

CANADA'S
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DES POLITIQUES PUBLIQUES
DU CANADA

INTERNATIONAL APPROACHES TO INFRASTRUCTURE GOVERNANCE

Experiences from the United States, the United Kingdom and Australia

Final report
August 2014



CANADA'S
PUBLIC POLICY

FORUM

DES POLITIQUES PUBLIQUES
DU CANADA

The Public Policy Forum is an independent, not-for-profit organization dedicated to improving the quality of government in Canada through enhanced dialogue among the public, private and voluntary sectors. The Forum's members, drawn from business, federal, provincial and territorial governments, the voluntary sector and organized labour, share a belief that an efficient and effective public service is important in ensuring Canada's competitiveness abroad and quality of life at home.

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**WITH THANKS TO OUR PROJECT PARTNER, THE
GOVERNMENT OF CANADA**

Canada 



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PREFACE

The following report, *International approaches to infrastructure governance: experiences from the United States, the United Kingdom, and Australia*, is the result of extensive research and interviews conducted by Canada’s Public Policy Forum. This report offers a comparative analysis on the state of infrastructure in the United States, the United Kingdom, and Australia, with the hope that such insights can prove beneficial for reviewing infrastructure governance structures on a domestic level.

After a brief introduction depicting the evolution of governance models in each country, the report emphasizes the current state of infrastructure in each country and the most significant infrastructure gaps likely to impact productivity. The report then highlights the division of responsibilities across jurisdictions, including the role of federal governments in managing infrastructure where there is federal ownership as well as where the federal government funds/supports infrastructure owned by other jurisdictions. Finally, the report covers the alignment between infrastructure programming and governance structures, approaches to financing, with particular focus on privatization and public-private partnerships, and how sustainability considerations impact infrastructure investments, reflecting the need to take into account broader environmental and social goals.

The report draws from a series of recent reports commissioned by governments, think-tanks and other expert groups. It also draws on a series of interviews conducted with infrastructure experts (see Appendix).

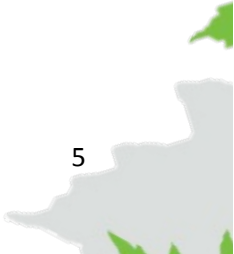
Canada’s Public Policy Forum would like to take the opportunity to thank the infrastructure experts from the United States, United Kingdom and Australia who took the time to participate in interviews and to provide information on infrastructure challenges and opportunities facing their respective countries.

We also wish to thank our partner, Infrastructure Canada, for supporting the production of our report. As with all reports published by Canada’s Public Policy Forum, the views expressed in this document do not necessarily represent those of our project partner.

I would like to offer a special thanks to our team at Public Policy Forum for their work on this project, including Vice-President, Sébastien Goupil, for leading this project, Amanda Pickrell for her research and project co-ordination, Dylan Kruger and Winnie Wong for their research assistance, and Mathias Schoemer for designing this report.



David Mitchell
President and CEO
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INTRODUCTION

Similar to many countries around the world, Canada is confronted with significant infrastructure challenges and gaps. The Champlain Bridge in Montreal is an easily identified example of the issues facing the country as aging infrastructure begins to deteriorate. In light of the enormous costs associated with maintenance, concerns about safety and security of users, and the potential catastrophic impact on the local, domestic and national economies should the bridge need to be closed, the Government of Canada recently announced plans to expedite construction of a replacement bridge by 2018. Similarly, the lack of adequate infrastructure to transport and export Canada's vast energy reserves and natural resources, especially those from the Western provinces, led to the private sector seeking to fill the gap with projects such as the Northern Gateway and Keystone XL.

According to government and expert sources, failure to refurbish or replace current transport, power, water and telecommunications assets and build new ones would not only significantly increase basic repair and maintenance costs, but more importantly, would harm productivity and place a heavy toll on the future prosperity of our country. As noted in the Canadian Infrastructure Report Card released in 2012, "The importance of investing in modern infrastructure has become synonymous with Canada's economic competitiveness and quality of life"¹. *The Global Competitiveness Report 2013 – 2014* from the World Economic Forum notes that "Extensive and efficient infrastructure is critical for ensuring the effective functioning of the economy, as it is an important factor in determining the location of economic activity and the kinds of activities or sectors that can develop within a country."²

After decades of underinvestment in infrastructure, governments in Canada have begun to reverse the trend, with the economic downturn providing the opportunity to invest in infrastructure as a means of stimulating the economy. In its most recent Speech from the Throne, the Government of Canada reiterated its commitment to further invest in infrastructure in order to create jobs, support trade, drive productivity and contribute to growth and long-term prosperity. Through the new iteration of the Building Canada Plan, the federal government committed to investing \$53 billion over ten years in federal, provincial, territorial and municipal infrastructure. Accounting for other Government commitments, this amounts to \$70 billion for public infrastructure over the next decade. This investment is presented as "the largest long-term federal commitment to infrastructure in Canadian history"³.

In order to address the current infrastructure challenges and gaps, it is important that governments in Canada continue to work together to identify and implement best practice approaches to infrastructure governance and financing. Governments must also work in close collaboration with the private sector and institutional investors through public-private partnerships that continue to provide value for Canadians. In determining the best approach for Canadian infrastructure governance and financing solutions, there is an opportunity to draw from the experience of other jurisdictions.

¹ "The Canadian Infrastructure Report Card" was produced in 2012 and jointly sponsored by four organizations: the Canadian Construction Association, the Canadian Public Works Association, the Canadian Society for Civil Engineering, and the Federation of Canadian Municipalities.

² "World Economic Forum, Global Competitiveness Report", 2014, p.5

³ "Prosperity and Opportunity in an Uncertain World" Speech from the Throne, October 2013

As noted by McKinsey & Company in their Report *Infrastructure productivity: How to save \$1 trillion a year*, “if infrastructure owners around the world were to adopt best practices, they could increase the productivity of infrastructure investment to achieve savings of 40 percent.”⁴ The Report notes four ways to upgrade infrastructure governance and delivery mechanisms: ensuring close coordination between infrastructure authorities; separating political and technical responsibilities for infrastructure; ensuring a clear division of roles and responsibilities between the public and private sector; and making available reliable data on which to base ongoing oversight and longer-term planning while maintaining strong capacity within the public sector for planning, delivering and operations.

In order to identify best practices, Canada’s Public Policy Forum has undertaken a review of the different approaches and success stories relating to infrastructure governance in three like-minded nations: the United Kingdom, the United States, and Australia. The project focused on the following principal asset classes: transportation infrastructure such as highways, roads and bridges; public transit; wastewater; water; energy; and digital infrastructure.

⁴ “Infrastructure Productivity: How to save \$1 trillion a year,” McKinsey Global Institute, 2013, pp 1-2, 7-8

UNITED STATES

HISTORY

During the earliest stages of American history, infrastructure development was funded by individual investors. The federal government had limited powers and insufficient funds to finance significant construction projects and was unable, and in many cases, unwilling to facilitate the development of American industry, agriculture, commerce, transportation, and expansion. Unfortunately, despite their enthusiasm, individual investors were unable to raise the kinds of funds required for commercial and transportation networks and other infrastructure. Consequently, in the latter half of the nineteenth century, the federal government began to embark on infrastructure development.

The Civil War prompted the then President, Abraham Lincoln, to recognize the importance of good transportation and communication links to military strategy. The federal government financed the completion of a significant railroad and telegraph network, which created the foundations for advanced communications, transportation and commerce following the war.

Under the Roosevelt administration, the New Deal escalated government investment in infrastructure as a means to stimulate the economy and end the Great Depression. The significant projects funded under the New Deal included the Hoover Dam and the Parker Dam, which brought significant population influx and economic growth to California and Arizona. The hydroelectricity energy harnessed by the Hoover Dam also enabled the growth of Los Angeles.

During the Second World War and in the Cold War era, federal investment grew to unprecedented levels, with particular increases in military infrastructure such as forts, shipyards, airfields, training grounds and research laboratories. The establishment of military-industrial complexes spurred economic growth and provided new jobs and stimulus to many regions.

The most significant statutes underlying infrastructure development were the Highway Acts of 1916, 1921 and 1956. In response to a sudden increase in road traffic following the introduction of the Model T Ford, Congress passed the Highway Act of 1916. Under this Act and the one that followed in 1921, a federal-state government agreement was reached whereby each would fund fifty percent of projects. The Highway Act of 1956 then expanded the network to connect 42 capital cities, transforming goods transportation, business travel, tourism and employment.

CURRENT STATE OF ASSETS

A series of recent, high-profile infrastructure failures has heightened concerns about the state of US infrastructure. The failure of the levees in New Orleans during Hurricane Katrina, a steam pipe explosion in Manhattan and a bridge collapse in Minneapolis have drawn attention to a lack of accountability in investments and poor decision making⁵. Public infrastructure spending has also been in decline as the US responds to the recent financial crisis. At the state and local level, where three-quarters of all spending on infrastructure occurs, states cut budgets by 3.8% in 2009 and 5.7% in 2010⁶. Comparatively

⁵ "To Fix America's Infrastructure, Washington Needs to Get Out of the Way", Katz and Puentes, Brookings Institute, 2014, <http://www.brookings.edu/research/opinions/2014/05/12-americas-infrastructure-washington-puentes-katz>

⁶ "America's crumbling infrastructure: Bridging the Gap", The Economist, 2014, <http://www.economist.com/news/united-states/21605932-country-where-everyone-drives-america-has-shoddy-roads-bridging-gap>

speaking, the annual expenditure on public infrastructure in the US has shrunk to about half the European level, and at 2.5% of GDP is well behind peer countries, such as Canada and Australia, both of which invest 3.9% of GDP⁷. Since 1998, the grades given to US infrastructure (by the American Society of Civil Engineers) have been steadily falling due to delayed maintenance and underinvestment on most assets. McKinsey Global has estimated that the US should spend at least an additional \$150 billion a year on infrastructure until 2020 in order to meet present day needs⁸.

Transportation (aviation, bridges, inland waterways, ports, rail, roads, transit)

Roads, transit and bridges are the areas of greatest concern for transportation infrastructure. 42% of major urban highways remain congested and the Federal Highway Administration (FHWA) estimates that \$170 billion in capital investment per year is needed to significantly improve conditions and performance⁹. And, while 1/3 of Americans who do not drive cars rely on public transit, agencies are struggling to balance increasing use with declining funding¹⁰. The average ages of bridges in the US is 42 years, while 1 in 9 bridges are rated as structurally deficient. The FHWA believes that the US needs to invest \$20.5 billion annually to eliminate the bridge repair backlog, but the current budget is \$12.8 billion¹¹.

In contrast, rail infrastructure is benefiting from an influx of capital as it experiences a resurgence both as an energy efficient freight transportation option and a viable city-to-city passenger service. Use of Amtrak by the public has doubled since the year 2000, with growth likely to continue¹². As a result, freight and passenger rail companies have been investing heavily in tracks, bridges and tunnels, as well as adding new capacity for freight and passengers.

Water (dams, drinking water, levees, wastewater/storm water)

While the quality of drinking water in the US remains high (disease outbreaks are very rare), most of the pipes and mains are over 100 years old and in need of replacement. There are an estimated 240,000 water main breaks every year and the American Water Works Association (AWWA) has estimated costs in the order of \$1 trillion over the next decade to replace pipes¹³. The capital investment required for wastewater and storm water systems is also very high. Since 2007, the federal government has directed cities to invest \$15 billion in new pipes, plants and equipment to eliminate sewer overflows. Many of the US's dams are aging. There are currently 4,000 deficient dams, and as of 2012, nearly 14,000 high-hazard dams, with increasing population and greater development in areas below dams. According to the Association of State Dam Safety Officials, an estimated investment of \$21 billion is required to repair deficient and high-hazard dams¹⁴.

Energy

Current energy infrastructure is largely meeting needs, although availability of electricity, gas and oil will become a greater challenge after 2020 as the population increases. There is also some concern about the viability of an electrical grid and pipeline distribution system that is ageing, some of which having

⁷ "The Way Forward: A New Economic Vision for America's Infrastructure" Lipschultz et al, KKR, 2014, <http://www.kkr.com/company/global-institute/way-forward-new-economic-vision-americas-infrastructure>

⁸ Ibid.

⁹ "2010 Status of the Nation's Highways, Bridges, and Transit: Conditions & Performance", US Department of Transportation, Federal Highway Administration, 2010: <http://www.fhwa.dot.gov/policy/2010cpr/execsum.htm#c3h>

¹⁰ Americans have increased use of transit by 9.1% in the past decade and that trend is expected to continue

¹¹ Ibid.

¹² "Amtrak sets new Ridership Record" Amtrak, 2012, <http://www.amtrak.com/ccurl/636/294/Amtrak-Sets-New-Ridership-Record-FY2012-ATK-12-092.pdf>

¹³ "2013 Infrastructure Report Card" American Society of Civil Engineers, 2013: <http://www.infrastructurereportcard.org/>

¹⁴ Ibid.

originated in the 1880s¹⁵. There has been increased investment in power transmission since 2005, but the pace of investment has been hindered by permit issues, weather events and limited maintenance. 17,000 miles of additional high-voltage transmission lines and significant oil and gas pipelines are planned to 2020, but permit issues threaten completion¹⁶.

Communications

Digital infrastructure is financed on a user pays basis, and for this reason, commercial entities are largely meeting current needs. 96% of Americans subscribe to wireless and/or wireline voice, 99% have access to wireless or wireline broadband (5Mbps down/1Mbps up)¹⁷. In 2012, President Barack Obama issued an Executive Order aimed at lowering governmental barriers to broadband infrastructure deployment on federal lands and along US highways. Under the “Dig Once” initiative, federal agencies are required to facilitate broadband deployment activities where roads or other property are already under construction, allowing broadband to be deployed faster throughout the US¹⁸

Despite robust consumer and business use and concerted government efforts, there is some concern that the US is falling behind its peers, trailing on penetration and speed. The US uses an infrastructure based competition model, rather than a service based competition model used in most other countries, where the company that owns the physical infrastructure sells access to independent providers on the wholesale market¹⁹. This impacts competitive pressures. Should cable broadband become a more pervasive technology, there may be less incentive for cable service providers and others to invest in innovation.

Delivering communications to rural communities continues to be a challenge. As of 2011, almost 18 million Americans living in rural areas had no access to robust broadband infrastructure. For those that do have access, services are much slower and more expensive²⁰. There are also significantly fewer service providers, as a result of higher associated costs, which limits choice and competition. In 2011, the US government established the Connect America Fund to accelerate the broadband build-out to unserved communities.

DIVISION OF RESPONSIBILITIES

US infrastructure is primarily owned and operated by state and local governments and the private sector. For example, about 97% of roads and 98% of bridges are owned by state and local governments, and the private sector owns a majority of freight railroad infrastructure (see Table 1). However, the federal government continues to provide a significant amount of funding for infrastructure and also plays an important oversight role in ensuring the security, and reliability of the nation’s infrastructure. One of the key challenges in coordinating this oversight is that federal responsibilities for infrastructure are spread across several departments:

- Department of Transportation – planning and support of national land, air and sea-based travel systems; federal regulations for roads and highways, airports, railways and seaport.

