



Ministerio de
Energía

Gobierno de Chile

Residential Energy Transition in Chile

Ministerio de Energía
August 2020

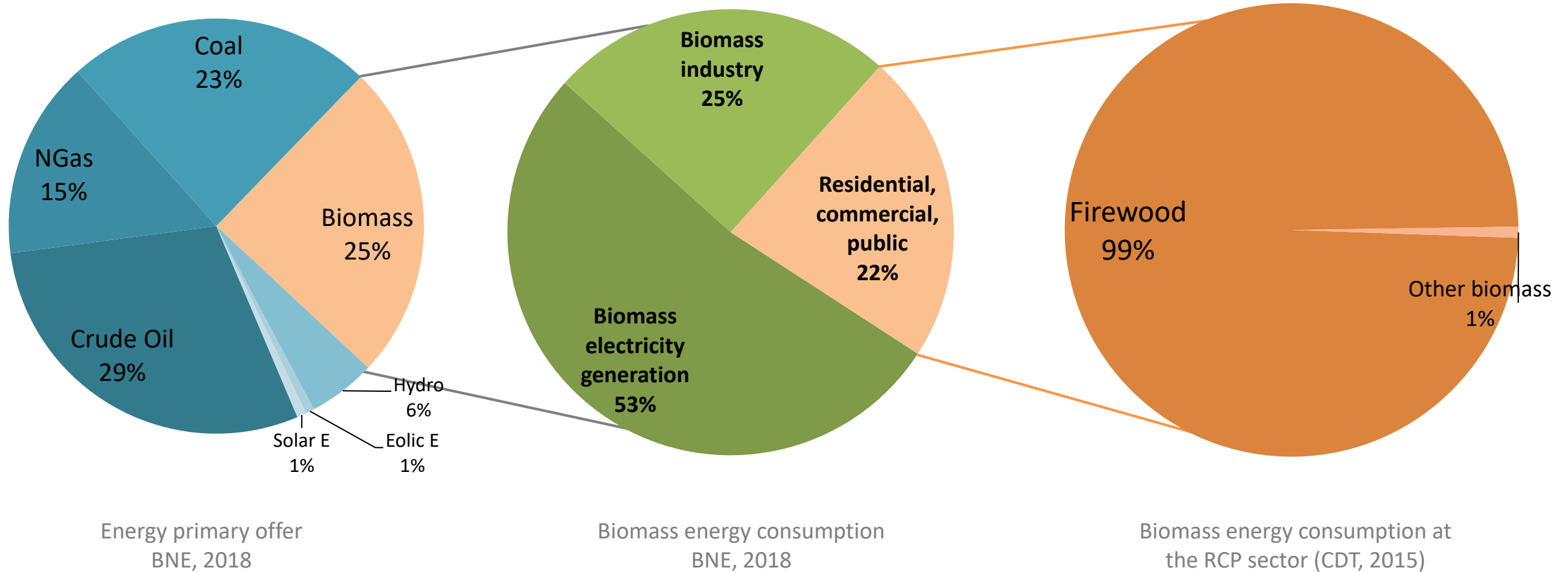


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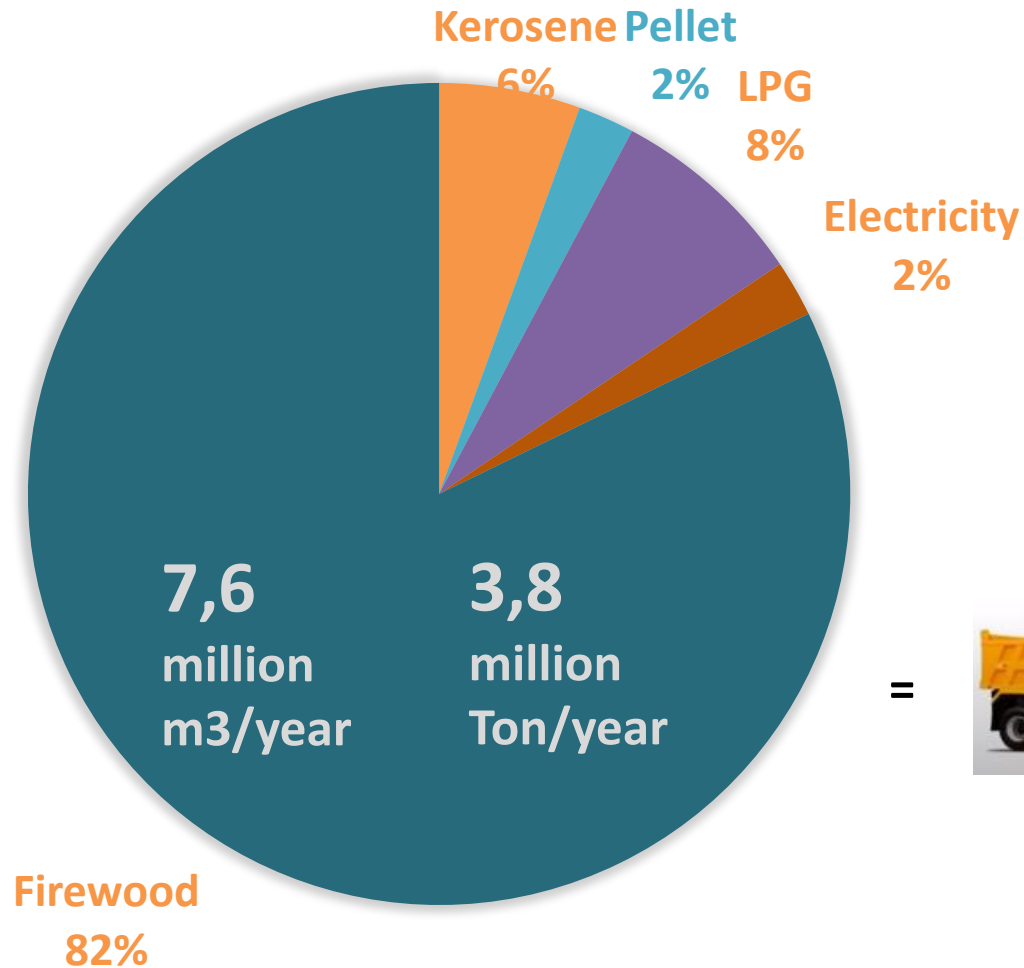
- Problem description
- Measures adopted
- Residential energy transition

