



ACESOL | ASOCIACION CHILENA DE ENERGIA SOLAR



# **INTERSOLAR SUMMIT CHILE**

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## **Solar Energy Market in Chile**

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DE ENERGIA SOLAR

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- ACESOL Corporate profile.
- Solar energy resources.
- 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.



# ACESOL ( [www.acesol.cl](http://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.

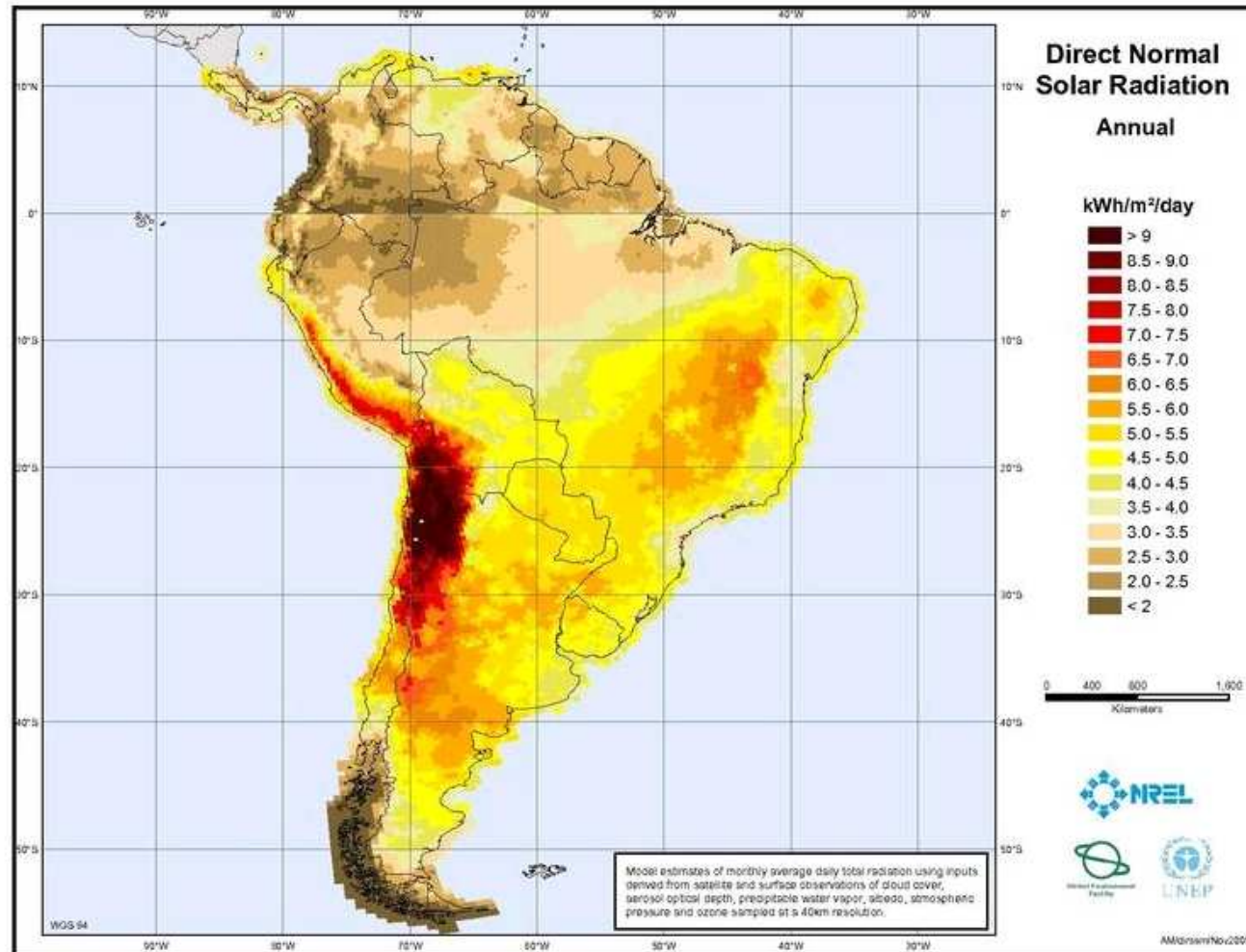


# Associated companies

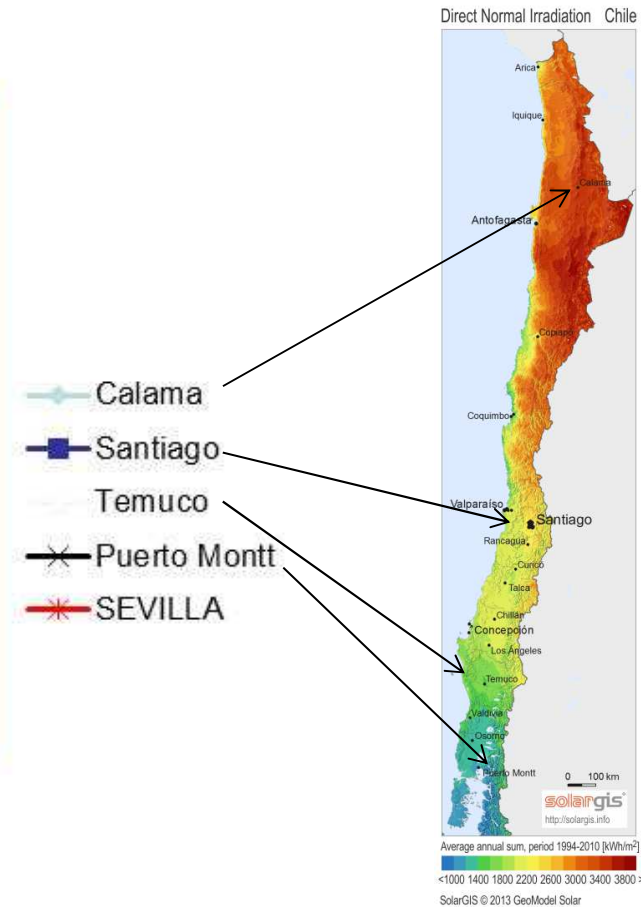
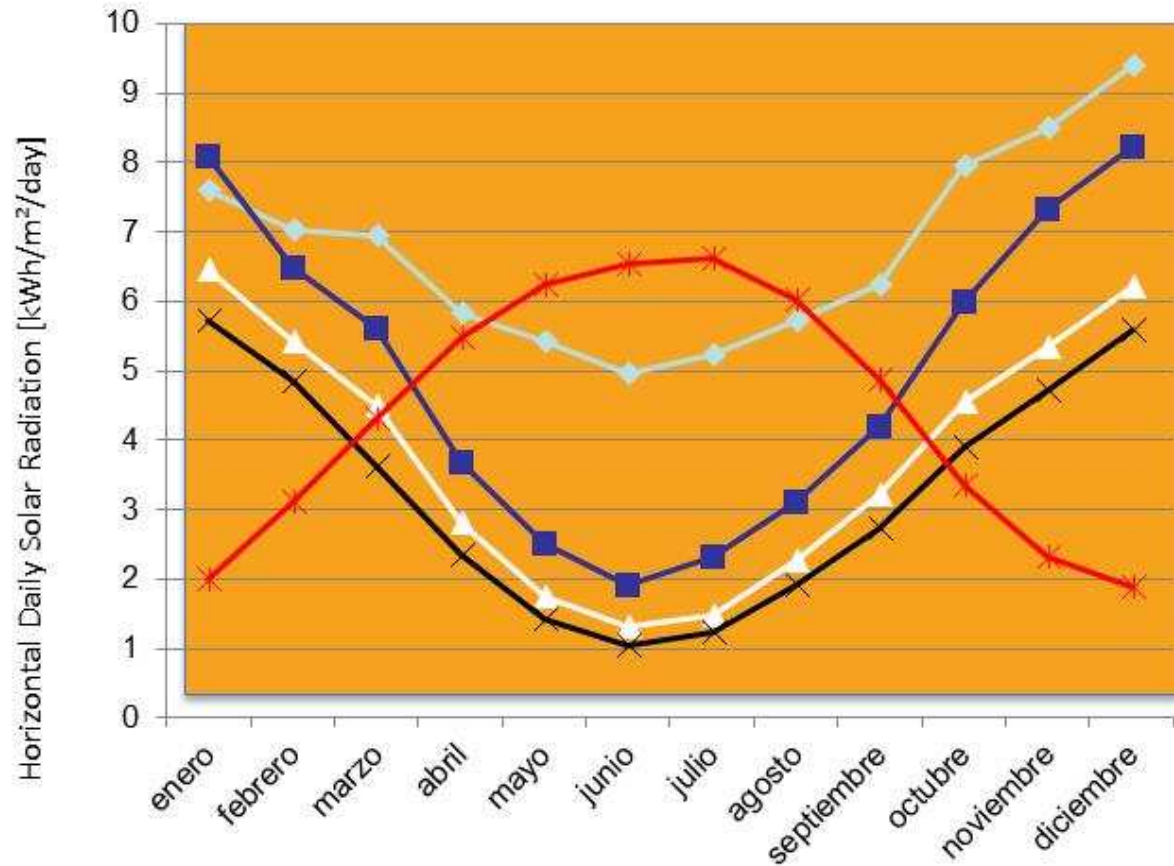
- Thermal and PV Solar Energy areas.
- Equipment Importers and distributors.
- Producers or Manufacturers (only TSE).
- Executors, installers, EPCs.
- Engineers, Advisors and Consultants.



