RAP
REGULATORY ASSISTANCE PROJECT

July 21, 2025

Unlocking the Potential of Heat Pumps in Chile

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Executive Summary

Chile's diverse geography results in varied heating and cooling needs across the country, significantly impacting household budgets and public health. The widespread use of firewood, particularly in southern regions, contributes to severe air pollution, leading to public health costs of at least US$670 million annually[1] and the highest rate of particulate-related deaths in South America. Addressing these challenges requires targeted, high-impact policies that support the transition to sustainable, efficient heating technologies like heat pumps.

Heat pumps present a key opportunity to reduce household energy costs, improve air quality and advance Chile's decarbonization goals. The government has taken important steps by implementing policies like the 2021 Heat and Cold Strategy and offering financial incentives. However, existing efforts must be strengthened to accelerate heat pump adoption, particularly by overcoming high upfront costs and implementing targeted regional policies.

Key Barriers and Opportunities for Heat Pumps in Chile

1. **High Upfront Costs and Need for Better Financing:** Heat pumps are cost-competitive with pellet technology but require significant initial investment, often four times higher than traditional firewood heaters. While electricity subsidies exist to reduce operational costs, the key barrier remains the high upfront investment. **On-bill financing** could bridge this gap by allowing consumers to pay for heat pumps through small installments on their utility bills. Another alternative would be the implementation of **heat-as-a-service pilots**, where the providers own the appliances and provide the heating service to consumers who don't need to pay their upfront costs.
2. **Grid Reliability and Regional Deployment Strategies:** While urban areas have sufficient grid reliability to support widespread heat pump adoption, many rural and southern regions — which rely heavily on firewood for heating and cooking — experience frequent electricity disruptions. This has led to skepticism toward electric solutions. A differentiated regional

deployment strategy should prioritize heat pump adoption in areas with strong grid infrastructure, while improving electricity reliability in firewood-dependent regions and allowing households to keep current technologies as a heating backup.

3. **Heat Pumps as a Competitive Alternative:** Unlike in other markets, in Chile, heat pumps are already cost-competitive with pellet technology in terms of their overall operational costs, which is the most widely promoted alternative by the government so far. Focusing on this competitive advantage in policymaking and communication efforts can drive broader adoption.
4. **Regulatory Gaps and Institutional Coordination:** Current policies support energy efficiency but lack strong regulatory mandates for heat pump adoption. Coordination between the Ministries of Energy, Environment and Housing must be strengthened to create a cohesive policy framework that ensures heat pumps are prioritized over less efficient technologies.

Priority Policy Recommendations

1. **Implement On-Bill Financing for Heat Pumps** (top priority)
    a. Enable households to pay for heat pumps in monthly installments through their electricity bills.
    b. Provide low-interest financing options to further ease upfront costs.
    c. Ensure that public subsidies prioritize more efficient technologies over less efficient alternatives.
2. **Enhance Regulations to Accelerate Heat Pump Adoption**
    a. Assess giving energy efficiency (EE) certification to devices that provide heating and cooling, following the example in the U.S. Seasonal Energy Efficiency Rating and Energy Star label.
    b. Strengthen minimum EE standards to phase out inefficient heating technologies.
    c. Expand EE labeling and certification to include all industrial and high-capacity heat pumps.
    d. Establish a regulatory framework for district heating, including clear rules for infrastructure development and investment incentives.
3. **Develop a Differentiated, Regional Heat Pump Deployment Strategy**
    a. Increase the carbon tax to align its price with decarbonization goals and social and environmental costs, following international benchmarks.
    b. Prioritize heat pump deployment in urban areas and regions with reliable electricity supply.
    c. Allow pellet heaters and other existing heating technologies as a backup option where electricity supply reliability remains a challenge.
4. **Strengthen Market-Based Instruments to Support Heat Pumps**
    a. Offer direct grants and subsidies to reduce the cost burden of heat pump installations.
    b. Introduce green bonds to finance large-scale industrial heat pump projects.

5. **Improve Public Awareness and Institutional Coordination**
    a. Launch public education campaigns to highlight the economic and health benefits of heat pumps.
    b. Develop training and certification programs for installers to ensure proper deployment and maintenance.
    c. Improve coordination between government agencies to align incentives and regulations across sectors.
6. **Implement Heat-as-a-Service Pilot Projects**
    a. Enable users to pay only for the services received, not the upfront cost for the appliances, which are owned by the service provider.

Chile's Heating Landscape: A Regional Challenge and a Strategic Opportunity

Chile has a population of over 19.9 million people, distributed across approximately 9 million households.[2] Nearly all households have access to electricity, with only 0.4% of the total and 3.5% of rural households lacking access;[3] however, some areas experience intermittent electricity supply.[a, 4] In contrast, only around 21% of households have access to natural gas.[5]

Chile's diverse geography and climate create significant variations in heating and cooling needs across regions. Heating and cooling account for about 35% of the primary energy consumption in Chile.[6] In the residential sector, final energy use is dominated by biomass, followed by electricity and expensive liquefied petroleum gas (LPG), mostly distributed in cylinders.

Firewood[b] is the most commonly used heating source in the country,[c] accounting for 40% of household use at the national level[7] but reaching over 90% in rural areas and the southern regions. Despite some local restrictions in place for the use of fuelwood in areas with higher levels of pollution and health risks,[d, 8] firewood heating produces

Household Heating and Cooling in Chile

35% of Chile's primary energy consumption is from heating and cooling.

40% of household heating comes from firewood.

85% of fine particulate matter emissions come from firewood heating.

[a] Chile has around 130 small isolated systems (with capacity under 1.5 MW), of which over half have partial power supply.

[b] Despite being the most traditional heating energy source, the use of firewood in Chile for this purpose is not done in the most efficient way, due to the use of inefficient burners and of humid firewood, which produces higher emissions.

[c] Followed by natural gas, LPG, oil, coal and others. https://caloryfrio.minenergia.cl/#:~:text=Uso%20final%20de%20la%20energía%20en%20Chile&text=Cabe%20destacar%20que%20la%20fuente,natural%20(18%2C2%25)

[d] Common measures include prohibiting the use of wet firewood (moisture content above 25%), banning open fires and restricting the burning of materials other than approved firewood, briquettes or pellets. Certain wood-burning stoves, such as simple chamber stoves, are also prohibited. During high pollution periods, complete or partial bans on wood-burning appliances may apply, such as in Santiago or Temuco.

over 90% of fine particulate matter (PM2.5) emissions in some cities[9] and is responsible for 85% of these emissions at a national level.[10] This significantly impacts household budgets and public health.

