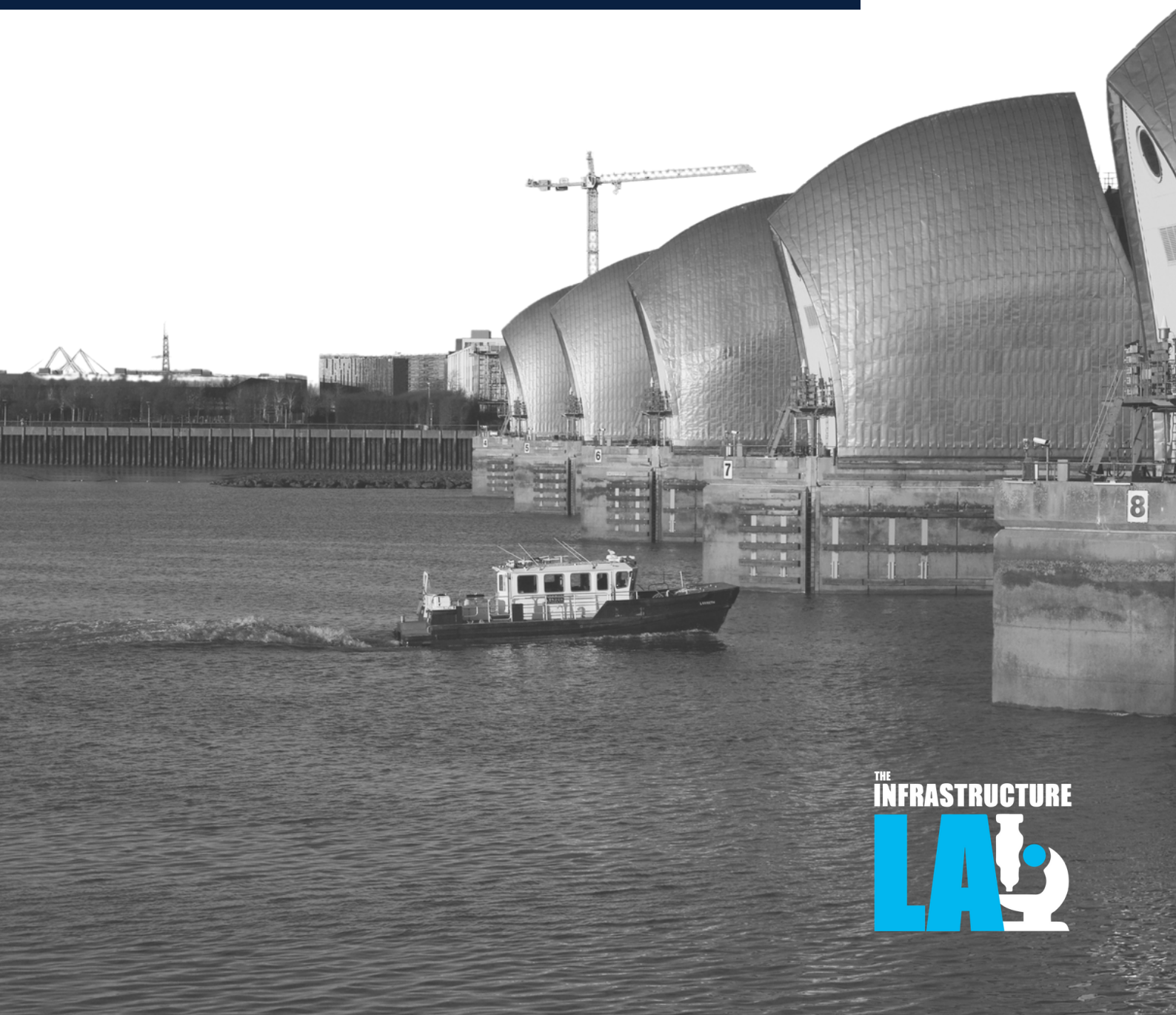
Infrastructure Exchange

INFRASTRUCTURE & NET ZERO

Lifecycle Planning & Procurement



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ABOUT THE INFRASTRUCTURE LAB

The Infrastructure Lab brings together organizations, businesses, government and academia to discuss solutions for infrastructure challenges. With Canada making unprecedented investments, our goal is to promote constructive dialogue, and draw on shared experiences, to ultimately help drive the most value for communities, and governments, and a healthy maket for the sector.