# Solar Energy Resources - Chile



# 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](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](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

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Tabla N° 10: Proyección global por Uso

USO	m <sup>2</sup> CST/año			TOTAL	
	2012	2013	2014	m <sup>2</sup> CST	%
<b>Viviendas Usadas</b>					
- 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%
<b>Subtotal viviendas usadas (m<sup>2</sup>)</b>	<b>18.747</b>	<b>23.074</b>	<b>27.402</b>	<b>69.222</b>	<b>20,8%</b>
<b>Viviendas Nuevas</b>					
- 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%
<b>Subtotal viviendas nuevas (m<sup>2</sup>)</b>	<b>21.322</b>	<b>25.195</b>	<b>33.740</b>	<b>80.257</b>	<b>24,1%</b>
<b>Comercio</b>					
- 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%
<b>Subtotal comercio (m<sup>2</sup>)</b>	<b>5.542</b>	<b>7.065</b>	<b>8.588</b>	<b>21.196</b>	<b>6,4%</b>
<b>Industria (m<sup>2</sup>)</b>	<b>2.242</b>	<b>2.858</b>	<b>3.474</b>	<b>8.573</b>	<b>2,6%</b>
<b>Otros (m<sup>2</sup>)</b>	<b>2.720</b>	<b>3.467</b>	<b>4.215</b>	<b>10.402</b>	<b>3,1%</b>
<b>Gran Minería (m<sup>2</sup>)</b>	<b>17.500</b>	<b>51.400</b>	<b>74.200</b>	<b>143.100</b>	<b>43,0%</b>
<b>TOTAL (m<sup>2</sup> CST)</b>	<b>68.072</b>	<b>113.060</b>	<b>151.619</b>	<b>332.751</b>	<b>100,0%</b>

Fuente: Elaboración propia



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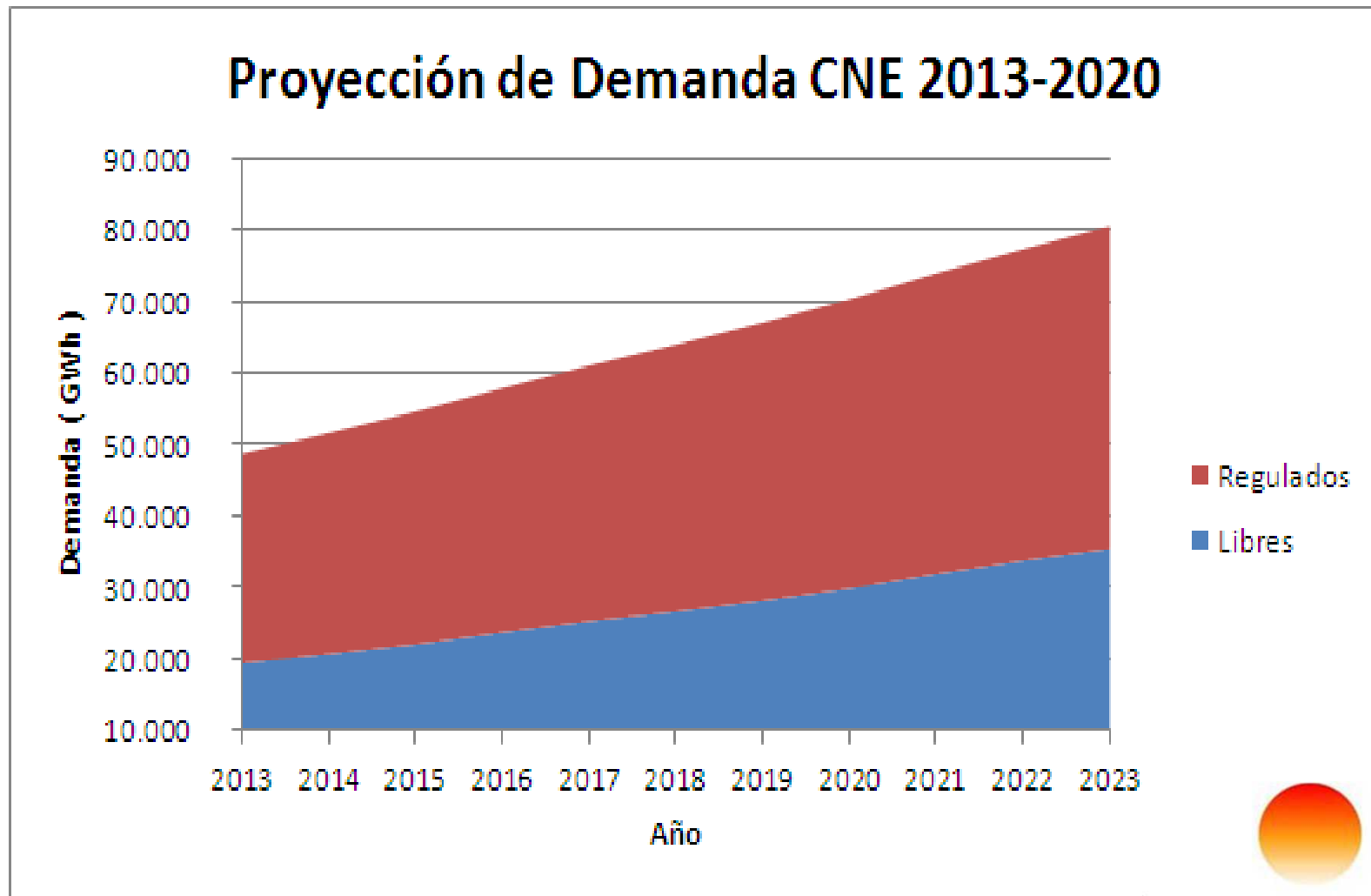
# PV Solar Energy Potential Market