Air pollution in Chile results in public health costs of at least US$670 million annually to the health sector[11] and the highest rate of deaths from particulate exposure in South America (230 deaths per million).[12] **In 2018, over half of Chile's population (around 9.7 million people) were exposed to high levels of air pollution (PM2.5), resulting in an estimated 3,640 premature deaths annually and generating US$2,437 million in social costs.**[13]

Amid these challenges, there is a need for targeted regional policies that address specific economic and climatic needs that prioritize sustainable solutions and efficient technologies. Chile has a unique leapfrog opportunity to foster advanced electric heating technologies such as heat pumps, which offer lower emissions, greater efficiency and overall cost benefits. Moreover, considering Chile's high climate change vulnerability, forward-looking policies are crucial, where the versatility and adaptability of heat pumps makes them a strategic tool.[e]

Heat Pumps: An Overall Cost-Competitive Alternative

Currently, in Chile, heat pumps are cost-competitive with pellet burners — one of the main heating technologies currently promoted by the government as a more efficient alternative to traditional firewood burners — even before accounting for environmental and health externalities.[14] This is considering the overall operational costs along the lifetime of the appliance. Studies show that **heat pumps operating at 300% efficiency have the same energy cost as pellet burners**, the cheapest household heating option, after traditional firewood burning (without considering externalities on health and the environment due to local pollutants).[15]

One of the main factors that has hindered heat pump adoption among households with limited financial means, and where this change is most needed, is the high upfront costs of heat pumps in comparison with cheaper technologies like pellet burners. The most vulnerable households are those in rural, economically disadvantaged and cold regions (with considerable heating needs throughout the year), where most people without electricity access live and where the most significant reliability problems exist.[16] They face the greatest health risks from inefficient heating technologies while also struggling with high upfront costs and electricity access limitations that hinder the adoption of cleaner electric alternatives, like heat pumps.[f] **These challenges have nurtured the widespread traditional use of firewood, continuing to drive pollution and high public health costs.**

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[e] According to the International Energy Agency, by 2030 heat pumps will fulfill a quarter of the heating demand in buildings internationally. *World Energy Outlook*. (2022). International Energy Agency. https://www.iea.org/reports/world-energy-outlook-2022/an-updated-roadmap-to-net-zero-emissions-by-2050

[f] This is also applicable for cooking, where more efficient electric heating options than biomass or fossil fuels are not widely adopted given the intermittency of electricity access, which has dissuaded users from adopting them, needing to rely on backup fossil fuel alternatives. For example, preliminary findings from a study on energy transition in the residential sector in Chile, Brazil and Colombia, commissioned by the Global Methane Hub, reveal that in Chile, natural gas and LPG account for 90% of residential cooking. *Residential Energy Transition Project*. (2024). Global Methane Hub. https://sites.google.com/ffla.net/proyectogmh/home?authuser=0

Given these challenges, **stronger public intervention is essential** to break the cycle of dependence on polluting fuels and reduce emissions. Targeted policies and financial mechanisms, such as on-bill financing and infrastructure investments, can accelerate the transition to sustainable, efficient heating solutions. By prioritizing heat pump adoption, **Chile has an opportunity to improve air quality, reduce health burdens, enhance energy efficiency and support a just transition to cleaner heating technologies**, while ensuring that its diverse heating and cooling needs are met.

Some Policies Paving the Way

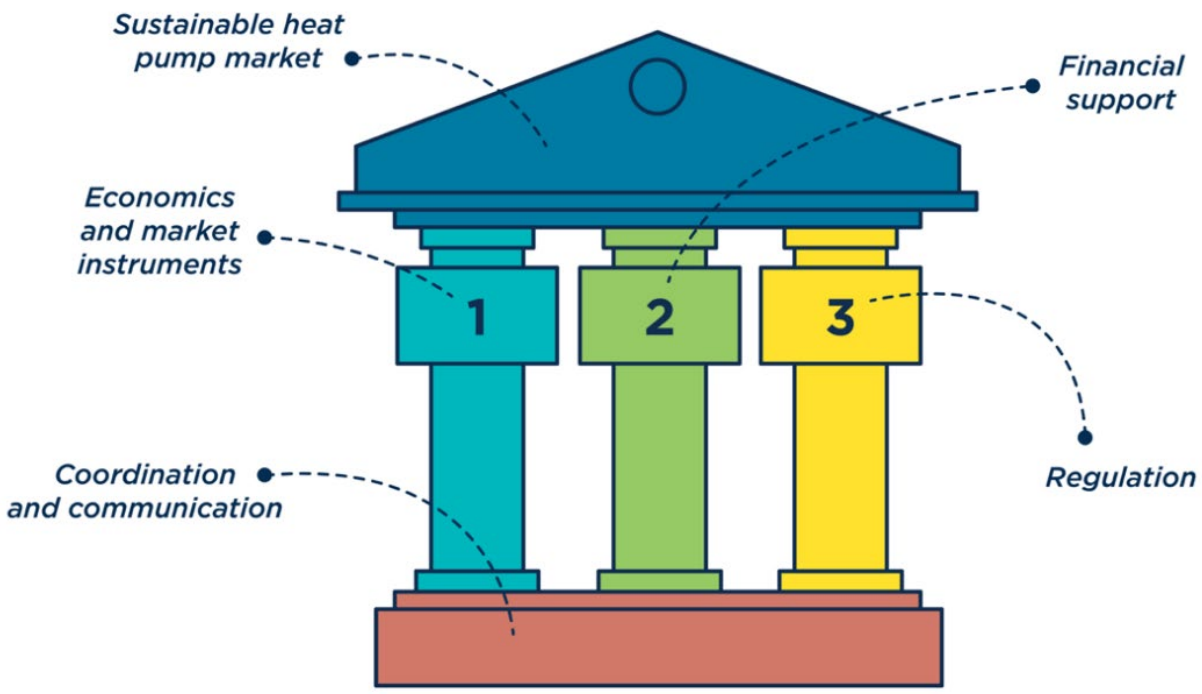
Chile has introduced several initiatives to support heat electrification and decarbonization. The country has significantly shifted its energy strategy from relying heavily on imported fossil fuels and coal plants toward a more sustainable approach, committing to phase out or reconvert[17] all coal-fired power plants by 2040[18] and aiming to source 80% of its electricity from renewable energies by 2030.[g] By 2050, Chile plans to achieve carbon neutrality. These ambitious goals are underpinned by several key policies, including the National Energy Policy,[19] the 2030 Decarbonization Plan that includes a just energy transition axis,[20] the Energy Efficiency Law and the 2022 Climate Change Law[21] that legally binds Chile to carbon neutrality by 2050, reinforcing its commitment to international climate goals through the Long-Term Climate Strategy 2050.[22]

The most comprehensive policy to support heat electrification is the 2021 National Heat and Cold Strategy that aims to reduce greenhouse gas (GHG) emissions from heating and cooling by 65% and increase sustainable energy use to 80% by 2050. The 2021 strategy prioritizes solar photovoltaic (PV), supplemented by heat pumps, and district energy systems to provide 75% of Chileans with sustainable and affordable heating and cooling. It also includes measures like housing retrofit subsidies and mandatory energy efficiency labeling for public buildings by 2025.

This brief employs the Regulatory Assistance Project (RAP) Heat Pump Policy Toolkit[23] as a framework to explore the current policy environment for heat pumps in Chile. The toolkit suggests that comprehensive policy measures are essential for the rapid deployment of heat pumps. Illustrated in Figure 1, the toolkit outlines three key pillars supported by a strong foundation to foster an effective heat pump deployment strategy. These pillars include considerations of economics and pricing, financial support and regulatory measures. Additionally, the toolkit emphasizes the importance of addressing softer governance aspects such as skills development, communication and coordination. Our analysis of Chile's heat pump policies identifies examples of effective practices and highlights areas where policy adjustments could further enhance heat pump deployment.

[g] By 2022, this target had already reached 60% predominantly through hydro and solar sources.

Figure 1. The Heat Pump Policy Toolkit Temple



Source: *Heat pump policy toolkit.* (2024). Regulatory Assistance Project. https://www.raponline.org/toolkit/heat-pump-toolkit/

This brief concludes with targeted policy recommendations structured around key pillars:

- Enhancing economic and market instruments
- Expanding financial support mechanisms
- Strengthening regulatory frameworks
- Improving coordination and communication

Specific recommendations include:

- Promoting on-bill financing
- Offering low-interest loans and upfront subsidies
- Increasing carbon pricing
- Implementing stricter efficiency standards
- Fostering public education campaigns

Together, these measures aim to accelerate the adoption of heat pumps to support Chile's goals and tackle its environmental, climate, health and cost challenges tailored to Chile's unique geographic, economic and social context.