Biomass in Chile's energy matrix

- Biomass represents 25% of total primary energy production.
- At the residential sector, firewood is by far the biofuel mostly used, representing around 99%.



Sources of heat in the residential sector



Percentages of energy consumption for heating and cooling by source, in the residential sector

=  X 960,000 / year

8 m³

Source: (CDT, In-Data SpA, 2019)

Climate Adaptation

The World's Worst Air Isn't in Beijing or New Delhi

Residents of Temuco, a tiny town in Chile, largely live in poverty and are forced to burn cheap, wet firewood to keep warm.

By [Laura Millan Lombrana](#), [Eduardo Thomson](#), and [Valentina Fuentes](#)

20 de julio de 2020 10:00 GMT-4

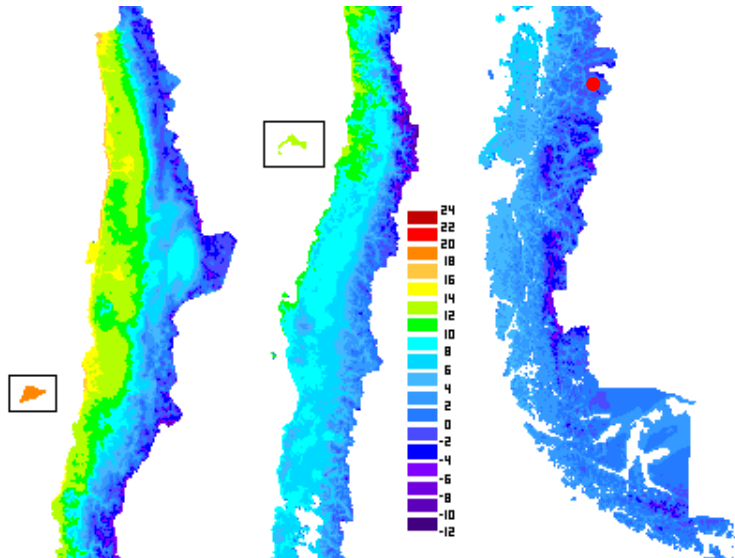


Among the ten cities with the highest air pollution in Latin America, nine are in Chile: Osorno, Coyhaique, Valdivia, Padre Las Casas, Temuco, Santiago, Linares, Rancagua and Puerto Montt.

