



# TAKING STOCK OF BRITISH COLUMBIA'S CAPITAL STOCK POLICY PERSPECTIVES

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Business Council of  
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# POLICY PERSPECTIVES



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## TAKING STOCK OF BRITISH COLUMBIA'S CAPITAL STOCK

### HIGHLIGHTS

- The capital stock is important because people are more productive when they have more modern and advanced facilities, tools, technology, and intellectual property to work with. All else being equal, a country or province with large stocks of non-residential capital *per worker* will have high labour productivity (real GDP per hour worked), real GDP per capita, and real market incomes. In other words, the accumulation of productive capital is a sure path to prosperity and higher average living standards over time.
- B.C.'s overall capital stock per available worker is growing. This growth is overwhelmingly concentrated in just two assets: residential structures; and engineering structures.
- B.C.'s capital stock per available worker of residential structures (note, this metric excludes land) is larger than the *entire* non-residential capital stock, having surpassed it about 2015. In 2020, the residential structures capital stock was \$116,100 per available worker, 12% larger than the total non-residential capital stock of \$103,800 per available worker.
- B.C.'s non-residential capital stock per available worker in 2020 consists of \$54,700 for engineering structures, \$26,500 of non-residential buildings, \$13,400 of machinery and equipment (M&E), and \$9,200 of intellectual property products (IPP).
- B.C. has a smaller non-residential capital stock per available worker than Canada because of Alberta's positive impact on the national average. A better comparison is the "Rest of Canada" (i.e., Canada excluding B.C. and Alberta), relative to which B.C. has a modestly larger non-residential capital stock per available worker. B.C.'s advantage over the Rest of Canada is concentrated in engineering structures.
- Apart from engineering structures, the rest of B.C.'s non-residential capital stock per available worker (i.e., stocks of non-residential buildings, M&E, and IPP) was only 6% larger in 2019 than in 1981. It has been shrinking since 2008 and is smaller than in the Rest of Canada.
- Federal and provincial policymakers should be unnerved by the unbalanced nature of growth in the capital stock per available worker and question how long this model of economic growth is sustainable. An economy where the residential capital stock accounts for an unusually large share of the aggregate capital stock, and the lion's share of investment, is likely to struggle to advance prosperity through high labour productivity growth. Outside of Alberta, Canada's non-residential capital stock per available worker has barely grown since the 1970s. This helps explain Canada's serially poor growth in labour productivity.
- Policymakers should holistically review and reform the structural impediments and disincentives facing non-residential capital investment to put the economy on a path to higher labour productivity and real market incomes for Canadians and British Columbians.

### INTRODUCTION

Our previous issue of *Policy Perspectives* delved into long-run capital investment trends in Canada and British Columbia ([Williams, 2022](#)). Total capital investment per available worker in B.C. is lower than in Canada, but this is mainly

because Alberta lifts the national average. Compared to the "Rest of Canada" (i.e., Canada excluding B.C. and Alberta), B.C.'s total investment per available worker is slightly higher due to elevated levels of investment in residential and non-residential structures.

This paper will expand on the previous analysis and examine B.C.'s *net capital stock*, defined as accumulated capital investment flows net of depreciation. The capital stock is important because economic theory and empirical evidence find that workers are more productive

when they have more (and more modern and advanced) facilities, tools, technology, and intellectual property to work with. Therefore, all else being equal, a country with large stocks of capital per worker will have high labour productivity (real GDP per hour worked), real GDP per capita, and real average market incomes for workers. This can be seen in [Robson and Wu's Figure 1 \(2021, p4\)](#) which shows a strong positive relationship across OECD countries between real GDP per available worker and the real capital stock per available worker. In other words, the accumulation of productive capital is a sure path to prosperity and higher average living standards over time.

## METHODOLOGY AND DATA

The analysis here largely follows [Williams \(2022\)](#) and [Robson and Wu \(2021\)](#). The main unit of analysis is the *real (price-adjusted) net capital stock per available worker*. Annual capital stock data from 1961 are in constant 2012 prices and sourced from Statistics Canada Table 36-10-0098-01 (non-residential capital stock, all industries) and Table 36-10-0099-01 (residential structures capital stock). Available workers are numbers of persons in the labour force annually from 1976 as reported in Statistics Canada Table 14-10-0327-01.