Geographic Differences: Heating and Air Conditioning Needs Vary Across Regions

Stretching over 4,300 km from the arid Atacama Desert in the north to the cold, humid southern regions, Chile's vast range of climates profoundly influences its energy needs, particularly in heating and cooling. In the northern Atacama region, extreme daily temperature variations require both cooling and heating solutions, with electric heaters, liquefied gas and firewood covering most of the heating needs.[24] Central Chile, including Santiago, with a semi-Mediterranean climate, requires heating in cool winters and cooling in hot summers. This region relies mostly on liquefied gas, firewood, kerosene and electricity, with a broader use of portable heaters. The southern regions, experiencing the coldest and wettest climate of the country, have high heating demands, primarily met through firewood, leading to environmental and health issues. In Patagonia and the extreme south, with long and cold winters, the consistent cold requires year-round robust heating, mainly covered also by firewood. Despite these needs, **by 2022, around 17% of households in Chile did not use or had no access to energy for heating, and 11% did not have access to hot water**.[25]

Due to its unique geography and climate conditions, Chile is highly susceptible to the impacts of climate change,[h, 26] which exacerbate power supply reliability challenges, leading to frequent and prolonged interruptions that hinder electrification efforts and increase the use of firewood for heating and cooking.

Energy Consumption in Chile

Within the residential sector, heating and air conditioning (including individual heaters, central heating and air conditioners) constitute **53%** of final energy consumption, followed by hot water, which accounts for **20%**.[27]

Electricity and heat account for almost **40%** of total energy-related CO_2 emissions in Chile.[28]

Biomass is the most common source of heat production, accounting for **41.4%** of the total, followed by natural gas at **18.2%.**

In 2020, the industrial sector accounted for **50%** of final biomass consumption and the residential sector for **49%**.[29]

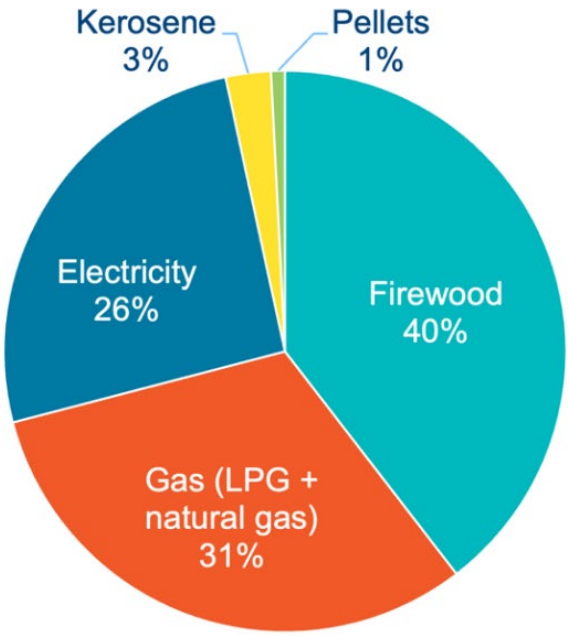
The Cost of Staying Warm: Energy Consumption and Household Expenses in Chile (2018)

In 2018, the residential sector in Chile consumed 50,763 gigawatt-hours (GWh) of energy, with an average household consumption of 8,083 kilowatt-hours (kWh) per year across 6.28 million

[h] These impacts involve sea level rise, natural disasters, and significant climatic shifts, including prolonged droughts and the degradation of mountain glaciers and river systems due to rising temperatures.

homes. Firewood accounted for around 40% of residential energy consumption, followed by gas, electricity, kerosene and pellets,[30] as shown in Figure 2.

Figure 2. Energy Use Within the Residential Sector



Data source: *Informe final de usos de la energía de los hogares Chile 2018* [Final report on household energy use in Chile 2018]. (2019, December). Ministerio de Energía. https://www.energia.gob.cl/sites/default/files/documentos/informe_final_caracterizacion_residencial_2018.pdf

In December of 2018, the average annual household energy expenditure in Chile was approximately US$872, or about US$72 per month.[i] The highest costs were for heating (at around US$244), hot water (US$216), and refrigerators/freezers (~US$86).[j] Regional energy costs varied, ranging from US$652 (452,399 Chilean pesos) a year in the north-central region to US$1,187 (823,434 Chilean pesos) a year in the southern region (the most vulnerable to heating needs), where firewood remains a major cost factor. Electricity and LPG accounted for the highest household energy expenses nationwide.[31]

Leveraging Advanced Heat Pump Technologies for Cost, Energy Efficiency and the Environment

Addressing these challenges would require fostering sustainable electrification initiatives, such as heat pump adoption. Extreme conditions will require further active climatization solutions at the residential level capable of providing both heating and cooling.[32] This presents a significant leapfrog opportunity for Chile to consider the adoption of advanced technologies like geothermal

[i] Corresponding to 605,126 Chilean pesos (CLP) annually or around 50,000 CLP per month. Conversions are based on the December 2018 exchange rate of ~693 CLP/USD.

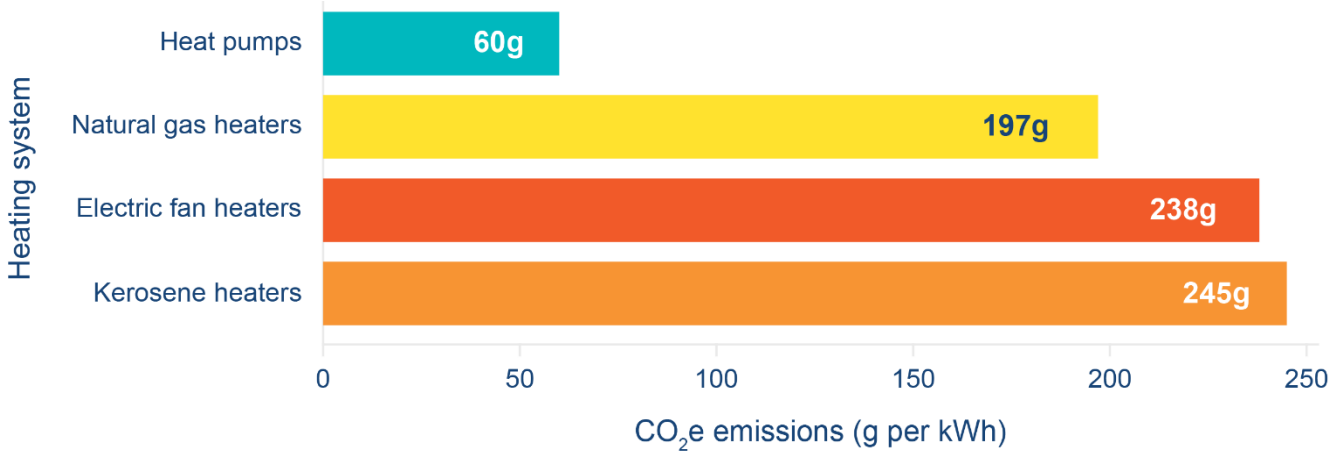
[j] Corresponding to 169,025 CLP/year for heating, 149,876 CLP/year for hot water, and 59,470 CLP/year for refrigeration.

reversible heat pumps that could provide climatization (heating and cooling) while also producing domestic hot water, bringing significant opportunity for cost reduction in residential energy expenses. By embracing more efficient technologies like heat pumps, Chile could improve energy access, sustainability and living conditions while enhancing energy efficiency. A study in 2024 on the life cycle of the main heating sources in Chile found that heat pumps (split inverters) offer significant environmental benefits, reducing climate impact (98%), particulate matter formation and ozone depletion across various regions.[33]

