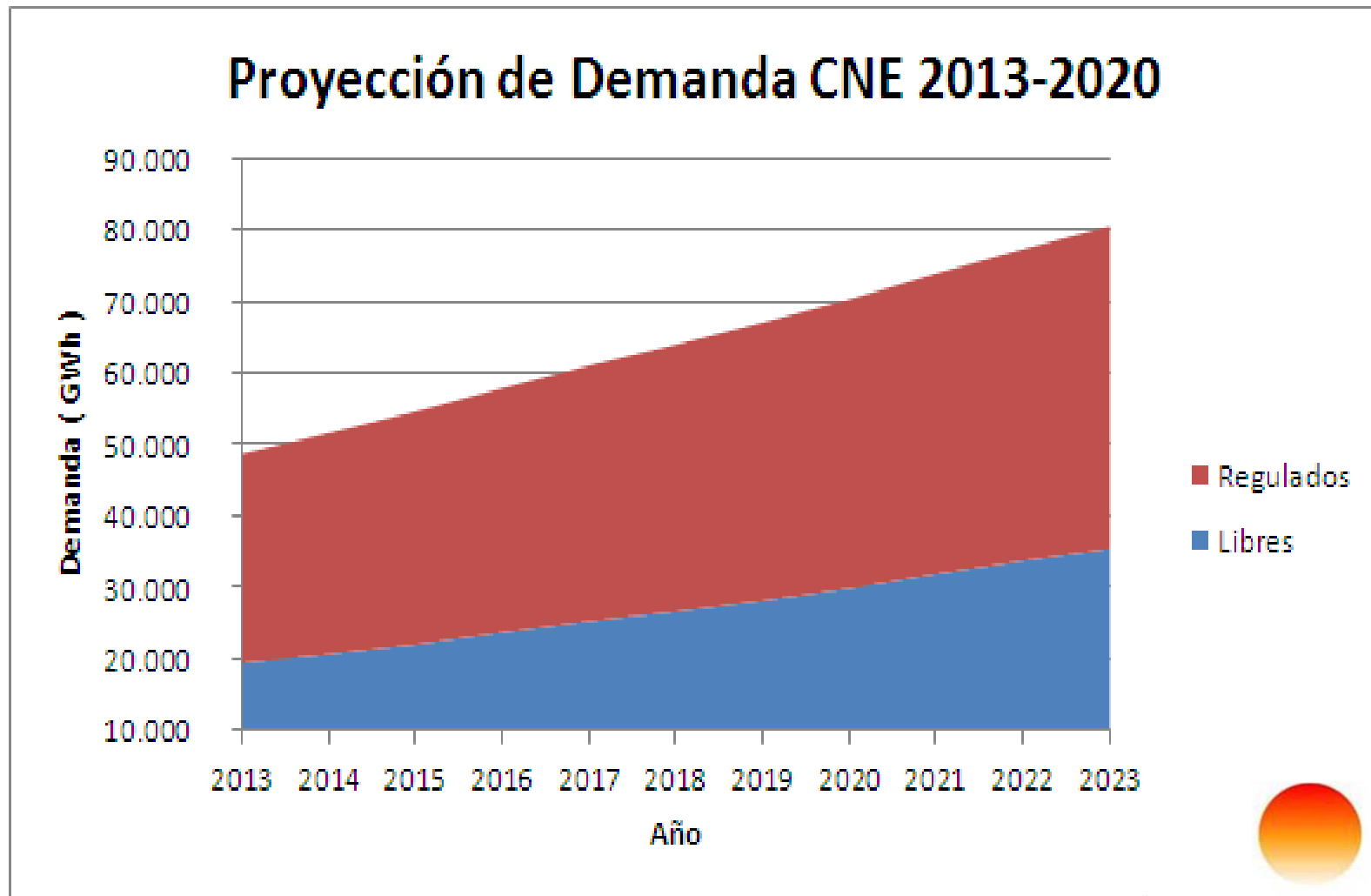


ACESOL | ASOCIACION CHILENA
DE ENERGIA SOLAR

PV Solar Energy Potential Market

- **20/25 : Energy matrix**
 - To reach a minimum of 20% of the energy matrix with NCRE (ERNC) at 2025 (around 16,500 GWh).
- **Power Sector's Agents :**
 - Customers : Generators and Distributors companies, Free Cutomers.
 - Contracts and SPOT.
- **Residential customers and Small and Medium Enterprises (PYMEs):**
 - Production, own consumptions, sale of surplus power.