The net capital stock is *accumulated* flows of gross investment less depreciation. With respect to gross investment flows, that analysis can be found in [Williams \(2022\)](#). With respect to depreciation, capital assets wear out as they are used in production, or they become obsolete

## The accumulation of productive capital is a sure path to prosperity and higher average living standards over time.

over time, so it is important to adjust gross investment to account for depreciation. Because the “wearing-out” process is unobservable, there are three main ways to estimate depreciation over an asset’s lifespan: linear or straight-line (equal depreciation per annum); geometric (depreciation is weighted toward the start of the asset’s life); and hyperbolic (depreciation is weighted towards the end of the asset’s life). We adopt the widely-used geometric depreciation approach. Thus, the net capital stock series are the geometric end-year net capital stock series published by Statistics Canada.

B.C.’s net capital stock is compared over time, across business cycles, and relative to Canada, Alberta, and the Rest of Canada (i.e., Canada excluding Alberta and B.C.). The overall capital stock includes residential structures and non-residential capital. The residential structures net capital stock consists of accumulated expenditures on new and renovation residential construction and on transferring ownership of existing and new real estate, less depreciation. The non-residential net capital stock includes structures (engineering structures and non-residential buildings), machinery and equipment (M&E), and intellectual property products (IPP, comprising software, research and development, and mineral exploration and evaluation), less depreciation.

## WHAT HAS HAPPENED TO B.C.’S CAPITAL STOCK PER WORKER OVER TIME?

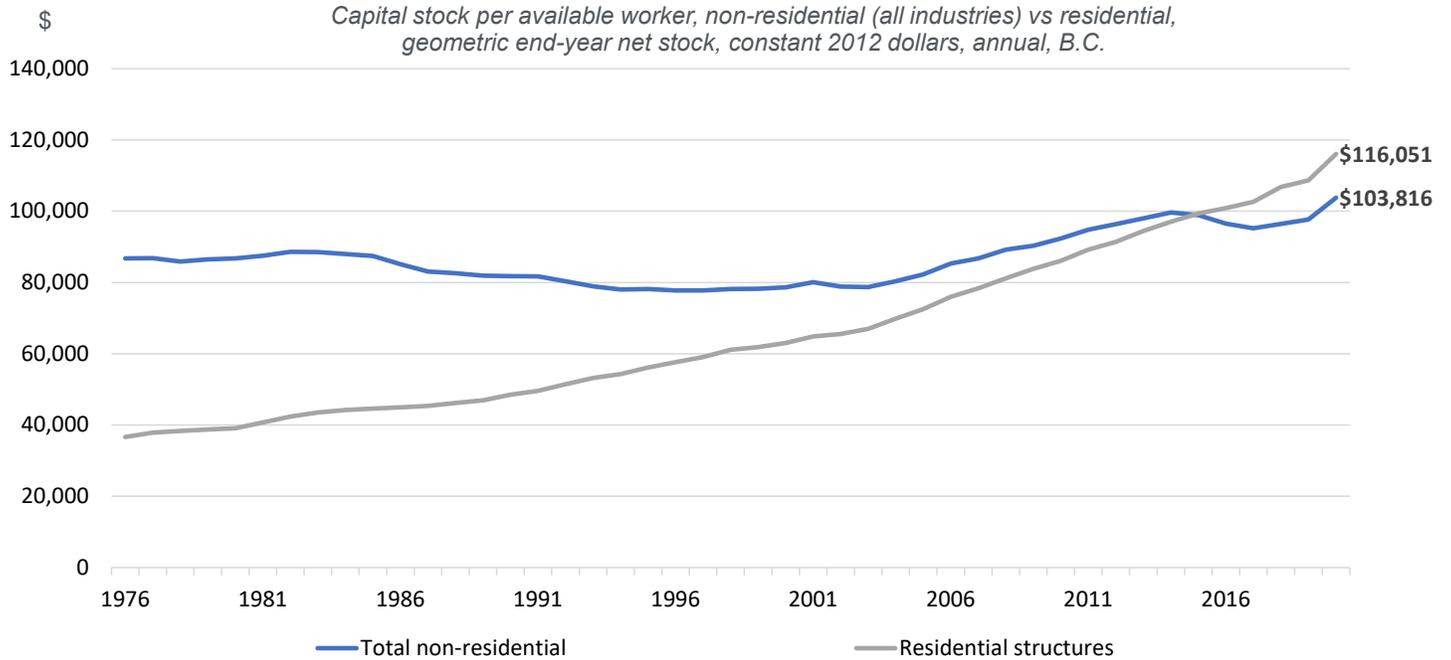
B.C.’s overall capital stock per available worker is rising, although the increase is overwhelmingly concentrated in just two asset types: residential structures; and engineering structures. The residential structures capital stock has almost quadrupled from less than \$40,000 per available worker in the 1970s to \$116,100 in 2020 (**Figure 1**). Note that this metric is the *structure* value excluding land values.