Unlocking Chile's Heat Pump Potential: Barriers, Opportunities and the Path Forward

If Chile is to meet the National Energy Policy 2050 goals, electrification must play a pivotal role in residential heating. Heat pumps would be a valuable contributor to electrification, as they are a more efficient and less polluting heating source than traditional biomass heaters and even some electric heating sources. **Studies estimate that as of 2023, heat pumps used for domestic heating in Chile emit approximately 60g of carbon dioxide equivalent (CO_2e) per kilowatt-hour of thermal energy**, which is significantly lower than emissions from other heating systems: 70% lower than natural gas heaters, 75% lower than electric fan heaters and 76% lower than kerosene heaters, as seen in Figure 3.[34]

Figure 3. CO_2e Emissions per Kilowatt-Hour of Thermal Energy



Source: *How heat pumps can play a role in Chile's 2050 net-zero push*. (2024, June 18). BNamericas. https://www.bnamericas.com/en/interviews/how-heat-pumps-can-play-a-role-in-chiles-2050-net-zero-push

Projections from the Inter-American Development Bank estimate that by 2050, electric heating would need to reach 56% of houses and 70% of apartments in Chile. Under the enhanced Nationally Determined Contributions (NDC+), these targets increase to 72% and 89%, respectively.[35] Despite Chile's push for cleaner energy technologies, to our knowledge, there is

limited publicly available data on heat pump deployment in the country, showcasing a significant gap in energy technology dissemination. However, market indicators suggest there is a growing interest in and adoption of heat pumps, with multiple vendors offering this advanced technology for both residential and industrial sectors.[36] Some projections indicate that demand for heat pumps in Chile is on the rise, with the market estimated to experience sustained growth over the next decade.[k, 37]

The initial cost of heat pumps can be over four times higher than traditional firewood burners, even though their overall operational costs are the lowest among heating alternatives, if externalities are taken into account.

Heat pumps stand out as one of the most efficient and sustainable solutions for electrifying heating. However, high upfront costs remain the primary barrier to adoption, followed by high electricity costs and intermittency of electricity access.

In 2017, the upfront costs of heating technologies varied significantly in Chile, as seen in Table 1, and yet heat pumps' overall operational costs are the lowest from them all.[38] For example, heating a 57m² home for eight hours daily during the month of July (winter) incurs varying costs across different cities from the center and southern regions in Chile, as seen in Table 2. Despite the cost differences, the trend is that inverter air conditioners (A/Cs) are the most cost-effective heating option across all the analyzed cities, proving cheaper than firewood, pellet and kerosene in both central and southern Chile.[39]

Table 1. Upfront Costs of Different Heating Technologies in Chile in 2017

Heating Technology	Approximate Upfront Cost (US$)[l]
Firewood	$315
Gas	$630
Pellet	$1,315[40]
Inverter A/C	**$1,338**[41]
Kerosene	$1,540

Source: Information gathered from *Informe de detalle de Programas Sociales, Proceso Formulación Presupuestaria 2021: Calefacción Sustentable* [Detailed Report on Social Programs, Budget Formulation Process 2021: Sustainable Heating]. (2021). Ministerio de Desarrollo Social y Familia. http://www.dipres.gob.cl/597/articles-212515_doc_pdf1.pdf

[k] Heat pumps market value in Chile peaked at US$117.6 million in 2019, declined to US$98 million in 2020, and rebounded by 2024 after two consecutive years of decline, showing further momentum and interest in adoption.

[l] As of the average exchange rate during December 2017: US$1 = 635 CLP.

Table 2. Comparative Operational Costs by Heating Technology and Cities in Central and Southern Regions in Chile 2017

Energy Source	Rancagua (US$)[m]	Temuco (US$)	Valdivia (US$)	Osorno (US$)	Coyhaique (US$)
Inverter A/C	**$34**	**$42**	**$36**	**$46**	**$57**
Pellet	$45	$49	N/A[n]	N/A	N/A
Kerosene	$47	$52	N/A	N/A	N/A
Firewood	$51	$51	$43	$43	$59

Source: Information gathered from *Informe de detalle de Programas Sociales, Proceso Formulación Presupuestaria 2021: Calefacción Sustentable.*

Despite the traditional conception that the cultural use of firewood was due to its low cost and being the most readily available source for heating in the central and southern regions in Chile, this data indicates that in some cities, using an inverter A/C for heating is more cost-effective in terms of operational costs compared to traditional methods such as firewood, pellet or kerosene.

A study in 2023 modeled yearly overall costs in a residential building in Chile's central region for a reversible heating system (including heat exchangers, solar thermal collectors, reversible scroll compressor, heat storage tank and pumps) to produce heating, domestic hot water and electricity. It showcased that this system has much lower operating costs and annual emissions compared to oil, natural gas, pellet boilers or electric resistance systems, as shown in Table 3.[42]

Table 3. Comparative Costs and Emissions of Heating Systems in Chile

System	Yearly Operating Costs (US$)*	Direct Emissions (tons of CO_2)	Equivalent Emissions (tons of CO_2)
Reversible Heating System	**$2,500**	**0**	**4.46**
Pellet Boilers	$11,370	37	3.3
Oil Boilers	$20,700	7.1	39
Electric Resistance Systems	$22,170	0	39.4
Natural Gas Boilers	$32,500	15.5	34

Source: Adapted from Pezo, M., et al. (2023). *Modelado de un sistema bomba de calor/ciclo Rankine orgánico reversible acoplado a colectores solares.* [Modeling of a reversible heat pump/organic Rankine cycle system coupled to solar collectors]. Cuadernos de Mecánica Computacional, 20(1). https://www.researchgate.net/publication/374554476_Modelado_de_un_Sistema_Bomba_de_CalorCiclo_Rankine_Organico_reversible_acoplado_a_Colectores_Solares

* Exchange rate of August 6, 2024. A carbon price is not taken into consideration in these calculations.

[m] As of the average exchange rate during December 2017: US$1 = 635 CLP.

[n] N/A indicates that data was not available for that particular energy source in the specified city from the source analyzed.

Heat-as-a-Service: An Alternative to Reduce or Eliminate High Upfront Costs

Heat-as-a-Service (HaaS)[43] is a relatively recent business model where service providers own and operate heating and/or cooling equipment (including heat pumps) and charge fees for the services they provide (that might include heating, cooling or even electricity), rather than selling the equipment itself. By being the owners of the appliances, service providers either totally or mostly cover the upfront costs associated with these technologies and are also in charge of maintenance and operation of the equipment. End users (including residential, commercial and industrial customers) pay a fee only for the services received, hence reducing or eliminating the upfront costs and financial risk for consumers and making energy solutions more accessible, particularly for low-income households. These models help decarbonize heating, benefit from economies of scale, reduce financial and technical barriers, simplify decision-making for consumers, increase efficiency and provide flexible, low-carbon heating (and cooling) solutions. Some countries are already implementing some HaaS pilots, like Denmark and the United Kingdom.[o]

Why Heat-as-a-Service?

- Lowers financial risks for consumers by reducing upfront costs and installation expenses.
- Simplifies decision-making for consumers.
- Makes energy solutions accessible to low-income households, helping to reduce fuel poverty.
- Reduces technical risks, as service providers handle maintenance and repairs.
- Providers benefit from economies of scale and access to operational data; they might also receive incentives to improve energy efficiency and reduce environmental impact.

