



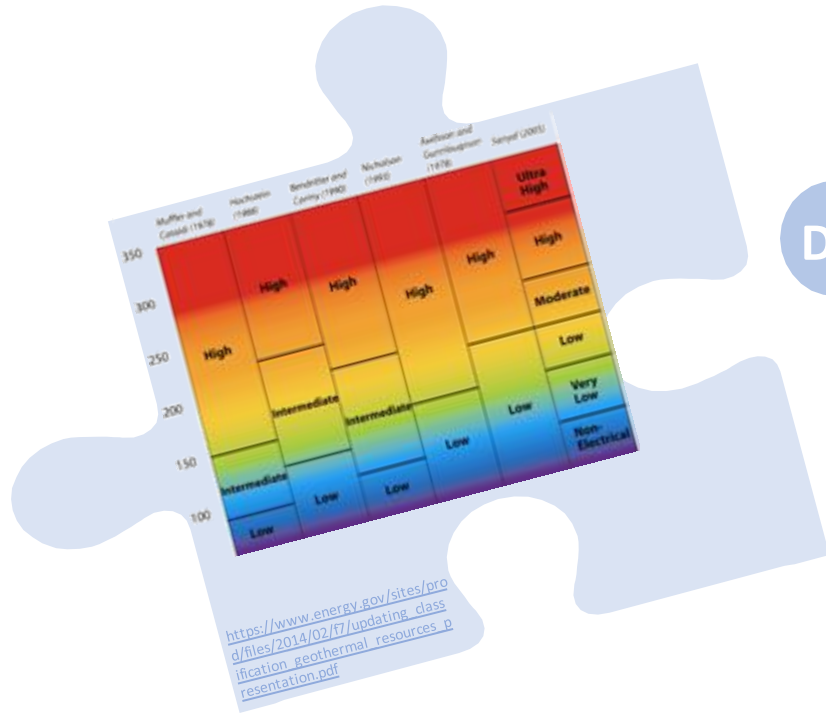


Direct Use of Geothermal Energy Opportunities

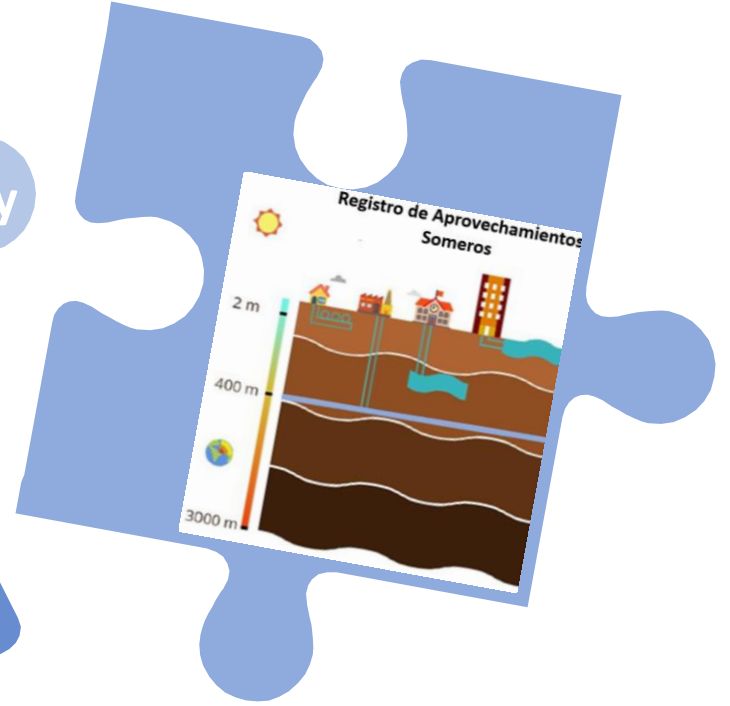
Sustainable Energies Division
Geothermal & District Energy Unit