The residential structures capital stock is by far B.C.’s largest capital asset. However, stocks of residential structures do not necessarily expand the economy’s future productive capacity other than through consumption of housing-related services. **Remarkably, the residential structures capital stock in B.C. surpassed the entire non-residential capital stock in about 2015. By 2020, B.C.’s residential structures capital stock of \$116,100 per available worker was 12% larger than the total non-residential capital stock of \$103,800 per available worker.**

**Figure 2** shows the composition of the non-residential capital stock, the largest element of which is engineering structures. After shrinking from the 1970s, the stock of engineering structures in the province started rising again after 2000 and reached \$54,700 per available worker in 2020 – still *less than half* the value of the residential capital stock.<sup>1</sup> The next largest stocks of capital are non-residential buildings (\$26,500 per available worker) followed by M&E (\$13,400) and IPP (\$9,200).

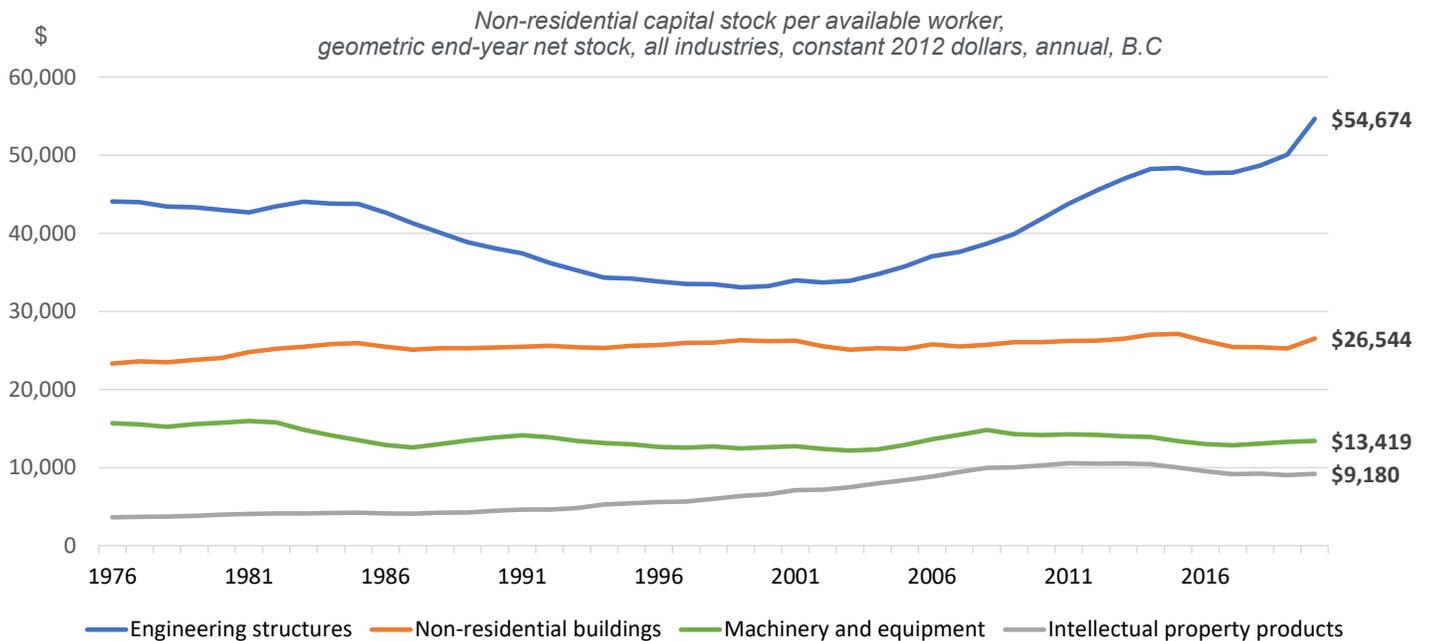
<sup>1</sup> Current projects boosting engineering construction in B.C. (across all industries including the public sector) include the Trans Mountain pipeline expansion, the Site C dam project, the Coastal GasLink pipeline project, and the LNG Canada project. Of these, the Site C dam project, and the Trans Mountain project (since it was nationalised in August 2018) are both public sector projects.