¹⁵ Ibid.

¹⁶ “Pipelines Problems Could Cloud Future of Gas Power”, T.Overton, 2012

¹⁷ “Federal Broadband Deployment Programs and Small Business”, GAO-14-203, Government Accountability Office, 2014.

¹⁸ Executive Order -- Accelerating Broadband Infrastructure Deployment, The White House, 2012: <http://www.whitehouse.gov/the-press-office/2012/06/14/executive-order-accelerating-broadband-infrastructure-deployment>

¹⁹ “Encouraging Infrastructure Investment and Innovation in the US”, World Economic Forum, 2014 <http://reports.weforum.org/delivering-digital-infrastructure/encouraging-infrastructure-investment-and-innovation-in-the-us/>

²⁰ “Federal Broadband Deployment Programs and Small Business”, 2014

- Department of Energy – advancing national, economic and energy security through the implementation of policies regarding nuclear power, fossil fuels and alternative energy sources.
- Federal Communications Commission – regulating radio, television and phone industries.
- US Army Corps of Engineers – designing and constructing flood control systems and involved in a wide range of projects pertaining to the Department of Defense.
- Environmental Protection Agency – protecting the natural environment by enforcing national standards.
- Department of Homeland Security – ensuring the safety and security of the US from both man-made and natural disasters. Focuses on nationally significant infrastructure.

Table 1: Physical Infrastructure Ownership

Source: GAO summary of information from the Airport Cooperative Research Program, Department of Transportation, Environmental Protection Agency, Federal Emergency Management Agency, National Academy of Public Administration, and the National Railroad Passenger Corporation.

Surface transportation	<ul style="list-style-type: none"> • Ninety-seven percent of the nation’s roads and highways are owned by state and local governments, with local governments owning approximately 77 percent of the miles of roadway. • About 98 percent of the nation’s bridges are owned by state and local governments. • Most transit systems are owned and operated by public agencies that are created by state and local governments. • Most freight railroad infrastructure is owned by private freight railroads. The federal government owns about 650 miles of Amtrak’s 22,000-mile rail network. • The maritime transportation infrastructure, including ports, is generally owned and operated by state and local agencies and private companies. Many ports are publicly owned and privately operated.
Aviation	<ul style="list-style-type: none"> • Most commercial service airports are owned by local or state governments, either directly or through an authority, a quasi-governmental body established to operate the airport. • Air traffic control facilities are owned by the federal government.
Water	<ul style="list-style-type: none"> • About half of the nation’s drinking water systems and an estimated 20 percent of the wastewater systems are privately owned. Private owners range from homeowners’ associations, mobile home parks, and other entities whose primary business is unrelated to water supply or wastewater treatment, to larger, investor-owned companies. Publicly owned drinking water systems and wastewater utilities are owned by municipalities, townships, counties, water or sewer districts, and water or sewer authorities.
Dams (including levees)	<ul style="list-style-type: none"> • The majority of dams in the United States are privately owned. The federal government owns and operates about 5 percent of the nation’s dams. • Levees are typically constructed by the federal government, and local governments are responsible for their operation and maintenance.

ALIGNMENT OF INFRASTRUCTURE PLANNING/PROGRAMMING WITH GOVERNANCE STRUCTURES

The state-centric, multi-agency approach to planning and execution has resulted in several key challenges for the federal government:

1. Monitoring how federal government funding is allocated;
2. Coordinating the many jurisdictions involved in infrastructure development to support timely and cost-effective projects; and,
3. Developing a national picture of infrastructure needs.

Monitoring

Because of the way that federal funding is allocated to states, federal departments do not have strong mechanisms to monitor use of those funds. For example, the US Department of Transportation provides about \$40 billion to states annually to build and maintain highways and bridges, through the federal-aid highway program. In recent decades, as the highway program has expanded to encompass broader goals and more responsibilities, the oversight role of the Federal Highway Administration (FHWA) has also expanded but resources have not kept pace. A recent GAO report indicated that FHWA has not been as strict as needed in its oversight role, which has resulted in:

- Improper and ineffective use of federal funds;
- Inaction on recouping funds from inactive highways projects; and,
- Putting state interests ahead of federal objectives to protect the federal-state partnership.

As a result of these concerns, legislation approved by the Senate in March 2012 established a more performance-based highway program, introducing performance measures for highways and bridges and requiring FHWA to monitor states' progress in meeting those measures²¹. MAP 21, passed late in 2012, further refined federal frameworks for monitoring surface transportation projects.

MAP 21 reform

Moving Ahead for Progress in the 21st Century Act, known as MAP 21, was passed in June 2012 as part of efforts to improve governance of infrastructure development, specifically surface transportation. The bill made significant changes to the legal framework that directs federal transportation funding, generally providing more flexibility to states and other recipients, while requiring the Department of Transport, states, and metropolitan planning organizations (MPOs) to establish performance measures and targets to evaluate these investments. The bill also called for simplification of the many existing programs, consolidating the current structure by two thirds into a smaller number of broader core programs. To improve timeliness in program delivery, the environmental review process is also being reformed to speed up project development by excluding more projects from review and enforcing a four-year review deadline with financial penalties.

Coordination and National Oversight

Not only does the federal government have a role in reviewing permits for major infrastructure projects, but states, municipalities and tribes can also have review and permitting roles. These are projects that typically involve multi-year design, development, and construction timelines with complex approval processes. Project proponents may be required to obtain permits and approvals from multiple agencies with different statutory jurisdiction and processes, with no single organization in charge. Because there is not a single federal agency with responsibility for infrastructure development, there are many inefficiencies in the system which can be time-consuming and costly for governments, developers and other stakeholders²².

²¹ "Federal-State Partnership Produces Benefits and Poses Oversight Risks" Government Accountability Office, House of Representatives, 2012

²² "Report to the President: Rebuilding America's Infrastructure: Cutting Timelines and Improving Outcomes for Federal Permitting and Review of Infrastructure Projects", White House, 2013, <http://www.whitehouse.gov/sites/default/files/omb/reports/report-to-the-president-rebuilding-americas-infrastructure.pdf>

Executive Order 13604

In 2012, President Obama signed Executive Order 13604, Improving Performance of Federal Permitting and Review of Infrastructure Projects, to launch a series of government-wide initiatives to cut review and permit decision-making timelines, while improving outcomes for communities and the environment. To implement these objectives, a steering committee has been established comprised of senior leaders from 12 federal agencies with major permitting and review responsibilities. Through this initiative, agencies have expedited the review and permitting of 50 major infrastructure projects, including bridges, transit projects, railways, and roads. Time savings have ranged from several months to several years.

In addition to the Executive Order 13604 discussed above, a new role for the Department of Homeland Security since 2001 in monitoring the protection of key national assets, including highways and bridges, has improved the federal government's oversight. DHS's role has also increased elected officials' understanding of issues associated with and the importance of robust infrastructure development. Officials interviewed consider that the improvements in national oversight of highway safety since the 1970s is in large part a result of the strong political role of a governors' board that has championed road safety²³. They believe that the Department of Homeland Security's new role can build a similar profile for infrastructure development.

INFRASTRUCTURE GAPS AND IMPACTS ON PRODUCTIVITY

Underinvestment in infrastructure is costly for the US:

- The Federal Aviation Administration estimates the cost of airport congestion and delays in 2012 was almost \$22 billion;
- Congestion of urban highways is costing around \$101 billion in waste time and fuel annually; and,
- Deficient and deteriorating transit systems cost the economy \$90 billion in 2010, with agencies struggling to maintain aging and obsolete fleets and facilities due to reduced funding.

Similar challenges are being faced in the water and energy sectors, and without ongoing investment to replace or improve ageing assets, infrastructure will struggle to meet future needs²⁴.

Underinvestment in infrastructure is not only causing safety concerns. It is also having an impact on the economy, negatively affecting business productivity, GDP, employment, personal income and international competitiveness. As the American Society for Civil Engineers notes, "there is an interaction between different infrastructure sectors and a cumulative impact of ongoing investment gaps in multiple infrastructure systems: for example, regardless of efficiency of ports, if highway and rail infrastructure for transporting goods is congested, traffic will slow and costs to business will rise,

²³ In 1967, several Governor's Representatives, realizing the need to share information and collectively work for national safety goals, decided to organize into the National Association of Governors' Highway Safety Representatives (NAGHSR). The organization was incorporated in 1974 and received nonprofit status in 1976. In the ensuing years, its membership, expertise and influence grew. In 2002, the name was changed to the Governors Highway Safety Association.

²⁴ Heintz, Pollin and Garrett-Peltier, "How Infrastructure Investments Support the U.S. Economy: Employment, Productivity and Growth", Political Economy Research Institute, 2009

creating a drag on the economy reflected in lower GDP²⁵. According to the same study, if the investment gap is not addressed throughout the various infrastructure sectors, the economy could lose almost \$1 trillion in business sales, resulting in the loss of 3.5 million jobs by 2020.

FINANCING APPROACHES

Funding for infrastructure comes from a variety of federal, state, local and private sources. According to the Congressional Budget Office, state and local governments make up about 75 per cent of total spending on transportation and water infrastructure, not including financing from federal grants and loan subsidies; the federal government accounts for the other 25 per cent²⁶. Federal grants are available for new capital investments, but state and local governments are largely responsible for operation and maintenance costs, which can be a concern for some local governments²⁷. Where federal funding is available for maintenance, amounts are very limited. Operations and maintenance represented only 8% of total federal grants between 2000 and 2011²⁸.

In terms of specific federal programs and grants:

- **Roads:** a majority of roads funding is channeled through the \$40 billion Highway Trust Fund which is based on taxes collected through transportation user fees and federal fuel taxes. There is some concern about the future of the HTF as fuel taxes have not increased since 1982 and the federal government has been transferring general revenues into the fund, increasing the debt level as a result. GAO has included funding for surface transport on its high risk list for 2015.
- **Water:** the federal government provides a majority of its funding through subsidized loans (less than \$10 billion per year) which are paid back through municipal bonds. Given the user fees associated with water infrastructure, only limited direct grants are available for low-income, rural areas.
- **Digital:** communications infrastructure is primarily owned by the private sector. The federal government provides \$4 billion in subsidies for companies serving in high cost areas and \$2 billion for libraries and schools. The funds are supported by fees levied nationally on telephone bills (15%).

Taxes

The federal government has a range of taxes and fees to fund federal and state infrastructure projects. Currently, there are several trust funds with the most prominent being the Highway Trust Fund (discussed above). Other trusts include the Airport and Airway Trust Fund, Harbor Maintenance Trust Fund, and Inland Waterways Trust Fund. The taxes associated with these funds are based on a user fee model whereby users of the infrastructure system are charged a tax that is related to their use²⁹.

States also have a variety of revenue sources for infrastructure, a majority of which is directed to funding highways, including:

- **Fuel taxes** – all states have some kind of motor fuel tax. In 2008, state gasoline taxes generated approximately \$38 billion.
- **Sales tax on fuel** – a number of states also add a sales tax to gasoline purchases.

²⁵ American Society of Civil Engineers, "Failure to Act: The Impact of Current Infrastructure Investment on America's Economic Future", ASCE, 2013

²⁶ "Public Spending on Transportation and Water Infrastructure", Congressional Budget Office, 2010, <http://www.cbo.gov/publication/25116>

²⁷ Bosworth and Milusheva, "Innovations in U.S. Infrastructure Financing: An Evaluation", The Brookings Institution, 2011

²⁸ Ibid.

²⁹ "Infrastructure Energy and Natural Resources", The United States Senate Committee on Finance, 2014, <http://www.finance.senate.gov/issue/?id=8b4a11ec-b93f-43bd-8f72-fbc4f4768989>

- Vehicles Registration fees – all states, bar two, collect some form of fee for vehicle registration which amounted to \$20 billion in 2008.
- Tolls – 40 of the 150 toll roads, bridges and tunnels in the United States are administered by state operating authorities. In 2007, tolls generated \$7.6 billion in state revenues.
- General funds – 32 states have general fund revenues that account for about 6 percent of total state highway funding. These funds are a combination of income taxes, sales taxes, property taxes and other state and local fees³⁰.

Bonds and loans

For some infrastructure, the federal government issues bonds to states that provide capital in advance of expected federal funds, allowing states to accelerate highway and transit project construction. The federal government also has programs that offer credit assistance for surface transportation projects, including through the Federal Highway Infrastructure Fund (discussed above) to provide credit assistance for projects of national significance and the Railroad Rehabilitation and Improvement Financing offering loans to acquire, improve, develop or rehabilitate rail related infrastructure.

Other sources of funding

P3s

Given that public investment is unlikely to meet current or future US infrastructure needs, governments inescapably need to consider P3s³¹. The federal government has several programs that seek to incentivize innovative partnerships.

- **Private Activity Bonds (PABs)** - Provide private developers and operators access to tax-exempt interest rates for highway and surface freight transfer projects, significantly lowering the cost of capital. Highway facilities and surface freight transfer facilities are eligible for up to \$15 billion in tax-exempt facility bonds.
- **Special Experimental Project 15** - Enables states to obtain federal waivers to experiment with new public-private partnership approaches in four major areas of project delivery: contracting, right-of-way acquisition, project finance and compliance with the National Environmental Policy Act and other environmental requirements³².

However, take-up of public-private partnerships has been slow in part due to the impacts of the recent financial crisis. And while peers such as the UK and Canada have made greater strides with P3s, the perception internally in the US is that there remains a great deal of skepticism and misperceptions about what P3s are³³. This is changing somewhat, with more than half the states having P3-enabling legislation. Nearly \$21 billion has been invested in highway facilities during the last 12 years with California, Florida, Texas and Virginia leading the way and accounting for half of the dollar volume of those P3s.

³⁰ Greg Dierkers and Justin Mattingly, "How States and Territories Fund Transportation - An Overview of Traditional and Nontraditional Strategies", NGA Center for Best Practices, 2009

³¹ Eric Boyer, Rich Cooper, and Janet Kavinoky, "Public-Private Partnerships and Infrastructure Resilience - How PPPs Can Influence More Durable Approaches to U.S. Infrastructure", National Chamber Foundation, 2012

³² Deloitte, "Closing America's Infrastructure Gap: The Role of Public-Private Partnerships", Deloitte, 2007

³³ "Fostering a Larger Private-Sector Role in United States Infrastructure", AECOM, 2011, <http://www.aecom.com/deployedfiles/Internet/Brochures/FosteringWhitePaper.pdf>

Chicago Skyway

P3 models are not only being applied to new projects, they are also being used for operating and maintaining existing assets. The City of Chicago struck a landmark long-term toll road lease with the Skyway Concession Company, a joint venture between Spanish toll road operator Cintra Concesiones de Infraestructuras de Transporte and the Australian Macquarie Infrastructure Group—the first of its kind in the United States—that brought in \$1.83 billion. In return for operating and maintaining the toll way for the next 99 years, the Skyway Company will collect toll and concession revenues.