Most Polluted Regional Cities

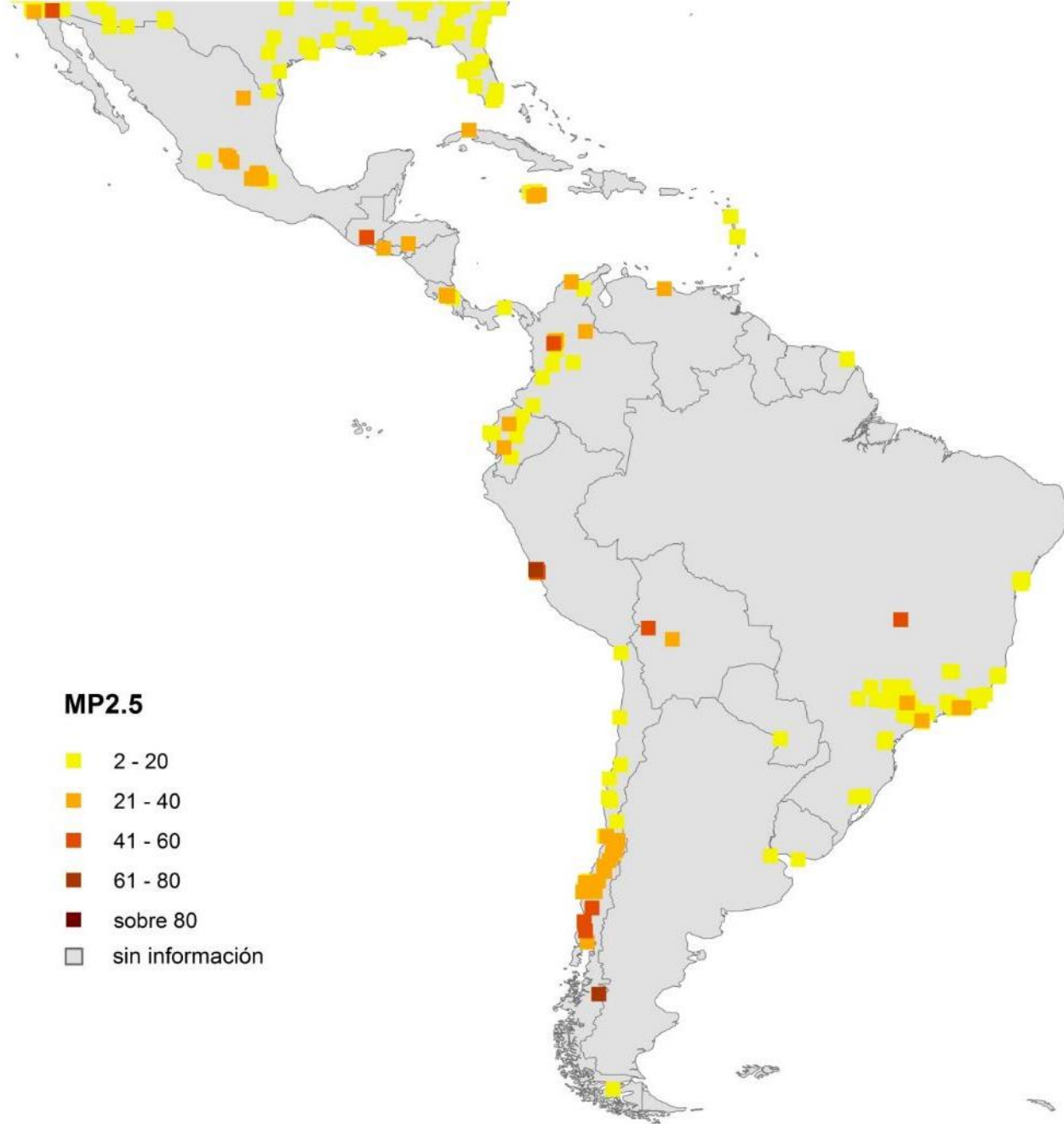
Rank	City	2018 AVG
1	 Padre las Casas, Chile	43.3
2	 Osorno, Chile	38.2
3	 Coyhaique, Chile	34.2
4	 Valdivia, Chile	33.3
5	 Temuco, Chile	30.4
6	 Mexicali, Mexico	30.2
7	 Santiago, Chile	29.4
8	 Lima, Peru	28.0
9	 Toluca, Mexico	26.4
10	 Linares, Chile	25.5
11	 Ecatepec de Morelos, Mexico	24.9
12	 Tlalnepantla de Baz, Mexico	23.7
13	 Rancagua, Chile	22.9
14	 Nezahualcóyotl, Mexico	22.8
15	 Puerto Montt, Chile	22.6

In the Latin American
and global context,
Chilean cities stand out
for presenting high
levels of pollution

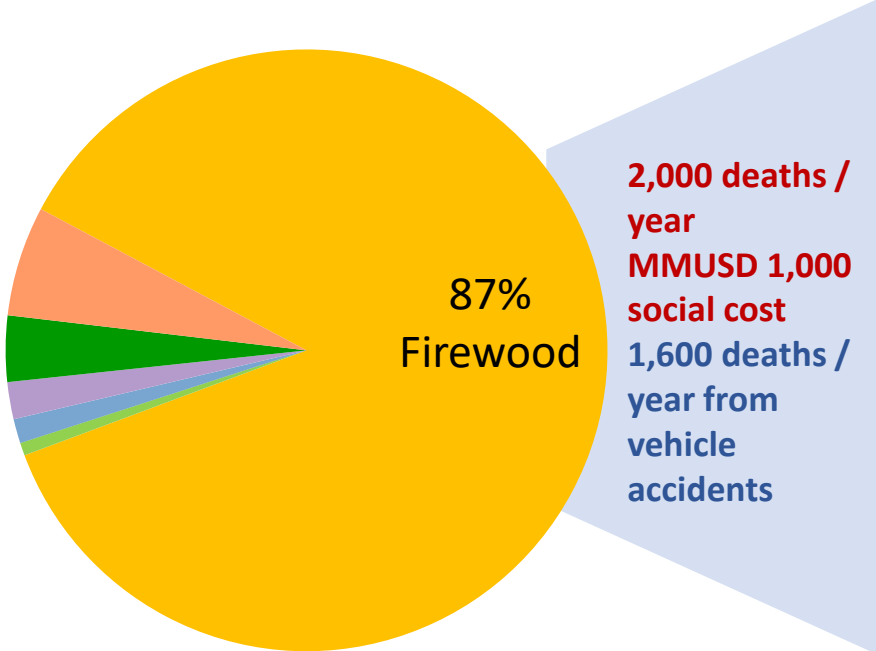


MP2.5

- 2 - 20
- 21 - 40
- 41 - 60
- 61 - 80
- sobre 80
- sin información



The combustion of firewood is responsible for 87% of the emissions of fine particulate matter (PM2.5) nationwide