**FIGURE 1: B.C.'S OVERALL CAPITAL STOCK PER WORKER IS RISING**



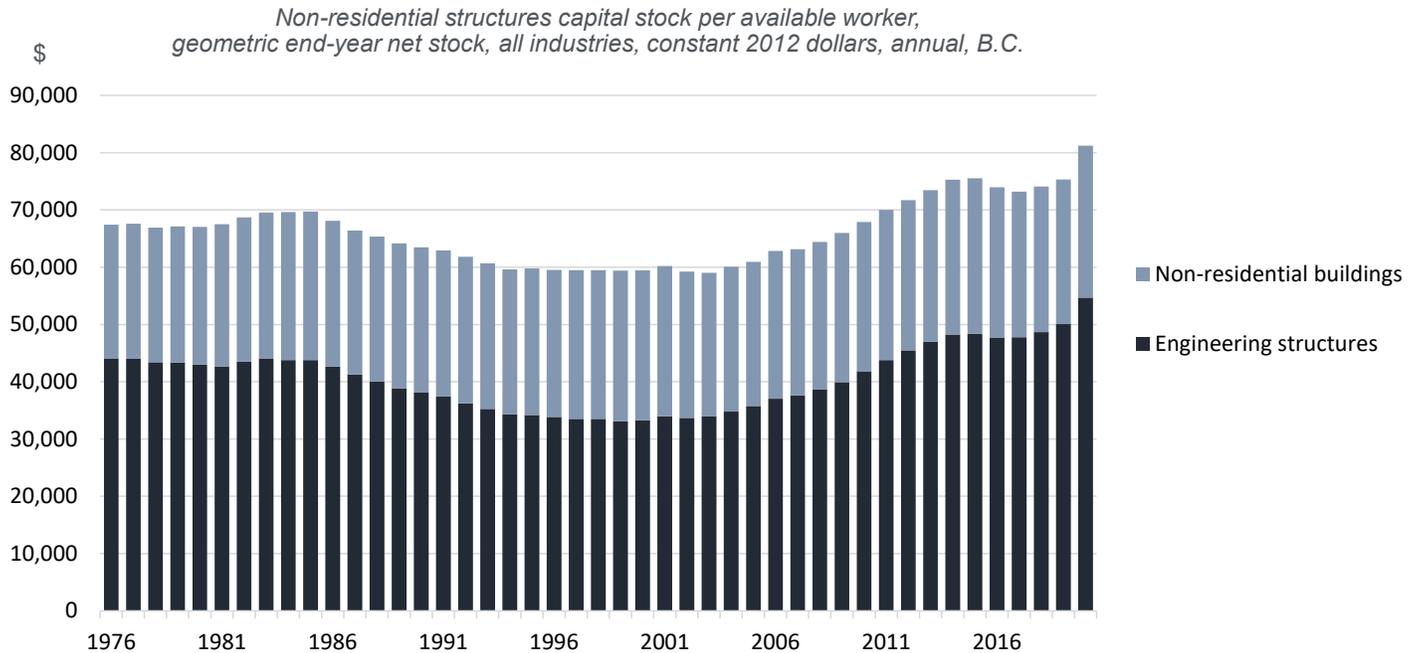
Source: Statistics Canada, BCBC.