User fees

User fees currently in place, or being considered, in the US include: highway tolls; freight fees, such as per-container charge; and congestion pricing of roads and aviation infrastructure. Many commercial airports impose passenger facility charges to fund airport capital projects, which results in over \$2 billion in revenues collected by airports every year³⁴. Following an extensive report and recommendations from the Government Accountability Office, Congress is also considering user-based mileage fees, although due to issues associated with privacy (GPS oversight of private citizens) and technical challenges, it is likely to be trialed through a pilot program for commercial vehicles in the first instance³⁵.

SUSTAINABILITY AND INFRASTRUCTURE PLANNING

The concept of sustainable development is based on the idea that the current generation can drive economic growth while preserving resources and ecological functions for use by future generations. The World Bank has emphasized “that cost-effective, reliable and affordable infrastructure services are critical for sustainable development and a necessary condition for reaching economic, social and environmental goals”³⁶. However, historically government investments have not considered the ongoing need to maintain or renew infrastructure, or the impacts that investment may have on the environment. US Government officials agree that the federal government is trying to get a better handle on decision-making and prioritization of investment based on sustainability. However, the extent to which states and local government employ systematic decision-making to maximize the potential of assets largely depends on their capacity.

³⁴ “Physical infrastructure - Challenges and Investment Options for the Nation's Infrastructure, Testimony before the Committee on the Budget and the Committee on Transportation and Infrastructure Government Accountability Office”, U.S. House of Representatives, 2008

³⁵ “Highway Trust Fund - Pilot Program Could Help Determine the Viability of Mileage Fees for Certain Vehicles”, Government Accountability Office, 2012, <http://www.gao.gov/assets/660/650863.pdf>

³⁶ “World Bank Group Sustainable Infrastructure Action Plan Fiscal Years 2009-2011”, The World Bank, <http://siteresources.worldbank.org/INTSDNETWORK/Resources/SIAPbooklet.pdf>

Climate change

The annual cost of adapting to climate change could be in the order of several billions of dollars for each infrastructure class. The Environmental Protection Agency has outlined several classes of transport infrastructure that it believes could be most impacted by climate change, including:

- Roads – higher temperatures can cause pavement to soften and expand, creating rutting and potholes, which will make it more costly to build and maintain roads and highways. Climate change is also projected to concentrate rainfall into more intense storms, thus creating flooding which can weaken or wash out soil and culverts that support roads, tunnels and bridges, and shorten the life expectancy of infrastructure³⁷.
- Rail – higher temperatures cause rail tracks to expand and buckle and more frequent heat waves may lead to more track repairs and speed restrictions to avoid derailments. Like roads, rail and subways are subject to rising sea levels and storm surges, particularly underground pathways and tunnels, and if damage should occur could require rail lines and subway infrastructure to be rebuilt or raise in future expansion projects³⁸.
- Ports – like other coastal infrastructure, ports (including docks and bridges) may need to be raised to accommodate higher tides and storm surges, as sea levels rise³⁹.

The government is trying to be proactive about these impacts, with President Obama’s Climate Action Plan directing federal agencies to encourage and support smarter, more resilient investments. Some agencies have accordingly updated their federal grant programs to meet these objectives⁴⁰. For example the Department of Housing and Urban Development and the Department of Transportation made a percentage of their Superstorm Sandy disaster-recovery assistance, which is traditionally only used to replace “like with like”, available to resilience projects.

³⁷ “The Potential Impacts of Climate Change on U.S. Transportation”, Transportation Research Board Special Report 290, National Research Council, NRC, 2008

³⁸ Ibid.

³⁹ Ibid.

⁴⁰ “The Crushing Cost of Climate Change: Why We Must Rethink America’s Infrastructure Investments”, Centre for American Progress, 2014, <http://www.americanprogress.org/issues/green/news/2014/02/11/83936/the-crushing-cost-of-climate-change-why-we-must-rethink-america-infrastructure-investments/>

UNITED KINGDOM

HISTORY

A 2012 report by the UK Infrastructure Transitions Research Consortium (ITRC) lays out four main eras of infrastructure evolution in the United Kingdom: municipal governance (Pre-1940s), centralization (1940s-1979), privatization (1980s-2000), and the modern era of the European Union (2000-present).⁴¹ Most existing infrastructure in the UK is young relative to the history of the region. Although the UK has been an official dominion for over three hundred years and the country of England has existed for over a thousand, most existing infrastructure in the United Kingdom dates back only to the mid-19th century.⁴²

During this time, infrastructure development was “seen as a local or at most sub-regional matter.”⁴³ Parliament would only involve itself in projects of national interest, such as cross country rail lines.⁴⁴ This was an era of classical liberalism for infrastructure in the United Kingdom, with a “hands off,” laissez-faire economic approach and limited government interaction. This highly decentralized system resulted in ambiguity between jurisdictions regarding responsibilities, safety standards, and building requirements. In the energy and transportation sectors in particular, private companies began projects to meet demand where local governments failed to do so.⁴⁵

The Public Health Act of 1848 was one of the first pieces of legislation to formally confer authority on local townships, giving them the responsibility to provide “water to houses, waterworks, drainage, sewerage, and street paving” as well as the responsibility to collect waste from homes on a weekly basis.⁴⁶ Between 1848 and 1945 a series of Acts of Parliament, including the Public Health Act of 1875 and the Public Health Act of 1936, further defined and consolidated the powers of local authorities.⁴⁷

Shortly after the end of the Second World War, the UK government began three and a half decades of nationalization, centralization and increased infrastructure spending.⁴⁸ During this time, the scope of infrastructure projects (particularly those related to transportation and energy) that were considered in the national interest skyrocketed, and the amount of legislation committed to centralizing and nationalizing the UK’s infrastructure grew exponentially as well.

The British Transport Commission was founded in 1947 and given authority over virtually all facets of major transportation in the UK.⁴⁹ The Ministry of Civil Aviation also took control of the UK’s airports in 1947.⁵⁰ The Water Resource Act of 1963 fully centralized water authority in the UK.⁵¹

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⁴² Ibid.

⁴³ T. Marshall, “Working Paper-Infrastructure and Spatial Planning: Planning major infrastructure sectors in the UK during recent decades,” Department of Planning, Oxford Brookes University, Oxford, UK, 2010, 5.

⁴⁴ Ibid.

⁴⁵ Ibid., and, “Fast Track,” IRTC, Annex K, 1.

⁴⁶ “Fast Track,” IRTC, Annex K, 1-2.

⁴⁷ Ibid.

⁴⁸ Ibid., 2.

⁴⁹ Marshall, “Infrastructure and Spatial Planning,” 5.

⁵⁰ Ibid.

⁵¹ “Fast Track,” IRTC, Annex K, 1-2.

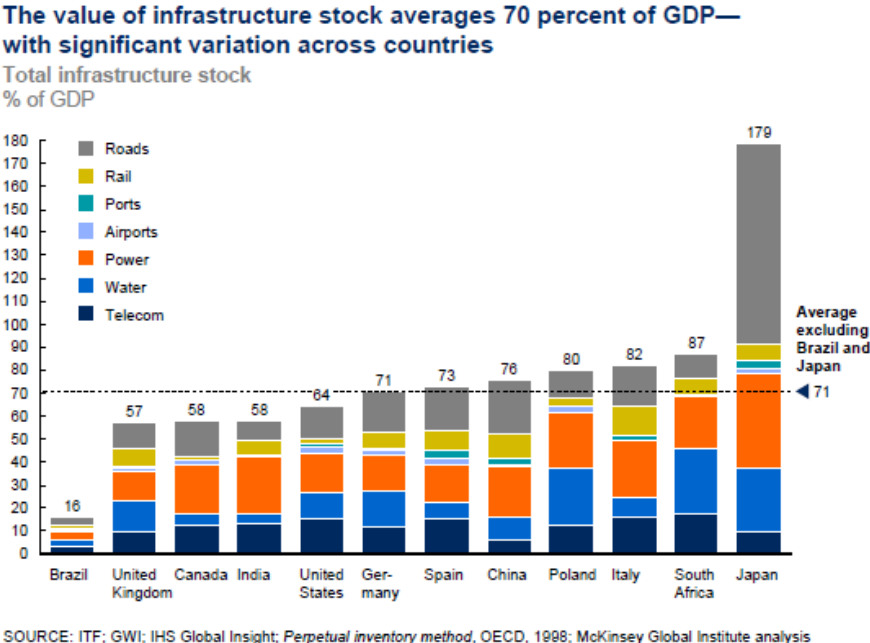
The election of Margaret Thatcher’s Conservative Government in 1979 would brand the final quarter of the 20th century as the age of privatization. The government of the day believed privatization was “a relief because it allowed the state to meet national infrastructure investment needs without placing the burden on users or governments budgets.”⁵²

Mass-privatization severed the government’s ability to have a direct role in infrastructure development, reverting to a relationship similar to the one that existed before the start of World War II. However, what separated the Thatcher privatizations from the pre-1940s era of decentralized liberalism was the string of strict environmental regulations that accompanied each privatization.⁵³ This emphasis on environmental protection would effectively act as a precursor to the ambitious environmental targets set by the EU decades later.

The mid-1990s saw a massive increase in investment in UK utilities by foreign companies. It is now estimated that 30% of the UK’s infrastructure is owned by foreign shareholders.⁵⁴ This includes much of the electricity sector, which has been taken over by US-based companies, as well as the water sector and many of the UK’s privatized airports.⁵⁵

Since 2000, the focus of UK infrastructure has been on fulfilling EU requirements for environmental sustainability. For decarbonization, the UK is party to the Emissions Trading Scheme (ETS), Renewable Energy Directive, and the Energy Performance of Buildings Directive.⁵⁶ For water protection, the EU has released the Urban Wastewater Directive and the EC Water Framework Directive.⁵⁷ For air quality improvement, European Commission regulations include the Air Quality Framework Directive and the Directive on Integrated Pollution Prevention and Control (IPPC).⁵⁸

These vast and extensive regulations have encouraged the UK government to heavily invest in green energy projects by creating organizations such as the Green Investment Bank (GIB), which will be discussed in detail later in this section.



⁵² Ibid, 4.
⁵³ Ibid.
⁵⁴ Ibid., 5.
⁵⁵ Ibid; see also Case Study on Commercialization, Privatization and Economic Oversight of Airports and Air Navigation Service Providers: United Kingdom,” International Civil Aviation Organization (ICAO), <http://www.icao.int/sustainability/CaseStudies/UnitedKingdom.pdf>.
⁵⁶ Ibid., 6.
⁵⁷ Ibid.
⁵⁸ Ibid., 7.

CURRENT STATE OF ASSETS

The United Kingdom has vast quantities of modern and aging infrastructure, much of which outdates the comparatively young infrastructure history of Canada and other Commonwealth nations. Public Sector Net Investment (infrastructure spending and defense procurement) in the UK dropped to 1.4% of GDP in 2012/13 from a post-recession peak of 3.4% in 2009/10, and is projected to stay steady at 1.5% from 2015 onwards.⁵⁹ As a monetary value, the UK government spent £22 billion (about \$40.44 billion CAD) on infrastructure in 2012/13. The government's National Infrastructure Plan (NIP) "identifie[s] 550 projects totaling \$471 billion to 2015 and beyond."⁶⁰

While the government sets ambitious infrastructure spending plans for the future, the current state of infrastructure in the UK has been met with harsh criticism. A 2013 report by the Institution of Civil Engineers (ICE) revealed the deteriorating state of infrastructure in the United Kingdom. The report determined that UK infrastructure was not currently fit to meet the demands of a growing population and the spontaneity of a changing climate. The 2012 National Infrastructure Plan also outlined similar concerns, noting challenges facing each class of infrastructure.⁶¹

Transport (roads, railways, marine channels, ports, airports, interchanges and intermodal terminals)

According to the Institute of Civil Engineers, "the UK has mature and highly-developed transport infrastructure."⁶² Despite this, the UK's continued economic recovery combined with a growing population will increase the demand for transportation infrastructure in the coming years. Currently, it is estimated that congestion costs taxpayers \$3.69 billion (CAD) a year.⁶³

Roads

Roads fall under multiple jurisdictions in the United Kingdom. Major roads in England that are a part of the Strategic Road Network (SRN) are the responsibility of the central government through the Highways Agency.⁶⁴ Despite accounting for less than 3% of all roads in England, the SRN holds over one third of all car traffic.⁶⁵ Local roads and other non-major roads in England are the responsibility of local governments. In Scotland, Transport Scotland is responsible for roads, and in Wales, they fall under the portfolio of the Welsh Assembly.

Generally speaking, local roads are not currently up to standard. Significant challenges include "constrained motorway capacity, increased network congestion over time, and [the government's] ambition to reduce carbon intensity."⁶⁶ The Institute of Civil Engineers estimates a maintenance cost of close to \$22.15 billion (CAD) to bring them up to par. The government is taking action to appease the transportation shortfall, promising to deliver £6 billion (\$11 billion CAD) on road upgrades in the next session of parliament.⁶⁷ The government is also currently in the process of reorganizing the Highways Agency "to provide it with stable funding and clear strategy."⁶⁸

⁵⁹ Ibid., 9.

⁶⁰ "Infrastructure 2013: Global Priorities, Global Insights," Urban Land Institute, Ernst & Young, 2013, 34.

⁶¹ "State of the Nation: Infrastructure 2014," Institution of Civil Engineers (ICE), June 2014, 4-5.

⁶² Ibid., 15.

⁶³ Ibid.

⁶⁴ "Our network," Highways Agency, <http://www.highways.gov.uk/our-road-network/our-network/>.

⁶⁵ "State of the Nation," ICE, 16.

⁶⁶ Rhodes, "Infrastructure policy," 5.

⁶⁷ "State of the Nation," 18.

⁶⁸ Ibid.

Rail

Rail services in the United Kingdom cost Westminster approximately \$9.14 billion (CAD) per annum.⁶⁹ The UK's rail lines face significant "capacity constraints," with standing room only on the most popular trains during peak hours. UK rail has also faced considerable structural issues and problems with severe weather in recent years. To keep up with the cost of upkeep and necessary upgrades, Westminster has opted to increase ticket prices and keep taxes constant, thereby ensuring that only those who ride the train pay for it. As an additional financing method, the government will sell off its remaining 40% stake in Eurostar rail service, a high-speed train that connects the UK to France through the Channel Tunnel.⁷⁰

The future development of high-speed railway, High Speed 2 (HS2), will connect London to Scotland and help satisfy the UK's growing demand for transport between these two regions. HS2 will connect eight of the UK's most populous cities and provide service to one in every five Britons.⁷¹ The total cost to government for this project will be £17 billion (\$29.5 billion CAD).⁷² In 2012, Network Rail, a government funded not-for-profit that governs the UK's railways, released "Strategic Business Plan 2014-19". The plan proposes "seven hundred extra trains a day linking northern cities, a 20% increase in available seats on peak commuter services in London and the South East, New Lines to increase capacity in Scotland... the introduction of modern signaling," and the conversion of more UK rail to electricity.⁷³

Aviation

The British Government created the British Airports Authority (BAA) in 1965 as a government owned independent commercial enterprise to manage major airports (Heathrow, Gatwick and Stansted).⁷⁴ This was followed by a government transfer of ownership of eighteen additional airports to local authorities.⁷⁵ The privatization process was completed in 1986 when the government sold its remaining shares in BAA.