- **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.





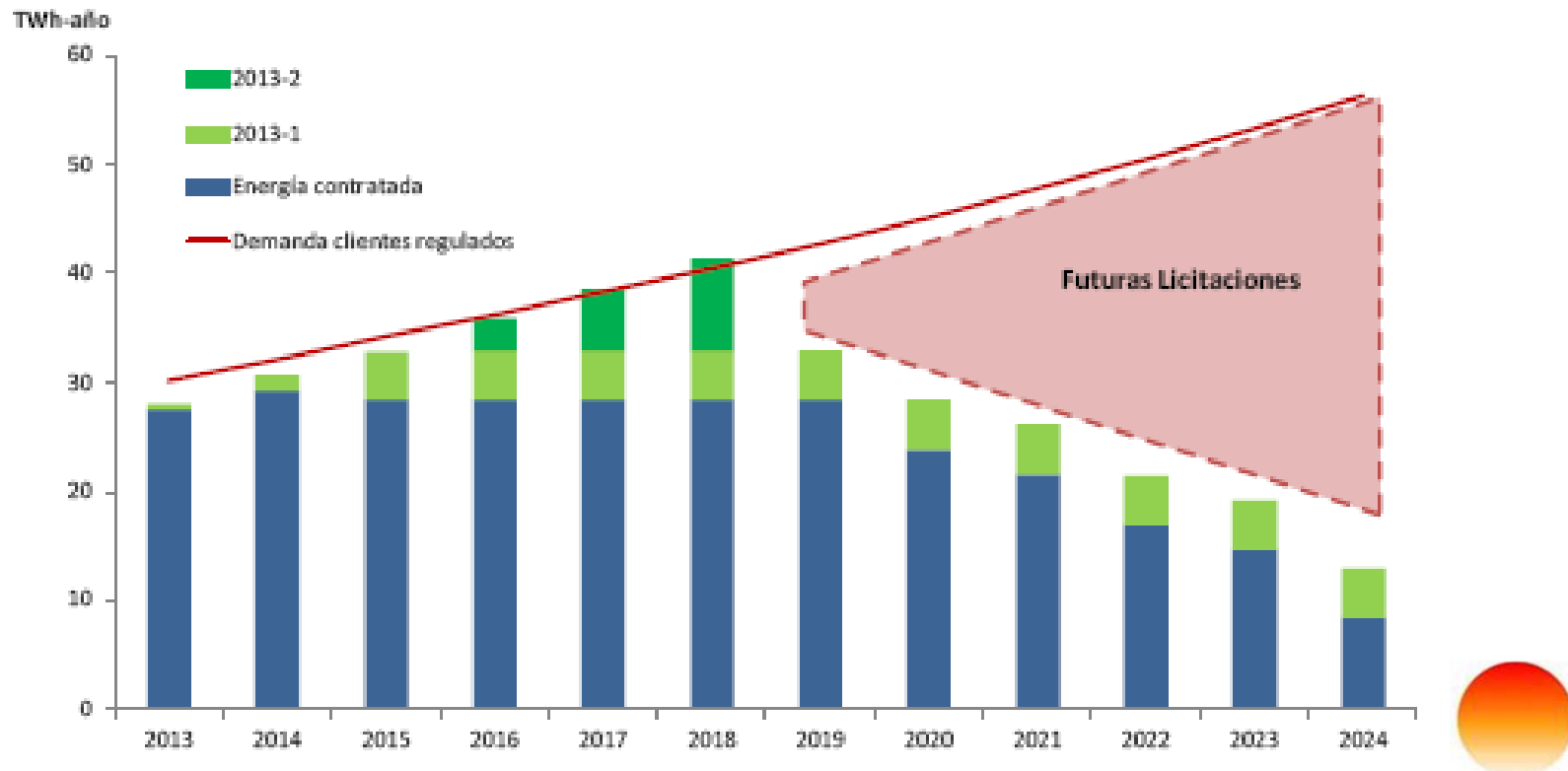
# Total power demand forecast



# 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
- Start of supply : January 2021



## Current status of NCRE projects

Estado	Operación [MW]	Construcción [MW]	Estudios Ambientales aprobados [MW]	En evaluación [MW]
Biomasa	461	0	74	66
Biogás	43	0	1	0
Eólica	571	520	4.337	1.664
Mini-Hidro	338	85	270	202
Solar - PV	176	170	5.490	3.539
Solar - CSP	0	100	760	100
Geotermia	0	0	120	0
<b>Total</b>	<b>1.589</b>	<b>875</b>	<b>11.052</b>	<b>5.571</b>

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

Source : [www.cer.gob.cl/mailling/2014/mayo/REPORTE\\_Mayo2014\\_FINAL.pdf](http://www.cer.gob.cl/mailling/2014/mayo/REPORTE_Mayo2014_FINAL.pdf)



