

Public Governance Directorate

Gaps and Governance Standards of Public Infrastructure in Chile

Summary





GAPS AND GOVERNANCE STANDARDS OF PUBLIC INFRASTRUCTURE IN CHILE

SUMMARY

MARCH 2017

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Public infrastructure in Chile

Chile has been successful in building its key transport and water infrastructure

Over the past 25 years, Chile has successfully rolled-out many of the key investments in its basic infrastructure backbone that are essential for economic development and welfare. Rapid investment in infrastructure has permitted impressive economic growth rates and improvements in living standards for the Chilean population. Gross domestic product (GDP) per capita has increased, from USD 4 787 in 1990 to USD 22 197 in 2015. Chile has also achieved near universal access to basic services essential for well-being such as drinking water and sewerage (Ferro and Mercadier, 2016). There is also near universal access to electricity from the national grid. While growth led to significant overall reductions in poverty (OECD, 2015), it relied heavily on capital accumulation (IMF, 2015) and has been geographically uneven (OECD, 2011).

Major economic infrastructure such as the highway network and port system have been built over the past two decades. Chile can claim to have a high-quality and well-maintained highway system. The main vertical north-south highway (Route 5) and most transversal arteries linking the key cities have been built. Within the decade from 2004 to 2014, total container capacity at Chilean ports more than doubled and the productivity of maritime transport at the port level is among the highest in Latin America. Major urban infrastructure projects such as the Santiago metro system and the city's ring roads have sustained the capital's economic and demographic growth. Between 1985 and 2013, Chile managed to expand its wastewater treatment capacity from 0% to 100%. Finally, Chile has managed to develop this infrastructure efficiently and to a high standard, which is a testament to the quality of the country's institutions (IMF, 2016).

Chile has also been successful in mobilising private finance in the development of its infrastructure. It has adopted and refined the concessions model for delivering infrastructure, a major factor accounting for the speed at which it has been able to build its extensive highway network. In the more than two decades since the launch of the concessions programme in 1992, Chile has procured 82 projects worth USD 19 billion, and built or rehabilitated 2 500 kilometres of highways using this mechanism (MOP, 2016).

The circumstances that frame infrastructure investment needs are changing

Many of the key investments in basic infrastructure that are essential for economic development and welfare have been completed. The increase in coverage of basic roads, rural drinking water systems and rehabilitation of fishing coves has been significant.

While these investments have had clear economic benefits, future investment choices may be more difficult and marginal returns may be lower. As it will be highlighted in the chapters on transport and water (Chapters IV and V respectively), infrastructure gaps still exist, yet the nature of these gaps is shifting to issues such as regional inequality, equal access, welfare and quality of life. For instance, there are great disparities in the quality of infrastructure across different regions. The same can be said with regard to national level and local level infrastructure. While national infrastructure of strategic importance such as the main highways is built and operated to high world standards, urban roads are often of a lower quality and poorly maintained, despite increased efforts in remote and isolated areas. Finally, there are significant gaps with regard to negative externalities, such as congestion, air pollution and road safety, which have emerged as a consequence of economic development.

In response to public demands, the current government has prioritised social sectors such as education and health. This is in many ways consistent with Chile's transition from a middle-income to a

high-income country. However, this means that in the future, traditional infrastructure investment may increasingly need to compete for resources with the social sectors. While it may not result in an overall reduction in infrastructure investment, Chile may experience a shift in the types of infrastructure being built, with perhaps more hospitals and schools, and fewer major transport projects.

The Chilean economy has experienced a slowdown in recent years as a result of a lower global growth in general and a drop in copper demand in particular. With the end of the commodity super-cycle, Chile may face lower medium- and long-term growth prospects (IMF, 2015). This reduces the resources available for public investment. On the other hand, the right infrastructure investment, performed well, can contribute to productivity growth. In addition, Chile may benefit from a rebalancing of its economy from the export of natural resources to manufacturing and services. Infrastructure will have an important role to play in supporting economic diversification. Choices regarding what infrastructure to build will therefore need to be informed by a vision of the evolving structure of the Chilean economy.

Transversal issues such as climate change, pollution, natural disasters and regional equality are becoming more important. Chile's intended national determined contribution submitted for the Paris Climate Agreement in 2015 envisages a 30% reduction in carbon emission intensity compared to 2007 levels by 2030. Infrastructure will need to support this shift towards a lower carbon economy. Moreover, with its long coastline, glaciers and dry climate in the north, Chile is highly vulnerable to the impacts of climate change. Notions such as resilience, preparedness and sustainable development therefore need to be integrated into infrastructure planning. However, when infrastructure decisions are based primarily on financial criteria they do not easily accommodate values that are not so easily captured in monetary terms.

These evolving circumstances have implications for infrastructure planning

Past choices regarding infrastructure development were relatively simple: the infrastructure needs were great, the gaps were obvious and there was little doubt as to the key driver of the economy – principally the export of minerals. Future infrastructure choices may not be so straightforward.

Future infrastructure needs will be more localised, requiring a greater ability to identify and respond to needs at a local level. Thus, while access to most basic infrastructure services in Chile is universal, significant discrepancies in quality exist between different regions and localities. For example, there are problems in access to water services in some of the urban peripheries of metropolitan areas (particularly in Santiago), and rural water services are still not universal (particularly in the case of sanitation services). Also, standard roads in the north are lacking and the motorway network does not cover the northern macrozone from Atacama to Arica.

Moreover, future projects may be less transformational in nature and large maintenance requirements can be foreseen, since many of the major infrastructure assets have been built (whether it be the inter-city highway network or the Santiago Airport). In order to address a more complex set of needs, infrastructure planning in the future will need to focus more on social infrastructure, as well as smaller and more localised projects; become more inclusive in terms of social and spatial dimensions; and integrate transversal issues such as climate change, sustainability and resilience considerations.

Future benefits from infrastructure investment may increasingly accrue from the existence of complementarities and synergies among a cluster of assets rather than stand-alone projects. Such complementarities are easier to find and manage at the regional or local level. With many of the large infrastructure investments complete, future investments will increasingly involve extensions to or linkages with existing infrastructure. A key example here is the need to enhance intermodality, facilitating the movement of goods and people across transport modes, and developing “last-mile” infrastructure. Intermodal strategies require better co-ordination at the planning stage, a wider lens to assess the benefits at the assessment stage, and more complex interactions at the implementation stage. The marginal returns of single projects may therefore be lower and more difficult to evaluate. Project evaluation methodologies will need to evolve to take into account the impact of linkages and synergies between projects.

With many of the basic needs in terms of access to key infrastructure services having been satisfied, addressing future needs may require more of a mix between supply and demand measures. For instance, digital technologies are making demand management an increasingly viable alternative for resolving capacity issues in the transport sector. When productivity improvements enhance capacity, investment in digitalisation can be an alternative, or at least a complementary measure, to infrastructure building.

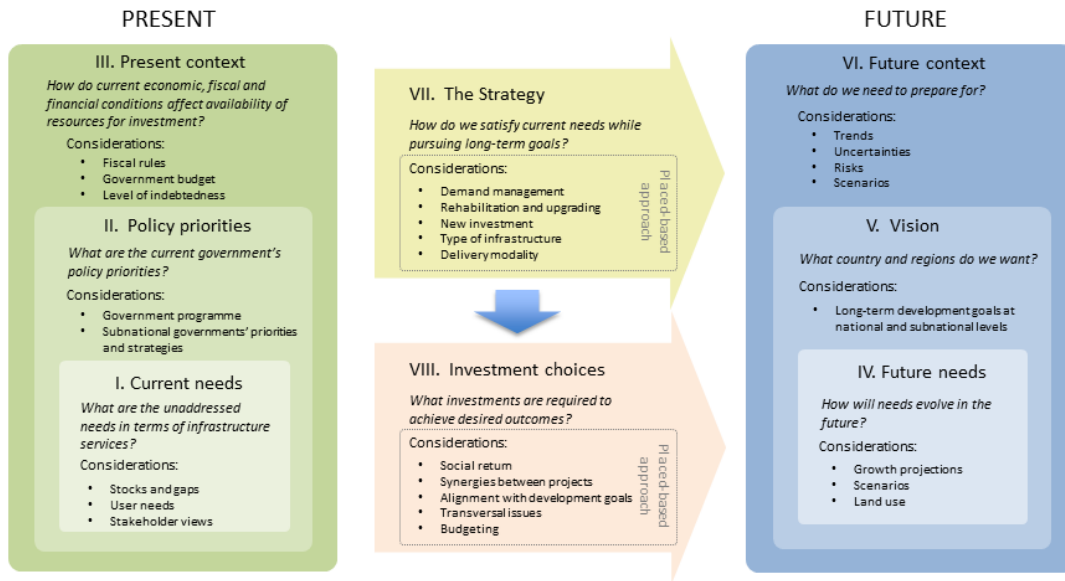
Decisions regarding what to build and how to build it will increasingly need to take into account negative externalities, whether in terms of air quality, carbon emissions, or health and safety. It will no longer be sufficient to privilege growth to the detriment of social or environmental values. Planning instruments will need to be adapted to better reflect externalities generated by infrastructure investments.

The evolution in infrastructure needs will have implications for the types of competences that will be required of the Chilean infrastructure planning system going forward. In order to adapt to these changing circumstances, the planning system will need to develop a greater capacity for long-term thinking, decentralise infrastructure decision making, improve co-ordination within and across sectors, accommodate transversal issues (e.g. climate change) in project evaluation and prioritisation, and develop a more holistic approach to addressing infrastructure gaps that extends beyond supply measures to consider a wide range of policy interventions.