Heathrow, the national hub airport, is running at almost full capacity. This limits the government's ability to access new markets and establish new flight routes for UK regional connections, which exacerbates delays and undermines the airport's resilience to shocks such as unexpected weather events. UK airport delays are significantly above the European average, and capacity challenges will continue to increase unless new runways are constructed⁷⁶. The UK Government commissioned the Davies Report on Aviation at the end of 2012, due to make its final report in 2015, which will focus on capacity needs particularly in London and the South East, and the role of regional airports.

⁶⁹ "State of the Nation," 16.

⁷⁰ "UK Government's Infrastructure Spending Plan Unveiled," BBC, 2013, <http://www.bbc.com/news/business-25201064>.

⁷¹ HS2: Developing a new high-speed rail network," Department for Transport, <https://www.gov.uk/government/policies/developing-a-new-high-speed-rail-network>.

⁷² Ibid.

⁷³ "Strategic Business Plan 2014-19," NetworkRail, <http://www.networkrail.co.uk/publications/strategic-business-plan-for-cp5/>.

⁷⁴ "Case Study on Commercialization, Privatization and Economic Oversight of Airports and Air Navigation Service Providers: United Kingdom," International Civil Aviation Organization (ICAO), <http://www.icao.int/sustainability/CaseStudies/UnitedKingdom.pdf>, 1.

⁷⁵ Ibid.

⁷⁶ "State of the Nation", ICE, p 16.

Water (drinking water, sewage, drainage and water for commercial or industrial use)

The water sectors in England and Wales were both privatized in 1989 by the Thatcher government.⁷⁷ Ten previously government-owned water companies were sold off to maximize efficiency and secure private sector investment. “The type of ownership varies, and includes publicly-listed companies, companies which are parts of a multi-national and companies owned by private equity.”⁷⁸ Many of the private water companies in England and Wales are also responsible for waste management.

The quality of water and sanitation in England and Wales is monitored by the economic regulator Ofwat, (The Water Services Regulation Authority) which shows that service quality has improved significantly since privatization. The number of unplanned interruptions, properties at risk of low pressure, the share

Sector	Strengths	Challenges
Major roads	<ul style="list-style-type: none"> Road safety Improved asset condition 	<ul style="list-style-type: none"> Constrained motorway capacity Increasing network congestion overtime Ambition to reduce carbon intensity
Rail	<ul style="list-style-type: none"> Improved punctuality Improved asset condition 	<ul style="list-style-type: none"> Increasing passenger crowding of commuter and intercity routes High cost per passenger-km Ambition to reduce carbon intensity
Airports	<ul style="list-style-type: none"> Improved connectivity (especially at regional airports) London as an international hub 	<ul style="list-style-type: none"> Constrained South East airports capacity Delays at airports
Ports	<ul style="list-style-type: none"> Excellent connectivity One of the lowest lead times to import in Europe 	<ul style="list-style-type: none"> Future deep water port capacity
Electricity	<ul style="list-style-type: none"> Reliable and secure supply Adequate current generation spare capacity margins Low prices (relative to Europe) 	<ul style="list-style-type: none"> Falling generation spare capacity margin in the future Increasing need to be de-carbonize the electricity system
Gas	<ul style="list-style-type: none"> Reliable and secure supply Growing storage and import capacity Low prices (relative to Europe) 	<ul style="list-style-type: none"> Recent increase in gas supply interruptions Increasing import dependence Increasing need for flexible supply and transport infrastructure
Communications	<ul style="list-style-type: none"> Improvement in fixed line. Broadband and mobile coverage Improved access to high broadband speeds Declining costs of mobile and broadband access 	<ul style="list-style-type: none"> Coverage and take-up of high speed broadband, particularly amongst SMEs Universal coverage of broadband services Resolving mobile voice and data 'not-spots'
Water and sewerage	<ul style="list-style-type: none"> Improved water quality Improved mains pressure High security of supply Reduced leakages 	<ul style="list-style-type: none"> Future security of supply, driven by demand pressures and supply constraints Overuse of some water resources
Waste	<ul style="list-style-type: none"> Higher recycling rates Reduced waste to landfill 	<ul style="list-style-type: none"> Absolute volumes of municipal wast sent to landfill remain high
Flood defenses	<ul style="list-style-type: none"> Increase in number of households protected Improved asset condition 	<ul style="list-style-type: none"> Scope for further improvement in household coverage and condition of flood defenses Uptake of flood warning services Maintaining performance in the light of climate change impacts

SOURCE: National Infrastructure Plan, 2011, p. 17

⁷⁷ Caroline van den Berg, “Water Privatization and Regulation in England and Wales,” *Public Policy for the Private Sector* 115, World Bank Group, 1997.

⁷⁸ “GP Water for Dummies,” John Wiley & Sons Ltd, England, 13.

of complaints not answered within five days and combined sewer overflows have all declined, while sewage treatment works compliance has increased and river water quality has improved. Drinking water quality is also universally high.

Although privatization has been of great benefit to water infrastructure, and this asset is generally meeting citizen needs, there are some concerns that climate change, population growth and requirements to meet new sustainability standards will place immense pressure on water security⁷⁹. This is of particular concern in London and the South East of England, where the population is predicted to increase by approximately 23% by 2035 and the area is already suffering from water stress.

Another area of concern is flood management, where funding for watercourses will be as low as CAD\$71 million by 2014/15. According to the Institute of Civil Engineers, the Government will spend CD\$2.5 billion less on flood management between 2015 and 2021 than is needed to meet environmental management requirements⁸⁰.

Energy (gas, electricity)

Overall, the UK's energy infrastructure is aging and much of it will be in need of replacement in the coming years. "The UK has a mature and reliable electricity network," with more than enough capacity to meet Britain's current needs.⁸¹ However, as technology continues to age and demand for energy increases, the UK's energy capacity will shrink considerably.⁸² The deterioration of the UK's energy infrastructure presents the government with the opportunity to install low-carbon generating solutions as replacements. Across the sector, there is a large emphasis on environmental sustainability. Looking into the future, the UK has established ambitious targets for decarbonization. The government intends to reduce "greenhouse gas emissions by 34% from 1990 levels by 2020, and 80% by 2050."⁸³

In 2013, the government passed the Energy Act, a piece of legislation that brought new reforms to energy generation by focusing on low-carbon producing solutions.⁸⁴ The Act also created the Office for Nuclear Regulation and established a set decarbonization target range.⁸⁵ The last few years have also seen a dramatic rise in wind power in the UK, which supplied over a tenth of the UK's electricity in 2013.⁸⁶ In July 2014, the House of Lords assigned a committee with the task of assessing the resiliency of the UK's electricity infrastructure. The committee will determine whether the current state of electricity is sufficient and whether it will remain sufficient through 2030. The committee will begin work this October.⁸⁷

Communications

While the United Kingdom once had a strong national telecommunications service, the government privatized British Telecom, the national telecommunications organization, in 1984 with the Telecommunications Act.⁸⁸ Despite this privatization, the central government maintains an active role in securing broadband services across the country, mainly focused on connecting rural areas. Devolved

⁷⁹ "State of the Nation: Water", Institute of Civil Engineers, 2012, <http://www.ice.org.uk/getattachment/86d84a07-f7d6-4027-b477-e751b845aaa5/State-of-the-Nation-Water.aspx>

⁸⁰ "State of the Nation", ICE, 11.

⁸¹ "State of the Nation", ICE, 14.

⁸² Ibid.

⁸³ Ibid., 14.

⁸⁴ "Energy Act 2013," www.parliament.uk.

⁸⁵ Ibid.

⁸⁶ "Top 10 UK wind energy facts," Business Green Plus, <http://www.businessgreen.com/bg/analysis/2220998/top-10-uk-wind-energy-facts>.

⁸⁷ "Resilience of electricity infrastructure," UK Parliament, www.parliament.uk/resilience-of-electricity-infrastructure.

⁸⁸ "History of BT," BT, http://www.btplc.com/Thegroup/BTsHistory/History_of_BT.pdf.

governments and local authorities are delegated the “responsibility for taking forward projects to deliver improved broadband in their areas.”⁸⁹

Broadband connectivity in the UK has seen drastic improvements since 2010, when “almost three million homes and businesses did not have access to broadband speeds of at least 2Mbps.”⁹⁰ Average broadband speeds have tripled since that time.⁹¹ In 2010 the European Commission set a goal for all European homes to have access to broadband by 2013.⁹² This goal was met in the United Kingdom, which now enjoys 100% household access to broadband services in both urban and rural areas.⁹³ Currently, 82% of UK homes have access to broadband at a speed of 30 Mbps or higher.

Broadband Delivery UK (BDUK) is a central government funded program (within the Department for Culture, Media, and Sport) to bring high speed broadband access to rural areas.⁹⁴ BDUK has set a target for 95% UK access to broadband speeds of 24 Mbps or higher by 2017 through the “Superfast Extension Programme.”⁹⁵

The government is currently investing in a number of initiatives to strengthen broadband services across the country, including:

- investing £530 million to stimulate commercial investment and bring high speed broadband to rural communities reaching 90% of UK homes and businesses;
- investing a further £250 million to extend the benefits of superfast broadband to 95% of the UK and exploring approaches to deliver superfast broadband to the remaining hardest to reach areas, initially through a new £10 million competitive fund;
- investing £150 million in ‘super-connected cities’ across the UK; and,
- removing red tape to make it easier to put in broadband infrastructure.⁹⁶

DIVISION OF RESPONSIBILITIES

There are three levels of government in the United Kingdom. As a constitutional monarchy, executive power to govern in the United Kingdom is given to Her Majesty’s Government in London. There are also three devolved governments in Scotland, Wales, and Northern Ireland. These governments are responsible for, among other areas, health, education, culture, the environment, and transport within their respective jurisdictions.⁹⁷ The UK also has local governments in the form of county councils and district, borough or city councils.⁹⁸

⁸⁹ “Broadband Delivery UK: Overview,” UK Government, <https://www.gov.uk/broadband-delivery-uk>.

⁹⁰ “STIMULATING PRIVATE SECTOR INVESTMENT TO ACHIEVE A TRANSFORMATION IN BROADBAND IN THE UK BY 2015,” UK GOVERNMENT, [HTTPS://WWW.GOV.UK/GOVERNMENT/POLICIES/TRANSFORMING-UK-BROADBAND](https://www.gov.uk/government/policies/transforming-uk-broadband).

⁹¹ Ibid.

⁹² “Next Generation Access Networks,” Europa: summaries of EU legislation, http://europa.eu/legislation_summaries/information_society/strategies/si0018_en.htm.

⁹³ “Digital Agenda for Europe: United Kingdom Scorecard,” European Commission, <https://ec.europa.eu/digital-agenda/en/scoreboard/united-kingdom>.

⁹⁴ “Broadband Delivery UK: Overview,” UK Government.

⁹⁵ “Digital Agenda for Europe: Broadband in Member States: United Kingdom,” European Commission, <http://ec.europa.eu/digital-agenda/en/country-information-united-kingdom>; see also: “Superfast Extension Programme,” UK Government, <https://www.gov.uk/government/policies/transforming-uk-broadband/supporting-pages/rural-broadband-programme>.

⁹⁶ Ibid.

⁹⁷ “How government works,” Gov.UK, accessed July 7, 2014, <https://www.gov.uk/government/how-government-works>.

⁹⁸ Ibid.

Because the division of responsibilities is spread across so many players, there is no single, national, infrastructure story. UK infrastructure is a highly fragmented and crowded field, with all three levels of government responsible for certain aspects of infrastructure spending.

Infrastructure UK (IUK), is a division of Her Majesty's Treasury, the UK Government's economic and finance ministry.⁹⁹ IUK is responsible for "coordinating and simplifying the planning and prioritization of investment in UK infrastructure" and "improving UK infrastructure by achieving greater value for money on infrastructure projects and transitions."¹⁰⁰ IUK funds projects of both national and regional significance (see table below).

The Planning Act (2008) – Nationally Significant Infrastructure

*The 2008 Planning Act defines a nationally significant infrastructure project as a project that fulfills at least one of the following requirements:

- Construction or extension of a generating station;
- Installation of an electric line above ground;
- Development relating to underground gas storage facilities;
- Construction or alteration of an LNG facility;
- Construction or alteration of a gas reception facility;
- Construction of a pipe-line by a gas transporter;
- Construction of a pipe-line other than by a gas transporter;
- Highway-related development;
- Airport-related development;
- Construction or alteration of harbour facilities;
- Construction or alteration of a railway;
- Construction or alteration of a rail freight interchange;
- Construction or alteration of a dam or reservoir;
- Development relating to the transfer of water resources;
- Construction or alteration of a waste water treatment plant;
- Construction or alteration of a hazardous waste facility.

Experts believe the United Kingdom has an over-centralized decision-making system. There is growing discontent outside of Westminster that the government is far too London-focused and does not spend enough time or money on issues pertaining to the needs of the rest of the country. In their view, this unbalanced public sector investment is unsettling the economy and increasing regional inequality in the United Kingdom. Greater efforts by Westminster to devolve power and resources to local authorities would mitigate the growing regional inequality.¹⁰¹

In the wake of this criticism, government officials are attempting to make changes. The government has made considerable effort to transfer funds and decision making authority from London to local authorities.¹⁰² UK Deputy Prime Minister Nick Clegg chairs the local growth cabinet committee, and

⁹⁹ "About us," Infrastructure UK, accessed July 7, 2014, <https://www.gov.uk/government/organisations/infrastructure-uk/about>.

¹⁰⁰ Ibid.