Chile, July 2019

key Concepts



Direct Uses of Geothermal Energy

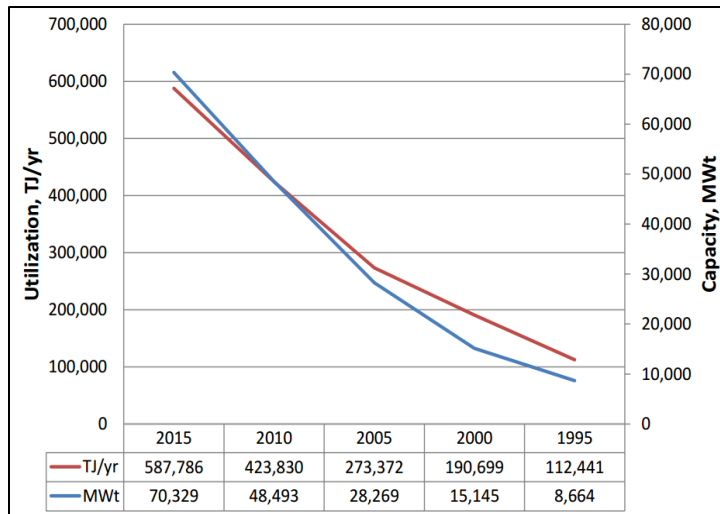


Direct-Use A range of applications that directly utilise the thermal (heat) energy of the resource without conversion to electrical, chemical, or mechanical energy.

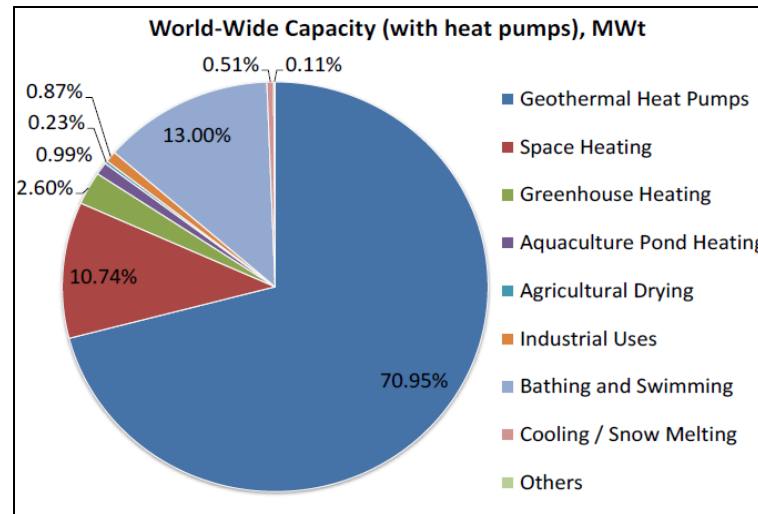
<http://data.directuseofgeothermal.govs.cri.nz/geothermal/>

International Framework : “Direct Utilization of Geothermal Energy 2015 Worldwide Review” John Lund & Tonya Boyd (World Geothermal Congress 2015)”

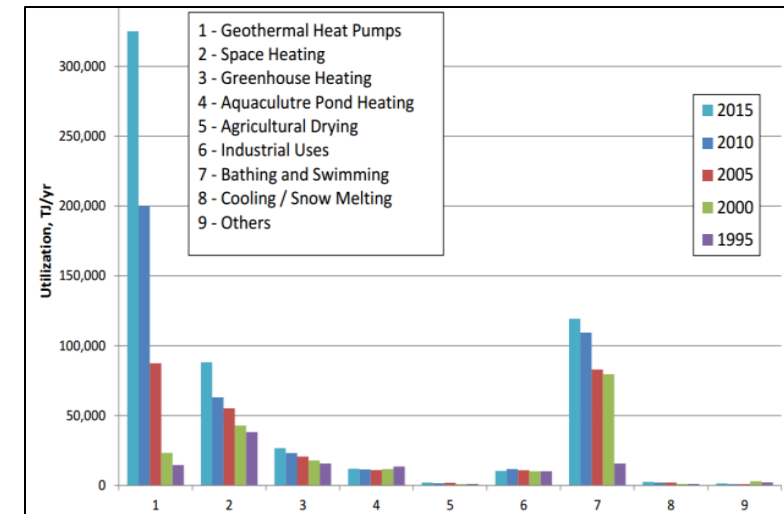
Installed direct-use geothermal capacity and annual utilization from 1995 to 2015.



Geothermal direct applications worldwide in 2015, distributed by percentage of total installed capacity (MWt).

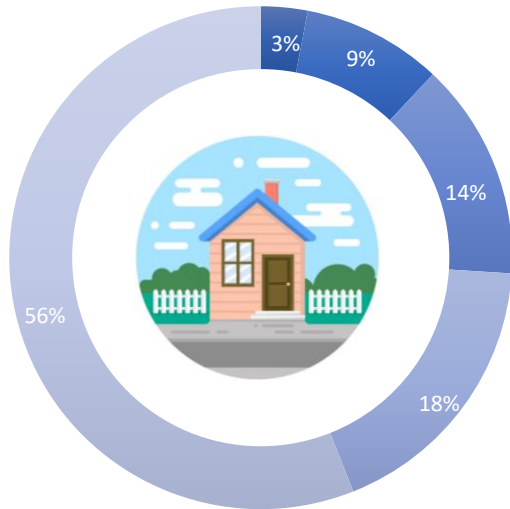


Comparison of worldwide direct-use geothermal energy in TJ/yr from 1995, 2000, 2005, 2010 and 2015.