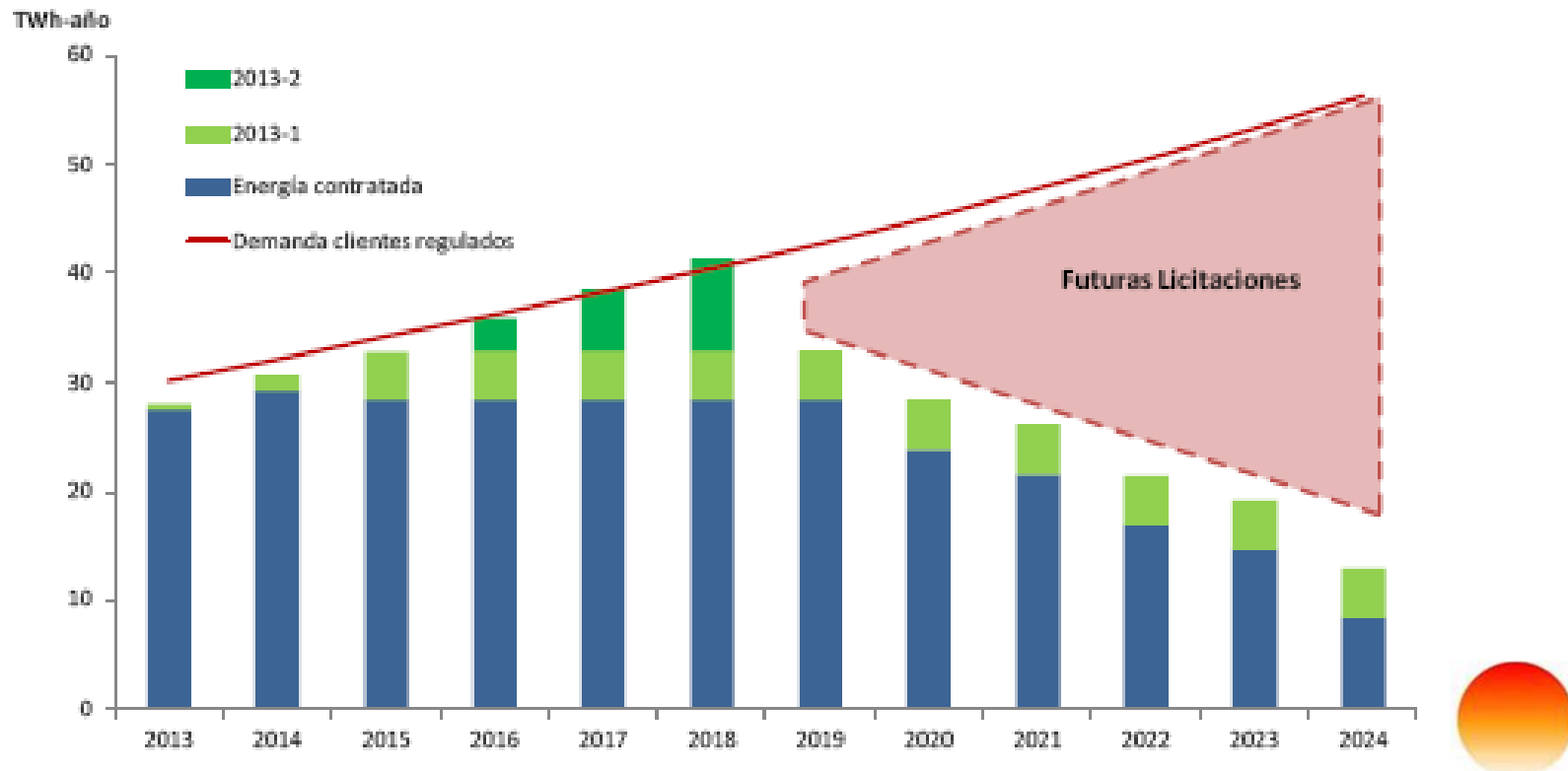
Total power demand forecast



Regulated customers - Power demand forecast

Contracted energy through Bidding processes

Source : CNE Elaborated by SYSTEP.



Long Term Bidding processes (Distributors)

CNE (Energy National Commission) is considering:

- Bidding call : March 2015
- Capacity : around 5,000 MW
- Periods of supply : different deadlines.
- Energy blocks : different sizes.
- Expected ceiling price : lower than 128 USD/MWh (2013)
- Receipt of tenders : March 2016
- Later date of supply : January 2021

Current status of NCRE projects

Estado	SEIA			
	Operación [MW]	Construcción [MW]	RCA aprobada [MW]	En calificación [MW]
Biomasa	461	22	94	94
Biogás	43	0	1	8
Eólica	682	154	4.542	2.481
Mini-Hidro	342	34	290	185
Solar - PV	189	487	6.150	4.247
Solar - CSP	0	100	760	0
Geotermia	0	0	120	0
Total	1.716	797	11.957	7.015

Tabla 1 - Estado de Proyectos ERNC (MW). Fuente: CER, SEA, CDEC, CNE. Agosto 2014.