The governance framework for infrastructure and horizontal co-ordination in Chile

The success of Chile’s infrastructure can be ascribed in significant parts to the strength of Chile’s institutions and the capacity of its public administration. The Ministry of Public Works’ (MOP) experience and capabilities in preparing and executing projects has been instrumental in delivering the country’s high-quality infrastructure. Chile’s public investment system benefits from a well-institutionalised social evaluation process that has contributed to ensuring that infrastructure investments are of good quality and generate value-for-money. In addition, the Ministry of Finance has performed an important gatekeeper role by reviewing and approving projects to ensure that they are affordable and do not compromise financial stability. It has also introduced innovations into its successful concessions model, such as contracts based on the “least present value of future revenues”, which helps to reduce demand risk. However, as Chile strives to achieve high-income status, infrastructure needs are changing. This will require adjustments to how infrastructure is planned and governed. The key role of Chile’s infrastructure planning system will be to create an enabling pathway between the present conditions and the desired future state (Figure 1).

Figure 1. Infrastructure planning framework in Chile

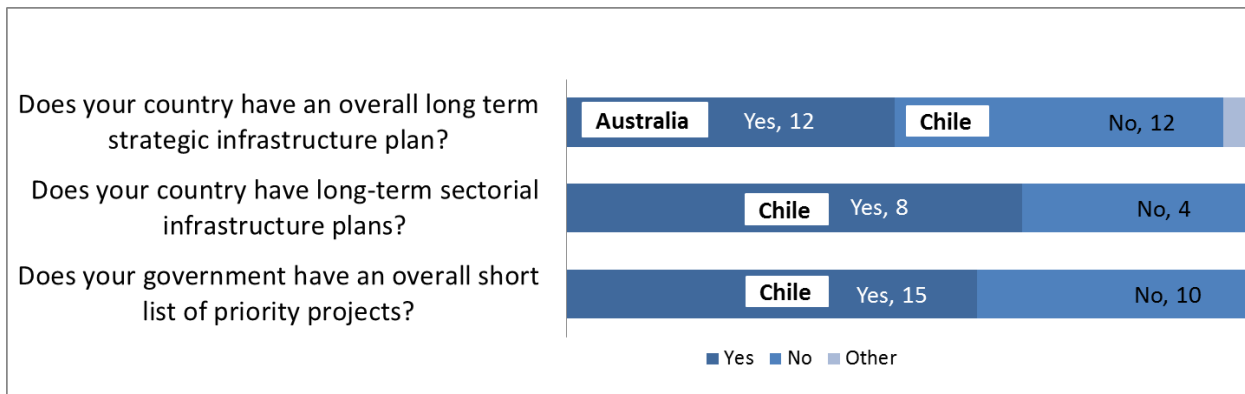


Source: Own elaboration.

Using long-term planning for infrastructure planning and policy making to achieve development goals

A key weakness identified in Chile's governance framework is the lack of medium- to long-term infrastructure planning, particularly in the central government. Although a number of sectoral ministries undertake infrastructure planning with regard to their sector, there is currently no clear centralised guidance with respect to a long-term vision and development goals that can frame the assessment of future infrastructure needs (Figure 2). The Chilean Infrastructure Plan for Development and Inclusion 2030 has the potential for generating such a vision and guiding framework, particularly given its inclusive and bottom-up process. The challenge will be ensuring that the output of the process survives future changes in administration – a challenge that is particularly acute because of the four-year electoral cycle combined with the single presidential terms.

Figure 2. Infrastructure planning and prioritisation



Source: OECD (2016e), "OECD Survey of Infrastructure Governance".

Long-term planning requires new capacities for long-term thinking, for example by establishing an institutional counterweight at the centre of government mandated to develop long-term science-based policy research that could inform infrastructure planning as well as other policy areas. The use of scenarios could also inject greater robustness into assessments of future needs through accommodating factors that are inherently unpredictable, such as the timing and impact of technological change. More long-term thinking with respect to infrastructure planning should be supported by a budgeting framework that generates medium-term commitments, thereby creating greater certainty for both procuring authorities and contractors. Australia offers an example of an infrastructure planning system that frames infrastructure choices within a long-term integrated strategy. The infrastructure plan includes how infrastructure is financed, delivered and used and is guided by Australia's main long-term ambitions. This holistic approach considers all infrastructure sectors within a single plan, which encourages greater alignment across sectors and investments, and improves the scope for generating synergies.

The project evaluation and prioritisation system will need to accommodate transversal issues and multiple policy goals

As transversal issues gain in strategic significance they will need to be better integrated into processes for evaluating, prioritising and selecting projects. For example, Chile's international commitments under the Paris Climate Agreement will require greater integration of sustainability considerations in infrastructure planning. Chile's National Investment System has a rigorous process and a well-established methodology for evaluating projects to ensure they generate value for money. However, the current system offers limited scope for incorporating transversal issues and other political objectives into the decision-making process in a transparent way. Nevertheless, changes to project evaluation methodologies and selection criteria must not come at the expense of value for money and efficiency considerations.

Some countries apply a multi-criteria analysis (MCA) framework for broadening the inputs to include factors that elude monetisation. An MCA framework can serve as a complement to a cost-benefit analysis, and provide space for integrating political choices and policy priorities into infrastructure decision making in a transparent manner. The context surrounding infrastructure projects is often highly complex, and investments are usually required to satisfy a number of policy goals. MCA methodologies offer the benefit of being able to accommodate multiple priorities, such as cost efficiency, climate change and regional inequality.

Introducing an integrated and co-ordinated view on infrastructure planning both within and across sectors

Chile's central government is characterised by a high degree of compartmentalisation. Sectoral ministries work within somewhat isolated silos, with limited mechanisms for ensuring alignment and integration across policy areas and investments. In Chile, sectoral ministries typically determine the needs and the strategies to address those needs, including the identification of specific investments in their sector. In certain sectors, significant overlaps exist between ministries and the delimitation of roles is not entirely clear. This co-ordination challenge is particularly acute in transport, where responsibilities are distributed across multiple ministries.

An integrated infrastructure plan would serve to improve co-ordination, especially where planning responsibilities within a sector are distributed across multiple ministries, as in the case of transport. A comprehensive transport sector strategy, developed with input from relevant ministries and which integrates all transport modes, including ports, roads, rail and airports, could serve to reduce co-ordination problems within the transport sector. Overall, co-ordination may be guided by a central level infrastructure advisory body. It will also require adopting a more systemic and cross-sectoral perspective in

infrastructure planning and prioritisation. Chile's currently weak land-use planning could be improved to serve as a critical instrument for ensuring co-ordination between infrastructure development and other land uses, such as housing. In addition, there should be a stronger link between budgets and planning instruments, such as regional strategies.

Furthermore, as local needs become more relevant drivers of infrastructure development, it will become important to be able to identify, prioritise and respond to needs at the subnational level. In the short- to medium term, many subnational governments will not have sufficient capacity to plan and develop projects in response to local needs. The central government will therefore need to support the transfer of competences through the provision of extensive training, advice and coaching. This should be supplemented by strengthening stakeholder engagement, particularly in the project preparation phase, in order to identify user needs and integrate their feedback into the project design.

Strengthening the analytical capacity of planners and decision makers to ensure evidence-based decision making and value for money

Chile's decision-making process for the delivery mode of infrastructure projects is not based on a formal set of criteria, although it assesses cost recovery potential using user fees in the decision to proceed using the concessions model.¹ Nevertheless, going forward, Chile would benefit from adopting a more formal set of criteria to guide choices relating to delivery modes, particularly if it seeks to extend the concessions model to other types of infrastructure where it has less experience (such as hospitals) and where cost recovery may not be feasible. This decision-making process should be insulated from institutional bias and decisions should not be taken by the same unit that is responsible for delivering the project, as is currently the case with the Concessions Unit within the MOP (Coordinación de Concesiones de Obras Públicas, CCOP). For example, in France a unit within the Treasury provides support and advice to all levels of government regarding the choice of financing modality. This unit, called the Infrastructure Financing Support Unit (Mission d'appui au financement des infrastructures) furthermore gives advice on how to structure projects from a legal and financial perspective.

In order to ensure that infrastructure investment delivers value for money, infrastructure planners need to adopt a whole-of-life approach with sufficient capacities at each stage of the project's life cycle – from project preparation through execution to operation – including sufficient resources for ensuring value for money during contract modifications, renegotiations or extensions. Specifically, the CCOP will need to ensure that it has sufficient capacity to effectively monitor concessions during their operational phase. As the number of projects in their operational phase increases, greater resources will be required to monitor the performance of concessions. Overcoming these shortages includes strengthening the capacities of the Inspector Fiscal, which is tasked with monitoring the implementation of contracts.

The capacities to collect, analyse and disseminate data are often overlooked but are critical for delivering value for money in infrastructure investment over the long term. Evidence-based decision making requires the availability of data and the use of appropriate methodologies to interpret the data. The recent establishment of the Research and Financial Analysis Division within the CCOP is a step in the right direction, but it is equally important that data on projects executed through other means are systematically collected and analysed.

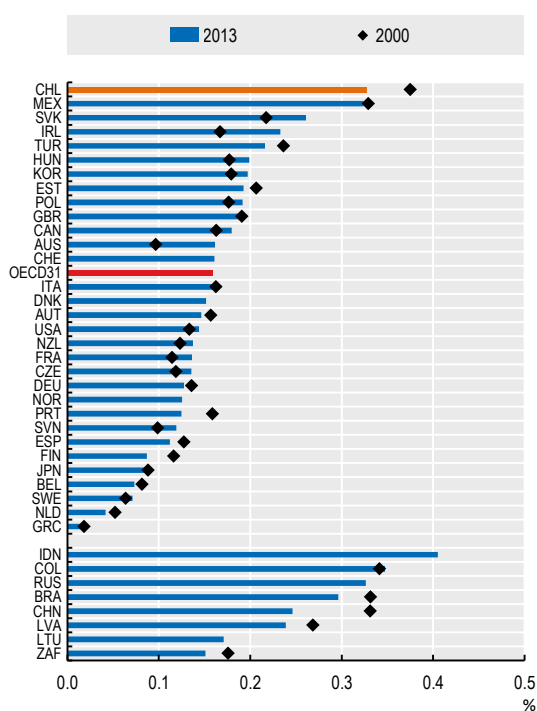
¹ Conversation with officials from the CCOP.