2021

Session Co-Chairs:
Lisa Mitchell, Infrastructure Canada
Alan Muse, RICS

Convener:
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With thanks to session participants from the following organizations:

- Alberta Infrastructure
- Arup
- BDP
- Canada Infrastructure Bank
- Commerce Decisions
- Construction Innovation Hub
- Construction Leadership Council
- Foster + Partners
- Hawkins\Brown
- Infrastructure Canada
- Infrastructure Ontario
- Mace
- Rider Levett Bucknall
- Royal Institution of Chartered Surveyors
- Scottish Government
- Turner & Townsend
- UK Department of Business, Energy, and Industrial Strategy

Authors: John Allen, Jess Neilson

GLOBAL PUBLIC AFFAIRS
FROM INSIGHT TO IMPACT

PLANNING, PROCUREMENT AND NET ZERO

Government buying power can radically shift infrastructure delivery to become more efficient and deliver wider economic, social, and environmental goals. Here are some of the key themes raised at the Canada-UK roundtable on Moving from Cost to Value and Net Zero:

1

From cost to value:

UK government and industry have worked together to help shift mindsets and provide set processes with the development of the Construction Playbook and Value Toolkit

2

Defining value:

Incorporating whole life costs is a start as well as looking at economic, social and environmental impacts. There are standards like ICMS 2 and PAS 2080 to help directly compare those costs and measure carbon

3

Government vision:

An overall vision helps drive change with examples like Canada's Greening Government Strategy and Scotland's National Performance Framework focusing plans and overcoming siloed thinking

4

Project assessment:

The UK developed a project scorecard to assess projects against policy priorities, and Scotland uses a Common Investment Hierarchy. It is also important to look holistically at wider social and environmental benefits

5

Planning and design:

Design can reduce energy consumption though use of natural light and shading, better airflow, and materials used. It also reduces lifetime emissions by looking at how one asset fits in overall systems

6

Procurement approaches:

Procurement models and evaluation play an important role in driving market behaviour. This starts with looking at evaluation criteria including whole life costs, and using a range of procurement models best suited for each asset type

7

Funding and financing:

Many institutional investors are seeking opportunities with strong environmental and social credentials with infrastructure banks playing an important role in attracting private finance

INFRASTRUCTURE AND NET ZERO: CANADA AND THE UK

Environmental performance and economic value go hand-in-hand when assessed over the lifetime of infrastructure. As projects are planned and procured it is often only the upfront costs for design and construction considered, which does not take into consideration the costs of operating and maintaining these buildings and infrastructure over 30, 50, or 100 years.

More innovative designs and building materials may have greater upfront costs, but reduce lifecycle costs and substantially reduce greenhouse gas emissions over the years an infrastructure asset is in use. By capturing that lifetime value it becomes easier to fairly compare proposals and deliver long-term cost savings and environmental benefits.

In 2021 the UK hosts COP26 to help align efforts and advance global climate action. Moving forward and well beyond these milestones, as a whole of government approach, the UK has pivoted its focus to a clean growth agenda, decarbonsing its economy and net zero ambitions. This includes through a lens of 'good for business', and identifying and supporting commercial opportunities for innovative clean technologies, environmental goods and services, and green finance, and leading to inclusive and sustainable economic and social prosperity. For this to take place, market dynamics, policies, and planning need to align with long term thinking, new perspectives and considerations, and a solutions driven approach.

Both the UK and Canada are focused on the role infrastructure will play in economic recovery, and both have also committed to producing net zero emissions by 2050. This virtual roundtable, with Canadian and UK public and private sector stakholders, provided an opportunity to share best practices on how infrastructure investment can deliver better environmental and economic outcomes, and support both countries on the journey to net zero.