Implementing HaaS in Chile could help overcome the financial barrier that currently limits heat pump adoption, particularly among low-income households. Shifting the ownership and maintenance of heating equipment (including heat pumps) to service providers reduces or eliminates high upfront costs and financial risks for consumers, making energy efficient solutions more accessible; it also improves energy efficiency through economies of scale and better system optimization.

[o] For example, in Denmark, a company provides heat pumps with no upfront costs, managing them remotely and optimizing their operation based on weather and consumption patterns, with consumers paying in installments over 10 years. Also, some trials in the UK have shown that 85% of households using a form of heat-as-a-service were more likely to switch to low-carbon heating against just 30% of those not using them. However, some barriers for implementation include regulatory complexity, low consumer trust and uncertain business models. These obstacles could be tackled by providing stronger policy support, clear consumer guidelines and collaborative innovation to further scale successfully heat-as-a-service. https://energy-nest.com/heat-as-a-service/ https://es.catapult.org.uk/insight/heat-as-a-service-is-it-all-hot-air-richard-halsey-and-edmund-hunt/

Heat Pumps: A Good Complement for District Heating

Heat pumps are a highly efficient solution for delivering sustainable heating in Chile. However, the most cost-effective way to deploy heat pumps may depend on population density. Heat pumps can enhance the efficiency and flexibility of broader heating strategies, such as district heating, by integrating with other technologies to optimize cost-effectiveness and energy use. While individual heat pump installations offer significant short- and medium-term benefits, studies suggest that district heating could be a more economical option in densely populated areas, potentially amplifying these benefits in the long run.

Most efficiency can be achieved by including heat pump capacity with combined heat and power technologies, and large-scale heat pumps would provide high flexibility to the system.[44] **This shift could lead to public health savings of nearly US$2,500 million and prevent approximately 2,800 premature deaths annually.**[45] Further studies showcase the environmental benefits and energy efficiencies of implementing hybrid district heating systems that use heat pumps with other sources, including storage.[46]

Chile has made some efforts toward the adoption of district heating, including the 2022 Energy Efficiency National Plan and economic incentives for the development of district heating projects,[48] among other initiatives.[49] Additionally, there is a District Energy Project Development Manual showcasing success cases with heat pumps.[50] Despite launching the first district heating public tender in 2022, no bids were received.[51]

A heat roadmap scenario for Chile developed in 2019 estimated that, by 2050, a district heating system with different supply sources (including 60% of combined heat and power and over 20% of heat pumps, among others) could cover 40% of national heat demand in the most cost-optimal and efficient way, while reducing particulate matter pollution from the heating sector by 99%.[47]

Currently, district heating systems present significant challenges in Chile, despite years of studies and initiatives. Clear legislation and regulation would be required to define its governance scope, the type of providers, infrastructure development and the safeguard of consumer rights, among other crucial elements. Further considerations include the potential need for subsidies, necessitating an evaluation of their cost and impact. However, heat maps[52] indicate limited opportunities to utilize excess industrial heat for such systems in the areas of more demand, and coordinating the required investments remains complex. Additionally, highly dense areas, primarily in the Metropolitan Region, face competition from established natural gas distribution networks, further complicating the feasibility of district heating implementation.

To maximize these benefits, it is crucial to establish clear regulations for district heating and identify priority zones where this approach would deliver the most significant economic and environmental impact.

Overcoming Barriers to Accelerate Heat Pump Adoption

The lack of heat pump adoption in regions as an alternative heating source, despite their environmental benefits and lower overall operational costs, is due to a financial barrier that impedes consumers, especially low-income households, from tackling the significant upfront cost difference between traditional (firewood burners) and more efficient technologies (heat pumps). Addressing this issue could involve implementing simple financing options like on-bill financing, more robust financial incentives and more focalized and targeted subsidies per technology to make heat pumps more accessible to households.

Heat Pump Policy Toolkit in Action: Pathways to Cleaner Heating in Chile

As Chile works toward decarbonizing its heating sector, reducing reliance on biomass and tackling its unique geographic and climate challenges, strategic policies and financial mechanisms are essential to accelerate the transition to cleaner technologies. Applying the Heat Pump Toolkit to Chile would provide a structured approach to accelerating heat pump adoption, addressing both policy and market barriers, to maximize emissions reductions, enhance energy affordability, and improve public health outcomes. This section explores how the toolkit's recommendations can be tailored to Chile's specific context.

Pillar: Economics and Market Instruments

Carbon (Green) Tax and Green Bonds

Chile has been a pioneer in the region in implementing carbon taxes and green bonds,[p] aiming to improve these mechanisms over the years. However, these instruments remain insufficiently effective due to low pricing and policy gaps.

One key improvement in Chile's carbon tax policy was the shift from a technical capacity-based criteria to an emissions-based approach for stationary sources. Before 2023, carbon tax on stationary sources only applied to facilities with a thermal power capacity of at least 50 thermal megawatts (MWt). This has evolved since 2023, with the carbon tax on stationary sources being applied to entities emitting more than 25,000 tons of CO_2 and/or 100 tons of particulate matter annually from combustion processes.[53]

The following table provides a summary of Chile's carbon tax limitations.

[p] Chile approved taxes on CO_2 emissions and local pollutants (including particulate matter PM2.5) in 2014 (implemented in 2017), and green bonds in 2019.

Theme	Carbon Tax Limitations
Carbon tax value	Chile's carbon tax on stationary sources[q] is only set at US$5 per ton of CO_2, far below the government estimated social cost of carbon of US$32.50 per ton[54] and international[r, 55] benchmarks.[s, 56] The country has committed to increase the carbon tax to at least US$35 per ton by 2030,[57] but studies showcase that higher increases would be needed to bring Chile toward its decarbonization goals.[t, 58] This highlights a significant discrepancy between the tax imposed, the estimated environmental impact cost and the country's decarbonization goals.
Emissions vs. carbon-content-based carbon tax	Currently, Chile's carbon tax is set as an emissions-based tax, not a carbon-content tax, creating market distortions.[u, v, 59]
Allocation of carbon tax revenues	Carbon tax revenues (about US$565 million in 2020) cannot be pre-allocated to environmental initiatives, limiting their use in supporting renewable energies and low-carbon technologies, including heat pumps.[60]

Recommendations

- **Enhance Carbon Pricing and Implement a Gradual Tax Increase:** Increase/adjust carbon tax rates to align with decarbonization goals and social and environmental costs, following international benchmarks and leveling the playing field for low-carbon sources. Gradual increases give industries time to adapt and invest in cleaner technologies, reducing the economic impact while moving toward more effective carbon pricing.
- **Transition to a Carbon Content Tax:** Consider the transition from an emissions-based tax to a carbon content tax to cover all commercialized fuels based on their carbon footprint. This would incentivize the use of cleaner energy alternatives across all sectors and could correct current market distortions, encouraging the use of and investment in low-carbon sources and technologies.
- **Direct the Allocation of Carbon Tax Revenues:** Implement needed reforms to allow for the pre-allocation of carbon tax revenues to environmental initiatives, including renewable energy projects and low-carbon technologies, like heat pumps.

[q] The current tax structure excludes emissions from biomass-fueled thermal plants and does not cover smaller stationary sources, such as those in the residential sector.

[r] The average carbon tax in the world is of around US$40 per ton of CO_2. Between European countries, the average is around US$54 per ton of CO_2, but some countries like Liechtenstein, Switzerland, Finland and Sweden have set carbon taxes of over US$100 per ton of CO_2. Uruguay has set the highest price for carbon tax at over US$167 per ton of CO_2.

[s] It is estimated that the global average social cost of carbon is around US$40 to US$525 per ton of CO_2 for high and low discount rates, respectively.