Co-ordinating infrastructure policy across levels of government

Chile is characterised by a markedly geographic heterogeneity and strong territorial disparities

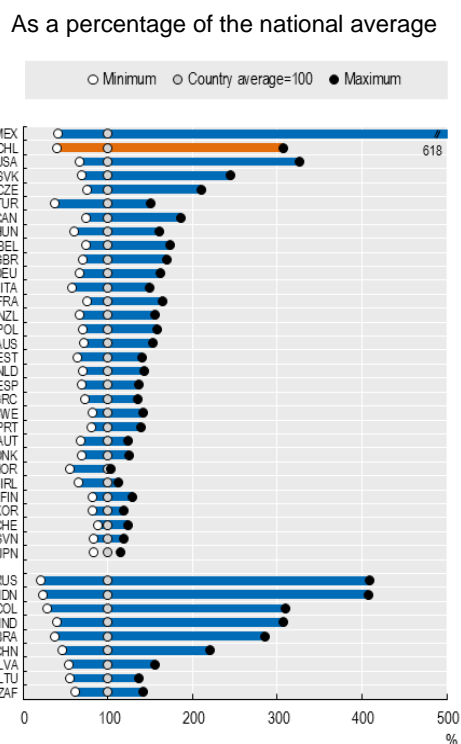
Territorial characteristics of the country have led to a concentration of economic activities; Chile records the highest level of geographic concentration of GDP (52) among OECD countries (OECD, 2014). Urban areas are the economic engines of the Chilean economy. Santiago, Valparaíso and Concepción account for the largest share of national growth: Santiago alone accounted for 48.14% of national GDP in 2013. This is mirrored by important territorial disparities: while decreasing, the Gini Index of GDP per capita across Chilean provinces remains the highest among OECD countries (Figures 3 and 4). While some regions are at least three times richer than the national average, other regions have values lower than half of the national average. This is also true when looking at infrastructure. Gaps in surface quality and safety standards of roads are important across Chilean macrozones and within these zones as seen by large differences in road paving rates and road accidents. Even starker differences are evident across areas of large cities, such as in Santiago where poorer neighbourhoods are not only located further away than richer ones from jobs and services, but also suffer from lower quality infrastructure. Rural and remote areas are the most affected by connectivity, remaining disconnected and sometimes isolated from urban areas.

Figure 3. Gini Index of inequality of GDP per capita across TL3 regions



Source: OECD (2016c), *OECD Regions at a Glance 2016*, http://dx.doi.org/10.1787/reg_glance-2016-en.

Figure 4. Regional variations in GDP per capita, TL2 regions, 2013



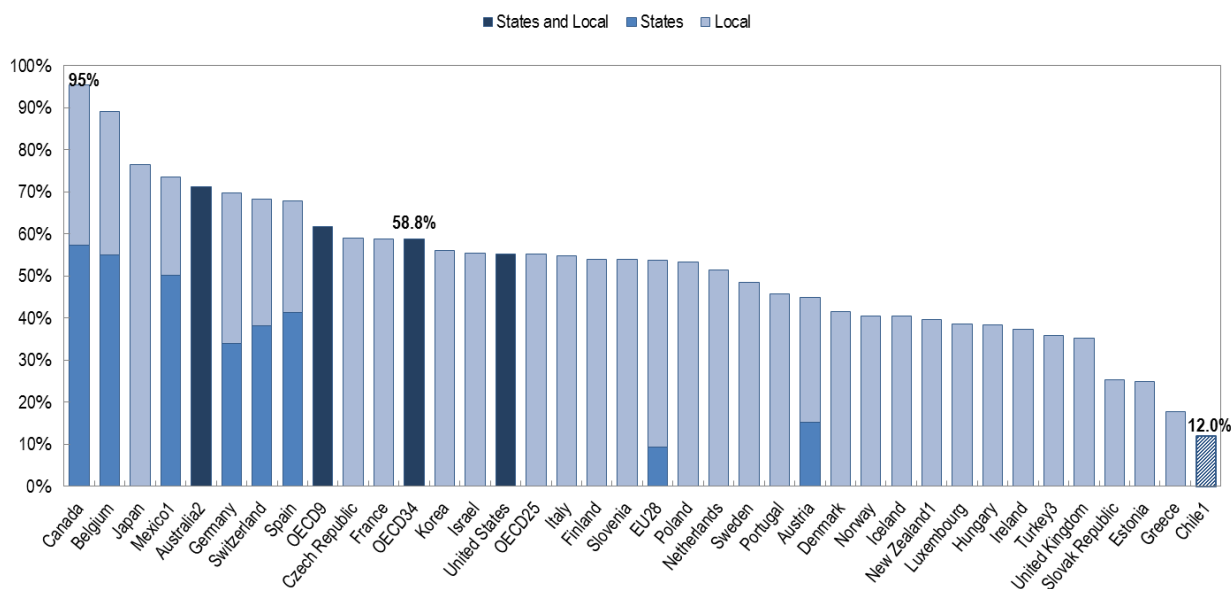
Source: OECD (2016c), *OECD Regions at a Glance 2016*, http://dx.doi.org/10.1787/reg_glance-2016-en.

Towards a place-based investment strategy

Chile needs to diversify its economic activities to boost growth and productivity through place-based investment strategies. The Chilean economy depends on a few sectors largely concentrated in some regions. It is crucial to further diversify economic activity to avoid the middle-income trap. Developing and investing in new economic hubs throughout the country will allow economic activities to be balanced and to achieve considerable potential for additional domestic production. For this, a comprehensive investment strategy based on territorial needs is necessary. Infrastructure investment strategies need to be tailored to the place they aim to serve in order to boost productivity while also promoting inclusiveness.

The decentralisation agenda is a key step to move further ahead on place-based infrastructure investment strategies while deepening the representativeness and autonomy of subnational governments. Chile is the most fiscally centralised country in the OECD. Subnational governments have constrained own revenues, limited expenditure and investments decided by localities are significantly lower than OECD levels. While in the OECD 60% of public investment is conducted by subnational governments, in Chile this figure is only 12% (Figure 5). Centrally driven, investments can partially respond to local needs. While on the agenda for several years, devolving more responsibilities and increasing subnational autonomy in the current economic context is unavoidable as it serves as a tool to boost productivity throughout the territory. Chile needs more active municipalities and regions that define their development and investment strategies, decide where and how to invest, and benefit from greater financial autonomy and more flexibility in the use of grants. This path is a learning-by-doing process that takes time – pilot experiences for the devolution of competences should be pursued to diminish transition costs, especially in less developed regions.

Figure 5. Subnational governments' share of public investment



Notes: 1. 2013 figures. 2. 2012 figures. 3. 2011 figures.

Sources: Authors' elaboration based on OECD (2016b), "Subnational governments in OECD countries: Key data", <https://www.oecd.org/gov/regional-policy/Subnational-governments-in-OECD-Countries-Key-Data-2016.pdf>; OECD (2016d), "Subnational government structure and finance", *OECD Regional Statistics* (database), <http://dx.doi.org/10.1787/05fb4b56-en>; authors' calculations for Colombia based on OECD National Accounts.

Improving the planning framework for infrastructure investments

Chile needs to move further in co-ordinating the planning of subnational infrastructure investments across sectors and levels of government. Cross-sectoral co-ordination both at the national and subnational levels is a major challenge. Chile has made important progress with inter-ministerial committees. In order to avoid creating new institutions, Chile could envisage further institutionalising the COMICIVYT by extending its planning and monitoring competences, following the examples of the Executive GORE in Peru or the Council of Australian Governments in Australia. Such a platform for dialogue, together with decentralisation reforms, will also help Chile to better define competences and accountability across the different levels of government. To improve collaboration between ministries and public agencies at the subnational level, the government should also strengthen the role of the Sub-secretariat for Regional and Administrative Development.

More effective infrastructure investments at the subnational level require turning strategic planning into effective investment prioritisation. The non-binding and unfunded nature of local development strategies limits their usefulness and the existence of multiple planning instruments does not help in the prioritisation of projects. Funding mechanisms also prevent a comprehensive and strategic approach to infrastructure investments and their prioritisation, as the budget is allocated on a project and sectoral basis; the various projects comprising an integrated initiative risk being evaluated independently of a master plan. Furthermore, the capability to overcome weak co-ordination of planning instruments is limited by political cycles that create incentives for national and local actors to prioritise a short-term agenda. A unique strategy for infrastructure and spatial planning co-ordinated among sectors at the national and subnational levels, such as the Area Agendas in the Netherlands, could help Chile to streamline its infrastructure planning. This should be completed by a better connection between planning and budgeting through medium-term budgeting frameworks or multi-annual budget planning that provides a reasonable certainty for funds being allocated and carried over.

In Chile, programming agreements (*convenios de programación*) have largely contributed to the development of regional infrastructure and are unique tools allowing for multi-annual budgeting of infrastructure investment. These agreements can ensure that national level policy decisions and regional priorities cohere and “synergetically” contribute to national development targets. To best use this instrument, the government should move from sectoral-based to territorially based contracts, like contracts in Colombia or France. Territorial contracts need an agreed comprehensive portfolio with a medium-term horizon and clearly defined goals and development priorities.