Source : <http://www.cer.gob.cl/mailling/2014/agosto/REPORTEAgosto2014.pdf>

vicepresidente@acesol.cl



ACESOL | ASOCIACION CHILENA DE ENERGIA SOLAR

Current status of NCRE projects (2)

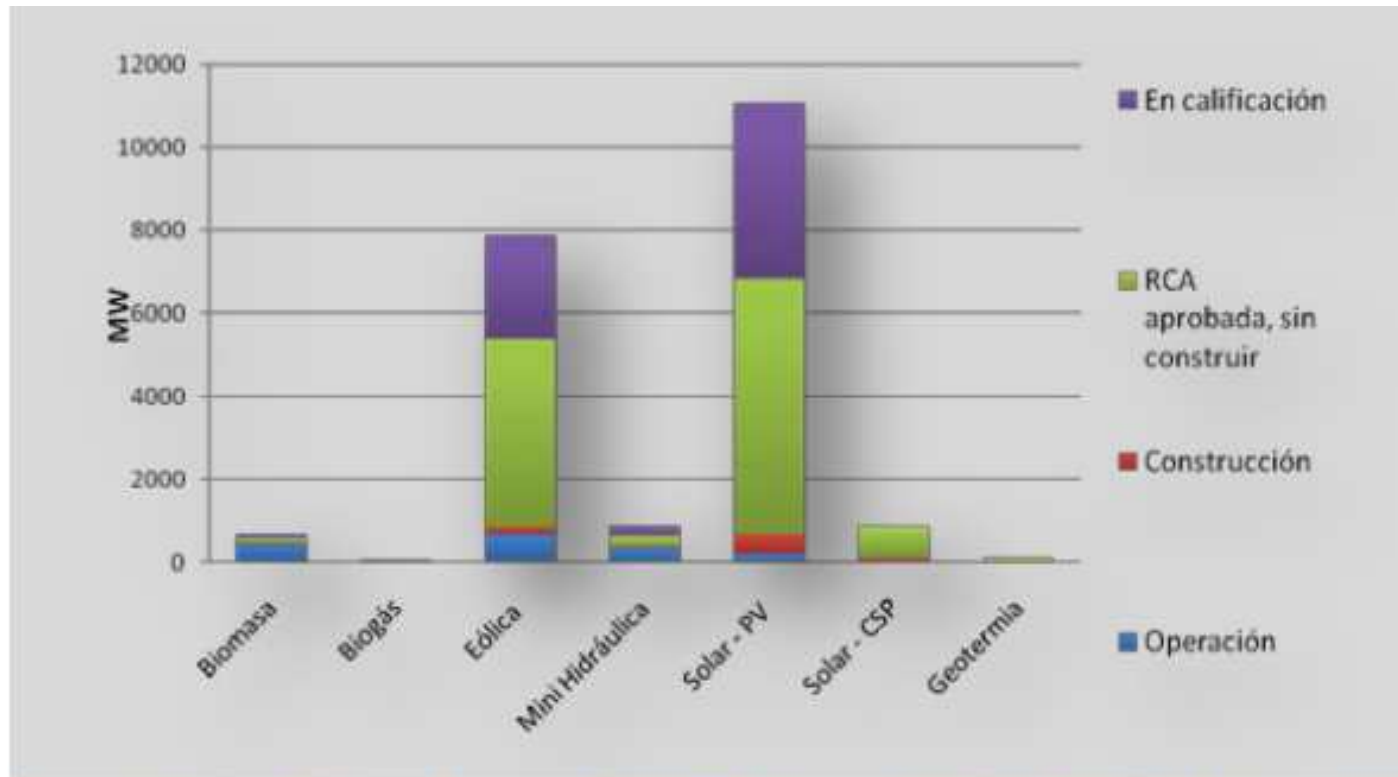


Figura 1 – Estado Global de Proyectos ERNC (MW). Fuente: CER, SEA, CDEC, CNE. Agosto 2014.