50%

OF EMISSIONS COME FROM CONSTRUCTION, OPERATION, AND USE OF INFRASTRUCTURE. ESTIMATED TO REACH 80% BY 2030 AS ELECTRICITY DECARBONIZES

SOURCE: UK INFRASTRUCTUE CARBON REVIEW, 2013

2:1

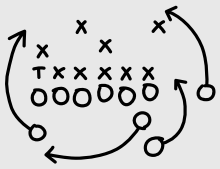
THE UK NATIONAL GRID ESTIMATES EVERY 2% CARBON SAVING RESULTS IN A 1% DROP IN COST. CARBON IS A PROXY FOR ENERGY AND MATERIAL USE

SOURCE: NEW CIVIL ENGINEER, 2018

1 FROM COST TO VALUE

The UK has made a concerted effort over recent years to shift the focus of procurement towards value, and to factor in economic, social, and environmental impacts. This came in response to a perceived race to the bottom with contracting authorities selecting the lowest cost solution, and an increasingly silo-driven mentality. With an emphasis on lowest cost bid, and little scope for innovation, it had an increasingly negative impact on the market that was seeing large players go under. From the government's perspective there was also a sense of a missed opportunity not making the most out of the spending to effect change and address lifecycle asset management.

Collaboration between government and industry led to developing tools to change the industry's mindset. Two key documents reflect this.



Construction Playbook

Developed by the UK Department for Business, Energy, and Industrial Strategy (BEIS), the playbook sets out how contracting authorities can better procure projects and be more collaborative. Its aim is to improve the quality of what the public sector can procure from the industry, creating more cooperation through the supply chain, including delivering wider social value. It focuses on creating more stable and fair contractual payment terms; encouraging outcome-based specifications, longer term contracting, and standardised designs; driving innovation; creating win-win contracting arrangements; and increasing speed of delivery.

Value Toolkit

Created by the Construction Innovation Hub, and a collaboration between government and industry, the toolkit looks at how procurement could change behaviours and outcomes on projects. Focusing on value and whole-life performance, it is underpinned by the five capitals model, and designed to drive better social, environmental and economic outcomes. It sets a definition of value, has guidance on selecting the best delivery model, designing procurement processes, and robust evaluation and measurement strategies.

2 DEFINING VALUE

Value goes beyond cost and the construction phase. It considers economic, social, and environmental factors over the lifetime of infrastructure. This requires a change in approach to drive more informed decision-making. It provides bidders with an ability to innovate in a way that can provide a lower overall price across the lifetime of the asset. It gives contracting authorities the ability to drive strategic policy in areas such as reaching net zero or developing local jobs. Most importantly, it also ensures early stages of design and construction consider how people will use the infrastructure over decades of its lifecycle.

Canada is also working on the low carbon assets through lifecycle assessment (LCA2) initiative. This is being led by the National Research Council (NRC) to build the base for public and private entities to undertake whole-asset life-cycle assessment. This will also provide a platform for the development of a life-cycle inventory for Canada.

There are standards that help to provide a framework to build procurement around:

- **PAS 2080:** Is a standard for managing carbon from infrastructure created by Arup and Mott MacDonald, together with the British Standards Institute. It provides a framework for contracting authorities, designers, constructors, and suppliers to manage carbon over the whole of an asset's life. It provides guidance on setting targets and baselines, transparent reporting, and sets stages for when to get the biggest carbon and cost benefits from the supply chain.

- **ICMS2:** The International Construction Measurement Standard, led by the Royal Institute of Chartered Surveyors (RICS), is now in its second iteration and has been expanded to include lifecycle costs. This standard provides contracting authorities with the ability to directly compare overall costs and other data between bids, and help to evaluate the merits of projects in the planning phase.

3 GOVERNMENT VISION

Canada's net zero program extends to the entirety of government. The Government of Canada's Greening Government Strategy aims to reduce the carbon footprint of its real property portfolio. It uses a CAD$300 cost of carbon and requires a full life-cycle costing. Governments can demonstrate leadership where they are asset owners, where they are funders (by putting in place requirements) and can also help build capacity - including with respect to data.

In addition to the Construction Playbook, the UK recently introduced a Social Value model for procurement. This mandates that social value makes up 10% of the weighting in evaluating bids. This includes considerations around tackling climate change, reducing waste, promoting new jobs and skills development, and driving equal opportunities.