Collaboration across regions and municipalities is critical for more effective infrastructure investments. To further encourage municipal associations and their capacity to undertake infrastructure investments, Chile should create funding incentives devoted exclusively to joint projects or through special territorial contracts where associations are called to co-finance infrastructure projects. In parallel, planning at a macro-regional level might help Chile to define place-based policies. While the benefits are important, this also entails some challenges; with no macro-regional institutional head, collaboration between regions depends strongly on political will. Thus, authorities need to handle rigorously political imbalances that may arise in the process of defining macro-regional priorities.

Chile should move further in metropolitan governance. Urban investment at the national level is highly fragmented, putting at stake the metropolitan administration, notably in transport. The challenge is twofold: on the one hand, municipalities do not have the right incentives to co-operate; on the other, differences in administrative and financial capacity accentuate inequalities within the metropolitan areas, including socio-spatial segregation. A first step in strengthening metropolitan governance could be to better co-ordinate transport investment and management policies. A dedicated transport authority, overseen either by the Ministry of Transport or a devolved level of government, could be set up to address this gap.

For example, Santiago, which has for decades struggled with its public transport system (see Chapter 4), could envisage the creation of a transport authority as a means of building capacity for managing the region's transport system at the metropolitan scale, based on the example of the Auckland Council in charge of developing the Auckland Plan which, amongst other things, sets out strategies for building infrastructure to improve Auckland's congestion over the next 30 years. The authority could build on the experience of Plan Santiago and Secretary for Transport Planning (SECTRA).

Improving the capacities of regions and municipalities is crucial for the existing co-ordination mechanisms to work effectively. In Chile the capacity gap varies largely across subnational governments. Bridging this gap is crucial, not only to improve the capabilities to design and implement infrastructure investments at the local level but also to move forward in the decentralisation agenda as the capacity gap might be one of the main arguments to impede the decentralisation process. If well managed, the recently approved Law 20.922 on permanent municipal staff opens the door for municipalities to strengthen subnational capacities by hiring professionals with the skills and capacities needed while offering improvement and the possibility to access more benefits through greater grades or financial incentives. This needs to be accompanied by articulated training programmes targeting specific local needs. Chile should, in fact, complement training programmes with an adequate and rigorous competence assessment of the capacity gap of municipalities and/or regions defining performance standards.

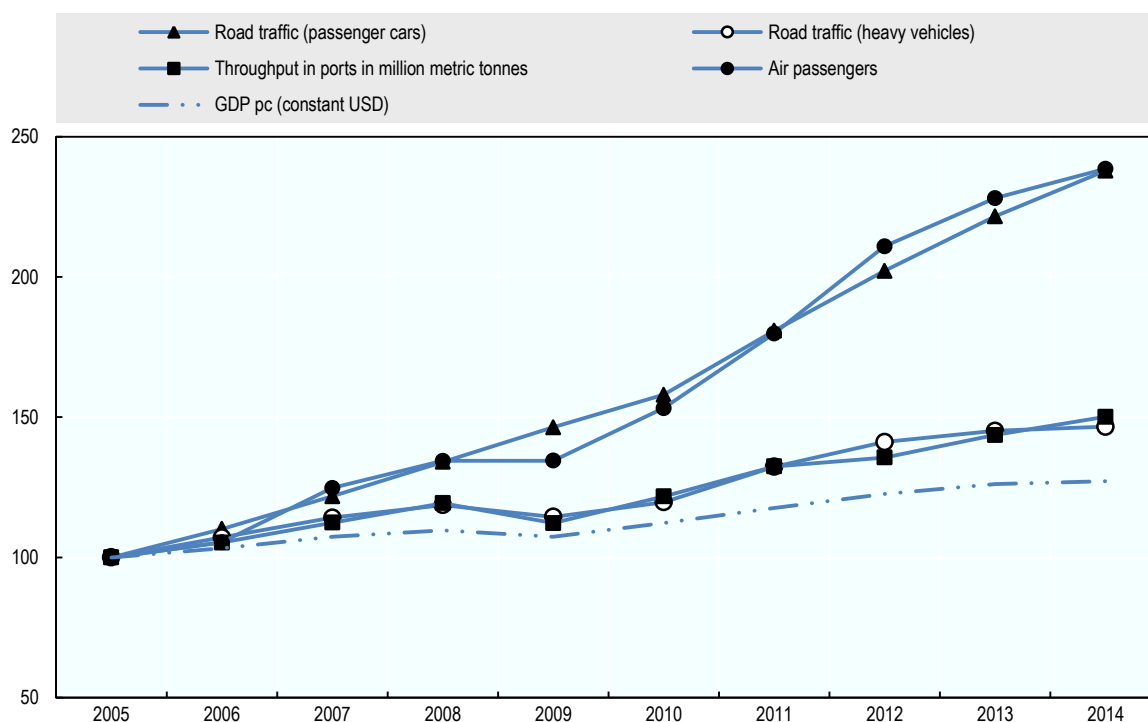
The governance of transport infrastructure in Chile

Infrastructure, productivity and equity

Chile is a middle-income economy heavily geared towards exports. Investment in a high-quality transport infrastructure base, notably intercity motorways, deep-sea ports and modern airports, has contributed significantly to the country's development. Productive investment in transport infrastructure will be central to achieving the objectives of the Infrastructure Plan 2030, as existing networks will be under pressure from transport volumes that are growing at faster rates than GDP, a trend expected to continue even if it attenuates (Figure 6). Maintenance budgets will also need to be increased as the stock of infrastructure grows. The arrangements under Chile's concessions have been successful in maintaining quality and a similarly sustainable approach to asset management needs to be applied to all infrastructure. Beyond the good quality infrastructure base, there are number of potential gaps that will require new investment to meet policy objectives that are co-ordinated between the MOP and sectoral ministries and targeted to deliver on productivity or equity goals. First, there is a gap between policy objectives and investment in port hinterland connections. Second, in relation to investments that address regional equity, a full life-cycle approach to infrastructure investment needs to be adopted to ensure maintenance commitments are financially sustainable. Third, policies to improve social equity, reduce road crashes and contain environmental costs in urban areas will also require increased investment. Fundamentally, co-ordination between ministries could be improved to achieve better integrated land-use and transport planning. This is widely acknowledged and recent joint initiatives are promising.

Figure 6. Evolution of available transport volume indicators in Chile

2005 = 100



Notes: Road traffic is calculated as the number of vehicles counted at toll booths on inter-urban motorways.

Sources: MOP (road traffic); data elaborated by the ITF/OECD based on data from Lloyds Intelligence Unit (throughput in ports); Junta de Aeronautica Civil (air passenger); World Bank (GDP).

Port hinterland connections

Many of Chile's ports lack connections to the country's high-quality motorway network. These gaps result in trucks travelling the final kilometres to the ports through narrow urban streets with junctions ill-suited to large vehicles. This exacerbates congestion and pollution and undermines the efficiency of logistic operations. While access has been greatly improved to the Valparaíso container port through a dedicated truck access road and an inland port, San Antonio, Concepción and many other ports lack spurs to nearby motorways. Investment to remove these bottlenecks should be a priority.

National policy sets an ambitious aspirational target for a modal shift from road to rail, particularly for port hinterland freight traffic. Without major investment in freight railways this target will not be achieved. The recent *Red Logística de Gran Escala* joint initiative between the Ministry of Public Works and the Ministry of Transport and Telecommunications with the State Railway Company, which will focus on developing logistics centres and the rail link to San Antonio port, is an excellent initiative in this respect. The planned construction of a mega port to serve growing demand for container traffic in Central Chile also presents a clear opportunity to develop freight rail services, as the new port is likely to generate sufficient traffic to justify investment in a dedicated rail freight connection to logistics centres inland. Co-ordination of land-use and transport planning will be essential to ensure the long-term success of such an investment.

Unless such dedicated plans for rail freight investment take shape, modal shift targets need to be adjusted; liberalising the regulation of coastal shipping to allow cabotage would be an alternative route to shifting some freight from trucks to more environmentally sustainable transport.

Social equity

Co-ordinated land-use and transport planning is equally important for passenger transport in urban areas. The improvements to Santiago's public transport system in preparation for adjusting the metro, bus and bus rapid transit systems to the rapidly changing spatial demography of the city will require investment in vehicles. More broadly, the street environment in lower income neighbourhoods needs significant investment to improve access to public transport and in turn jobs and services. Many roads in these areas lack pavements, making access to bus stops difficult and dangerous. The situation is similar in other cities. Road congestion is chronic in Santiago, exacerbating air pollution, and will worsen unless demand management policies (such as charging for parking and potentially road use and limiting access to central streets) are strengthened. Road investment alone will not suffice. However, as with port connections, last-mile infrastructure gaps are present at the interface between inter-urban and urban roads. These will need to be addressed as one of the measures to reduce bottlenecks in a number of suburbs.

Regional equity

Chile's regions compare reasonably well with the OECD regions against which this study benchmarked infrastructure quality, both in desert mining regions and isolated boreal regions. These thinly populated regions still face the issue of attracting investment to close some of the existing gaps, but as with similar remote regions in OECD countries they also face problems of low rates of economic return on infrastructure investment. Standard cost-benefit tests to prioritise investments need to be employed, but are suited to comparing similar projects and are not suited to choosing between road projects to relieve urban congestion and to develop remote areas. Factors such as resilience to extreme events, the extent to which infrastructure provides a lifeline to isolated communities and other equity considerations should be covered in a revised methodology for prioritisation. A two-step procedure is also indicated: allocating budgets in relation to regional equity first, then prioritising like projects under these budgets in a second step.