Source : <http://www.cer.gob.cl/mailling/2014/agosto/REPORTEAgosto2014.pdf>

vicepresidente@acesol.cl



ACESOL | ASOCIACION CHILENA
DE ENERGIA SOLAR

Energy Matrix Composition

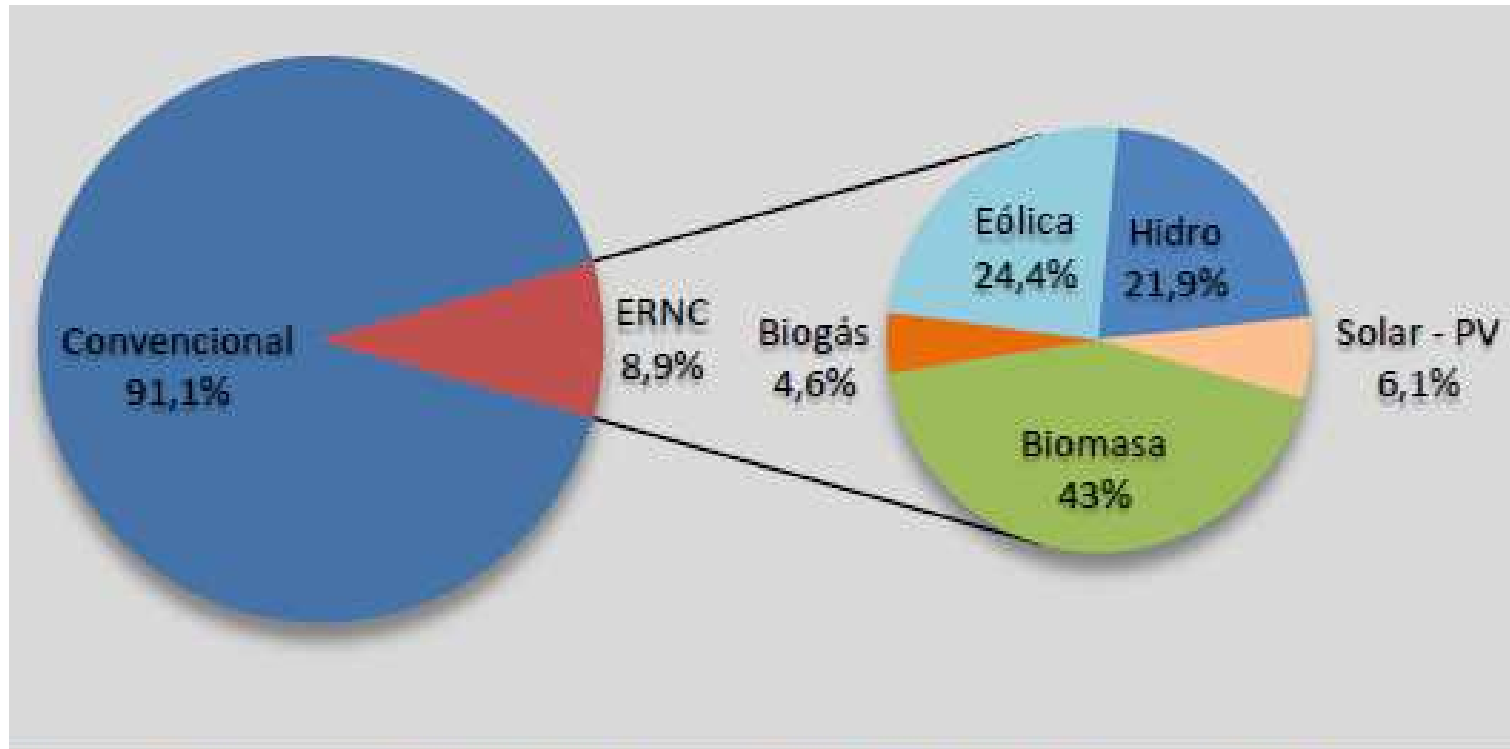


Figura 4 – Generación ERNC 2014. Fuente: CER, CNE, CDEC. Agosto 2014.

Source : <http://www.cer.gob.cl/mailling/2014/agosto/REPORTEAgosto2014.pdf>

vicepresidente@acesol.cl



ACESOL | ASOCIACION CHILENA DE ENERGIA SOLAR

Power Prices evolution



Figura 6 – Evolución Precios de Mercado. Fuente: CER, CNE, CDEC, Agosto 2014.