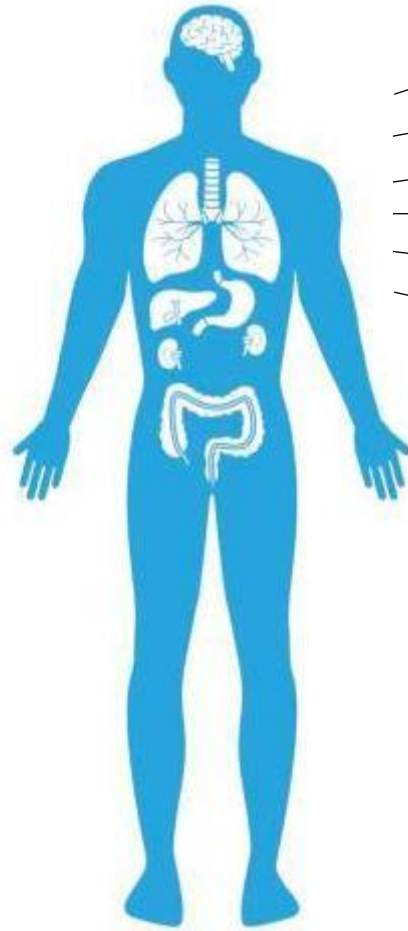




Coyhaique



Impacts of MP 2.5 on people's health

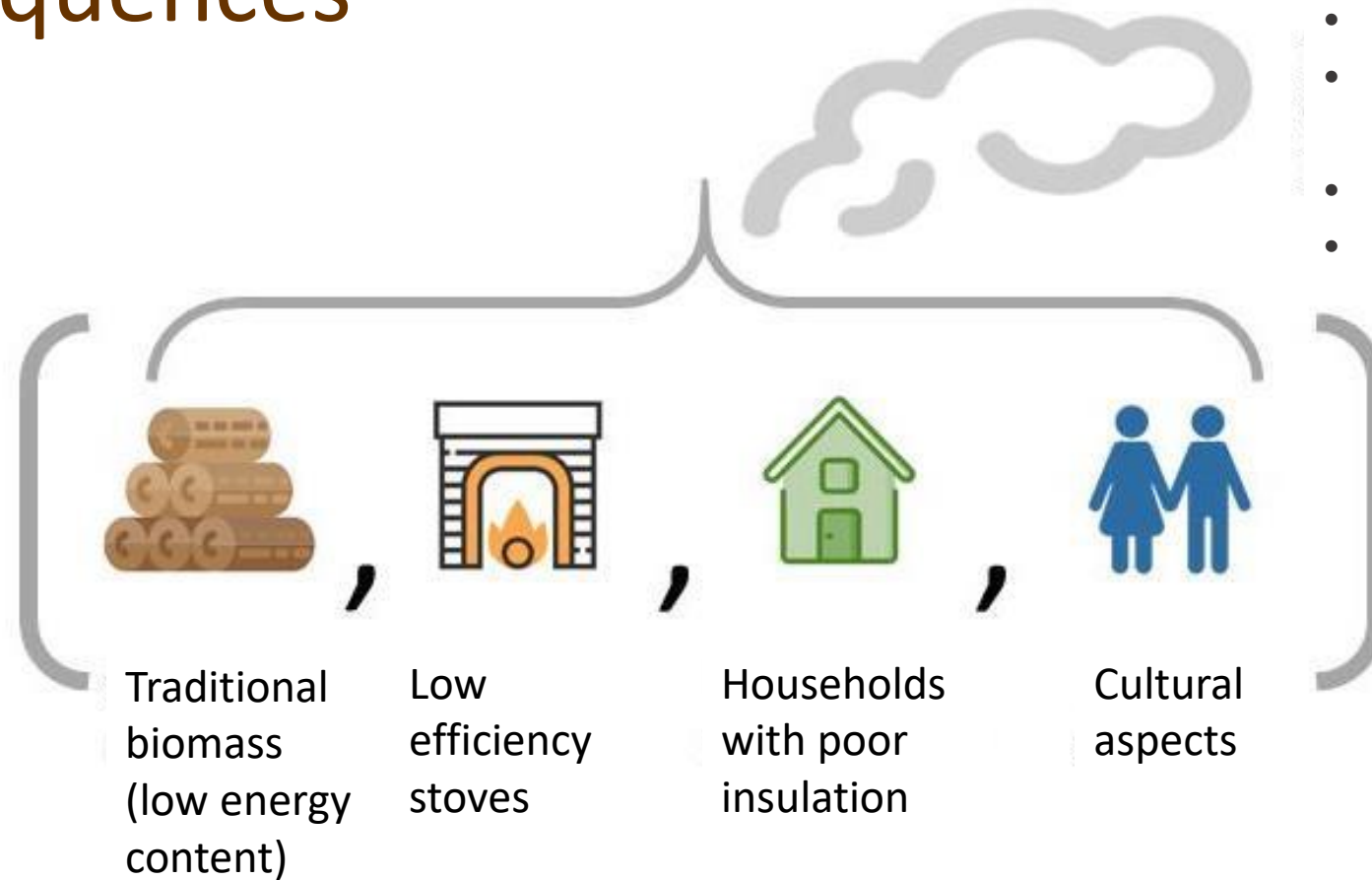


- Premature mortality
- Cardiovascular diseases
- Respiratory diseases
- Chronic obstructive pulmonary disease.
- Pneumonia
- Asthma
- Days lost from work
- Days of restricted physical activity

PM10 contains PM 2.5 and is associated with morbidity and mortality in the population due to short exposures.