[t] Studies have estimated that Chile would require having an economy-wide carbon tax of US$35 per ton by 2024 (for a social cost of carbon scenario), which would need to linearly increase up to US$75 per ton in 2030 to bring the country toward its decarbonization goals. A moderate scenario would still require an increase to US$15 per ton carbon tax by 2025, reaching up to US$50 per ton by 2035 (excluding the road transportation sector, one of the main emitters in the country).

[u] Market distortions include over-allocation of permits, lowering prices and reducing incentives to cut emissions (as occurred during the early phase of the EU Emissions Trading System (ETS), where excessive allowances weakened incentives for emission reductions); windfall profits for companies selling excess permits (in the EU ETS, some companies sold surplus permits at market prices, benefiting financially, without really cutting emissions); and price volatility, undermining long-term planning (initial stages of the EU ETS saw considerable price swings, hindering its ability to provide stable incentives for emissions reductions).

[v] Implementing a shift to a carbon-content-based tax would need to be paired with appropriate social benefits or tax credits to avoid disproportionately affecting lower income households spending a larger share of their income on energy.

- **Expand Green Bonds:** Use green bonds to finance large-scale heat pump projects at the industrial level and consider social housing pilot projects with district heating or heat pump heating systems to attract private investment and reduce reliance on traditional heating fuels like firewood and kerosene. This can be coupled with on-bill financing schemes.

Pillar: Financial Support

Incentives and Subsidies

Chile has implemented some programs to support cleaner heating and financial incentives to reduce economic impact from energy consumption for heating, like the following:

Appliance replacement program	**Heater Replacement Program:** Launched in 2011 by the Ministry of Environment[61] to reduce emissions from residential wood burning in central and southern regions. ▪ Target: 190,000 heater replacements in over 10 communities. However, by 2021 the program had only reached around 18% of its goal, replacing about 35,000 heaters, mainly due to financing challenges and the high upfront costs of alternatives like heat pumps (of which upfront costs are over four times more expensive than traditional firewood burners). ▪ The program primarily incentivized pellet heaters over more efficient technologies like heat pumps due to lower initial costs, driving a 2,000% increase of pellet demand in those regions from 2010 to 2018. ▪ Positive impact: o Pellet heaters are eight times less emitting than traditional firewood burners, leading to 12%-40% PM2.5 reductions in targeted regions. o Increased market availability for more efficient alternative heating technologies and overall cost reduction: Pellet heater costs dropped by 20% over six years due to increased market availability.[62] ▪ Missed opportunity: The program expanded the use of biomass heaters[w] instead of encouraging the shift toward more sustainable solutions[63] like heat pumps, which would have required supporting financing mechanisms, such as on-bill financing or low-interest loans, to reduce the impact of their high upfront costs. o A more strategic allocation of targeted technologies could have further enhanced the program's effectiveness by promoting the adoption of more efficient options, without prolonging the reliance on biomass heaters over a decade. o Further lessons from this program are described in the section Foundation: Coordination and Communication. ▪ Subsequent stages: In 2021, the scope of the program evolved, aiming to increase the number of heaters to be exchanged and to provide education to the communities in terms of the environment and air quality.

[w] The lifespan of a pellet heater is estimated to be approximately 10 years.

Energy-based incentive programs (for heating)	▪ **Change Your Heat Program (2020):** Launched by the Ministry of Energy,[x] it offers a 20%-30% discount on heating-related energy consumption electricity tariffs to encourage the transition from wood to electric air-conditioning heating in the most polluted communities in the country, aiming to provide a competitive alternative to firewood. ▪ **Heating Subsidy (2013):**[y] Grants economic support to the most vulnerable families of certain regions to help cover gas or electricity bills during the winter.[64] ▪ **Electricity Subsidy (2024):**[z] Offers 15%-30% discount on electricity bills for vulnerable families.[65]
Other programs	▪ Further programs focus on supporting **thermal insulation and conditioning**,[66] **energy efficiency**[67] and **household improvements**[68] to reduce heating demand and increase system efficiency.
Industrial sector support	▪ **Put Energy to Your Company Program (2023):** National program launched by the Ministry of Energy to support two aerothermal heat pump projects and one hybrid thermal solar heat pump system.[69]

Recommendations

- **Implement On-Bill Financing:** On-bill financing programs could help reduce the burden of high initial cost for consumers and create an efficient channel for public funds to support the transition to cleaner technologies. By integrating loan repayment into utility bills, which allows for small, manageable payments, on-bill finance programs make it financially feasible for more households to adopt heat pumps, while also ensuring that public subsidies target specific energy-efficient technologies. This approach amortizes the loan over time, making the transition to heat pumps financially smoother for households.
- **Offer Low-Interest Loans:** Providing low-interest loans specifically for the purchase and installation of heat pumps can help tackle one of the main problems of heat pump deployment: high upfront costs. By spreading the initial cost over time, loans can make the investment more manageable for consumers.
- **Increase Upfront Incentives:** Provide higher grants and subsidies to offset heat pump installation costs, making them accessible for households and businesses.
- **Establish a Dedicated Fund for Environmental Initiatives:** Pursue the needed legal changes to advocate for a portion of carbon tax revenue to fund energy efficiency projects and low-carbon technologies like heat pumps, reducing financing challenges due to higher upfront costs than other less efficient technologies.
- **Reassess Supported Technologies:** Reassess the technologies supported by some programs, like the Heater Replacement Program, and implement the needed adjustments to target the most efficient technologies, focusing on heat pumps over less efficient alternatives.

[x] *Programa Recambia tu Calor*.

[y] *Bono de Calefacción*, previously called Firewood Subsidy (*Bono Leña*).

[z] Approved by Law 2147, Electricity Rate Stabilization Law, that introduces a subsidy aimed at supporting over 1 million low-income households, benefiting approximately 3 million people. https://www.bcn.cl/leychile/navegar?idNorma=1179524

- **Expand Existing Programs:** Enhance programs like the Change Your Heat Program to provide more significant electricity discounts for switching from wood to efficient electric heating.

Pillar: Regulation and Policies

Chile has been paving the way toward a policy and regulatory framework to promote the transition to more efficient heating (and cooling) technologies, including heat pumps. Key efforts have focused on promoting the use of renewable energy in heating systems, energy efficiency (EE) standards and product certification, as described below:

Policy/Regulation	Relevant Aspects
National Heat and Cold Strategy (2021)[70]	▪ Comprehensive plan for the development and adoption of sustainable energy for heating and cooling. ▪ Goals by 2050: ○ Cut GHG emissions from heating and cooling by 65% ○ 80% penetration of sustainable energy for heating and cooling ○ 75% of households having access to sustainable, reliable and affordable heating and cooling ▪ Focuses on transitioning to renewable energy sources like solar PV and biomass, supplemented by electric heat pumps and district energy systems. ▪ Structured around four pillars: sustainability for energy transition, regulatory and institutional strengthening, sector development training and public awareness and education. ▪ Other measures include support for housing retrofit subsidies and programs for reduced electricity tariffs for heating, intending to address and alleviate energy poverty. ▪ Additional plans are in place to transition the residential, industrial and public/commercial sectors toward less environmentally harmful energy sources, including regulatory efforts like the mandatory energy efficiency labeling for public buildings by 2025.
National Energy Policy 2050 (updated in 2022)[71]	▪ Sets ambitious targets for universal electricity access for heating and cooking by 2030 and low-emission energy sources for these needs by 2040. ▪ By 2050, it envisions 90% of industrial heating from sustainable sources, 500,000 users connected to district heating and a 70% reduction in PM2.5 pollution from heating.
Strategy for Residential Energy Transition (2020)[72]	▪ Goal: To create a cleaner, safer and more efficient residential energy matrix with accessible alternatives to firewood. ▪ Key objectives include regulating the firewood market, promoting and providing affordable heating alternatives, coordinating efficient equipment and building conversions, and promoting a just and sustainable transition.