¹⁰¹ PPF Interviews

¹⁰² "Giving more power back to cities through City Deals," Deputy Prime Minister's Office, accessed July 8, 2014, <https://www.gov.uk/government/policies/giving-more-power-back-to-cities-through-city-deals>.

argues that devolving authority to cities will help end “a culture of Whitehall knows best.”¹⁰³ Clegg made his comments upon the announcement that the government will give £5 billion (around \$9.15 Billion CAD) to regional authorities in the form of a “£2 billion-a-year (\$3.66 billion CAD) local growth fund” which will support regional infrastructure projects.¹⁰⁴

In addition, the government has released two waves of City Deals to increase local infrastructure funding and delegate more decision-making authority to UK cities. The first wave of City Deals, released in 2012, included New Development Deals for eight of the UK’s largest cities outside of London that gave local authorities the ability to create new infrastructure projects through increment financing measures (further described below).¹⁰⁵ Among numerous initiatives, these projects include a new payment program called “Earn Back” that “incentivizes a city to invest in growth in return for a share of the national tax take,” as well as the creation of economic investment funds to give cities “the power to pool multiple funding streams and business rate income into a single investment fund, leverage private sector capital and invest in local priorities.”¹⁰⁶

Other measures in wave one include the devolution of rail services and local transport funding, increased broadband funding, and low carbon programs to invest in green, sustainable projects at the local level.¹⁰⁷ Wave two of the City Deals project, a comprehensive agreement with twenty mid-sized UK cities, is in the process of being finalized. The government is also seeking to create a partnership with the Scottish government to complement a recently released City Deal with Glasgow.¹⁰⁸ All three devolved governments have released infrastructure plans in recent years (the Scottish Infrastructure Investment Plan, the Wales Infrastructure Investment Plan, and the Investment Strategy for Northern Ireland), highlighting infrastructure development priorities.

ALIGNMENT OF INFRASTRUCTURE PLANNING/PROGRAMMING WITH GOVERNANCE STRUCTURES

A 2012 report by the United Kingdom Infrastructure Transitions Research Consortium (ITRC) highlighted specific concerns with the current governance arrangements for infrastructure programming in the UK.¹⁰⁹ Chief among these concerns was the trepidation that the “traditional governance approach of using intermittent solutions is [not] fit for dealing with new challenges... such as climate change, demographic changes, growing interdependencies across sectors, and an unfavorable investment environment and much needed future transformations.”¹¹⁰

As previously mentioned, a great deal of UK infrastructure is maintained by the private sector and governed through public regulatory agencies. However, in many sectors there are multiple agencies assigned to the task of regulating different aspects of the same utility, for example Ofwat (the Water

¹⁰³ David Sapsted, “UK regions to get extra £5 billion for housing infrastructure,” *Relocate Magazine*, July 7, 2014.

¹⁰⁴ *Ibid.*

¹⁰⁵ “Unlocking growth in cities: city deals – wave 1,” HM Government, last modified July 2012, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/221009/Guide-to-City-Deals-wave-1.pdf, 4.

¹⁰⁶ *Ibid.*

¹⁰⁷ *Ibid.*, 4-5.

¹⁰⁸ “Glasgow City Deal: article by David Cameron and Danny Alexander,” The Prime Minister’s Office, accessed July 8, 2014,

<https://www.gov.uk/government/news/glasgow-city-deal-article-by-david-cameron-and-danny-alexander>.

¹⁰⁹ “A Fast Track Analysis of strategies for infrastructure provision in Great Britain,” UK Infrastructure Transitions Research Consortium (ITRC), 2012, 33.

¹¹⁰ *Ibid.*

Services Regulation Authority), Drinking Water Inspectorate, Environment Agency, and Consumer Council are all responsible for various aspects of water regulation.

This governance structure has resulted in a system where “the fragmented, complex, and disconnected nature of arrangements within and between various sectors is a matter of concern, especially when various infrastructure sectors have gradually become interdependent and the breakdown of one sector may directly influence the other.”¹¹¹

Good governance approaches – mega projects

Several recent, nationally significant projects have entailed a new form of governance which has thus far proved to be an effective way of achieving value for money and timely delivery. The Crossrail project, a \$15 billion fast train linking Heathrow to the Docklands, was wholly funded by the UK Government. However, to manage the project, the Government established a limited company in 2001 – Crossrail Ltd. The company was originally a joint venture between Transport for London and the Department of Transport until late 2008, when it became a fully owned subsidiary of Transport for London. By establishing a limited company, the government was able to oversee expenditure and delivery at arm’s length while maintaining ownership and responsibility for the project. Crossrail was delivered on time and on budget and has proven such a successful governance approach that similar arrangements have been established for High Speed II, the new high speed train north of London.

A 2009 report from the UK Council for Science and Technology (CST) came to a similar conclusion: “Economic regulation allied with the drive for improved efficiency makes good business sense and provides better value; but it does risk driving out spare capacity within the networks, with the unintended consequence that resilience is lost, exacerbated by the increasing interconnectedness between infrastructure sectors where failure in one is likely to affect another.”¹¹²

ITRC offers two possible solutions to the problem. The first is to streamline regulatory bodies, merging them into smaller organizations with greater responsibilities. While this option would create more efficiency, ITRC’s second solution is to create “independent economic and environmental regulation” regimes. Option two, ITRC argues, would allow for “more open scrutiny of the activities of infrastructure providers.”¹¹³

INFRASTRUCTURE GAPS AND IMPACTS ON PRODUCTIVITY

A note from the UK House of Commons Library suggests the United Kingdom has long suffered from “historic underinvestment”.^[1] The current gaps are well documented in the section on UK’s current state of assets. Similar to the United States and Australia, the UK infrastructure deficit has an important impact on productivity. While the UK government strives to overcome their long-term pattern of insufficient funding by making the state of their infrastructure competitive with other OECD partners,

¹¹¹ Ibid., 35.

¹¹² “A National Infrastructure for the 21st Century,” Council for Science and Technology, HM Treasury, 2009, <http://webarchive.nationalarchives.gov.uk/20100714131339/http://www.cst.gov.uk/reports/files/national-infrastructure-report.pdf>, 39.

¹¹³ “Fast Track,” ITRC, 35.

^[1] Chris Rhodes, “Infrastructure policy,” House of Commons Library, www.parliament.uk/briefing-papers/sn06594.pdf, 3.

the reality is that the UK is currently ranked 28th in the world for infrastructure quality (World Economic Forum).¹¹⁴ This is a downward trend from an overall ranking of 24th in 2011/12.¹¹⁵

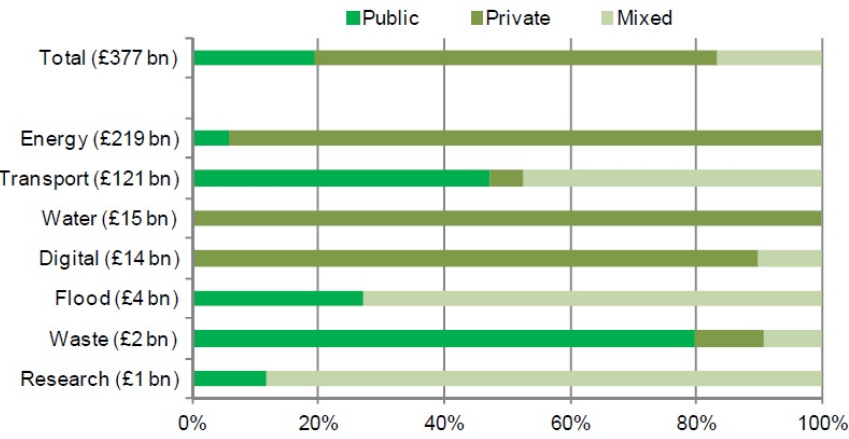
Discussions with experts emphasized that the UK government continues to be seen as overinvesting in revenue programs and underinvesting in capital infrastructure projects; that as a percentage of GDP, less money is spent on infrastructure projects than other government funded projects. The result is that the UK may still not be achieving its full potential, and as such may continue to be less developed than their European competitors.¹¹⁶

Experts also indicated that this tradition of underinvestment in UK infrastructure projects could be attributed to a lack of popular support for such investment schemes. The long-term and often “maintenance-based” nature of infrastructure projects can make them a difficult sell.¹¹⁷

As noted by one expert, a solution to address various gaps in UK’s infrastructure and improve overall efficiency could rest in the creation of a more competitive environment for businesses. By improving their competitiveness, major cities can ensure that local businesses improve their performance. As businesses improve performance, the amount of money paid to cities in taxes will increase. Therefore, more competitiveness equals more taxable income. Cities can utilize their increased revenue stream by investing in local infrastructure projects. This, in turn, will help address traditional underinvestment in local infrastructure.

The UK is currently experimenting with new financing schemes, including tax increment financing (TIF), which allows local governments to borrow funds for projects against future growth in business rate receipts. TIF is discussed in more detail in the “Financing Approaches” section of this report.

Planned infrastructure investment by source of finance
Infrastructure Pipeline 2013



In contrast to these criticisms, a 2013 report by the McKinsey Global Institute cited the United Kingdom as a world leader when it comes to the productivity of their infrastructure, including praising efforts to streamline delivery to realize significant savings and establishing a unique court system designed to “expedite disputes over land acquisition.”¹¹⁸

¹¹⁴ “National Infrastructure Plan 2013,” HM Treasury, UK Government, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263159/national_infrastructure_plan_2013.pdf, 3.; and, “Global Competitiveness Index,” World Economic Forum, 2013, http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf, 432.
¹¹⁵ “Rhodes, Infrastructure Policy,” 3.
¹¹⁶ PPF Interviews
¹¹⁷ PPF Interviews
¹¹⁸ “Infrastructure Productivity: How to save \$1 trillion a year,” McKinsey Global Institute, 2013, 6.

FINANCING APPROACHES

The United Kingdom relies heavily on private sector investment to finance infrastructure spending. In fact, in 2011, private financing accounted for two-thirds of annual infrastructure investment.¹¹⁹ The remaining one third of infrastructure investment is divided between the various levels of government in the UK. Because devolved and local governments have no independent taxation power, the central government assigns funds to the three devolved governments and local authorities for infrastructure spending.

Government financing

Public Sector Net Investment (PSNI) declined sharply in the 1970s and 1980s in part due to privatizations, including of the water and energy industries. In the early 2000s, the then Labour Government increased infrastructure spending as a proportion of GDP, although it remained low, until it was sharply increased in 2008-09 and 2009-10 as part of stimulus efforts. Since then the PSNI has fallen from 3.4% of GDP in 2009-10 to 1.4% of GDP in 2012-13¹²⁰.

Estimates vary on the total amount of investment that is required to meet the UK's infrastructure needs, although the Treasury has noted that of the planned projects in the Infrastructure Pipeline (with a value totalling £377 billion), only 58% have secured funding¹²¹. The Government is therefore pursuing a number of initiatives to attract much-needed private sector investment.

UK Guarantees Scheme

The UK government created the UK Guarantees Scheme in 2012 to assist in financing and “avoid delays” in UK infrastructure projects.¹²² The scheme allows for £50 billion in financial guarantees (£10 billion of which has been set aside specifically for housing projects) to back companies that wish to borrow funds but might not have the necessary credit requirements. In practice this means the government “is effectively substituted” for the company seeking funds from a lender or investor.¹²³ The UK government hopes this arrangement will “greatly assist the overall commercial imperative of stimulating UK infrastructure.” In October 2013, the UK government announced the development of a \$16 billion nuclear power station in Hinkley, funded by a French utilities company and other investors. The government had announced earlier in 2013 that the power station had been pre-qualified for consideration for a UK Guarantee.

¹¹⁹ Sophia Chong and Emily Poole, “Financing Infrastructure, A Spectrum of Country Approaches, Reserve Bank of Australia, <http://www.rba.gov.au/publications/bulletin/2013/sep/pdf/bu-0913-8.pdf>, 74.

¹²⁰ Chris Rhodes (2013) Infrastructure Policy, House of Commons Library

¹²¹ HM Treasury, *Infrastructure Plan 2013*, 2013, p85

¹²² “Chancellor announces UK Guarantees Scheme,” Infrastructure UK, <https://www.gov.uk/government/news/chancellor-announces-uk-guarantees-scheme>.

¹²³ “The UK Guarantees Scheme for Infrastructure Projects: A brief overview of the standard documentation,” Allen & Overy, 2013, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209806/UK_Guarantee_-_A_brief_overview_-_Allen_Overy.pdf.

Pension Plans

The UK government has used pension plans as a source of funding for low-risk infrastructure projects. The Pension Infrastructure Platform (PIP) was developed with government support in 2012 by the National Association of Pension Funds (NAPF) and the Pension Protection Fund (PPF).¹²⁴ PIP, with an original target of £2 billion, aimed to invest in upcoming infrastructure projects across the country. PIP is part of the government's £200 billion plan for private contributions to infrastructure projects in the UK over the next ten years.¹²⁵

Local Government funding – tax increment financing

A reasonably recent development for local governments is the introduction by the federal government of a tax increment financing scheme. Founded on the Business Rates Retention Scheme (which was introduced in 2013-2014) local governments may borrow for infrastructure projects against the future expected growth in business rate receipts. A lead agency – a local authority, private sector partner or some combination – raises money upfront to pay for infrastructure, on the basis that the increased business rate revenues generated by the scheme can be used to repay that initial investment. The upfront funding may be borrowed from public or private sources, or it may be provided by the developer from capital available to it. The risk of not realizing expected growth is carried by the local authority¹²⁶.

Infrastructure Pipeline 2013 by sector

Sector	£ billions	No of projects
Energy	219	315
Transport	121	183
Water	15	32
Digital	14	7
Flood	4	67
Waste	2	34
Research	0.9	8
Total	377	646

Source: *Infrastructure Pipeline 2013*

Notes: £ billions data is in 2012/13 prices

Includes public and private investment

Private sector funding

Privatization

As previously mentioned, the United Kingdom places a much higher emphasis on utilizing the private sector than its counterparts in Australia, the United States, and Canada. This approach dates back to the Thatcher-era government reforms, and is still prevalent. It is common in the UK for an infrastructure utility to be privatized (water, waste management, rail, etc.) but regulated by a public entity.

Since the 1980s, the public perception on the privatization of government services in the United Kingdom has been relatively positive. The general understanding has been that the private sector can deliver where the public sector can't. Where the public sector is weak and inefficient, the private sector has been seen as strong, efficient, and transparent.

This perception, however, is beginning to change. The recent economic crisis has led people to question the validity of P3s and privatization schemes. The population is beginning to question the legitimacy of the privatization strategy. The UK could very well be in the midst of a social change in favour of more government control of infrastructure.

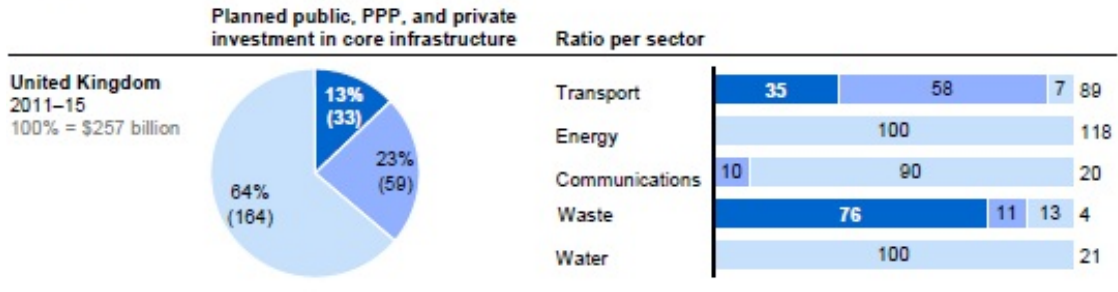
¹²⁴ Jonathan Williams, "UK schemes to sign up to Pensions Infrastructure Platform," *Investment & Pensions Europe*, October 12, 2012.