Air pollution has Multiple causes And consequences

- Health problems
- Climate change
- Low productivity
- Loss to the Treasury (informality)
- Job insecurity
- Fires



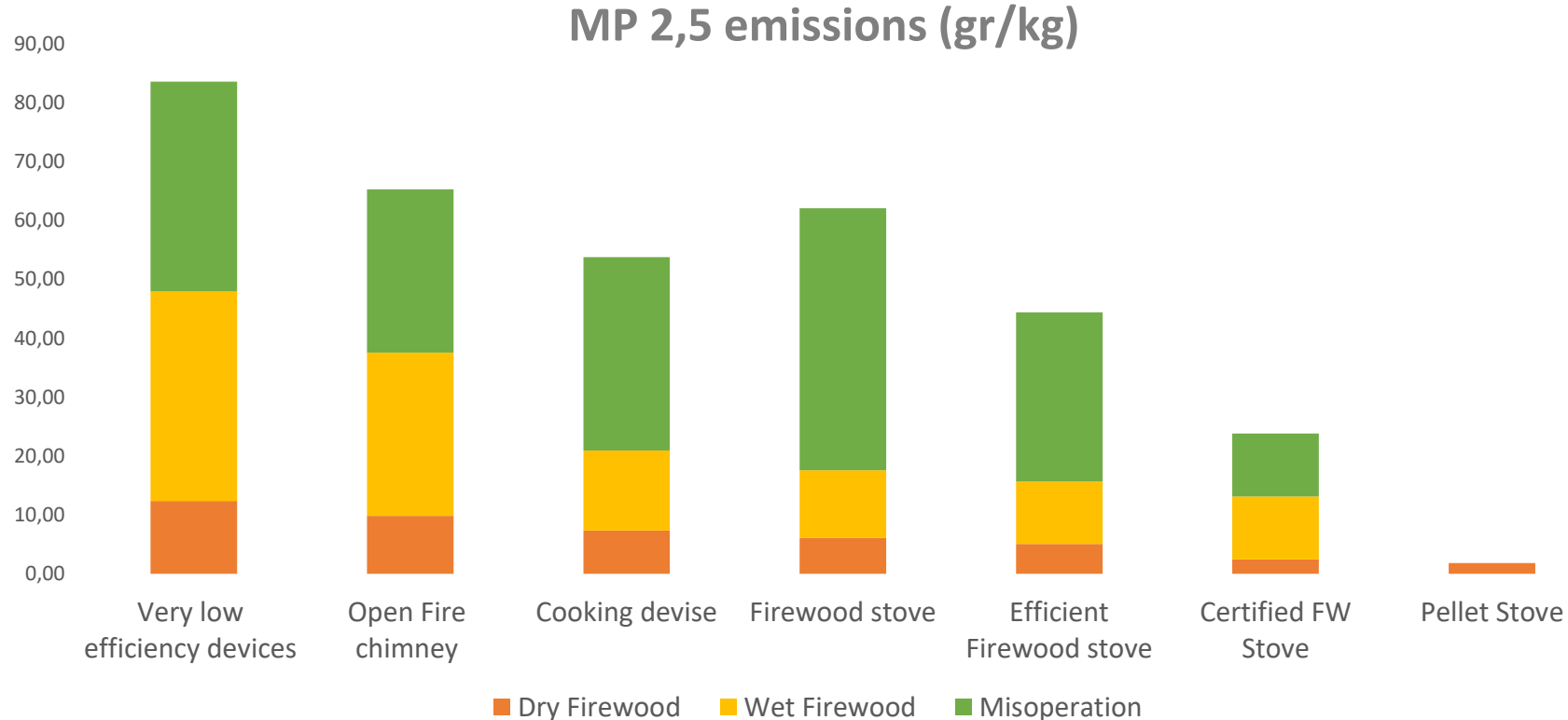
Firewood market characteristics.

- Firewood is the cheapest and most abundant source of energy in Chile.
- Firewood market is unregulated, highly informal.
- Firewood is sold with non quality standards.
- Firewood producers are dispersed in a wide territory, making more difficult their control.



Low efficient combustión technologies.

Firewood stoves are the least efficient technologies, hence, the most polluting. This is exacerbated by mis operation of the stoves (by limiting the amount of oxygen into the chamber, so the wood can burn the whole night)



Source: MEN, based on MMA emisión factors.

Poorly insulated households



In Chile, 12% of the households have thermal insulation standards in accordance with current regulations (dating from 2007) and only 22% do have some standard.

Cultural Aspects



Firewood is part of
the lifestyle and
culture of the south

Jobs associated with production and distribution of firewood



Between 80 y 136
thousand Jobs /
year

Fuente: CONAF, 2016. Diagnosis of means, standards and actors involved in the firewood marketing process, within the framework of the National Strategy for Climate Change and Vegetation Resources (ENCCRV)

A photograph of a wooden house with solar panels in a forested area. The house is made of dark wood and has a corrugated metal roof. There are solar panels on the ground in front of the house. The background is filled with tall trees.

What have we done so far?

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- **Measures adopted**
- Residential energy transition

Atmospheric Decontamination Plans (ADPs) are an environmental management instrument, which contains a package of measures designed to reduce air pollution.

- ✓ Subsidy for thermal insulation of households and improvement of the insulation standard.
- ✓ Subsidy for the production of dry firewood
- ✓ Subsidy for the replacement of wood-burning heaters for cleaner technologies (pellets, electricity, firewood).
- ✓ Firewood is banned in cities with Air Decontamination Plan (in emergency days).