## Current status of NCRE projects (2)

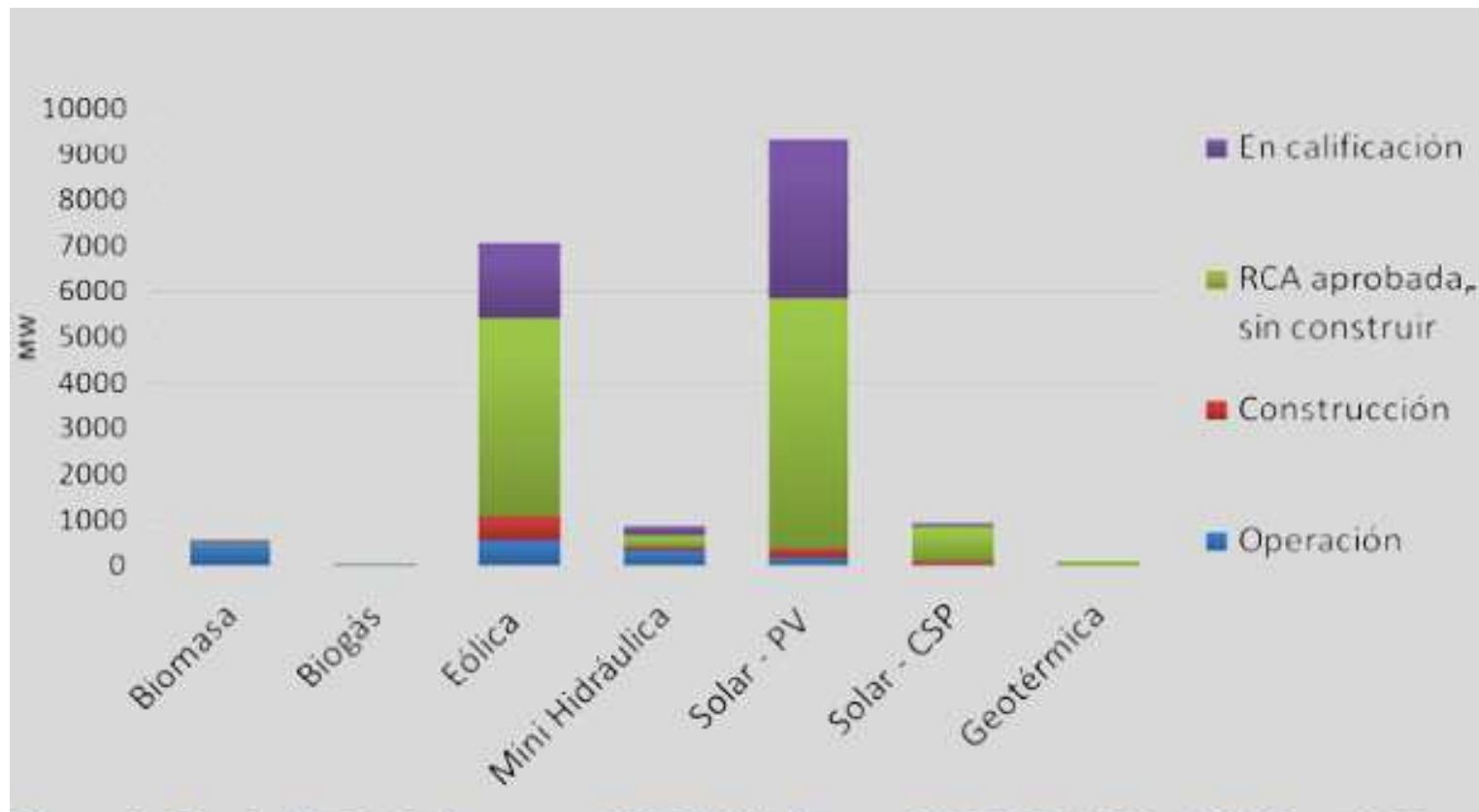


Figura 1 – Estado Global de Proyectos ERNC (MW). Fuente: CER, SEA, CDEC, CNE. Mayo 2014.

Source : [www.cer.gob.cl/mailling/2014/mayo/REPORTE\\_Mayo