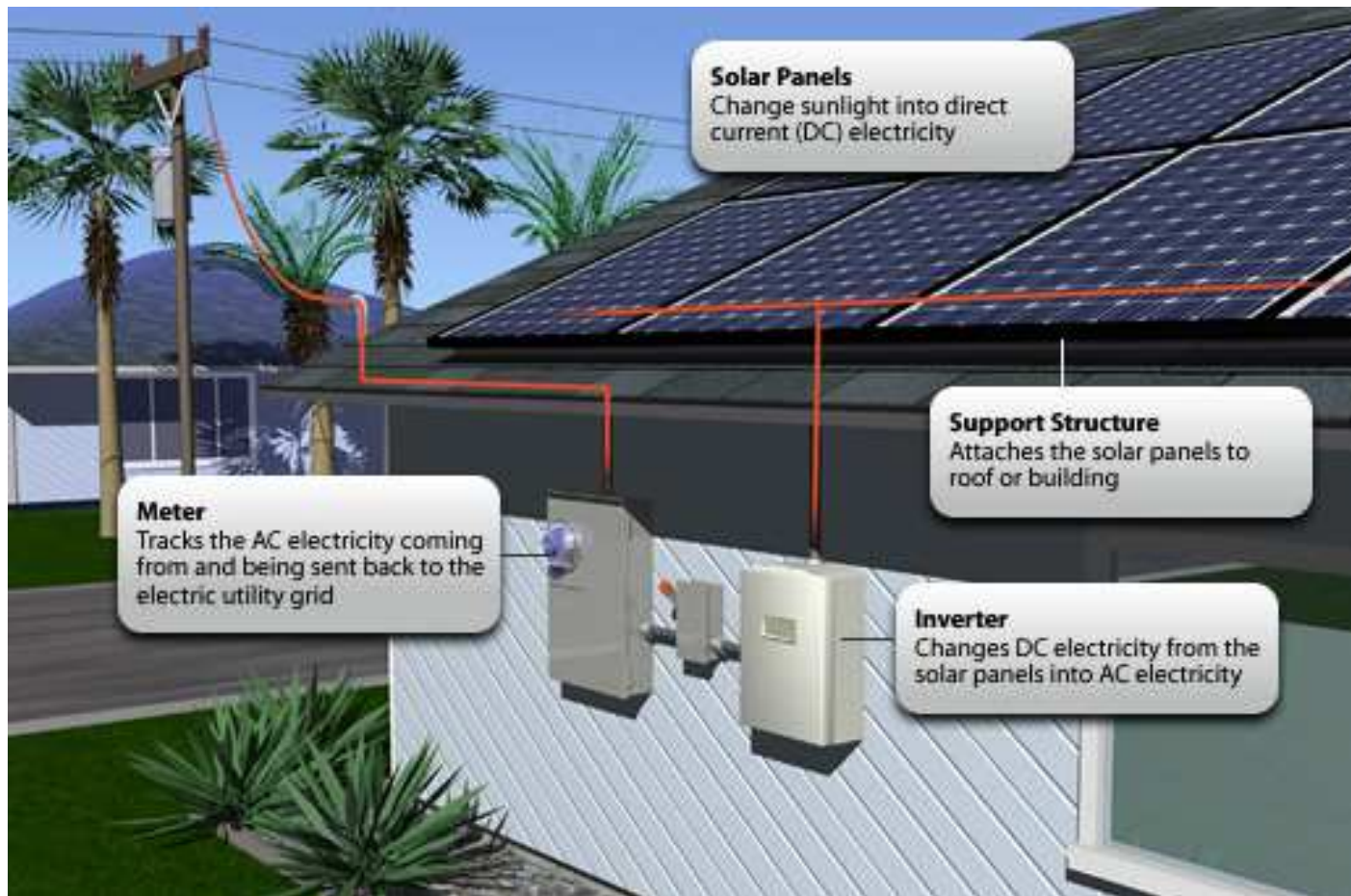
Source : <http://www.cer.gob.cl/mailling/2014/agosto/REPORTEAgosto2014.pdf>