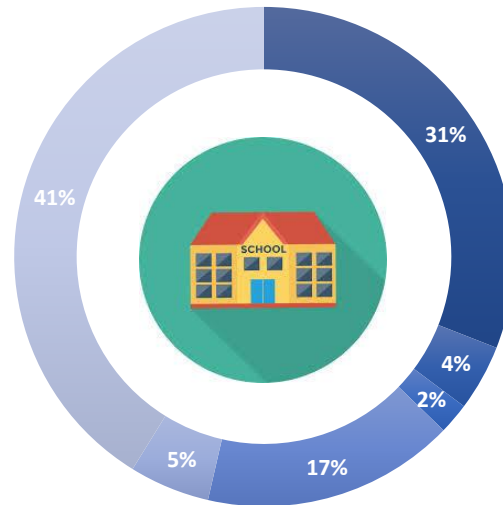
Chilean Framework: Energy Consumption (annual average)

10.232 KWh



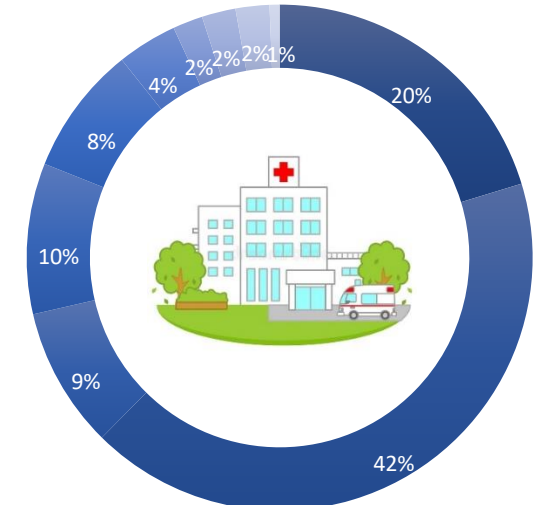
- Space Cooling
- Lighting
- Cooking
- Electrical Equipments
- Domestic Hot Water

80.347 KWh



- Lighting
- Office Equipments
- Other Equipments
- Cooking
- Domestic Hot Water

8.729.000 KWh



- Domestic Hot Water
- Lighting
- Industrial Equipments
- Cooking
- Office Equipments
- Space Heating and Cooling
- Medical Equipments
- Sterilization Process
- Household appliances
- Other

http://dataset.cne.cl/Energia_Abierta/Estudios/Minerg/Usos%20finales%20y%20curva%20de%20oferta%20de%20conservaci%C3%B3n%20de%20la%20energ%C3%ADa%20en%20el%20sector%20de%20residencial%20de%20Chile.pdf

Chilean Framework

Geothermal Energy application can be "electricity" but also **thermal uses**.

Huge thermal demand: space heating and cooling, industrial process and domestic hot water.

Disinformation about: technologies associated to direct uses, costs, utilization and successful cases.