The Scottish government put net zero at the heart of its five-year infrastructure investment plan. Scotland set goals for net zero, integrated inclusive economic growth goals, and building resilient and sustainable places. It also focuses on outcomes, as opposed to inputs. These outcomes are derived from a National Performance Framework, which aligns with its Sustainable Development Goals, reduces inequality, and reflects the values and aspirations of the people. Scotland is also developing a new carbon assessment methodology.

4 PROJECT ASSESSMENT

The UK is also developing a new Project Scorecard for major projects through the Infrastructure and Projects Authority. This will set out a clear framework linking the contribution of a project to the government's priority outcomes as defined by the UK's Public Value Framework and social value model. This will allow contracting authorities and suppliers to make informed decisions throughout the project lifecycle.

Considering some of the historical infrastructure that Scotland has, it prioritises maintaining and investing in existing infrastructure rather than building new. It has developed a common investment hierarchy that informs future investment choices. This starts by looking at future need if for example, new technologies will change how services are delivered, it then looks at maximizing use of existing assets, then repurposing or co-locating, and finally replacement or new builds.

A holistic view is absolutely necessary in determining how quickly a piece of infrastructure can pay off. On an individual project level it is important to consider legacy and lifecycle. The UK has thousands of roads, some that are thousands of years old. The M4 motorway extension in South Wales was a major project to be assessed for carbon impact by Arup. This process looked at the whole life of the road through capital, operational, and user carbon. Given the impact on reducing congestion, shortening journey length, and taking cars off hilly alternative routes, the project was found to offset the initial capital carbon expended. This also accounted for any capacity-induced traffic that would come from adding capacity.

5 PLANNING AND DESIGN

The design stage has the greatest impact on overall lifetime cost and carbon, and the two are intrinsically linked. It also helps to deliver better experiences and outcomes for end users. For example a study in the UK by RICS found that better design could help improve learning in schools by 10 percent, and reduce recovery time in hospitals by 27 percent.

The UK's National Infrastructure Commission (NIC) published a set of design principles for all infrastructure of national significance to help encourage the industry to understand the importance of design focused on climate, people, places, and value. Investing more in design can reduce energy consumption though the operations period by greater use of natural light and shading, better airflow, and use of more insulating materials. The design also shapes how much and which materials are used for construction.

Better design can also shift user behaviour, for example, increased transit use. Transit station design, building location and proximity to transit and mobility options are important. According to Foster + Partners, for a location close to transit, 20-25 percent of the overall carbon can come from travelling to and from the building. When a building is located away from transit that figure can rise to three times that amount.

As electricity grids become increasingly decarbonised other factors become more important, such as embodied carbon. This is the carbon used in construction through the processes and materials used. There is a growing emphasis on retrofits over new builds with the construction sector producing 35-40 percent of national emissions and 63 percent of waste. Hackney Town Hall was updated, with UK's Hawkins\Brown appointed to carry out the restoration of the building, adding 70 percent occupancy and introducing intelligent building controls, and durable easier to maintain materials.

Repeated and predictable models can also have a significant effect and unleash the potential of modular and off-site manufacturing. Network Rail launched a competition to design footbridges that could be used around the country. Network Rail has around 2,400 footbridges throughout the UK, by using standardised design and modular construction they could reduce costs and embodied carbon by 30 percent.

6 PROCUREMENT APPROACHES

Tender evaluation is becoming more complex with a shift from lowest cost compliant, to best value with more of a focus on the outcomes. The required outcomes are now also becoming broader with a wider set of interested stakeholders and policy directives. As well as confidence in the quality and delivery of the procurement subject as an outcome, there are now a number of social value considerations that need to be balanced with this, including environmental performance.

National Defence Canada has followed this approach for a number of years with support from Commerce Decisions. High value projects are required to have Canadian Industrial/ Technological benefit (ITB/VP) as a dimension along with cost and capability. Additional dimensions and evaluation share is becoming more prevalent in infrastructure procurement.