	▪ It outlines needed legal and regulatory changes,[aa] social programs to change firewood heaters, supportive pilot projects and subsidies, and the design of competitive electricity tariffs for heating.[73]
Energy Efficiency Law (2021)[74]	▪ Sets minimum energy standards, efficiency labeling, EE requirements for public and commercial buildings (expected to start in 2025) and mandates for energy management systems. ▪ Encourages the replacement of outdated heating systems with efficient technologies like heat pumps and promotes public initiatives and partnerships between utilities and construction companies to accelerate adoption.
Climate Change Law (2022)[75]	▪ Legally binds Chile to carbon neutrality by 2050, reinforcing its commitment to international climate goals through the Long-Term Climate Strategy 2050.[76]
Geothermal Concessions Law (2024)[77]	▪ This law improved previous regulations on geothermal energy concessions, facilitating the development of shallow geothermal energy utilization projects. ▪ This measure will allow an easier deployment of geothermal heat pumps benefitting various sectors, supporting a wide range of applications from small-scale heating and cooling in homes to large projects in schools, hospitals and public buildings.[78]
Energy Efficiency Standards & Certification	▪ Chile has established EE norms[bb] and certification, labeling and minimum energy performance standards (MEPS)[cc] for certain refrigeration and air conditioning equipment, primarily for domestic use. ▪ Since 2019, only certain domestic heat pumps (single-phase, split or uni type, without ducted air distribution, using air for condensation),[79] with a thermal power capacity of up to 12 kW, are subject to MEPS and must meet labeling requirements[80] under Supreme Decree 64[dd] (2013).[81] ▪ Chile's General Ordinance of Urbanism and Construction (updated in 2024)[82] mandates EE standards for residential building envelopes.

[aa] Among the legal modifications, a District Energy Law was contemplated to establish a regulatory framework for district energy systems, but its approval was unsuccessful.

[bb] In 2002, several EE norms were issued for electric appliances, including air conditioners and heat pumps, by setting standards adapted or aligned with international ISOs, ensuring consistency with global practices. These norms include NCh2685 and NCh2686. *Normas de Eficiencia Energética para Aparatos Eléctricos* [Energy Efficiency Standards for Electrical Appliances]. (2024). Comisión Nacional de Energía. https://www.cne.cl/archivos_bajar/documento_normas.pdf

[cc] The Ministry of Energy determines which products require certification and labeling. Supreme Decree 97 (2011) establishes regulations for setting MEPS, applicable for energy-related products/equipment and components that affect energy consumption when used, including individual parts intended for integration into other products, with their energy performance independently assessable. The regulation mandates that certain products must have an approval certificate as per the guidelines established in Decree No. 298 (2005) related to the certification of electrical and fuel products. *Decree 97 approves regulations establishing the procedure for setting minimum energy efficiency standards and rules for their application*. (2012). Ministerio de Energía. https://www.bcn.cl/leychile/navegar?idNorma=1040003; *Decree 298: Approval of regulations for the certification of electrical and fuel products, and repeal of specified decree*. (2005). Ministerio de Economía. https://www.bcn.cl/leychile/navegar?idNorma=246921

[dd] This Decree establishes regulations for defining technical specifications for energy consumption labels, including electric products. Of these, only electric heat pumps (up to 12 kW) for domestic air conditioning require labeling (no industrial usage was covered).

Stronger Efficiency Standards: The U.S. Raising the Bar for Heating and Cooling Appliances

In 2023, the United States implemented a change to its Seasonal Energy Efficiency Rating and increased the EE requirements by 8%-10%, affecting around 70% of the appliances on the market that will no longer comply with the updated criteria. The Energy Star label certification increased EE requirements and will only be granted to those appliances that emit heating and cooling; before, appliances that only produced cooling (simple air conditioning systems) could also be awarded the label if they fulfilled certain criteria.

Recommendations

- **Develop a Differentiated, Regional Heat Pump Deployment Strategy:** Deployment should be prioritized in urban areas and regions with reliable electricity supply. In regions where electricity supply reliability remains a challenge, other heating technologies (more efficient than traditional firewood usage) should be allowed as a backup option to ensure heating reliability.
- **Improve Appliance Efficiency Standards:** Establish higher efficiency standards for heating appliances, favoring the most efficient, like heat pumps, and phasing out inefficient biomass heaters.
- **Raise Standards for Heating and Cooling Appliances:** Assess giving EE certification to devices that provide heating and cooling, following the example in the U.S. Seasonal Energy Efficiency Rating and Energy Star label.
- **Expand EE Certification, Labeling and Minimum Energy Performance Standards (MEPS):** Extend these standards to cover both industrial and domestic heat pumps with higher thermal power capacity.
- **Regulate District Heating:** Establish a clear regulatory framework for district heating, including clear rules for governance, infrastructure development, consumer protection and investment incentives. Identify priority zones where this approach would deliver the most significant economic and environmental impact.
- **Pilot Heat-as-a-Service:** Consider the value of HaaS schemes and the development of regulatory sandboxes to implement pilot projects to assess their environmental and economic impact and potential scalability.
- **Promote Research and Development:** Pursue the needed legal changes to allocate carbon tax revenue to fund research and development for advanced heating technologies across residential and industrial sectors.

Foundation: Coordination and Communication

Chile has made significant efforts toward improving public awareness and institutional coordination around energy-related topics, including sustainable heating, as seen in the table below. However, stronger interministerial cooperation and broader public education about heat pumps' long-term benefits and cost advantages are crucial to accelerate their adoption and build consumer confidence. Additionally, better strategic planning and more targeted incentives are needed to prevent prolonged reliance on less efficient technologies and drive adoption to more efficient ones.

Area	Key Points
Interministerial coordination	▪ Chile has initiated coordination efforts among the Ministries of Energy, Housing and Environment, to develop communication strategies to advance toward efficient heating goals.[ee] ▪ However, stronger and more comprehensive interinstitutional collaboration is needed to align goals, streamline efforts and achieve long-term objectives effectively.
Energy Education Strategy[83]	▪ Launched by the Ministry of Energy, it outlines a comprehensive plan to integrate energy education into various social sectors to promote an energy culture and improve public understanding of energy use and efficiency. ▪ Aims to reduce information gaps and align public policy with institutional goals through educational initiatives for citizens, educational communities and human capital development. ▪ Includes a collaborative approach involving multiple governmental and non-governmental stakeholders, aiming toward a widespread and effective implementation of energy education programs through tools such as reports, videos, guidelines, capacity-building sessions and didactic tools, among others.[ff] Some examples include: o My Efficient Home Guideline — covers different heating alternatives, including split air conditioners, and the relevance of thermal isolation.[84] o Good Energy Program — focuses on improving public knowledge about energy use, efficiency and environmental impact.[85]
Public awareness of heat pumps and their benefits	▪ Initial efforts to build consumer trust include: o Publishing a detailed guide on heat pump types and their benefits[86] o Providing a list of suppliers to improve market transparency and support consumer decision-making[87]
Lessons from the Heater Replacement Program and other initiatives	▪ Program outcomes demonstrated the importance of broader strategic planning, comprehensive education on new technologies (including overall economic impacts) and policies carefully tailored to support the most efficient technologies while furthering government's strategic goals. ▪ If participants had been better informed about the overall efficiency, cost savings and benefits of all the available technologies in the program, especially by factoring in overall operational costs, more households might have opted for efficient solutions like heat pumps. ▪ Integrating and strengthening community education on the long-term cost and efficiency benefits of various technologies and improving program design to target the most efficient ones could have driven greater penetration of electric heating solutions, including heat pumps. This could have aligned well with subsequent

[ee] For example, Chile conducted some participatory workshops in all regional capitals of the country; the initial round was held between 2019 and 2020, collecting public opinions, future expectations and ongoing challenges in energy topics.