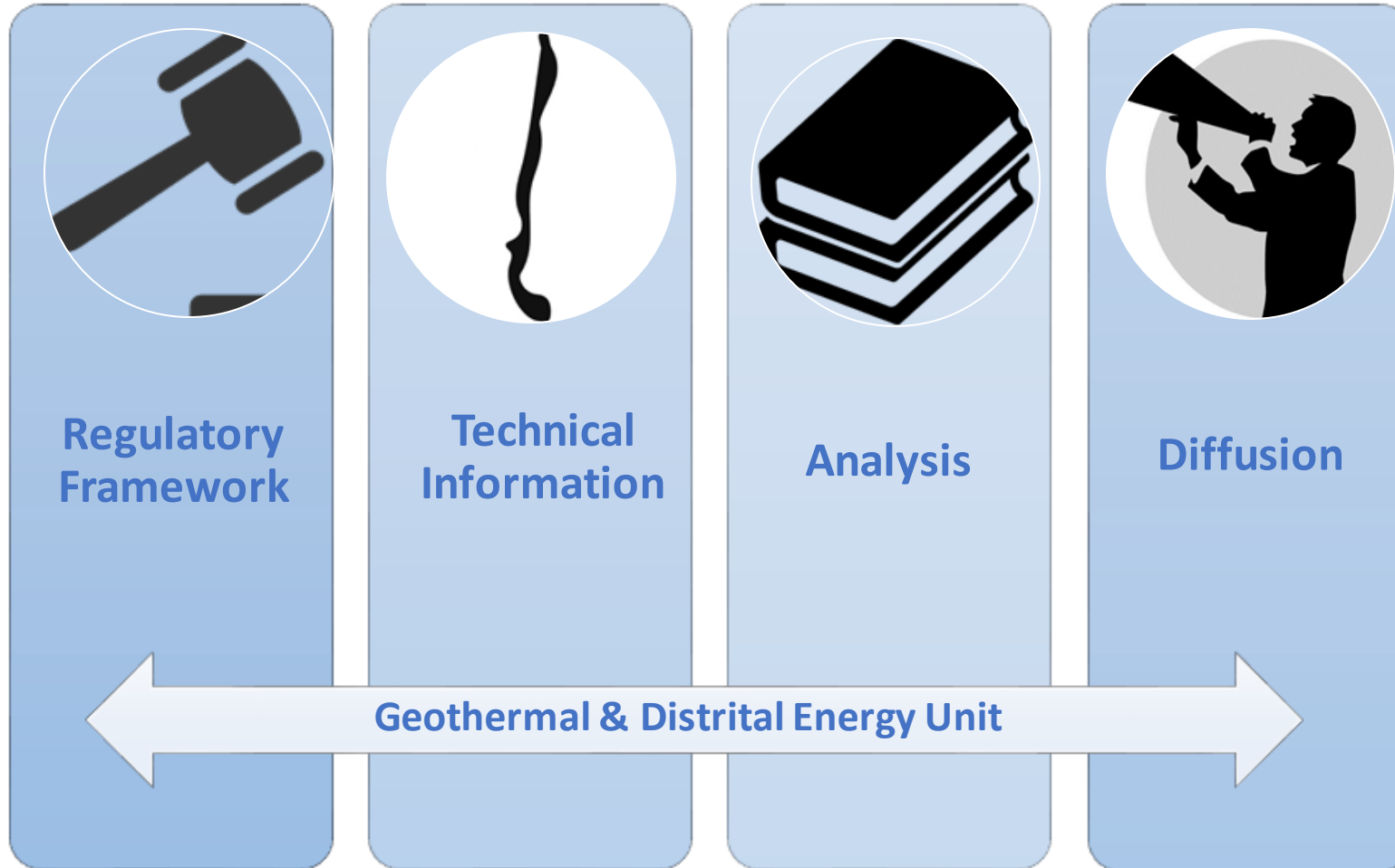


Absence of technical data for implementation of projects.

Regulatory uncertainty. **Law N°19657**.

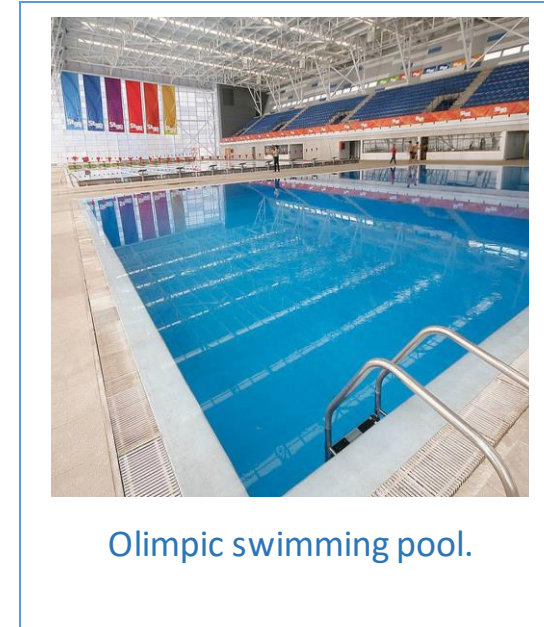
Regulation associated to the direct use of geothermal (Sectorial permits).

Geothermal Direct-Use Program: Outline Work Plan



Analysis

Case of Study: Olympic Swimming Pool “Estadio Nacional, Chile”



| Items | USD (thousand) |
|--------------------------------|----------------|
| Current Operation with Gas | 148 |
| Operation with GSHP | 55 |
| Saving (Replace Gas with GSHP) | 93 |
| Investment GSHP | 438 |

Replace Gas with Geothermal Heat Pumps (GSHP)
Payback (12%) 7 years



Diffusion

Educational Videos





Thanks for your Attention