vicepresidente@acesol.cl



ACESOL | ASOCIACION CHILENA DE ENERGIA SOLAR

Residential PV Installations – Netbilling



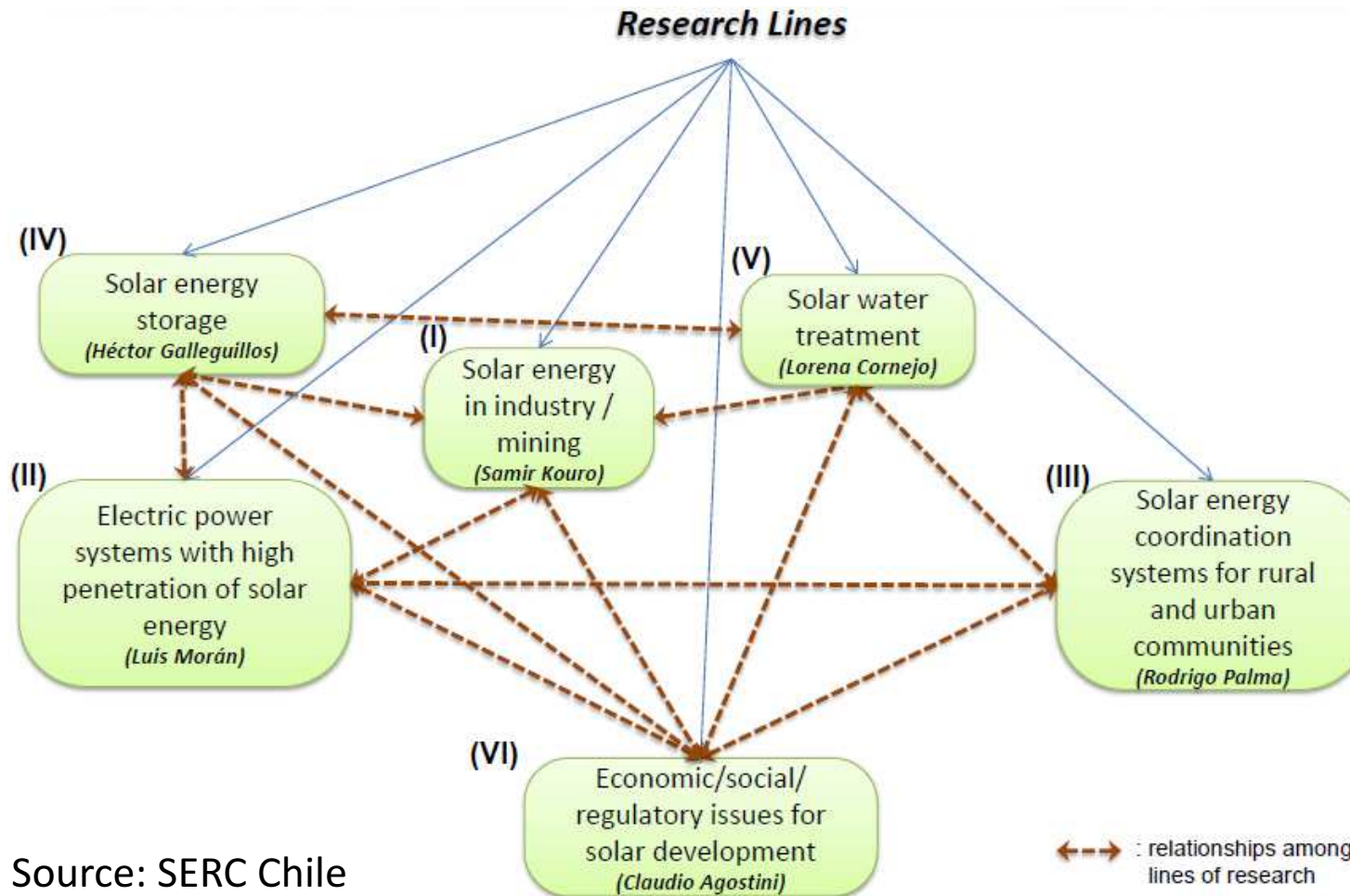
Success Critical Factors

- Economic viability.
- Demand existence.
- Existence of Offers.
- Financing.
- Legal and regulatory frames.
- Governmental support.