Work needs to go into building understanding among bidders and within contracting authorities on what the change in approach is trying to achieve. This new approach also requires new skillsets from procurement professionals and organisations. Infrastructure Ontario for example, has provided internal training around whole of life costing, and the UK introduced a broad requirement that 10 percent of scoring must be dedicated to social value, including climate impact.

Infrastructure Ontario announced changes to its procurement approach to boost innovation and drive competition, to rebalance bid scoring, and move toward outcome-based specifications. As well as scoring criteria, governments can mandate through the use of specifications. The Canadian Government also introduced a requirement that federal projects use low-carbon cement that produces 10 percent fewer emissions than regular cement as of 2021.

Ontario has developed a highly successful public-private partnership model. By including a requirement of maintenance over 30 years along with design, finance and construction it ensures that lifecycle considerations are forefront in the design and construction stage. It also provides scope for bidders to invest more in design and construction, knowing that there is an opportunity to save in areas such as energy costs over the life of the contract.

Successful projects start with extensive consultations with community stakeholders, in this case teachers and pupils. One example is the Waid Academy in Scotland designed by BDP. It is a community school that includes a high school, police station, library and a community hub. The energy performance is hitting benchmarks, and the sustainable campus is having a positive impact on learning outcomes.

7 FUNDING AND FINANCING

One area both the UK and Canada are looking to unlock is promoting a larger role of private finance, particularly large public pension plans, to invest in infrastructure. The Canada Infrastructure Bank (CIB) was set up to attract private finance into revenue generating infrastructure with CAD$35 billion to invest. The bank recently released a CAD$10 billion growth plan to support a transition to a low carbon economy. It will invest in zero emissions buses, clean power, green infrastructure, broadband, and trade and transport.

The CIB also included CAD$500 million for project acceleration, to help projects get to a point where they are attractive for investors. It encourages organisations to start a dialogue with them early to determine if projects could become viable investment opportunities. To tap into a wider pool of ideas, the Government of Alberta has also developed an Unsolicited Proposal Framework as a way to attract private investment in infrastructure. Organisations submitting bids will negotiate an advantage as the project moves to procurement to ensure the government can provide some competitive tension and be fair to the originators.

With Environmental, Social and Governance (ESG) factors driving more investment decisions, infrastructure assets seeking to attract private finance will need to meet higher standards. The Thames Tideway Tunnel project, a 25km sewer under London, has been particularly active in setting benchmarks around environmental and social performance. The project secured private investment and is being funded through a surcharge on water bills to pay for the urgent upgrades to a 150 year old system built for a much smaller population.

In Canada, the Tlicho all-season road in the Northwest Territories is a public private partnership with a 28-year maintenance component. Unique to the project is a bespoke climate change risk-sharing regime that required a reliance on cutting-edge modelling to enable bidders to better price risk exposure.

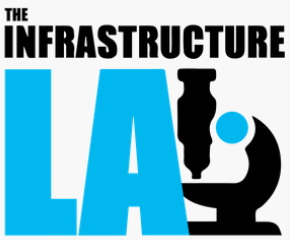
Another innovative scheme is Greater London Authority Retrofit Accelerator. The government funded programme managed by Turner & Townsend helps bring together a pipeline of retrofit work on social housing and other public sector estates. A lot of private sector clients are overwhelmed as they feel like they do not have enough funding to run the schemes or programmes effectively. However, developing the business case, they can bring different funding streams to the table to provide low-cost financing to get schemes off the ground. Government funding helps increase the scale of investment.

SUMMARY

As mentioned throughout the roundtable carbon and cost have a very close relationship. A lot of work has gone into developing frameworks and tools to better leverage investments in infrastructure to drive value and meet policy goals such as net zero. However, there remains opportunities for improvement via data.

Anecdotal estimates suggest 75 percent of data is generated during operational stage of asset. That data is not always used and opportunities to learn lessons that could provide evidence that can be used up front in the construction, delivery and planning of assets and how it can help. It will also help address some of the siloed thinking in the sector.

Technology and data can help make processes and decision-making become more systematic. This requires a host for all the information in one place to enable objective comparisons of information and unlock further progress.



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