¹²⁵ "Government welcomes first injection into Pensions Infrastructure Platform," HM Treasury, accessed July 8, 2014, <https://www.gov.uk/government/news/government-welcomes-first-injection-into-pensions-infrastructure-platform>.

¹²⁶ "A Rough Guide to Tax Increment Financing, Core Cities Group and the British Property Federation", Core Cities, 2014, <http://www.corecities.com/what-we-do/publications/rough-guide-tax-increment-financing>

The share of public and private capital in infrastructure development varies significantly across countries and assets

%; \$ billion

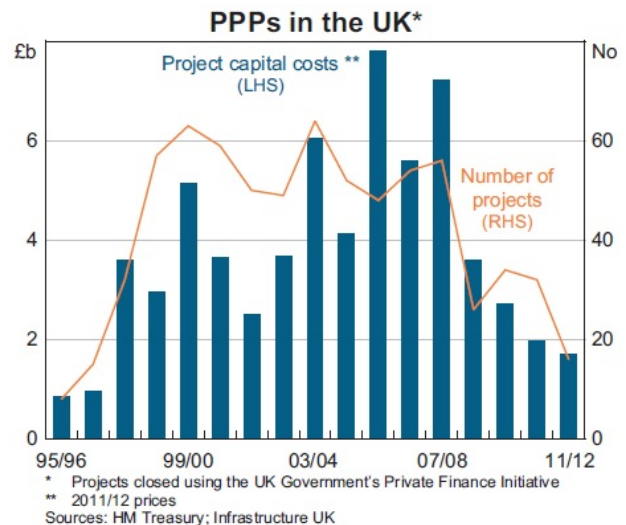


SOURCE: HM Treasury, United Kingdom; Planning Commission, India; McKinsey Global Institute analysis

P3s

The United Kingdom has set a target goal of increasing public-private partnerships (P3s) to 22% of infrastructure investment in the United Kingdom by 2015.¹²⁷ This would put the United Kingdom significantly ahead of other European Union countries, which commit between 0 and 12% of infrastructure investment to P3s.¹²⁸

The government replaced their traditional P3 model, Private Finance Initiatives (PFI), with what they called Private Finance 2 (PF2) in 2012.¹²⁹ PFI had become outdated and inefficient, and was forcing the government to spend more than necessary on infrastructure projects. PF2 brought in several reforms, “including the public partner acting as a minority co-investor in PF2 projects, streamlined procurement processes and greater transparency.”¹³⁰



Investing in UK infrastructure

Launched on 22 July, 2014, the UK Government has developed a guide for international and domestic investors on available infrastructure opportunities. The guide not only explains the UK's regulations and planning framework but also details specific projects that are seeking third party investment. The UK Government is trying to facilitate stronger private investment by providing transparent and easily attainable market information.

¹²⁷ “Infrastructure Productivity: How to save \$1 trillion a year,” McKinsey Global Institute, 2013, 4.

¹²⁸ Ibid.

¹²⁹ Sophia Chong and Emily Poole, “Financing Infrastructure,” 75.

¹³⁰ Ibid.

SUSTAINABILITY AND INFRASTRUCTURE PLANNING

The UK government has been considering the importance of sustainable infrastructure for several years, noting that “sustainable infrastructure must be able to face up to the near and long-term challenges and opportunities of population change, new technology, the transition to a low carbon economy and the impacts of climate change”¹³¹. The government is therefore considering how to ensure that infrastructure investments are adaptable, sustainable and climate resilient from the time of building, while also trying to secure sufficient investment for future infrastructure needs. The two objectives are not necessarily compatible and the government is faced with an ongoing conflict between mitigation for sustainability and achieving value for money.

To increase the resilience of both new and existing infrastructure, the UK is focused on both planning for future development but also considering how maintenance is undertaken on existing roads and railways. New infrastructure can be climate resilient by ensuring that an asset is located, designed, built and operated with the current and future climate in mind. Existing infrastructure can be climate resilient by ensuring that maintenance regimes incorporate resilience to the impact of climate change over an asset’s lifetime.

To promote this approach, the UK government has developed guidance for and is monitoring the impact of proposed infrastructure development, particularly on the environment and future generations.

- In 2008, the Highways Agency published *Climate Change Adaptation Strategy and Framework*, to ensure consideration of climate change in design standards and specifications, routine maintenance, operating procedures and contingency planning. As a result, road surface specific factions have been amended to withstand higher temperatures, which follow previous alteration to standards for increased drainage capacity.
- Network Rail (the owner of the UK’s railway network) commissioned a significant study in 2010 on the impacts of climate change on exposed tracks, embankments and bridges. The outcomes of this study have been embedded in the organization’s sustainable planning and their work with DEFRA (the Department of Environment, Food and Rural Affairs) on climate mitigation.

In 2012, the UK government also created the Green Investment Bank (GIB) with initial startup capital of £3.8bn (\$6.95bn CDN) to invest in green energy infrastructure projects across the country.¹³² The GIB also encourages additional private sector investment, further accelerating green energy development projects. By creating the GIB, the government eliminated much of the risk of pursuing green projects, leading to sustainable innovation that may otherwise have not occurred. GIB primarily invests in energy efficiency, waste and bioenergy and offshore wind.¹³³

¹³¹ “Climate Resilient Infrastructure, UK Government”, 2011:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69269/climate-resilient-infrastructure-full.pdf

¹³² “About us,” Green Investment Bank (GIB), accessed July 8, 2014, <http://www.greeninvestmentbank.com/about-us/>.

¹³³ Ibid.

AUSTRALIA

HISTORY

Australia's infrastructure has been built up over more than 200 years, including road and rail systems, ports and airports, communication networks, waterways and power grids – range from large-scale national networks to smaller community-based facilities.

The earliest transport links in Australia began in 1788, after the founding of the colony of New South Wales. At the time, they were little more than cleared paths and there was no system wide planning for location or linkages. In 1810, the arrival of Governor Macquarie led to a planned system for roads and bridges funded by government funds, public subscription and tolls and by the end of his term in 1822, the colony had a network of three major roads. Similar road networks were established in the other colonies of Australia¹³⁴.

Road construction programs in the early 19th century were generally underfunded, as they were dependent on government budgets. The limitations of the transport systems were further exacerbated by the huge increase in road usage during the Australian gold rushes. In response, local government authorities were established with responsibility for road construction and maintenance. The arrival of motorised transport in the early 20th century led to another major increase in traffic and resulted in the establishment of state road authorities in each state between 1913 and 1926, to manage the main arterial roads. Local governments remained responsible for local roads¹³⁵.

The federal government only began to fund roads in the 1920s. The Public Works Act was passed in 1922, which distributed funding to the states according to population levels and was conditional on states matching funding. The 1931 Federal Aids Roads Act removed matching conditions and were less restrictive about allocation of the funds, due to the Great Depression's poor economic conditions¹³⁶. The Depression greatly slowed funding and it remained at these lower levels until after the Second World War, when there were substantial improvements to transport networks.

In 1974, the federal government assumed primary responsibility for funding nationally significant roads. The National Roads Act was passed in 1974 and declared the most important roads between state and territory capital cities as National Highways. The federal government fully funded construction and maintenance works undertaken by states on these roads. In 2005, the National Land Transport Act replaced previous National Highway and Roads of National Importance classification and replaced it with the National Land Transport Network. The criteria for inclusion in the network were similar to the previous legislation but expanded to include connections to major commercial centres, and intermodal freight transport facilities¹³⁷. This network is now defined in the legislation as the "National Land Transport Network"¹³⁸. These roads remain the funding responsibility of the federal government.

¹³⁴ "History of Roads In Australia". *Year Book Australia, 1974*. Australian Bureau of Statistics. 25 January 1974

¹³⁵ Ibid.

¹³⁶ Ibid.

¹³⁷ "AusLink (National Land Transport) Act 2005", Government of Australia, 8 July 2005

¹³⁸ "National Building Program Legislation", Government of Australia, http://www.austlii.edu.au/au/legis/cth/consol_act/nbplta2009476/index.html#s4

The first steam railway was built in 1854 between Melbourne and Port Melbourne. Like many of the early railways, it was operated by a private company, but a shortage of speculation capital resulted in the continued development of the railways being undertaken by individual colonial governments. The initial purpose of rail development was to connect capital cities and by Federation in 1901, all states except Western Australia were linked. Unfortunately three gauge systems had been used, which handicapped the effective operation of interstate rail services. The incompatibility of the rail systems came to a head during World War II when the war required large quantities of goods and personnel to be moved quickly throughout Australia, but it was not until June 1995 that trains could travel on a standard gauge track across Australia.

While the federal government provided substantial funding for roads since the 1920, it has not regularly funded investment in railways, which are considered to be state government responsibility. Loans were made available for gauge standardisation from the 1920s to the 1970s, and there was some funding available for rail projects under the One Nation program in the 1990s. Currently funding is available through the Australian Rail Track Corporation, a federal government owned corporation established in July 1998 to manage Australia's interstate rail network.

CURRENT STATE OF ASSETS

Similar to other advanced economies such as the UK, the US and Canada, Australia has significant public infrastructure. Public sector construction activity represents around 1 per cent of Australia's GDP¹³⁹, or about A\$14 billion of infrastructure engineering construction activity in the 2011 financial year¹⁴⁰. In 2011-12, Australian governments owned 'infrastructure and other construction' assets valued at A\$614 billion. This category mainly comprises road, rail, energy and water assets. Governments owned a further A\$263 billion worth of buildings, much of which is social infrastructure, including schools and hospitals. These figures do not account for public infrastructure that is owned or leased long term by the private sector (including electricity and telecommunications assets, airports, ports, toll roads, schools and hospitals), which is estimated to have a value of around A\$260 billion¹⁴¹.

Infrastructure Australia (IA), a statutory government agency, undertakes assessments of nationally significant infrastructure according to a common, nationwide framework. Nationally significant infrastructure is classified as that for which Australians have expectations of reliability, for which Governments are considered to be accountable, are of substantial size and significant cost and are often provided by a single or monopoly provider. Each class of infrastructure is assessed against three key measures: policy and economic frameworks; planning and investment; and, capacity and performance. Australia divides its nationally significant infrastructure into four classes – transport, communications, energy and water – and the most recent internal assessment was undertaken in December 2013¹⁴².

¹³⁹ "Engineering Construction Activity, cat. no. 8762.0, on Department of Infrastructure, Transport and Regional Economics 2012a", Australian Infrastructure Statistics Yearbook 2012, Australian Bureau of Statistics, Canberra, Australia, 2012

¹⁴⁰ "Value of major infrastructure engineering construction work done by the public sector, cat. no. 8762.0 - Table 12.1c, on Department of Infrastructure, Transport and Regional Economics 2012a", Australian Infrastructure Statistics Yearbook 2012, Australian Bureau of Statistics, Canberra, Australia, 2012

¹⁴¹ "Public Infrastructure – Productivity Commission report", The Productivity Commission, 2014

<http://www.pc.gov.au/projects/inquiry/infrastructure>

¹⁴² "State of Play Report – Australia's Key Economic Infrastructure Sectors 2013", Infrastructure Australia, Government of Australia, 2013

Transport (roads, railways, marine channels, ports, airports, interchanges and intermodal terminals)

According to the 2013 assessment, public perception is that transportation infrastructure is not meeting current user needs and governments do not have robust, long-term plans with identifiable objectives for future projects. Crowding and congestion on rail lines is particularly an issue in Sydney, Melbourne and Brisbane, with significant infrastructure and operational improvements required, such as additional track capacity, separating freight and passenger lines, and signalling system improvements. Australia's roads range from adequate to poor condition and are not meeting community expectations around accessibility and reliability. The key issues relate to reducing road traffic, improving road asset utilisation, undertaking better planning for growth, and increasing funding for local roads. Governments have identified some priority airports, seaports and railways but have not done the same assessments for roads, terminals or interchanges. Identification of nationally significant roads have largely been for the purpose of allocating federal funding, but these exercises have not been based on robust cost benefit analysis, based on future need and likely utilisation.

According to IA, there is scope for more coordinated planning for transport infrastructure and a need to incentivise greater private sector investment. Some private investment is occurring in rail, ports, airports and terminals. However, in contrast, there is no coordinated planning for roads, with private investment limited to places selected by governments and no capacity for investors to influence design or location. The criteria for, and transparency of, decision-making around investment also varies by infrastructure type and across levels of government, which can be a deterrent to the private sector¹⁴³. For example, the cost-benefit analysis (CBA) for the Northern Sydney Freight Corridor program (four projects to remove bottlenecks along the existing railway between Sydney and Newcastle) was denied to the private sector until a Freedom of Information request was lodged. Potential private sector partners were concerned about overstated benefits and understated costs and were unable to provide inputs to the CBA process due to its unnecessary secrecy¹⁴⁴.

Water (drinking water, sewage, drainage and water for commercial or industrial use)

Water infrastructure is broadly meeting needs and is in good condition, although the fragmented state-based approach means that priorities around water management, water efficiency and water security are not as clear or detailed as they could be¹⁴⁵, which is a concern for a nation that regularly deals with water shortages. Two key policy initiatives – the National Water Initiative in 2004 and the 2009 Water for the Future Program (through COAG) – have committed governments to preparing plans, improving pricing and better managing demand, but implementation of these principles has varied across jurisdictions. Australia also has an unnecessarily complicated regulatory system, with each state and territory having its own economic regulator. In contrast, the UK has only one, although the geographic realities are quite different¹⁴⁶. The recently-signed Murray Darling Basin Plan may improve water trading across jurisdictions and between agricultural and urban users, although it is too early in its implementation to assess outcomes.

Australian governments are well aware that the capacity and performance of water infrastructure is largely influenced by climate; however, long-term planning is neither coordinated nor comprehensive. In urban systems, planning is driven by the utility providers, while other systems can be driven by the state or territory. Planning can also be undermined by political intervention, particularly with respect to

¹⁴³ Ibid.

¹⁴⁴ "Public Infrastructure - Productivity Commission Report", 2014

¹⁴⁵ "State of Play Report – Australia's Key Economic Infrastructure Sectors 2013", Infrastructure Australia, Government of Australia, 2013

¹⁴⁶ Ibid.

dams and managing water during droughts. The impact of insufficient planning can be seen in the panic caused by the 2002-2006 droughts which led to an overinvestment in desalination plants, many of which are now underutilised. To ensure the security of water in Australia, there needs to be a more efficient way of managing trade and delivery.