**FIGURE 2: ENGINEERING STRUCTURES ARE DRIVING THE INCREASE IN B.C.'S NON-RESIDENTIAL CAPITAL STOCK PER WORKER**



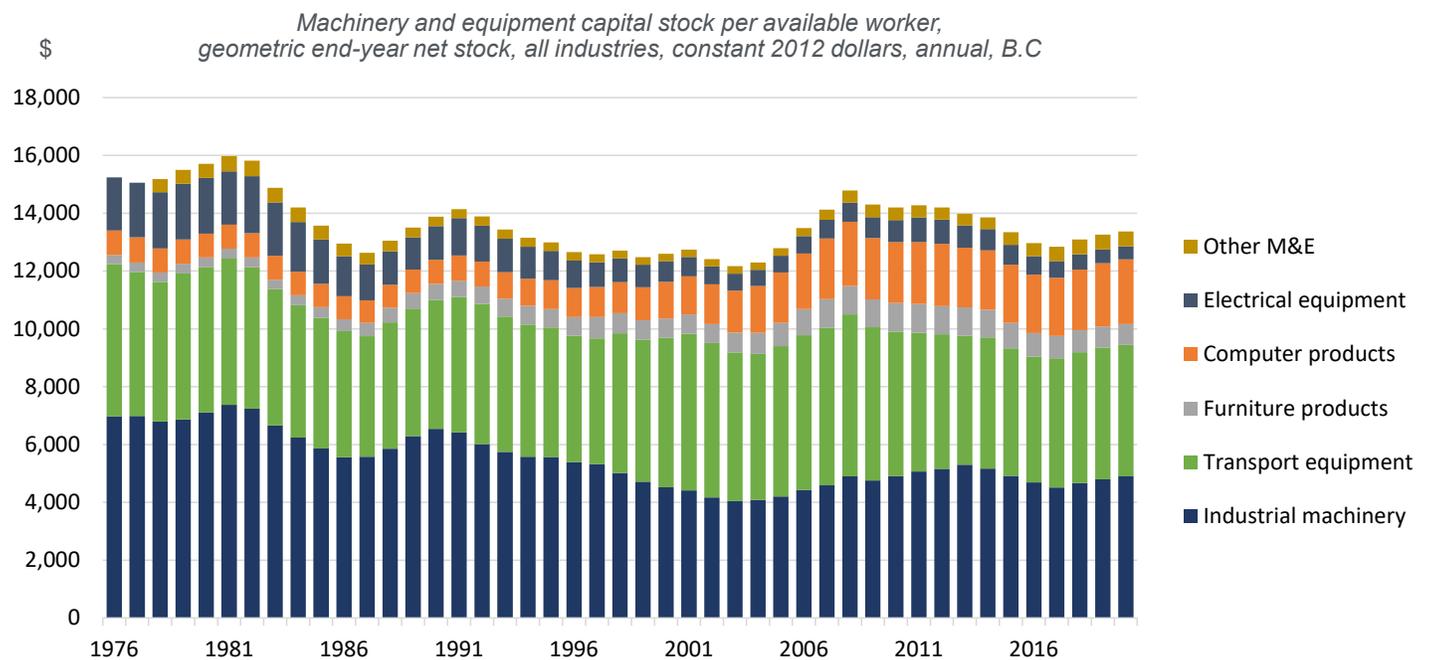
Source: Statistics Canada, BCBC.

**FIGURE 3: B.C.'S NON-RESIDENTIAL STRUCTURES CAPITAL STOCK PER WORKER IS RISING**



Source: Statistics Canada, BCBC.

**FIGURE 4: B.C.'S MACHINERY AND EQUIPMENT CAPITAL STOCK PER WORKER HAS DECLINED**



Source: Statistics Canada, BCBC.

**Figures 3-5** explore the components of B.C.'s non-residential capital stock. The non-residential *structures* capital stock per available B.C. worker is expanding. This is almost entirely due to the growth in engineering structures since 2000 (**Figure 3**). The *M&E* capital stock per available worker has mostly trended down since the 1970s (**Figure 4**). While there was a short-lived recovery during the 2000s, stocks of most types of M&E capital have declined since 2008. The *IPP* capital stock per available worker expanded significantly after mid-1980s but has also been shrinking since 2008 (**Figure 5**). Growth in stocks of software have not been enough to offset declines in stocks of research and development (R&D) capital and mineral exploration and evaluation capital.

**HOW DOES B.C.'S NON-RESIDENTIAL CAPITAL STOCK COMPARE ACROSS BUSINESS CYCLES?**

**Figures 6-8** compare the non-residential capital stock across business cycles. The end-dates of Canada's business cycles are 1981, 1989, 2000, 2008 and 2019, consistent with the dates used in the peer-reviewed analysis of labour productivity growth and real pay growth in [Williams \(2021a\)](#). B.C.'s non-residential capital stock expanded over the last two business cycles, 2000-08 and 2008-19. The increase was concentrated in stocks of engineering structures, which expanded by 51% between 2000 and 2019 and were 17% larger in 2019 compared to 1981 (**Figure 6**). However, the rest of the non-residential capital stock has shrunk since 2008 and by 2019 was only 6% larger than in 1981.

**Figure 7** provides more detail. The stock of non-residential buildings per available worker was only 2% larger in 2019 than in 1981. Stocks of M&E capital per available worker were 10% smaller in 2019 compared to 2008 and 17% smaller compared to 1981. The IPP capital stock per available worker has expanded by 122% from 1981 to 2019 although it has shrunk by 9% between 2008 and 2019.

**Figure 8** shows stocks of individual capital assets per available worker across business cycles. Engineering structures dwarf all other assets. Stocks of most other asset types are flat (e.g., non-residential buildings, transport equipment), in decline (e.g., industrial machinery, electrical equipment), or have risen modestly (e.g., computer assets). As noted above, stocks of IPP assets rose sharply after 1981 but have declined overall since 2008.