- ✓ USD \$ 764 million in 2014 - 2019 period.
- ✓ USD \$ 6 million in 2014 - 2019 period
- ✓ USD \$ 24 million in 2014 - 2017 period (24,000 replacements)

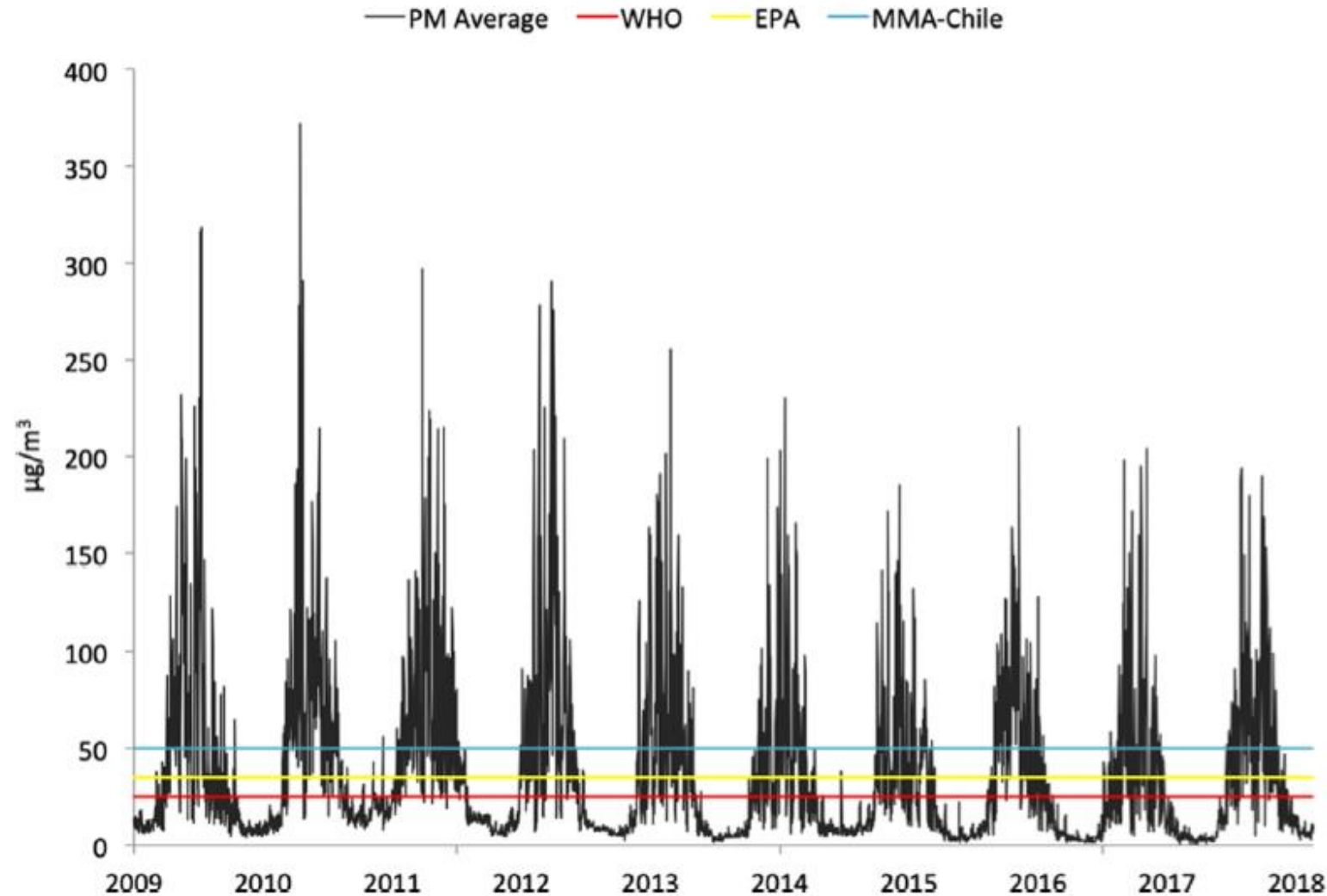


Fig. 1. Fine particulate matter concentration (PM_{2.5}) in the city of Temuco between 2009 and 2018 (24-h average).

Cities of Temuco and Padre las Casas were declared saturated zone of PM₁₀ and PM_{2.5} (in 2005 and 2013, respectively) by the Chilean Ministry of the Environment.

Since then, a decontamination Plan has been in place.

A photograph of a wooden house with solar panels in a forested area. The house is made of dark wood and has a corrugated metal roof. In the foreground, there are solar panels on a stand. The background is filled with tall trees and a clear sky.

What else can we do?