Energy (electricity and gas)

Energy infrastructure is meeting Australia's needs, although electricity networks are ageing and a significant increase in upgrades and renewals of network infrastructure is needed. Gas infrastructure is generally in good condition, though concerted attention needs to be given to meeting future needs. A lack of pipeline redundancy in some instances exposes some jurisdictions to massive disruption if the pipeline is damaged or shut down. Many regional communities are also not connected to larger networks and therefore do not have comparable levels of service as urban areas.

The energy sector has made the most significant improvement in productivity due to recent reforms to policy and regulations. Although state and territory governments have constitutional responsibility for their own electricity and gas infrastructure, there are broadly uniform policy and economic regimes in place across Australia¹⁴⁷. For example, in 2004, the Council of Australian Governments (COAG – see text box) signed the Australian Energy Market Agreement which provided a national blueprint for energy sector reform and national priorities, the National Electricity Law and National Gas Law.

Planning frameworks in the sector are well developed and there are good opportunities for private investment as a result of user pay arrangements with regulated prices. There is strong private ownership of gas networks, but the electricity network is still in the transition phase with states such as Victoria and South Australia leading the way in transferring more ownership to private entities. The sector is attractive because it is largely economically efficient. In sum, the energy sector is in reasonably good shape but there are further opportunities for improvement through current and proposed regulatory reforms to realise more dynamic and competitive markets.

Council of Australian Governments (COAG) – as a strong coordinating body

COAG is the peak intergovernmental forum in Australia, including all governments. COAG is a reasonably unique organisation, with no analogous body in Canada. It is a useful means for the state, territory and federal governments to oversee significant national issues, including infrastructure. The members of COAG are the Prime Minister, State and Territory Premiers and Chief Ministers and the President of the Australian Local Government Association (ALGA). COAG meets as required, usually twice a year, and its role is to discuss and agree policy reforms that are of national significance, or which need coordinated action by all Australian governments. Key reforms agreed by COAG in recent years include health, education and training reforms and packages to close the gap on Indigenous disadvantage.

Communications (fixed and mobile)

Communications infrastructure is broadly meeting user needs and the public is confident in the ability of networks to continue to transmit supply. The federal government has responsibility for regulating telecommunications services, with states and territories having limited involvement. The federal government historically had a strong ownership role, but this evolved into a regulatory and broader

¹⁴⁷ "State of Play Report – Australia's Key Economic Infrastructure Sectors 2013", 2013

policy setting role following the privatization of the national network in three stages from 1997 to 2007. By pursuing national competition principles and making regulatory decisions on access arrangements and pricing, the Australian Government has enabled new private carriers and service providers to enter the market. Development of competition in fixed infrastructure is hampered by the reliance of retail providers on Telstra's network to supply services, but mobile infrastructure has benefited from light regulation and significant private investment. This means that by and large telecommunications is economically efficient.

Regional connectivity remains a challenge. Even with government support, commercial provision is inadequate and some services remain unreliable due to vast distances and high costs. The roll out of the National Broadband Network (NBN) may improve connectivity. The NBN will also see the Australian Government reassume an ownership role of some telecommunications infrastructure. Connectivity for Indigenous communities remains a challenge, with high levels of digital inequality in many communities. The Indigenous Remote Media Association notes that "most remote Indigenous people currently have limited access and usage of ICTs", and that, "limited access to IT facilities, training, relevant on-line content and service delivery, and affordable broadband services will increase the digital divide"¹⁴⁸. Given the unique characteristics of most of Australia's indigenous communities, government efforts to improve communications will need to be targeted to suit individual community needs.

DIVISION OF RESPONSIBILITIES

All levels of government are involved in providing public infrastructure, but the nature and extent of their responsibilities vary between jurisdictions and across different types of infrastructure. State and Territory Governments are responsible for most types of public infrastructure, with the Australian Government being responsible for ensuring the provision of particular types of infrastructure, such as aviation services and telecommunications. Local governments also play a role, particularly for local roads, wastewater services and various types of social infrastructure (such as schools and hospitals)¹⁴⁹.

Even where governments are not responsible for providing infrastructure, they may still play a role in funding. In particular, the Australian Government's role in funding public infrastructure extends beyond its constitutional responsibilities, and includes providing funding for roads, schools, hospitals and public housing.

¹⁴⁸ "Rethinking the Indigenous Communications Program", Broadband for the Bush Alliance, 2013, <http://broadbandforthebush.com.au/wp-content/uploads/2013/05/Rethinking-the-Indigenous-Communications-Program-May-2013.pdf>

¹⁴⁹ "A Report to the Council of Australian Governments" Infrastructure Australia, Government of Australia, 2008

Responsibility for public infrastructure

<i>Level of government</i>	<i>Commonwealth</i>	<i>State/Territory</i>	<i>Local</i>
Airports			
Local and regional			✓
Major	✓		
Aviation services	✓		
Dams		✓	
Electricity supply		✓	
Ports		✓	
Public transport		✓	✓
Railways (non-urban)	✓	✓	
Roads			
Urban		✓	✓
Rural		✓	✓
National	✓	✓	
Sewerage		✓	✓
Storm water management			✓
Telecommunications	✓		
Water supply		✓	

Sources: Australian Airports Association (2012); PC (2011b); Webb (2008).

ALIGNMENT OF INFRASTRUCTURE PLANNING/PROGRAMMING WITH GOVERNANCE STRUCTURES

According to the recent Productivity Commission report, Australia could face serious challenges in providing fair and transparent future public infrastructure¹⁵⁰. This is because institutional and governance arrangements are largely deficient and ultimately unsustainable. The dispersion of responsibilities for infrastructure creates confusion in governing investments. Australia has nearly 600 different local, state and territory Governments that, together with the Australian Government, fund and plan infrastructure¹⁵¹. Within these jurisdictions it is not clear who has responsibility for policy making, approval processes, asset ownership and management. Because these activities often occur across agencies within the same tier of government, as well as across tiers of government, accountability is not specified and jurisdictions can deflect criticism to other arms of government. Conflict over roles and approval responsibilities between and within tiers of government has been blamed for projects being considered in isolation, lacking coordination and focusing on short-term outcomes rather than future infrastructure needs. The current governance arrangements can also lead to duplication and overlap of efforts, with the lack of integration and communication and between stakeholders meaning that agreements between jurisdictions are often not established prior to funding and public commitment. Government investment is suffering because jurisdictions lose opportunities to benefit from economies of scale and there is no national perspective on planning.

¹⁵⁰ "Public Infrastructure - Productivity Commission Report", 2014

¹⁵¹ "Local Government Infrastructure" Department of Regional Australia, Local Government, Arts and Sport, Government of Australia, 2011, http://www.regional.gov.au/local/publications/reports/2001_2002/c4.aspx#_7

A report prepared for the Council of Australian Governments by Infrastructure Australia outlines these concerns, pointing to a lack of evidence to support decision-making and an absence of accountability and transparency leading to inappropriate and escalated pricing. “Weak governance structures are further exacerbated by overlapping and inconsistent regulations. Present arrangements for infrastructure planning, investment, regulation, access and priority setting are state-based and fragmented across Australia.¹⁵²” For example, rules and regulations for transport infrastructure are different in each state and national transport companies incur costs associated with different licensing and safety regulations. In this case, improved governance arrangements would facilitate commercially-based decision-making and greater transparency in access charges. This could provide better market signals for investment, network planning, and potential new entrants to an industry that should be capturing greater market share from road freight. COAG is considering where a simpler and more consistent national approach is sensible and achievable. This would make it significantly easier for businesses and workers to operate across state and territory borders.

Improvements in governance

There has been some success in the transport sector in the partial implementation of a nationwide heavy vehicles agenda, introduction of a private sector discipline to interstate rail freight operations, and the creation of a corporation that controls most of the rail links between mainland capitals.

The energy sector has also made great improvements to its governance arrangements, and a national approach is slowly emerging. States are currently exempt from national electricity rules which makes each electricity market unique and hampers efficient national competition and the emergence of a truly national market, however states are working together to determine the feasibility for developing efficient, national rules.

The Productivity Commission report makes a series of recommendations to improve infrastructure governance:

- Developing effective processes, procedures and policy guidelines for planning and selecting public infrastructure projects;
- Ensuring transparent, innovative and competitive processes for selecting private sector partners and better allocation and monitoring of risks between government and the private sector;
- Making all projects over A\$50 million subject to greater levels of cost benefit analysis; and,
- Determining funding from the federal government for other levels of government based on compliance with governance principles¹⁵³.

Capacity issues within government

Underpinning these recommendations is that federal public servants need the skills to oversee public infrastructure projects, which they do not currently have. The Report is also cognisant that local government capacity should be taken into consideration and obligations need to be proportionate to both the funds the Commonwealth is providing and the capacity of local governments to comply with those obligations.

¹⁵² “A Report to the Council of Australian Governments”, 2008

¹⁵³ “Public Infrastructure - Productivity Commission Report”, 2014

Infrastructure Australia (IA) – Infrastructure Priority List

The establishment of Infrastructure Australia in 2008 has gone some ways to improving governance and oversight of national infrastructure development. Infrastructure Australia advises governments, investors and infrastructure owners on a wide range of issues including:

- Australia's current and future infrastructure needs;
- Mechanisms for financing infrastructure investments; and
- Policy, pricing and regulation and their impacts on investment and on the efficiency of the delivery, operation and use of national infrastructure networks.

One of its most significant roles is in planning and coordinating infrastructure projects across Australia, particularly where the work crosses state borders, and to establish funding priorities free from political considerations. IA seeks to achieve this through the publication of the Infrastructure Priority List (last updated in December 2013). The List identifies projects of national significance and ensures that Australia's key infrastructure-related challenges are being addressed. The List is developed to inform governments of the highest priority projects.

IA reports regularly to the Council of Australian Governments, through the Federal Minister for Infrastructure and Regional Development, and is therefore able to engage frequently with all of Australia's governments on national infrastructure issues.

INFRASTRUCTURE GAPS AND IMPACTS ON PRODUCTIVITY

Underinvestment in infrastructure can have significant economic and social effects. For example, bottlenecks and congestion increase costs for businesses using the services delivered by infrastructure, directly reducing productivity growth. These bottlenecks, which can arise from population growth and international migration, are of particular concern in Sydney, Melbourne, Brisbane and Perth. The Council for Economic Development Australia (CEDA) has estimated that infrastructure bottlenecks impose a cost on the national economy of approximately A\$6 billion per annum. Poorly chosen projects can also reduce productivity by financially burdening communities with infrastructure that doesn't meet their needs.

According to the recent Productivity Commission (PC) report, Australia could be facing an infrastructure deficit – that is, there is a gap between Australia's current infrastructure and its needs – particularly with regard to key national roads which are already stretched to capacity. Infrastructure Australia has estimated that the deficit is around A\$300 billion, while Citigroup¹⁵⁴ estimates that the required infrastructure investment needed to meet Australia's needs would be in the order of A\$770 billion before 2018. The long life of infrastructure assets and efforts to avoid budget deficits mean that governments have overlooked the productivity-enhancing aspects of infrastructure investment.

A 2013 report to COAG outlined the productivity improvements that better infrastructure planning could enable in Australia, including:

- Transport infrastructure to establish links between the farms and mines which will support increased food and resources trade in Asia;
- Efficient water irrigation to support the 135,500 farms across Australia growing food exports, which will have significant impacts on the productivity and vitality of the regions; and,

¹⁵⁴ Private financial institution

- Regional infrastructure to keep pace with population growth to ensure that Australia’s regions are livable and sustainable communities¹⁵⁵.

The 2014-15 Budget outlined a commitment of A\$50 billion by the Australian Government to future infrastructure investment by 2019-20. Total infrastructure investment from Commonwealth, State and local Governments, as well as the private sector, is forecast to build to over A\$125 billion of additional infrastructure by 2020. These commitments underline the Government’s view that efficient infrastructure contributes to productivity and competitiveness, including the competitiveness of cities.

FINANCING APPROACHES

State and local government and government trading enterprises (GTEs – further described below) provide the majority of public financing for infrastructure. Direct federal government investment is lower, however this does not account for the fact that a high proportion of state government revenue comes from federal transfer payments, including targeted payments to finance specific infrastructure investments. For example, federal grants provided almost 13 per cent of financing for public infrastructure projects in New South Wales in 2012-13. In 2014-15, the Commonwealth will provide funding of A\$5.7 billion to support state infrastructure services, including almost A\$4 billion for roads under the Infrastructure Investment Programme.

Taxation arrangements for infrastructure funding

Funding public infrastructure from broad-based taxes is complicated by the ‘vertical fiscal imbalance’ that occurs under Australia’s federal system of government. The more efficient broad-based taxes on income and consumption are typically levied by the Australian Government, whereas many of the least efficient taxes are typically levied by the states¹⁵⁶. Yet public infrastructure spending is largely

Building Australia Fund

The Building Australia Fund is one of three federal Nation Building Funds established in January 2009. It provides funding for transport, communications, energy and water infrastructure through financial assistance grants, acquisition of financial assets (such as shares) in a company involved in the creation or development of relevant infrastructure, and public private partnership payments. Funding applications are assessed by Infrastructure Australia which advises the relevant Minister if the project meets evaluation criteria. Project are assessed based on:

- Extent to which the project addresses national infrastructure priorities;
- Extent to which proposals are well justified with evidence and data, including that proposals pass a cost-benefit analysis;
- Extent of efficiency and co-investment, including that projects should take account of relevant market structures and pricing mechanisms; and,
- Extent to which efficient planning and implementation has occurred, including that project risks have been analysed.

The portfolio Minister then prioritises the list of eligible projects, most of which are then considered during the annual budget process. Payments to the states and territories are channeled through the COAG Reform Fund within the Treasury portfolio¹.

¹⁵⁵ Infrastructure Australia (2013) National Infrastructure Plan

¹⁵⁶ Henry et al, “Australia’s future tax system review”, 2009,

the responsibility of state governments because they usually have a much better understanding of local circumstances. The ability of State and Territory Governments to tax land does give them the scope to levy one of the more efficient broad-based taxes. However, relying solely on this source to fund infrastructure spending would be impractical, and probably less efficient than also relying on revenue from broad-based taxes on income and consumption.

In a submission to the Productivity Commission in 2014, the Victorian Government summarised the situation as follows: “ The progressive concentration of revenue raising power with the Commonwealth Government has increasingly left states reliant on revenue transfers from the Commonwealth to discharge their infrastructure and service delivery responsibilities . . . In 2013-14, the Commonwealth grants will constitute 46 per cent of Victoria’s total general government revenue . . . at the state level, there is limited general taxation revenue base available for infrastructure investment.¹⁵⁷” Unless there is an unlikely overhaul of the taxation system, the federal government will continue to be the indirect primary funder of public infrastructure.