2014\\_FINAL.pdf](http://www.cer.gob.cl/mailling/2014/mayo/REPORTE_Mayo2014_FINAL.pdf)



# Energy Matrix Composition

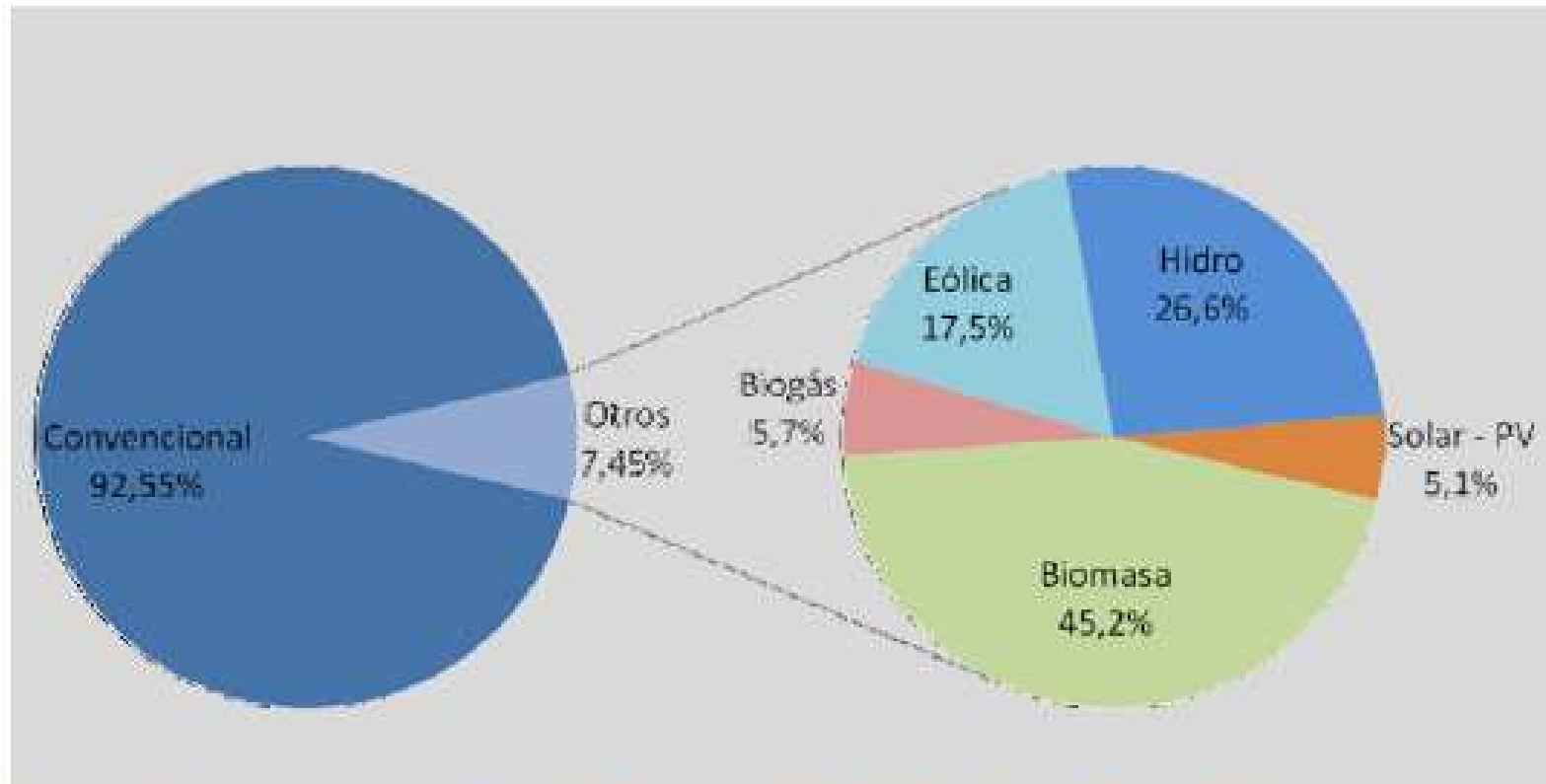


Figura 4 – Generación ERNC 2014. Fuente: CER, CNE, CDEC. Mayo 2014.