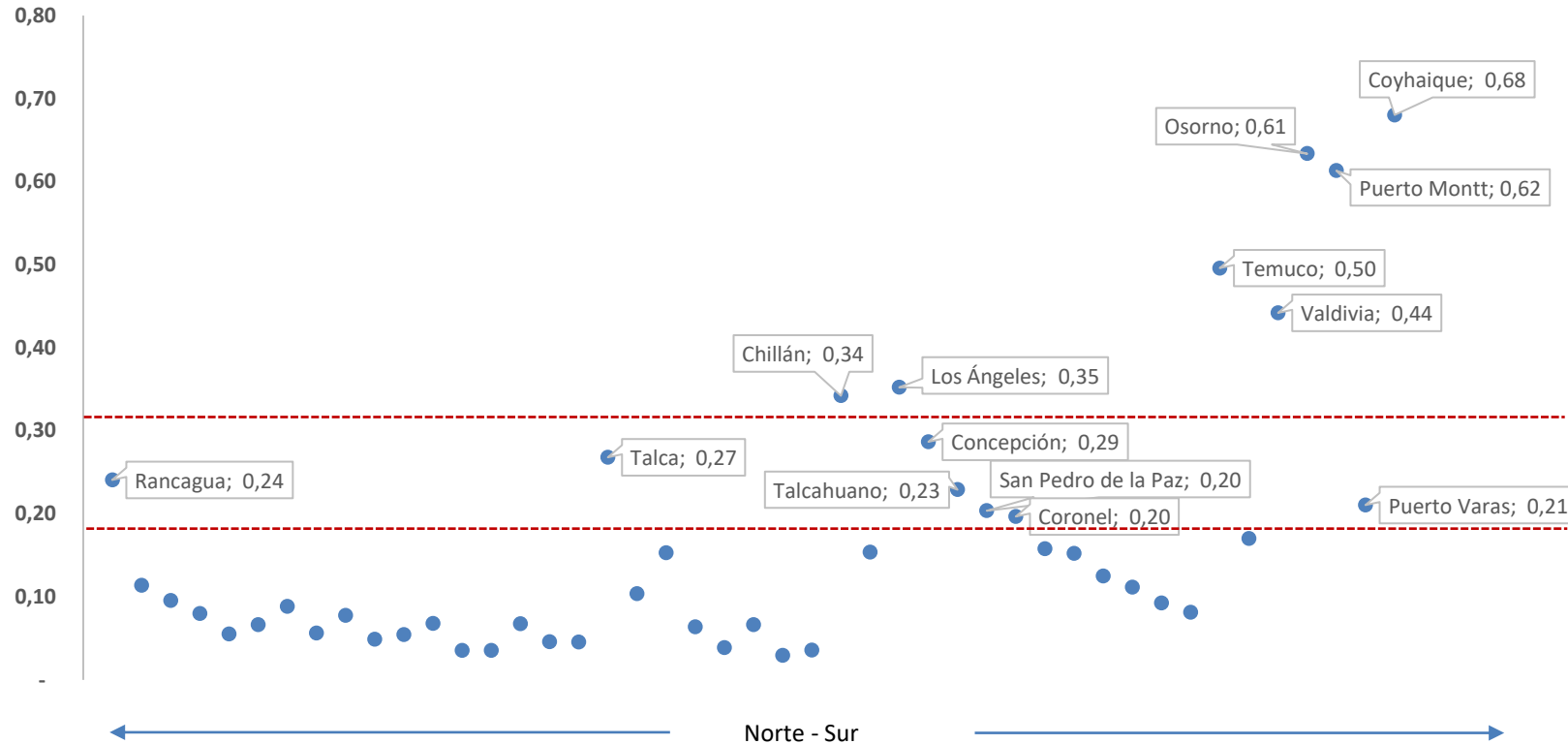
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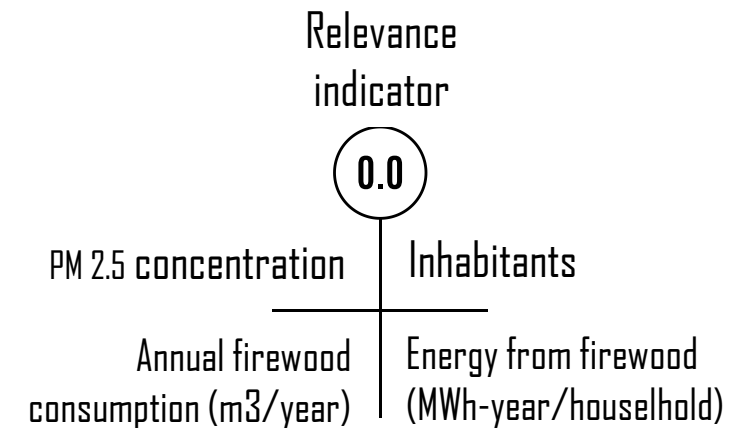
Eight Regions, around 600 participants



70% of the problem is concentrated in 14 cities



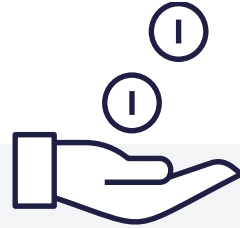
- To focus efforts and have a greater impact, a relevance indicator was evaluated.
- Indicator was used in 45 cities in the south-central part of the country.



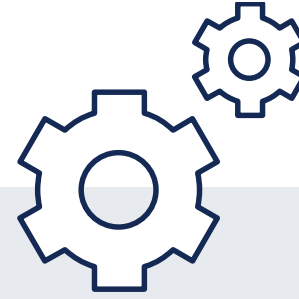
Objectives of the Residential Energy Transition Strategy



**Firewood market
regulation**



**Enabling heating
alternatives**



**Efficient buildings
and equipment**



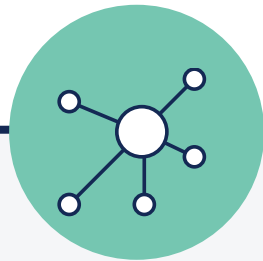
Just Transition

“Move towards a cleaner, safer and more efficient residential thermal mix, with alternatives to firewood that are accessible to all sectors of society, while promoting efficient buildings and equipment. With a just transition approach to the process that contributes to improving people's quality of life from a comprehensive perspective. ”