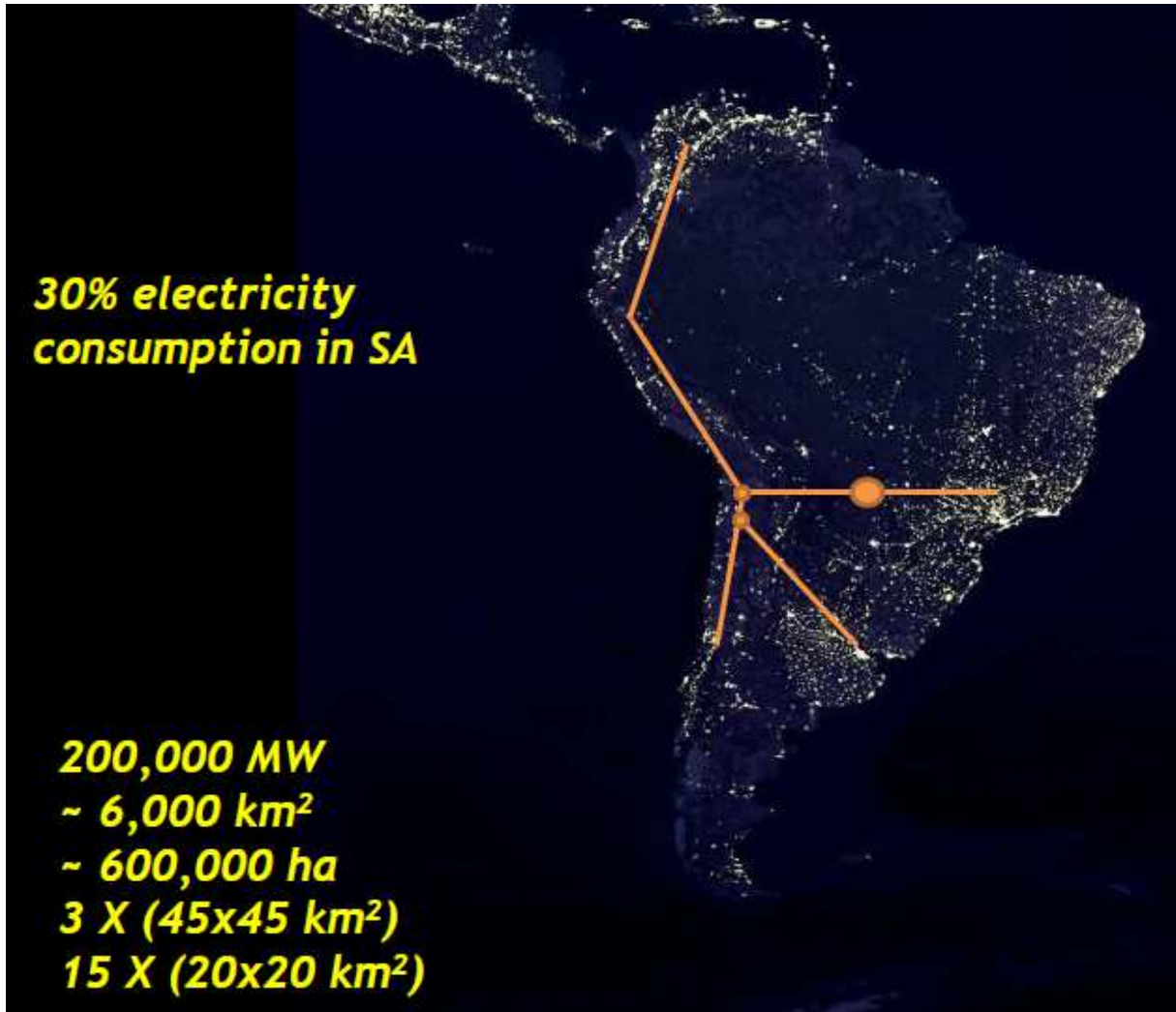
Initiatives on Solar Energy – SERC Chile

- CONICYT
- U. DE CHILE
- U. DE TARAPACÁ
- U. DE ANTOFAGASTA
- U. TÉCNICA FEDERICO SANTA MARÍA
- U. ADOLFO IBAÑEZ
- U. DE CONCEPCIÓN
- FUNDACIÓN CHILE



Source: SERC Chile
www.sercchile.cl

Initiatives on Solar Energy – SERC Chile



vicepresidente@acesol.cl

SERC CHILE
SOLAR ENERGY RESEARCH CENTER

www.sercchile.cl

Vision 2030 :

**Transform to Chile into
a Solar Energy Regional
Power**



ACESOL | ASOCIACION CHILENA
DE ENERGIA SOLAR

Initiatives on Solar Energy - CORFO



Support :

- ENTREPRENEURSHIP
- INNOVATION
- COMPETITIVENESS

Source: CORFO

www.corfo.cl



ACESOL | ASOCIACION CHILENA DE ENERGIA SOLAR

Our Vision – Dimensions

At 2025 :

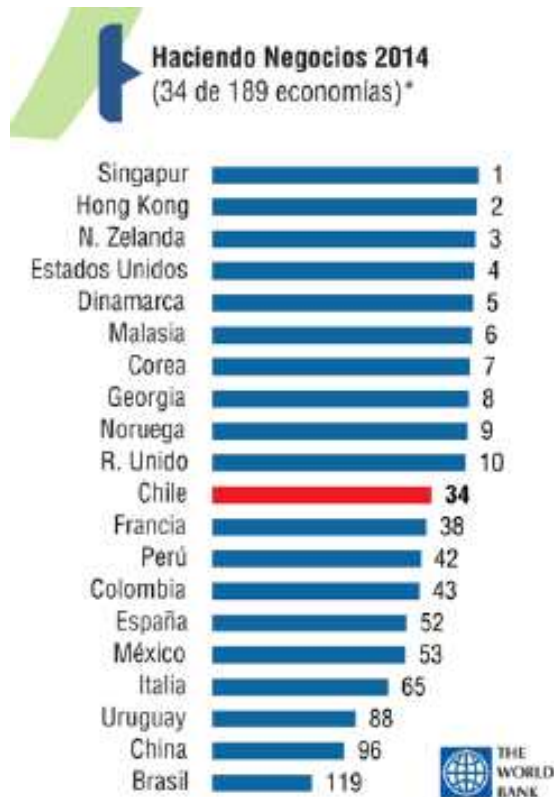
STRATEGIC GUIDELINE: Exploitation of our natural resources on a priority basis to conventional imported fuels.