Source : [www.cer.gob.cl/mailling/2014/mayo/REPORTE\\_Mayo2014\\_FINAL.pdf](http://www.cer.gob.cl/mailling/2014/mayo/REPORTE_Mayo2014_FINAL.pdf)



# Power Prices evolution

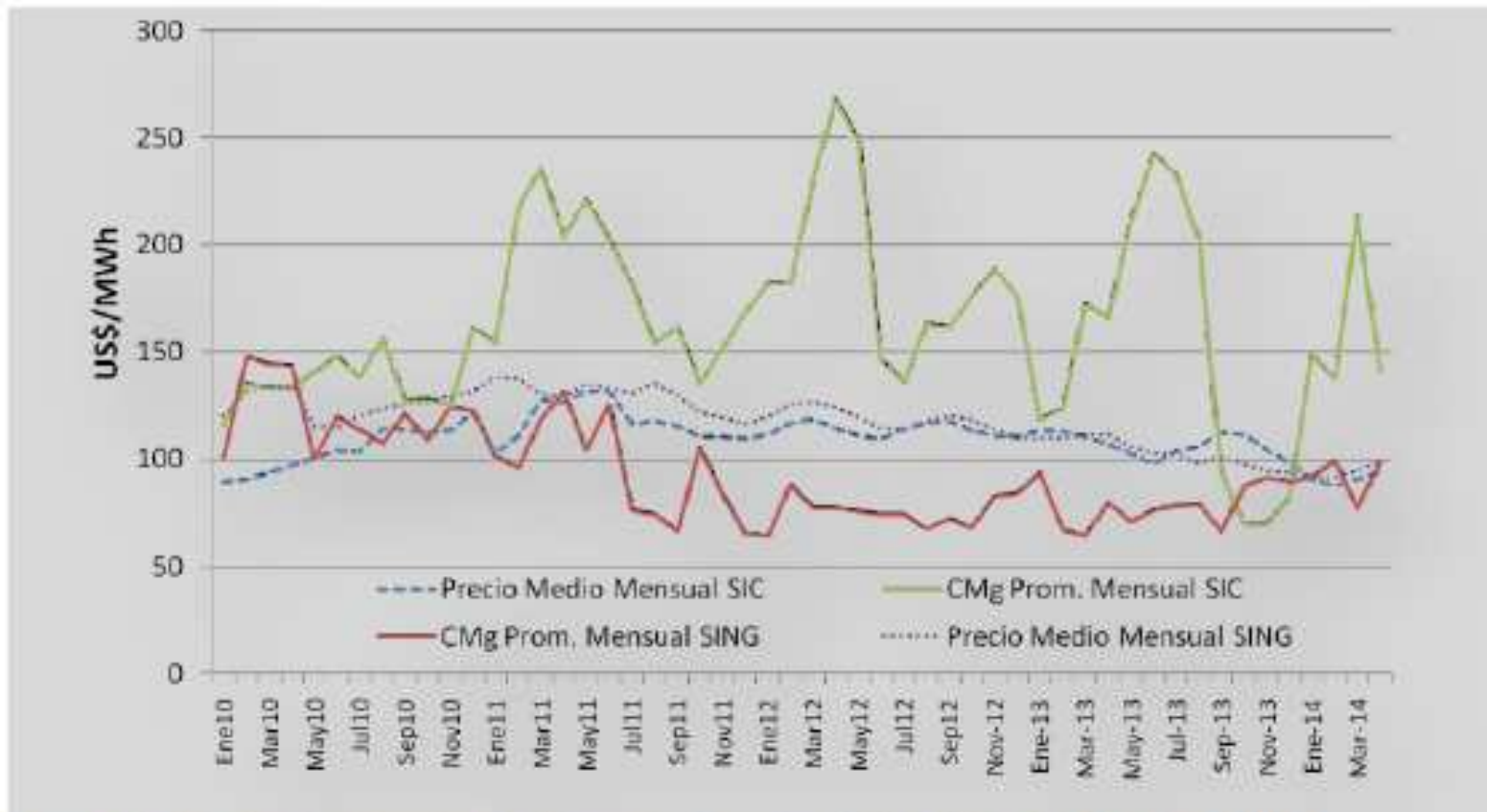


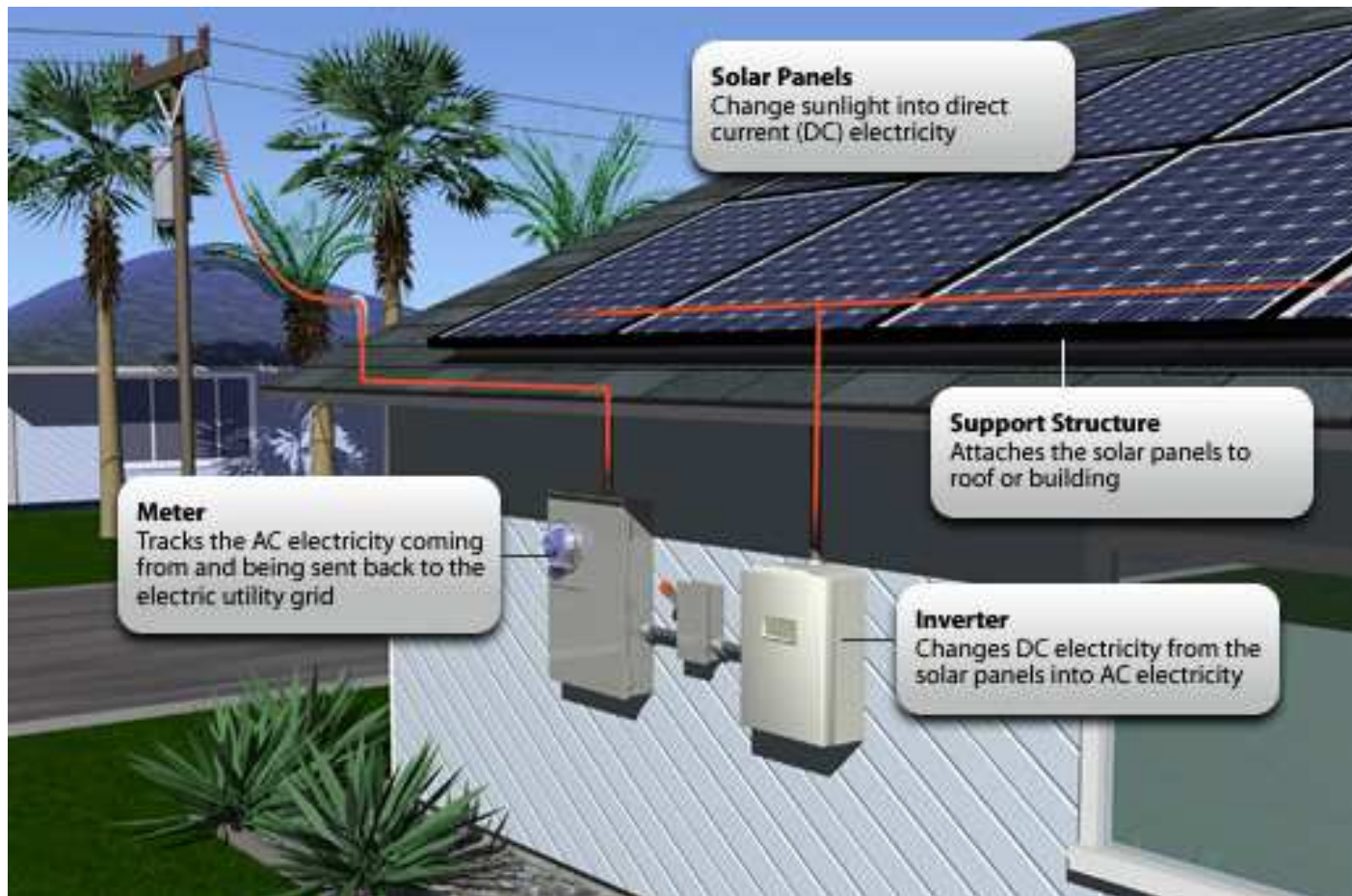
Figura 6 – Evolución Precios de Mercado. Fuente: CER, CNE, CDEC. Mayo 2014.

Source : [www.cer.gob.cl/mailling/2014/mayo/REPORTE\\_Mayo2014\\_FINAL.pdf](http://www.cer.gob.cl/mailling/2014/mayo/REPORTE_Mayo2014_FINAL.pdf)





# Residential PV Installations – Netbilling



# Success Critical Factors

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



THANK YOU VERY MUCH!



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