Fundamental principles



GRADUALITY



**TERRITORIAL
BELONGING**



**COORDINATION BETWEEN
MINISTRIES**



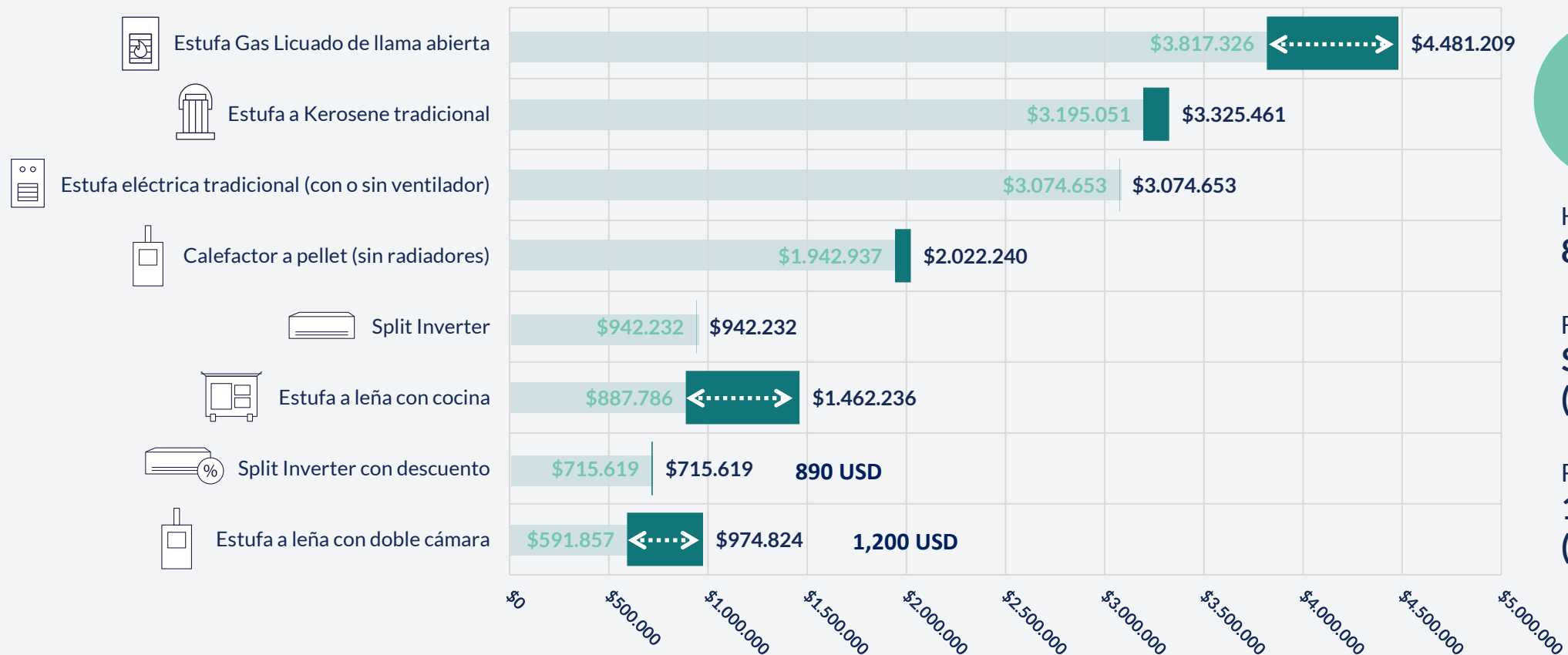
**PUBLIC - PRIVATE
COOPERATION**

14 Initial Strategy Action Pack

	Regulation	Public programs	Private-public alliance
O1: Solid Biofuel market regulation	<ol style="list-style-type: none"> 1. Regulation on solid biofuels quality standards 	<ol style="list-style-type: none"> 7. Subsidy for biomass drying and processing 8. Subsidy for Biomass Integral Centers. 9. Firewood certification program 	<ol style="list-style-type: none"> 12. Public studies (Relation between COVID19 incidences and firewood contamination)
O2: Enabling alternative sources of heating	<ol style="list-style-type: none"> 2. Offering special low electric tariff for heating to residential consumers. 3. District energy law 4. More competitive distribution market (Medium Systems Law) 5. Energy Portability Law 	<ol style="list-style-type: none"> 10. Replacement of firewood stoves for electric devises (air heat pumps) 11. Pilot of district heating 	<ol style="list-style-type: none"> 13. Collaboration agreement between the energy Ministry and the local distribution company to provide a special tariff 14. D. heating pilot in Coyhaique
O3: Promote efficient buildings and equipment	<ol style="list-style-type: none"> 6. Updating the Thermal household insulation regulation 	<ol style="list-style-type: none"> 11. Colaboration agreement between ministeries of energy, environment and housing 	

Example of annual heating cost comparing technologies

Coyhaique



Household:
81m²

Firewood price:
\$34.000-\$56.000 m³
(66 – 110 USD/m³)

Reduced electric tariff:
120 \$/kWh
(0,15 USD/kWh)

Estimated family expenditure when replacing firewood consumption with different energy sources (average house in the city)

Solid biofuel regulation

Objective: To establish requirements and conditions for the transportation, production, and commercialization of Solid Biofuels so they provide thermal energy in an efficient, clean and safe way.



Minimum quality
specifications



Defined forms and
metrics of
marketing



Sales unit	M3 st
Energy content (kWh)	1.600

Final remarks: Key aspects to be considered

Good diagnosis
based on the best
data available at the
municipality level.

Involving the local
stakeholders and
coordination between
institutions in the
development of solutions

Involving the
private sector in
the design of the
solutions

Early identification
of all stakeholders,
specially the local
ones

The sole regulation of the fuel is
not enough, it must be
accompanied by other measures
(financial aid, outreach, trainings,
etc.)

A good
communication
strategy



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