Spreading regional investment too thinly can have unforeseen consequences. Sweden previously took this approach to developing roads in its sparsely populated north, using the budget available to build more roads with lower specifications with shallow foundations. This resulted in much higher than anticipated maintenance costs, as the weaker roads were subject to severe damage from occasional heavy vehicle traffic. Although they were not intended for use by heavy trucks, in practice excluding such vehicles was impossible. The maintenance burden was unsustainable and the policy was subsequently abandoned – with fewer, standard quality, surfaced roads built and gravel roads reinforced rather than surfaced with asphalt. Chile will need to ensure the financial sustainability of its own *pavimentos básicos* programme. One of the strengths of Chile's strategic infrastructure development to date, notably through its highway concessions, has been to ensure maintenance and renewal costs are provided for and the quality of infrastructure preserved over the long term.

Data for sound policy

There is a fundamental gap in the scope of data on transport sector activity available in Chile. The freight sector is poorly understood and basic information such as ton-km transported is not available. More sophisticated indicators on asset age, quality and maintenance needs should also be developed and made available to agencies across competent ministries. This needs to be rectified and plans

for the development of a freight logistics observatory should be pursued, complemented by appropriate funding arrangements.

The governance of water infrastructure in Chile

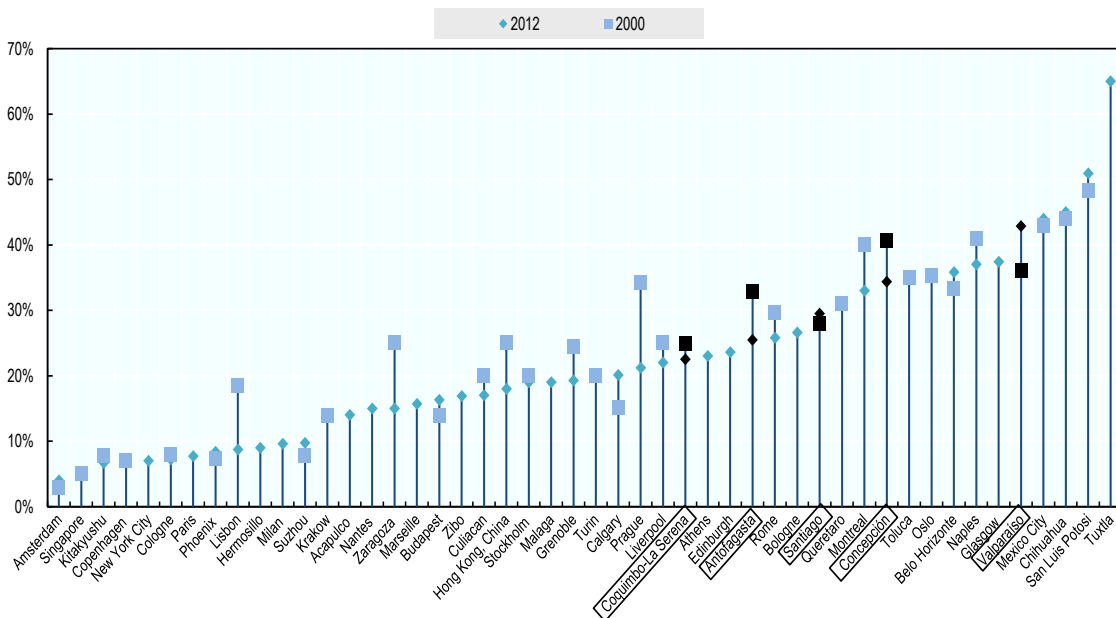
Current and future climate, urban, population and economic trends put pressure on Chile's water resources, especially for the water-intensive sectors, but also on sources of productivity, which are mining and agriculture. Chile's population grew at an average annual rate of 1.04% between 2002 and 2012 (higher than the 0.67% registered on average for the OECD), and it is projected that 90% of Chileans will live in urban areas by 2025. Mining, agriculture and manufacturing are the backbone of Chile's economic development and well-being, but are water-intensive. Agriculture and mining continue to develop in the north and the centre of the country where water is scarce. The central region is home to 50% of national mining potential, and it represented almost 66% of national output in 2013. The Infrastructure Plan 2030 aims at increasing in the Central and North Macrozone water supply through dams to expand 300 000 hectares of irrigated land by 2030. Furthermore, while over the past five years the average share of hydroelectric generation was 32%, the Energy Policy 2050 aims to raise the share of renewable energy to 60% of the electricity generation matrix by 2035 and to at least 70% by 2050. Although hydroelectricity will use water from reservoirs when irrigators downstream do not need them, there is no explicit co-ordination between the Infrastructure Plan 2030 and the Energy Policy 2050. Both strategies were conceived in parallel, with rather limited inter-ministerial consultation, which precludes implementation bottlenecks. Climate change will be a compounding factor to these trends and raise additional difficulties in Chile to ensure water security, as floods and droughts will be more recurrent, and reservoir levels will be lower, thus also having a negative effect on hydroelectricity production.

The previous key trends reveal that altogether there will be increasing pressure on the existing water resources, which will threaten water security in Chile. In Chile, as in many OECD countries, four types of water challenges (too much water, too little water, too polluted water and universal coverage of water services) need particular attention now and in the future to ensure sustainable and inclusive growth in the country. Floods and droughts are becoming more frequent and affect water supply and quality. During the last 30 years, 8 of the 10 largest natural disasters measured by the number of deaths are related to floods in urban areas or riverbeds. Floods affecting urban areas have a greater impact in Santiago and Valparaíso. For instance, the heavy rains in central Chile in April 2016 left an estimated 4 million people without drinking water. In May 2015 floods in northern Chile (Atacama region) caused 31 deaths and left 16 588 people homeless, and the Chilean government estimated recovery costs of at least USD 1.5 billion. The current drought, which began in 2007, is hampering copper production in the world's top exporter, exacerbating forest fires, driving energy prices higher and having an impact on water availability for agriculture. The latter holds economic implications as Chile is among the countries with the largest difference in economic growth between drought years and non-drought years, ranging between 1% and 2% of GDP. Water quality levels are lower in central and northern Chile. Large urban settlements, such as Santiago and Valparaíso, have limited access to tertiary wastewater treatment, which together with large agricultural runoff has caused eutrophication of coastal lakes, wetlands and estuaries. Mining activity has elevated copper and salinity levels in some rivers. In the northern regions, surface waters often exceed permissible or recommended thresholds of heavy metals and sulphates, mainly due to mining effluent. Lastly, while near-universal basic service access has been achieved at an aggregate level, providing access to water supply and sanitation in some rural settlements remains a challenge. According to the Joint Monitoring Programme, 7% of Chile's rural population currently lacks access to improved drinking sources and 9% to improved sanitation.

Investing in the right infrastructure mix, both in quantity and type, will help cope with water risks

Additional investments in infrastructure across several areas would help cope with water risks. First, urban water pipes are ageing and leaking, and need to be upgraded, properly operated and maintained. Chilean cities have among the highest leakage rates out of the 48 OECD and non-OECD cities surveyed in 2012 (Figure 7). Second, as highlighted previously, a key challenge in Chile is achieving universal coverage of water supply and sanitation in rural settlements. Third, rainwater infrastructure is currently insufficient and results in costly damages when floods occur. Even though each urban centre with more than 50 000 inhabitants should design its own Master Plan defining the rainwater network of the city, these plans are not often executed. A key reason for this is that rainwater infrastructure is not included in the concession regime to private utilities in urban areas. Fourth, the efficiency of irrigation systems needs to be improved. In some cases, multipurpose infrastructure can combine several of the above-mentioned needs. A critical way forward is to consider policy complementarities to make the most of these large sunk costs.

Figure 7. Water losses in selected OECD and non-OECD cities



Notes: From the surveyed cities: Budapest (data 2013); Liverpool (2012 figure is the actual loss for Liverpool. 2000 and 1990 values are based on UU's regional data); Singapore (unaccounted-for-water: PUB monitors the UFW which comprises two components, real losses [leakage] and apparent losses [metering]).

For Chile's metropolitan areas data are aggregated for municipalities within the functional urban areas and with available data for water losses. Santiago (Maipú, Gran Santiago, Las Condes, Estación Central, Colina, Lo Barnechea, Huechuraba, Vitacura, Peñaflo, Talagante, Buin, Cerrillos, Paine, Lampa, Padre Hurtado, Isla de Maipo, El Monte, Curacaví, Calera de Tango, San José de Maipo), Valparaíso (Viña del Mar, Valparaíso, Quilpué, Villa Alemana, Concón, Limachean), Concepción (Concepción, Talcahuano, Chiguayante, Coronel, San Pedro de la Paz, Tomé, Penco, Hualqui).

Data correspond to the percentage of the population served by urban water operators with respect to total population living within the area covered.

Source: Official statistics provided in the OECD questionnaire carried out for this report: Data Request on Water in Chile (2016); and OECD (2016a), *Water Governance in Cities*, <http://dx.doi.org/10.1787/9789264251090-en>.

Investment in low-cost options and green infrastructure are also part of the response to bridge these gaps. For instance, coupling the development of grey infrastructure in cities (e.g. tertiary treatment in wastewater plants) with natural infrastructure (ecosystem services) can make investments more

cost-efficient by reducing treatment requirements. In turn, treatment requirements will contribute to reducing electricity consumption and the use of chemicals, amongst others. Promoting green infrastructure in cities through rainwater harvesting systems will also contribute to limiting the need for grey infrastructure. Localised rainwater systems reduce peak flows in times of urban flooding and contribute to better water quality because rainwater is quickly disposed from street pavements. As such, it makes rainwater systems more resilient and cities resort less to wastewater treatment. Water demand management strategies also contribute to more efficient water consumption. These can combine different instruments, such as reuse of rainwater and grey water or enhancing public education on water conservation through awareness campaigns. Thus, the Infrastructure Plan 2030 should look beyond investments in grey infrastructure to also include natural and green infrastructure as well as other water demand management strategies.