Current funding arrangements

As noted above, due to Australia’s taxation arrangements, intergovernmental transfers from the Australian Government are the key source of infrastructure finance for State and Local governments. The Intergovernmental Agreement on Federal Financial Relations (2011) established the overarching framework and provides three broad forms of funding:

- National Specific Purpose Payments – to be spent in specific service delivery sectors (schools, disability services, affordable housing);
- General Revenue Assistance – consisting of GST payments that can be used by the state for any purpose; and,
- National Partnership Payments (NPPs) – which are payments to support the delivery of specific outputs or projects, facilitate implementation of reforms and reward states that deliver nationally significant reforms¹⁵⁸.

Infrastructure specific funding is directed through NPPs (some of which are also provided to local government). NPP payments include funding established through National Partnership Agreements as well as funding provided through a range of competitive and discretionary infrastructure grant programs, such as the Building Australia Fund. In 2014-15, A\$5.7 billion of infrastructure related NPPs will be paid to the states and territories.

Government Trading Enterprises (GTEs)

In many cases, public infrastructure is controlled by government trading enterprises (GTEs). They are common in utility sectors, including water and electricity, and can also be found in sectors such as rail and ports. GTEs are government-owned or government-controlled entities that produce goods and services on a commercial basis by substantially or fully covering their costs¹⁵⁹. They are outside the general government sector, being established as separate legal entities that generally have their own boards.

The potential benefits in using GTEs, rather than government directly investing in infrastructure, are similar to those realised through privatization. It can strengthen incentives and accountabilities for project selection, and for reducing costs and creating customer value. However, realistically,

¹⁵⁷ “Productivity Commission Public Infrastructure Inquiry - Victorian Government submission” Victorian Government 2014, http://www.pc.gov.au/_data/assets/pdf_file/0018/131913/sub081-infrastructure.pdf

¹⁵⁸ “Public Infrastructure - Productivity Commission Report”, 2014

¹⁵⁹ Ibid.

government-owned GTEs do not operate in the same way as private entities. One of the key concerns with GTEs is that they do not have the same incentives to operate efficiently, and government stakeholders hold undue influence on decision-making¹⁶⁰. This can impact project selection and management of assets. Acknowledging that GTEs do not always deliver the best possible outcome for infrastructure investment, the Australian Government has privatised some of the more significant GTEs such as Telstra (telecommunications).

Future funding ideas

While a majority of infrastructure funding is directed through grant programs, the Australian Government has recognised that the vast investment required for future infrastructure means that traditional grant funding will not be sufficient. The government is therefore considering alternative financing models, particularly for surface transportation infrastructure, including direct private investment, concessional loans and tolling arrangements¹⁶¹.

The government is also reviewing project management and delivery. As previously noted, although the Commonwealth is an important funder of public infrastructure, states and territories, as the asset owner, are responsible for delivery and project management. Funding has also traditionally been allocated in progress payments (pre-determined dates regardless of delivery), but the federal government is considering moving to a milestone model which would see fewer payments, and more rigorous oversight of delivery¹⁶².

User-pays

User charges are the norm in some public infrastructure sectors, including electricity, gas, telecommunication, water, ports, airports and public transport, but there is reluctance amongst policy makers to pursue potentially innovative means of user charging in other areas (particularly road transport). User charging would create a stronger link between funders and customers, meaning that infrastructure could be better suited to customer needs. It would also free up government funds for other social and economic infrastructure, which will not be developed by the private sector. User charges can also manage demand and result in better use of infrastructure, improving its productivity and reducing the need for costly new investment. In the United States, there is an estimated 28 to 38 per cent savings potential as a result of congestion charging on existing roads¹⁶³.

However, the public has an expectation that public goods will be free, particularly given infrastructure costs are covered by government taxes¹⁶⁴, and elected officials are very sensitive to voter views on this issue. As a result, a very small proportion of public roads are tolled and implementing changes to user charging will be challenging for Australia¹⁶⁵.

A single federal Infrastructure Fund

As previously noted, across the nation building program, National Broadband Network development, community infrastructure grants, clean energy funding, and grant programs for water, energy and regional infrastructure there is over a hundred billion dollars of Commonwealth Government investment

¹⁶⁰ Ibid.

¹⁶¹ Interview with the Australian Department of Infrastructure

¹⁶² Interview with the Australian Department of Infrastructure (2014)

¹⁶³ "Infrastructure Productivity: How to save \$1 trillion a year," McKinsey Global Institute, 2013

¹⁶⁴ Infrastructure Partnerships Australia, "The urban transport challenge, A discussion paper on a role for road pricing in the Australian Context", Saha, Sydney, 2010, p. 37

¹⁶⁵ "Public Infrastructure - Productivity Commission Report", 2014 and "State of Play Report – Australia's Key Economic Infrastructure Sectors 2013", 2013

for infrastructure. However, these funds and investment sources have overlapping purposes, different assessment frameworks and a variety of decision making mandates. Several government and non-government infrastructure stakeholders, including Infrastructure Australia, have advocated the development of a single Infrastructure Fund which would consolidate Commonwealth funding sources, and provide a single assessment and prioritization process. Not only would this transform the quality and efficiency of infrastructure spending, it would likely increase transparency and mean that only the most impactful projects would be funded as all projects would be assessed with the same cost-benefit analysis framework.

Concessional loans

As a means to encourage greater private sector investment in public infrastructure, the government is considering concessional loans, whereby the government would lend the capital on terms substantially more generous than market loans either through below-market interest rates, grace periods, or a combination of both. This concept has not been subject to detailed consideration nor assessed for potential financial risk exposure.

Private sector funding

There is some level of private sector involvement for most major public infrastructure projects, though the extent to which the private sector is involved varies across jurisdictions, types of infrastructure, and over time, reflecting changing political and community preferences. The public more easily accepts the notion that the private sector can own in full or in part infrastructure for which they receive a service (i.e. telecommunications or water) but not when the benefit is less easily discernible (using roads). There are two main approaches to private sector investment in public infrastructure – P3s and privatization.

Privatisation

Privatization of existing infrastructure assets has occurred in Australia, including the sale (or long-term leasing) of major, and some regional, airports, gas pipelines, various electricity and port assets, and the national telecommunications carrier Telstra, although recently the Australian Government has reverted to providing telecommunications infrastructure, by initiating the National Broadband Network. Between 1990 and 1997, about A\$61 billion of assets were privatised in the financial services, electricity, gas, transport and communications sectors, and a further A\$20 billion of assets were privatised between 2000 and 2007¹⁶⁶. The experience has been mixed, with a key learning for future privatization that methods to privatise assets should be designed to maximise net benefits to the community.

P3s

Aside from privatization, the Australian Government has undertaken a number of measures to encourage private financing of infrastructure projects by improving investor certainty in the project pipeline and the public-private partnerships (P3s) framework. One of the main reasons Infrastructure Australia was established in 2008 was to assist all levels of governments to develop plans to ease infrastructure bottlenecks and provide advice on the prioritisation process and financing mechanisms for significant infrastructure projects. In 2008, COAG also endorsed the National Public Private Partnership Policy and Guidelines, with the aim of providing a consistent national approach to P3 delivery.

¹⁶⁶ "Better Regulation of Public-Private Partnerships for Transport Infrastructure, ITF Roundtables Report, Report No. 151", Organisation for Economic Co-operation and Development/International Transport Forum, 2013

P3s in Australia have been used for some toll roads, railways, hospitals and water supply facilities in some jurisdictions. P3s have grown over recent years, but the commercial failure of a number of toll roads and the global financial crisis have led to a slowing of this trend¹⁶⁷. Some good examples are Melbourne's Citylink (a network of tolled freeways in Melbourne) and Sydney's Eastern Distributor (further described below). Under the draft National P3 guidelines all projects with a capital value over A\$50 million must consider a public-private partnership option. The Government generally undertakes a value-for-money assessment before agreeing to a P3, comparing the outcomes and costs of a private sector project (including higher costs of private capital) against public sector delivery. Key drivers for agreeing to a P3 include being able to transfer risk, offsetting whole-of-life costing, and using private sector innovation.

The Australian Government believes that facilitating private sector funding sources can streamline tendering processes, reduce regulatory uncertainty and increase the flow of infrastructure investment opportunities. However, despite the advantages of P3s, they still account for a relatively small share of capital spending on infrastructure. Since 1995, P3 projects have totalled just under A\$50 billion, or about 5 percent of total infrastructure, although their use is higher in some states such as in Victoria and New South Wales¹⁶⁸.

Sydney's Eastern Distributor

At 6 kms in length, the Eastern Distributor was built to link the Sydney central business district with Sydney Airport via the already existing Southern Cross Drive (freeway). It was designed to ease congestion and to reduce the time to travel from the city to the airport. Construction involved 5,000 workers and was undertaken by Leighton Contractors for Airport Motorway Limited. Privately built, the Eastern Distributor is also privately owned and operated by Transurban, with state government planning, support and management during construction. At a cost of A\$730 million, the motorway was opened on 19 December 1999, except for the William Street on and off ramps which were opened on 23 July 2000, just in time for the Sydney 2000 Summer Olympic Games. The term of private ownership is 48 years after which the road will revert to government ownership on 23 July 2048.

SUSTAINABILITY AND INFRASTRUCTURE PLANNING

With the establishment of the Building Australia Fund, significant attention was given to new nation building projects and assets. However, the Australian Government has begun to focus its attention on making better use of its existing substantial asset base acknowledging that productivity improvements can be achieved through technological innovation and efficiency improvements in processes and operations. For example, congestion relief, quicker turnaround times at ports, and faster communications can lower costs, decrease prices, increase competitiveness and growth and boost employment. Avoidance or deferral of major new capital expenditure through maximisation and sustainment of existing infrastructure could also be of considerable benefit given that the needed investment for new infrastructure in Australia is beyond the current financial resources of government and industry.

¹⁶⁷ "Public Infrastructure - Productivity Commission Report", 2014

¹⁶⁸ Chong, S. and Poole, E. "Financing Infrastructure: A Spectrum of Country Approaches", Reserve Bank Bulletin September Quarter, 2013

As a means to better assess the potential of existing infrastructure the federal government requires states to include consideration of whether existing assets could be expanded or changed, when they make proposals for funding for new development. However, Infrastructure Australia considers that governments must go further and consider long-term whole-of-life costs and benefits when assessing infrastructure solutions and priorities, including the long term impacts of potential solution on the environment, the economy, social equity and human behaviour. Government funding programs have also not caught up with sustainability objectives. While there are programs for minor remediation of roads, there is no large pool of funding for more significant assets, such as freeways.

Climate change

In late 2013, the Australian Government released *Sustainable Australia Report 2013*, outlining the key trends which will affect the next generation of Australians, including the impact of population growth and climate change on infrastructure planning.

Although the report agrees that there remains some uncertainty around the future of Australia's climate and the possible impacts, it recommends that policy makers begin to develop strategies for adapting to the impacts of climate change. As the report notes, the resilience of Australia's economy, society and infrastructure to the effects of climate change will be an important factor in future prosperity¹⁶⁹.

Building resilience and capacity to adapt to existing and future climate impacts will be critical in reducing the vulnerability of Australia's cities to actual or expected climate change effects. Several key areas for focus in developing resilient infrastructure include:

- Transport infrastructure – roads, ports and rail networks – are susceptible to damage from extreme wet, dry, hot and cold conditions. The direct financial costs of damage are substantial; however indirect costs, such as human safety, maintenance of critical supply lines and the commercial costs of delays, are just as significant.
- The threat posed by rising sea levels – with scenario projects of a 1.1 metre rise by 2100 – would impact approximately \$226 billion in commercial, civil and residential infrastructure in the case of inundation and erosion¹⁷⁰. Making development decisions now to avoid potential affects, or relocate critical infrastructure, could avoid greater costs in the future.

¹⁶⁹ Sustainable Australia Report 2013, Government of Australia, p 77.

¹⁷⁰ Australian Government Department of Climate Change and Energy Efficiency (2011) *Climate Change Risks to Coastal Buildings and Infrastructure: A Supplement to the First Pass National Assessment*

CONCLUSION

This report highlights the many successes and failures international governments have encountered with their approaches to infrastructure governance. While there is no obvious superior method of governance, and governments are still working hard to develop new structures, several programs and initiatives stand out as innovative and effective solutions to traditional governance flaws. Below is a brief summary of some of the best practices we discovered while compiling this report:

- In 2008, the Australian government established the statutory body Infrastructure Australia as a means to improve whole-of-government infrastructure coordination. While individual departments have responsibility for various infrastructure assets, IA is able to look across government to develop a picture of all infrastructure related activities. While IA does not have decision making authority, it provides advice and recommendations to federal and state/territory government on future priorities, policies, pricing and regulation issues; and, financing mechanisms. It also has the relatively unique remit to work with a wide range of stakeholder including governments, investors and infrastructure owners. IA is still a relatively young organisation and is currently under review by the Coalition government however, it has the potential to reduce disorganization between government departments by gathering all infrastructure related activities under one governance body and outlining one, clear, and consistent message on infrastructure management.
- The United Kingdom has had success with their innovative “arm’s length” governance model for infrastructure projects, as highlighted by the “Crossrail Project” excerpt on page 27. By fully funding the Crossrail project and establishing a limited company to manage it, the UK government ensured that the project would be completed efficiently, on time and on budget. In a sense, the company took on the role of a mini-Crown Corporation with a set termination date. This model could prove to be an effective alternative to outsourcing or public-private partnerships.
- The United Kingdom has also had success with their highly-privatized version of infrastructure governance. By creating industry regulators, the government can be assured that the private sector, which completes tasks at less cost and in a more efficient manner, abides by the government’s priorities.
- Australia, the United Kingdom, and the United States, have all recently completed the process of identifying critical national infrastructure. This provides the governments with clearer parameters to assess future investment and maintenance priorities.

APPENDIX – INTERVIEW PARTICIPANTS

United Kingdom

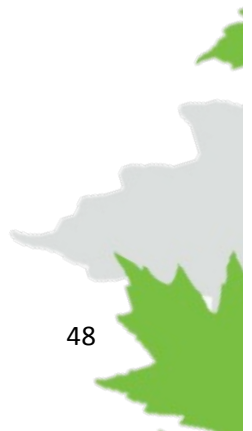
- Duncan Sutherland – Board Member, High Speed Rail II; Regeneration Director, Sigma Capital
- Professor Michael Parkinson – Liverpool University; Special Adviser to the House of Commons CLG Select Committee Inquiry into Regeneration

United States

- Bill Anderson – Director of The Infrastructure and Security Partnership
- Stephen Caldwell – Director, Infrastructure Protection Issues, Homeland Security and Justice Team
- Catherine Colwell – Government Accountability Office
- Jon Melhus – Government Accountability Office
- Steven Cohen – Government Accountability Office
- Michael Clements – Government Accountability Office
- David Wise – Government Accountability Office
- Michael Armes – Government Accountability Office

Australia

- Debra Robertson – Infrastructure Policy and Investments, Department of Infrastructure and Regional Development
- Bob Herbert – Department of Infrastructure and Regional Development





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