[ff] Some of these can be found in the following link: https://www.mienergia.cl/centro-de-recursos

	initiatives offering financial incentives for electricity use in heating, ultimately increasing the number of beneficiaries and improving overall program effectiveness by contributing more significantly to sustainable heating solutions.

Recommendations

- **Execute Public Education Campaigns:** Raise awareness about the benefits of heat pumps through media, workshops and community programs. Highlight cost savings, lower operating costs than other heating technologies and environmental advantages.
- **Develop Training and Certification Programs:** Provide training for installers and technicians to ensure proper installation and maintenance, improving heat pump efficiency and longevity.
- **Improve Dissemination Strategies:** Create accessible, user-friendly resources providing comprehensive information on heat pump installation, maintenance and qualified installer lists, along with updated deployment data by sector, to enhance transparency, enable better-informed decisions and foster trust in heat pump adoption. To encourage installer participation and uphold high service standards, consider the implementation of a reputational mechanism that incentivizes professionals' participation, such as rankings or certifications based on customer feedback and performance.
- **Promote Interagency Collaboration:** Foster collaboration between the Ministry of Energy, environmental agencies and local governments to align heat pump policies with national energy goals.

Conclusion and Policy Recommendations

Chile has taken important steps toward implementing and accelerating heating policies, responding to its vast differences in climate variations, heating needs and high particle emissions due to the traditional use of firewood as the main source of heating in some regions. Heat pumps are a tool with a great potential to enable Chile to pursue its national objectives in terms of energy poverty, reductions of local pollutants and climate.

Building on these strong foundations, Chile has the opportunity to scale its impact further. Unlocking the full potential of heat pump adoption will require targeted action in key areas: enhancing financing mechanisms, strengthening regulatory frameworks and support, and improving grid reliability. **On-bill financing** stands out as a powerful (and easy to implement) tool to address upfront cost barriers, while a **differentiated regional deployment strategy** can ensure a focused and effective rollout toward an efficient, targeted transition. **Strengthening regulatory frameworks** and **enhancing inter-agency coordination** will further solidify heat pumps as an important pillar in Chile's sustainable energy transition.

By prioritizing these actions, Chile can achieve a meaningful impact — improving air quality, reducing energy costs and advancing its decarbonization goals — while ensuring that all regions benefit from cleaner, more efficient heating solutions.

Table 4 provides a comprehensive “traffic light” assessment based on the key components of RAP’s Heat Pump Policy Toolkit model. Table 5 outlines RAP’s policy recommendations, categorized by priority and implementation timing.

Table 4. Traffic Light Assessment of Policy Tools

Policy Tool	Economic and Market Tools
Economics and Market Instruments	Carbon taxation
	Taxes and levies
	Obligations and portfolio standards
Financial Support	Grants and tax rebates
	Loans
Regulation	Building codes and appliance standards
	Planning and zoning
	Heat as a service
Communication and Coordination	Communication
	Installer communication, training and certification
	Wider technical and systemic coordination

Table 4 Key

Sufficient but room for improvement
Attention needed
Significant gap

Table 5 Key

Policy Tool
Economics and Market Instruments
Financial Support (Incentives and Subsidies)
Regulation and Policies
Coordination and Communication

Level of Importance
High
Medium
Low

Implementation Timing	
	Short
	Medium
	Long

Table 5. Policy Recommendations by Priority and Implementation

Policy Tool	Recommendation (by Level of Importance)	Implement-ation Timing
	Develop a Differentiated, Regional Deployment Strategy: Prioritize heat pump adoption in urban areas and regions with reliable electricity supply. Allow backup options where electricity reliability remains a challenge.	
	Implement On-Bill Financing for Heat Pumps: Enable repayment through utility bills to reduce upfront costs and create a sustainable funding channel.	
	Offer Low-Interest Loans: By spreading the initial cost over time, loans can make the investment more manageable for consumers.	
	Enhance Carbon Pricing and Implement a Gradual Tax Increase: Adjust carbon tax rates to align with decarbonization goals and social and environmental costs, following international benchmarks and leveling the playing field for low-carbon sources.	
	Transition to a Carbon Content Tax: Cover all commercialized fuels based on their carbon footprint to correct market distortions and encourage low-carbon alternatives.	
	Improve Appliance Efficiency Standards: Set higher standards for heating technologies and phase out inefficient heating technologies.	
	Expand EE Certification, Labeling and Minimum Energy Performance Standards: Extend standards to include industrial and domestic heat pumps with higher thermal power capacity.	
	Raise Standards for Heating and Cooling Appliances: Assess giving EE certification to devices that provide heating and cooling, following the example in the US Seasonal Energy Efficiency Rating and Energy Star label.	
	Promote Interagency Collaboration: Foster collaboration between the Ministry of Energy, environmental agencies and local governments to align heat pump policies with national energy goals..	
	Execute Public Education Campaigns: Raise awareness about heat pump benefits (e.g., cost savings, emissions reductions) through media, workshops and community programs.	
	Develop Training and Certification Programs: Provide training for installers and technicians to ensure proper installation and maintenance, improving heat pump efficiency and longevity.	
	Reassess Supported Technologies: Adjust current programs (like the Heater Replacement Program) to prioritize the most efficient technologies over less efficient ones.	
	Increase Upfront Incentives: Provide higher grants and subsidies to offset heat pump installation costs, making them accessible for households and businesses.	

Pilot Heat-as-a-Service: Consider the value of HaaS schemes and the development of regulatory sandboxes to implement pilot projects to assess their environmental and economic impact and potential scalability.		
Expand Green Bonds: Finance large-scale heat pump projects at the industrial level and pilot social housing projects with district heating or heat pump heating systems to attract private investment and reduce reliance on traditional heating fuels. This can be coupled with on-bill financing schemes.		
Improve Dissemination Strategies: Create accessible resources on heat pump installation and benefits, and establish a reputational mechanism for installers.		
Direct the Allocation of Carbon Tax Revenues: Allow for the pre-allocations of carbon tax revenues to environmental projects and clean energy technologies, including heat pumps.		
Promote Research and Development: Pursue the needed legal changes to allocate carbon tax revenue to fund R&D for advanced heating technologies across residential and industrial sectors.		
Regulate District Heating: Establish a clear regulatory framework for district heating, including clear rules for governance, infrastructure development, consumer protection, and investment incentives. Identify priority zones where this approach would deliver the most significant economic and environmental impact.		
Establish a Dedicated Fund for Environmental Initiatives: Use carbon tax revenues to create a fund for heat pumps and low-carbon technologies.		
Expand Existing Programs: Improve programs like the Change Your Heat Program to offer higher electricity discounts for switching from wood to efficient electric heating.		

Acknowledgments

We would like to express our sincere gratitude to the individuals who contributed to the peer review process of this policy brief. Our appreciation goes to Nicola Borregaard from EBP Chile, Pablo Serra from the Universidad de Chile and Richard Lowes and Shravya Reddy from the Regulatory Assistance Project.

We want to emphasize that all views, opinions and insights presented in this report, as well as any errors or omissions, are solely the responsibility of the authors. No statements have been directly attributed to any individuals acknowledged in this section.

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