The Infrastructure Plan 2030 should acknowledge soft measures that will contribute to raising the effectiveness and efficiency of investments. Among others, these include carefully evaluating future investments in desalination through long-term sound feasibility studies, which take into account initial capital investments as well as uncertainties related to energy prices in operating costs during the life cycle of the project. It will also be critical to strengthen the implementation of the Rural Drinking Water Programme (APR) to meet the challenges of delivering services to a semi-concentrated and disperse population, through different actions such as improving strategic planning; revising the social evaluation methodology for projects in Chile; and enhancing technical, managerial and financial skills and capacities in APR committees and co-operatives. Chile's large urban centres (Santiago, Valparaíso, Concepción) should develop local or metropolitan strategies to foster resilience and adaptive capacity of water systems in the face of climate, economic and urban trends. Moreover, promoting stakeholder engagement in multipurpose infrastructure choices and decisions could contribute to sharing costs and benefits across users in an efficient way. This becomes even more relevant in the current context, where Chile is looking to further develop hydroelectricity generation and expand its irrigation frontier.

In addition to investment in hard infrastructure, Chile will need to overcome fragmentation, scale and policy coherence challenges

While infrastructure can help manage water risks, it cannot be the only policy response. Constructing more dams, upgrading channels to have less leakage and installing efficient irrigation systems will all contribute to increasing water availability, and if the future scenario is business as usual, reduce risks of too little water. Rainwater systems with larger capacity and higher coverage will help manage higher peak flows and therefore diminish the risk of floods in cities. More quality treatments in wastewater treatment plants will also diminish the risks of disrupting freshwater systems. However, investments in physical infrastructure will need to be accompanied by sound water institutions, integrated into wider governance frameworks and improved information systems. For instance, if rainwater systems are enlarged in Santiago but are not operated and maintained properly due to the fragmentation of competences across the state and municipalities, the system will not deliver its intended goals. Dams that are not operated for multiple uses can supply water to one specific use while they could generate benefits for other categories of users as well.

Due to Chile's particular regimes of water rights and water markets, the realm of public action in water management is somewhat limited. The National Water Code of 1981 created a unique system of water rights, known as one of the world's most pro-market ones. The National Water Code allowed for the development of a water market with the objective of achieving higher economic efficiency and conservation of water. Whereas the former was achieved by allocating rights to productive activities, the latter is claimed to have failed due to monopolies and speculation. Water rights have been allocated by the national government to private users at their request, free of cost. They were allocated for an indefinite period of time with the possibility to be inherited from one individual to another. Once private parties are

in possession of their water rights, they would be responsible for the management and distribution of their water. Thus, the government loses weight to establish integrated planning and long-term vision, as it has no faculty over water allocation regimes and prioritisation of uses. For instance, such an institutional framework limits the role of the state to manage trade-offs between upstream/downstream, current/future generations, water producer/water users basins, water/energy/agriculture/households/mining users.

Recent attempts to foster co-ordination across water-related policies and to raise the profile of water in the national agenda through the Presidential Delegate for Water Resources or the Committee of Water Ministers have proven insufficient to meet the intended goals. Promising steps have been undertaken with the ongoing reform of the Water Code, but discussion and approval in the Senate is pending. In addition, the lack of a sound basin governance system that can allow for a functional approach to water management and the inconsistencies across agriculture, land-use, energy, mining and water policies are important challenges to address for Chile to be fit for the future. Further steps need to be taken to better co-ordinate actions across the public, private and non-profit sectors; to engage all levels of government in water-related decisions; to manage trade-offs across users; to regulate grey areas such as desalination expansion; and to engage stakeholders for greater acceptance of infrastructure and policy choices.

Chile should raise the profile of water in the national political agenda and strengthen its institutional framework for water management

A first step would be to establish a consensus-based National Water Resources Policy that involves sound consultation across water-related ministries and public agencies, between levels of government, and with the private sector and society at large. Chile's specific institutional framework based on water markets and atomisation of water rights should not prevent the design and implementation of a solid national framework with clear guidelines, priorities and strategies for water to drive economic, social and environmental outcomes. Previous attempts at doing so, including the policy document "National Water Resources Policy" developed by the Presidential Delegate under the Ministry of Interior, can provide food for thought and a useful baseline. Such a national policy would help foster co-ordination of otherwise fragmented actors, and provide a framework for aligning objectives across sectors. The ongoing Water Code reform could facilitate public action in managing water risks in Chile and be a first step toward building consensus around water challenges. Building on the 2005 Water Code reform, which established requirements for ecological flows, the reform started in 2011 holds potential to reinforce the role of water as a national public good. Should it pass through the Senate, it could help strengthen Chile's legal and institutional framework in a context of water scarcity, in particular regarding the regulation of water rights and markets, the prioritisation of human consumption, the improvement of data collection, and the shaping of a country-wide strategic vision on how water can contribute to sustainable and inclusive growth over the short, medium and long terms.

Consider incentives to foster effective basin governance to reconcile administrative and hydrological boundaries. Chile has a number of specificities in terms of climate variability (combining deserts and numerous glaciers), small-scale hydrographic basins formed by the 1 251 rivers flowing from the mountains to coast, and the special morphology that influences the river paths creating a complex water system to manage. In this context, water users' organisations are critical players to manage water resources at the appropriate scale. Chile could push forward a basin governance framework tailored to the territorial specificities of each basin. Raising awareness of the benefits of managing water resources at the basin level could be done through promoting the value of ecosystem services, for instance. The latter should be coupled with a sound water information system to guide planning and decision making. A common frame of reference should be set across institutions, including within river basins, to foster data gathering on social, economic and environmental trends, in line with international standards and OECD best practice.

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ANNEX: GAPS AND RECOMMENDATIONS

Table 1. Governance gaps and remedies

Pre-conditions	Gaps	Remedies
Medium- and long-term planning	<ul style="list-style-type: none"> • Lack of institutionalised central guidance for infrastructure planning in the form of a long-term vision and development goals for the country. • Lack of medium- and long-term planning. • Lack of institutions and a culture that promote more long-term thinking and evidence-based policy making. 	<ul style="list-style-type: none"> • Assign responsibility for developing centralised guidance regarding long-term objectives that should inform infrastructure planning across all sectors. • Develop capacities for long-term thinking within the centre of government.
Horizontal co-ordination	<ul style="list-style-type: none"> • High degree of compartmentalisation in central government. • No mechanism for co-ordinating infrastructure planning across sectors exists at the central level. • Responsibilities for planning in transport are distributed across multiple ministries with weak co-ordination. • Insufficient integration between infrastructure and land-use planning. • Lack of incentives or instruments for incorporating environmental considerations in a strategic sense to infrastructure planning and decision making. 	<ul style="list-style-type: none"> • Map the distribution of responsibilities both in terms of sectors and functions (policy making, planning and execution), and if necessary readjust responsibilities in order to reduce the need for co-ordination. • Develop an integrated transport plan covering all modes. • Improve integration between land-use planning and infrastructure planning at the subnational level, and develop spatial planning concepts and tools for nationally significant infrastructure. • Establish a unit within the centre of government focused on ensuring a whole-of-government approach to addressing the climate change challenge.
Focusing on user needs	<ul style="list-style-type: none"> • Highly centralised infrastructure planning creates obstacles to identifying needs at a local level. • Stakeholder engagement is limited in terms of scope (environmental impacts), techniques (Internet access and online tools) and level of participation (written contributions). 	<ul style="list-style-type: none"> • Extend the scope of stakeholder engagement beyond environmental impact assessment. • Deepen public participation in decision making through the adoption of more interactive and participatory techniques, such as public hearings, webinars, workshops, etc. • Develop guidelines for conducting stakeholder engagement during the project preparation phase.

Pre-conditions	Gaps	Remedies
Choice of delivery mode	<ul style="list-style-type: none"> Lack of value-for-money analysis or formal criteria for determining appropriate delivery modality. Decision to proceed with concession model is taken by the delivery unit. Significant resort to unsolicited bids in concessions projects. 	<ul style="list-style-type: none"> Develop formal criteria for determining the optimal delivery mode. Establish a clear institutional separation between the choice of delivery mode and responsibility for project delivery. Strengthen the capacity of the Concessions Unit (CCOP) and ensure it has the resources to prepare projects.
Sustainability and affordability of infrastructure investment	<ul style="list-style-type: none"> Frequent modifications to concession contracts, often instigated by the public sector partner. Regular extensions to concession contracts, and delayed retendering. Annual and per project budget process. 	<ul style="list-style-type: none"> Strengthen the analytical capacity of the CCOP and ensure it has sufficient resources to prepare projects. Tighten the rules governing contract modifications and ensure they are enforced by the Ministry of Finance. Introduce medium-term commitments to generate certainty for planners, procuring authority and contractors.
Focus on performance over lifetime of asset	<ul style="list-style-type: none"> Limited capacity to monitor the performance of concessionaires. Missing life-cycle perspective for managing infrastructure assets procured using traditional means. 	<ul style="list-style-type: none"> Improve the capacity of the CCOP to monitor the performance of assets and service levels. Ensure that future maintenance costs are included in project cost-benefit analysis. Expand the use of service-level contracts for maintaining the road network.
Value for money	<ul style="list-style-type: none"> Frequent modifications to concession contracts, often instigated by the public sector partner. Regular extensions to concession contracts, and delayed retendering. 	<ul style="list-style-type: none"> Strengthen the analytical capacity of the CCOP and ensure it has sufficient resources to prepare projects.
Robust anti-corruption mechanisms	<ul style="list-style-type: none"> Excessive dependence by the Ministry of Public Works on external expertise for project preparation, potentially resulting in susceptibility to influence from private actors. 	<ul style="list-style-type: none"> Strengthen the technical capacity of the CCOP and ensure it has sufficient resources to prepare projects.
Collection, dissemination and analysis of data	<ul style="list-style-type: none"> Insufficient use of data in infrastructure management both for monitoring ongoing projects and as a learning mechanism. 	<ul style="list-style-type: none"> Establish an independent analysis unit tasked with collecting, analysing and disseminating data across all delivery modes. Put in place information systems for collecting and providing access to data across the different phases of projects.