- **Power matrix :** At least 20% Solar Energy.
- **Distributed Generation:** 100 % installations using Solar Energy.
- **Roof Top usage:** 100 % using Solar Energy.
- **Treatment Water plants:** 100 % wastewater treatment and drinking water production plants using Solar Energy.
- **Useful Heat:** 100 % installations using Solar Energy.
- **Solar National Industry:** We expect to have a consolidated industry for the fabrication of components and equipment.
- **Solar systems and equipment maintenance:** We expect to have a consolidated industry based on micro-entrepreneurs.

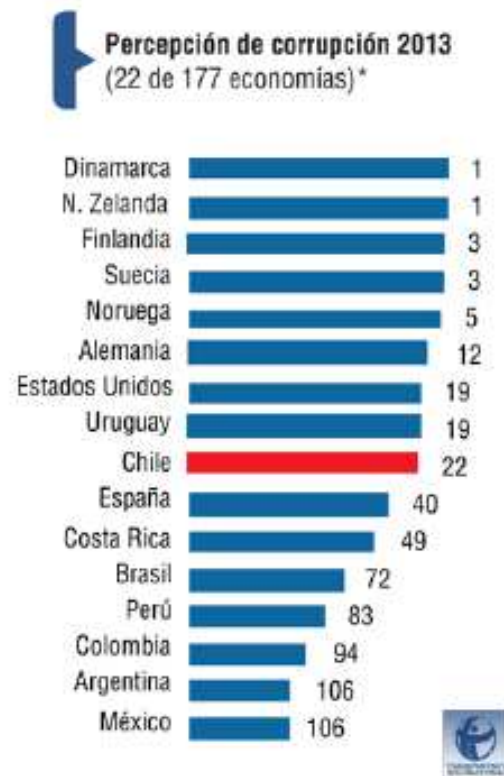


Chile: Businesses Environment of Excellence

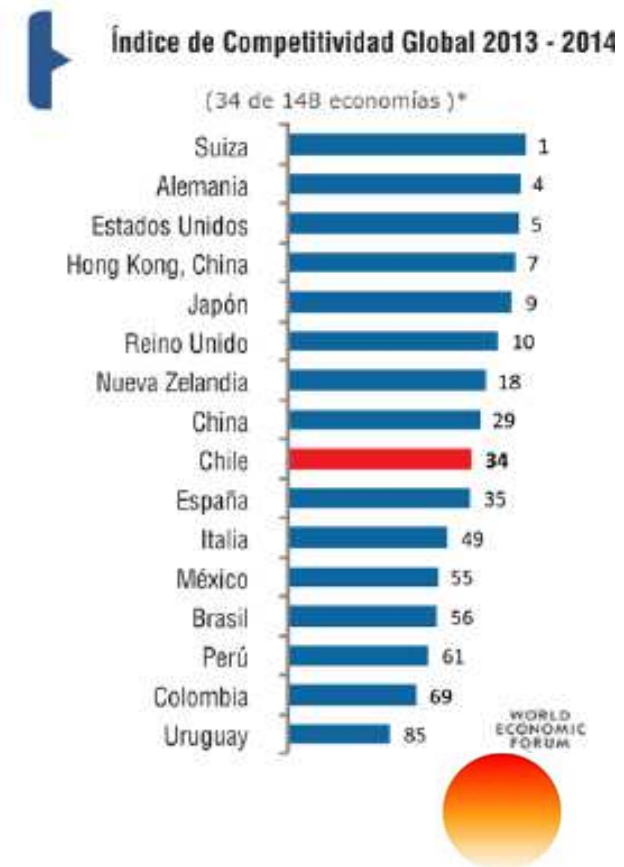
Doing Business 2014



Corruption Perception 2013



Competitiveness 2013-2014



Source: CIE-Chile, Mr Jorge Yañez , jyanez@ciechile.gob.cl

THANK YOU VERY MUCH!



ACESOL | ASOCIACION CHILENA DE ENERGIA SOLAR