Table 2. Main challenges in the multi-level governance of infrastructure and remedies

Pre-conditions	Challenges	Recommendations
<p>Decentralisation of infrastructure investments</p>	<ul style="list-style-type: none"> • Subnational governments have limited own revenues and expenditure and play a very limited role in public investments compared to most OECD countries. • Overlap and unclear competences on infrastructure across levels of government. • The autonomy of regional governments is very limited in an OECD perspective. <p>Weak co-ordination between subnational governments and private actors.</p>	<ul style="list-style-type: none"> • Strengthen the financial autonomy of subnational governments. • Pursue decentralisation reforms and complement the direct election of the <i>Intendente</i> with a transfer of competencies and funding. • Clarify and if necessary readjust the distribution of responsibilities across levels of government (policy making, planning and execution). • Pursue pilot projects on the devolution of competences to diminish transition costs. • Involve subnational governments in the definition and tendering of infrastructure investments with the private sector.
<p>Place-based infrastructure investment planning framework</p>	<ul style="list-style-type: none"> • Lack of institutionalised central guidance/strategy for infrastructure integrating territorial development goals/strategies. • Weak cross-sectoral co-ordination at the national level concerning infrastructure investments with a territorial impact. • Weak co-ordination among sectoral ministries (Regional Ministerial Secretary or SEREMIs) and services at the subnational level. • Top-down approach in deciding infrastructure investments with poor involvement of subnational governments. • The role of the Sub-secretariat for Regional Development and Administration (SUBDERE) in promoting regional development and co-ordination for territorial policies is weak. • Multiplicity of planning tools poorly linked and not connected with budgeting. • Insufficient integration between infrastructure and land-use planning. • Weak role of regional and municipal development strategies (Estrategia de Desarrollo Regional: ERD and Plan de Desarrollo Comunal: PLADECO) leading to poor prioritisation of projects. 	<ul style="list-style-type: none"> • Develop a long-term strategy/guidance for regional development to frame infrastructure planning across all levels of government. • Strengthen the role of SUBDERE to improve collaboration between ministries and public agencies. • Strengthen and further develop the role of the Interministerial Committee for City, Housing and Territory (COMICIVYT) in the definition and monitoring of regional investment strategies. • Strengthen the role of the ERD and PLADECO to guide and articulate regional infrastructure investments. • Streamline planning instruments at the national and subnational levels by articulating the ERD and PLADECO with a national and cross-sectoral national regional development strategy.
<p>Linking budgeting and planning</p>	<ul style="list-style-type: none"> • Allocation of budget for infrastructure investment is project-based. • Subnational investments funding prevents a comprehensive and strategic approach to infrastructure investments and its prioritisation. • Annual budget allocation discourages medium- or long-term investment planning. 	<ul style="list-style-type: none"> • Move towards a programme-based funding allocation framework to allow the effective execution of place-based agendas. • Develop a multi-year budgeting framework to improve the connection between planning and budgeting. • Further prioritise investments framed by the ERD and PLADECO within a medium-term budgeting framework.

Pre-conditions	Challenges	Recommendations
<p>Co-ordination across levels of government</p>	<ul style="list-style-type: none"> • The role of Regional Governments (GOREs) in terms of competences and financing is weak; the authority and autonomy of GOREs is limited. • The use of programming agreements is weak, highly concentrated in some sectors and focused on projects. • The involvement of municipalities in programming agreements is limited. • Dialogue across levels of government depends largely on political will; platforms for dialogue are more informal or <i>ad hoc</i> than institutionalised. • The role played by dialogue platforms such as the COMICIVYT has been crucial but remains limited. 	<ul style="list-style-type: none"> • Strengthen GOREs (competences and resources) as key levers for improved co-ordination: <ul style="list-style-type: none"> ○ GOREs can act as key interlocutors for vertical co-ordination in the interaction between municipalities and the central government. ○ GOREs should support critical projects that require cross-jurisdictional co-operation, in particular <i>vis-à-vis</i> rural municipalities. • Strengthen programming agreements to transform them into territorial contracts. Some of the key elements to consider are: <ul style="list-style-type: none"> ○ specify territorial goals and regional development priorities for each contract ○ consider a consultation phase involving national and subnational actors, the private sector and civil society ○ clearly define the role of the different institutions and authorities involved ○ encourage partnerships with municipal associations to support investments at a supra-municipal scale through special funding for contracts signed by associations ○ develop specific contractual arrangements for metropolitan areas ○ incorporate monitoring mechanisms and an evaluation phase ○ set incentives for contract enforcement, for example, allocate part of the funding based on good performance. • Further institutionalise the role of regional COMICIVYT by enhancing their competences. Regional COMICIVYT could be regular committees with monitoring competences and be accountable to citizens.

Pre-conditions	Challenges	Recommendations
<p>Co-ordination across regions and municipalities</p>	<ul style="list-style-type: none"> • Collaboration between regions and municipalities is limited; subnational governments are usually called to compete for funding of infrastructure investments, hampering collaboration between them. • Municipal associations have encountered a series of challenges mainly linked to their funding. • The involvement of municipal associations in infrastructure investments is limited. • Lack of financial incentives for co-ordination between municipalities and regions. • Urban investments are highly fragmented. • Lack of a metropolitan governance framework. 	<ul style="list-style-type: none"> • Further encourage municipal associations for infrastructure projects through financial incentives: <ul style="list-style-type: none"> ○ specific funding from the National Fund for Regional Development (FNDR or other sources) dedicated exclusively to joint projects ○ special territorial contracts where associations are called to co-finance infrastructure projects jointly. • Further encourage infrastructure investment planning at a macro-regional level articulated with existing regional planning instruments. • Develop a metropolitan transport authority as a first step towards the creation of metropolitan governance bodies. • Ensure a metropolitan governance architecture that is sufficiently flexible to adapt to the various types and challenges of Chilean urban areas.
<p>Subnational capacities for infrastructure investments</p>	<ul style="list-style-type: none"> • Low and unequal capacities of subnational governments to design and implement infrastructure projects. The main barriers for capacity building are high staff turnover and low salaries at the local level. • Important differences in local administrative capacity to undertake concessions contracts. • Multiple training programmes and methodologies weakly co-ordinated. • Weak stakeholder involvement in the definition of infrastructure investments. Citizen engagement is more reactive than proactive. • Multiple participatory spaces for different purposes with unclear outputs. • <i>Ex post</i> evaluation is mainly based on budget execution assessment. • Multiple data repository with limited articulation. 	<ul style="list-style-type: none"> • Streamline and articulate the various training programmes for investment capacities. A central level infrastructure advisory body (see Chapter 2) could assume this task. Regions and municipal associations might also be key levers to articulate capacity building and technical support. • Strengthen and adapt the permanent municipal staff (<i>planta municipal</i>) to local needs through Law 20.922. • Professionalise regional and municipal public servants. Subnational governments could consider adapting the principles for senior civil servants (<i>Sistema de Alta Dirección Pública</i>) to their local context. • Assess subnational capacity gaps with a competence and performance assessment framework that could involve defining standards of performance. • Pursue capacity building through pilot projects (learning-by-doing), especially in the devolution of infrastructure and transport competences. • Streamline participation spaces in order to avoid consultation fatigue by re-evaluating current participatory mechanisms and better aligning government and citizen approaches and expectations. • Complete <i>ex ante</i> assessment needs with an integrated monitoring and evaluation system, providing a comprehensive set of information available in a friendly way to encourage citizen's use. • Strengthen the IDE as an articulated platform, integrating information from the various existing platforms (BIP, SNI, SINIM, etc.). • Develop an <i>ex post</i> evaluation process to check the effectiveness and eventually the impact on territorial development of infrastructure and development strategies, such as the Plan 30/30.

Table 3. Transport infrastructure gaps and remedies

Theme	Gaps	Recommendations
Last-mile connectivity	<ul style="list-style-type: none"> • Last-mile connectivity gaps exist at the interface of different modes and limit the efficiency of transport networks as a whole. • Suburban motorways are not always linked to urban roads and bottlenecks are present along key access routes to large cities. • Missing high-quality links between ports and the national highway network result in heavy vehicles using inadequate and inappropriate urban streets to access port terminals. • Access to all major airports is exclusively car-based and public transport options are not integrated with urban mobility systems. 	<ul style="list-style-type: none"> • Develop a national multimodal strategy. The main goal of the strategy is to identify, upgrade and interconnect the assets that contribute to trade competitiveness. • Priorities should cover addressing last-mile connectivity issues and providing better intermodal links to the port, including the nationally significant opportunity to develop a logistics system in central Chile. • Give metropolitan authorities transport infrastructure planning instruments to develop comprehensive strategies and better co-ordinate investment across ports, airports and urban transport assets.
Inequalities in the provision and quality of infrastructure	<ul style="list-style-type: none"> • Gaps in surface quality and safety standards of roads exist not just between Chile and OECD comparators but also between Chilean macrozones and within these zones, as seen by large differences in the quality of secondary roads and road crash rates. • Even starker differences are evident across areas of large cities, where poorer neighbourhoods are not only located further away than richer ones from jobs and services, but also suffer from lower quality infrastructure, such as the lack of pavements and other infrastructure for pedestrians. 	<ul style="list-style-type: none"> • Provide more equitable access to jobs and services for all citizens by investing in higher quality public transport and urban spaces, coupled with policies to manage both car and truck traffic flows. • Target investment in order to make the most of the public funds spent to address gaps in remote regions, either with specific allowances in national and regional budgets, or by reforming appraisal methodologies. • Roll out road paving solutions incrementally in more peripheral regions, taking into account connectivity needs, projected traffic growth (by vehicle type), life-cycle costs and safety implications.
Rail transport potential	<ul style="list-style-type: none"> • Low investment, unclear capacity allocation choices and the lack of a national strategy for rail transport undermine the rail network's ability to accommodate both passenger and freight services. • The quality of rail freight connections to ports is poor and the logistics network lacks inland ports and distribution centres connected to the ports by trunk rail or road links, leading to low utilisation of existing tracks, particularly in Central and Southern Chile. 	<ul style="list-style-type: none"> • Promote rail transport to meet freight demand by providing reliable infrastructure and dedicated links that support commercial speeds and accommodate higher loads. • Develop a coherent strategy that reduces conflicts in the allocation of capacity between freight and passenger traffic. • Identify opportunities for new rail passenger services, especially at the suburban level.

Theme	Gaps	Recommendations
Collection, dissemination and analysis of data	<ul style="list-style-type: none"> The lack of comprehensive datasets for most transport sectors hinders the compilation of transport statistics and the development of performance indicators and related analysis. 	<ul style="list-style-type: none"> Deploy standardised data collection methodologies across transport sectors by bridging the knowledge gap between private and public actors, and between different government agencies. Set up a Logistics Observatory in charge of compiling and disseminating statistics and key performance indicators to guide policy.
External impacts of transport	<ul style="list-style-type: none"> Transport networks are generating high external costs, reflected in the number of deaths caused by road crashes, the exposure of urban residents to pollutants and growing greenhouse gas emissions. Externalities derive from an over-reliance on road transport for both freight and passenger movements, and low-quality public transport alternatives. 	<ul style="list-style-type: none"> Contain the growth of private motorised vehicles in urban areas by promoting a modal shift to public transport and active modes. Develop costal shipping including by liberalising cabotage as an alternative to road transport for imports that arrive at deep-sea ports in Central Chile but carry goods going to other regions. Develop the National Road Safety Strategy to ensure that legislation, education and infrastructure investment efforts towards greater road safety are joined up and adhere to international best practice.
Focus on performance over the lifetime of the asset	<ul style="list-style-type: none"> Maintenance needs are already evident in Chile's rail infrastructure, and given large-scale construction in recent years needs will grow as road, port and airport assets age. Extreme weather events linked to climate change and natural disasters will continue to be a challenge for the resilience of transport networks across the country. 	<ul style="list-style-type: none"> Assign greater priority to maintenance in future infrastructure budgets based on foreseen needs; develop studies to map and quantify the potentially disruptive impacts of natural disasters and climate change. Introduce asset management techniques across all modes to better assess what level of investment is best for each category of infrastructure.

Table 4. Water infrastructure gaps and remedies

Place water governance high in Chile's agenda for long-term sustainable development.		
Theme	Gaps	Recommendations
Bridging water governance gaps	<ul style="list-style-type: none"> Chile's central government is characterised by a high degree of compartmentalisation. Sectoral ministries work in isolated silos, with limited mechanisms for ensuring alignment and integration across policy areas and investments. The lack of horizontal co-ordination is particularly challenging in water management as many decisions taken in other policy domains (e.g. land use, energy, agriculture, industry) generate water risks and vice versa. A striking feature of the Chilean water management model is the absence of integrated basin governance systems that can provide the baseline for a functional and territorial approach to water risks. Chile has made important efforts to produce the Water Atlas, which provides an overall picture of the stock of water resources but, overall, data and information gaps on water resources management and planning hinder decision making. 	<ul style="list-style-type: none"> Establish a consensus-based National Water Resources Policy that involves sound consultation across water-related ministries and public agencies, between levels of government, and with the private sector and society at large. Discussions and the current reform of the Water Code are a significant step forward to facilitate public action in managing water risks in Chile. Consider incentives to foster effective basin governance that can help reconcile administrative and hydrological boundaries. There is room for building on the experience of the territorial roundtables and strong water users' organisations already in place as well as lessons learnt from past attempts. Strengthen water information systems and use them to guide planning and decision making. Improved access, quality and disclosure of information across levels of government are prerequisites for better decision making, monitoring and evaluation in water policy.
Choosing the right water infrastructure, both in quantity and type. Water infrastructure is heterogeneous and requires different approaches.		
Theme	Gaps	Recommendations
Urban water supply and sanitation services	<ul style="list-style-type: none"> Chile's challenges in urban water supply and sanitation relate to the infrastructure upgrade and renewal needed to sustain current levels of service delivery and water safety. Water losses in major Chilean cities are higher than in most peer cities, and wastewater treatment is not as high quality as in other high-income OECD countries. 	<ul style="list-style-type: none"> Develop a strategy and catalyse needed finance to upgrade, renew and maintain drinking water supply and sanitation infrastructure. Engagement with utilities and end-users will be needed to clarify who pays for what over the short, medium and long term. Enhance efforts to transition from water supply to water demand management, especially in cities, to better manage risks now and in the future.
Rural water supply and sanitation services	<ul style="list-style-type: none"> The renewed challenge in the APR programme is to secure access for the population living in semi-concentrated and disperse areas. In 2015, the Chilean government reported that while concentrated rural communities have overall access to drinking water, sparsely populated areas still struggle to access basic water services. Insufficient data and information hinders the efficiency of investments in the APR programme. There is currently a lack of systematic and comprehensive monitoring of the results achieved by the APR. 	<ul style="list-style-type: none"> Consider further alternatives to large-scale centralised systems in semi-concentrated and disperse agglomerations. OECD countries' experience in rural access to water and sanitation services indicates that localised systems can perform as centrally piped infrastructures. Strengthen the implementation of the APR programme by: 1) improving strategic planning; 2) revising the social evaluation methodology; 3) enhancing technical, managerial and financial skills and capacities in committees and co-operatives. Conduct regular monitoring of the APR programme to anticipate supply cuts, and costly investments due to infrastructure replacements, and co-ordinate with regional councils to establish investment priorities.

Choosing the right water infrastructure, both in quantity and type. Water infrastructure is heterogeneous and requires different approaches.

Theme	Gaps	Recommendations
Rainwater infrastructure operation and maintenance, and expanding the network	<ul style="list-style-type: none"> • Rainwater infrastructure exists in Chile's main cities, such as Valparaíso, Concepción or Santiago, but it is not effectively functioning against heavy rain episodes due to lack of maintenance by subnational authorities. • Medium-sized growing cities must consider further developing and maintaining rainwater infrastructure to be fit for the future. 	<ul style="list-style-type: none"> • Promote lower cost alternatives such as urban green infrastructure, resorting, for instance, to "source control" technologies, green roofs or pervious surfaces. • Develop local or metropolitan strategies in Chile's large urban centres (Santiago, Valparaíso, Concepción) to foster resilience and adaptive capacity of water systems in the face of climate, economic and urban trends.
Desalination projects	<ul style="list-style-type: none"> • There is no current land-use planning strategy of Chile's northern coastline to coherently develop desalination projects. • There is no co-ordinated approach to manage trade-offs across water users in the north of Chile, with desalination as part of the response. • There is no clear legal framework that sets rules and holds investors and public authorities accountable. The Water Code only regulates land water resources, not water resources resulting from seawater treatment. There is neither a regulation nor a regulatory authority that oversees the management and use of the resulting water from desalination processes. • Energy shortfalls in Chile and climate change require thinking of how and at what cost energy will be delivered for desalination plants. Desalination requires large amounts of energy and as a result can be a costly option depending on energy prices. 	<ul style="list-style-type: none"> • Strengthen the institutional, legal and regulatory framework for desalination as a prerequisite to continue investing in desalination projects. Actions include: 1) developing a national policy on desalination that sets planning guidelines to ensure private investment is done right; 2) setting clear, transparent and proportionate enforcement rules, procedures, incentives and tools (including rewards and penalties) to promote compliance. • Future investments in desalination need to be carefully evaluated through long-term sound feasibility studies, which take into account initial capital investments as well as uncertainties related to energy prices in operating costs during the life cycle of the project. • Reduce the impact of desalination projects on the local environment to ensure sustainability in the medium and long term. Ensure that the highly concentrated brine does not disrupt natural ecosystems by installing cutting-edge technologies and reducing the impact area.
Irrigation and water resources infrastructure	<ul style="list-style-type: none"> • Chile's rate of freshwater abstraction per hectare of irrigated land is among the highest in the OECD. Although Law 18450 contributed to the improvement of irrigation efficiency in Chile, it is still lagging behind other countries such as Brazil, France or Italy. • In the face of climate, economic and urban trends, some infrastructure could contribute to better water supply management for irrigation. Selected dams and aqueducts could help keep the level of current water consumption up and deal, to some extent, with increasing demand. 	<ul style="list-style-type: none"> • Irrigation systems could be upgraded in Central Chile where most of the water allocated to agriculture is used. This upgrade should be done on a case-by-case basis, as efficiency in irrigation is also associated with lower recharge of aquifers. • Engage stakeholders in multipurpose infrastructure choices and decisions and strive to share costs and benefits across users in an efficient way. The Chilean government has an important role to play in establishing an institutional environment that encourages exchange and more bottom-up decision making.

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