**HOW DOES B.C.'S NON-RESIDENTIAL CAPITAL STOCK COMPARE TO THE REST OF CANADA?**

B.C.'s non-residential capital stock per available worker is smaller than Canada but that is only because Alberta lifts the national average (**Figure 9**). Alberta is in a different league ([Williams 2022](#)). In 2020, Alberta's stock of non-residential capital per available worker was \$274,100 - *more than twice* that of Canada (\$114,800), B.C. (\$103,800), and Rest of Canada (\$90,900).

The good news is that B.C.'s non-residential capital stock per available worker has exceeded the Rest of Canada since about 1997. The bad news is that the non-residential capital stock per available worker in the Rest of Canada has barely grown

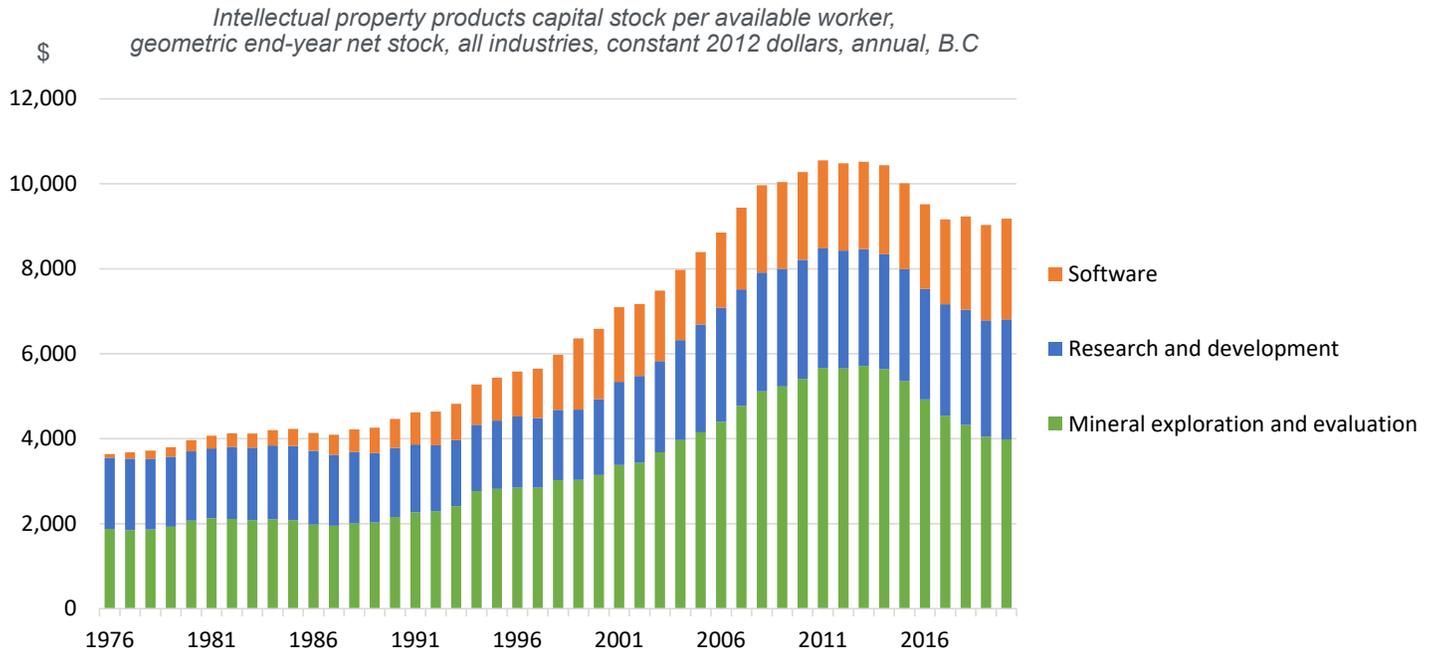
**The failure of business investment to meaningfully exceed depreciation, and therefore to expand the non-residential capital stock per available worker, helps explain Canada's serially low growth in labour productivity.**

since the 1970s. These results help explain Canada's serially poor labour productivity growth performance - which would be even worse without Alberta.

**Figure 10** shows the gap in the non-residential capital stock per available worker between B.C. and Canada by asset type. The total gap was -\$11,000 in 2020. Since the early 1990s, B.C. has lagged Canada for all types of non-residential capital. Again, this is due to the positive influence of Alberta on the national average.

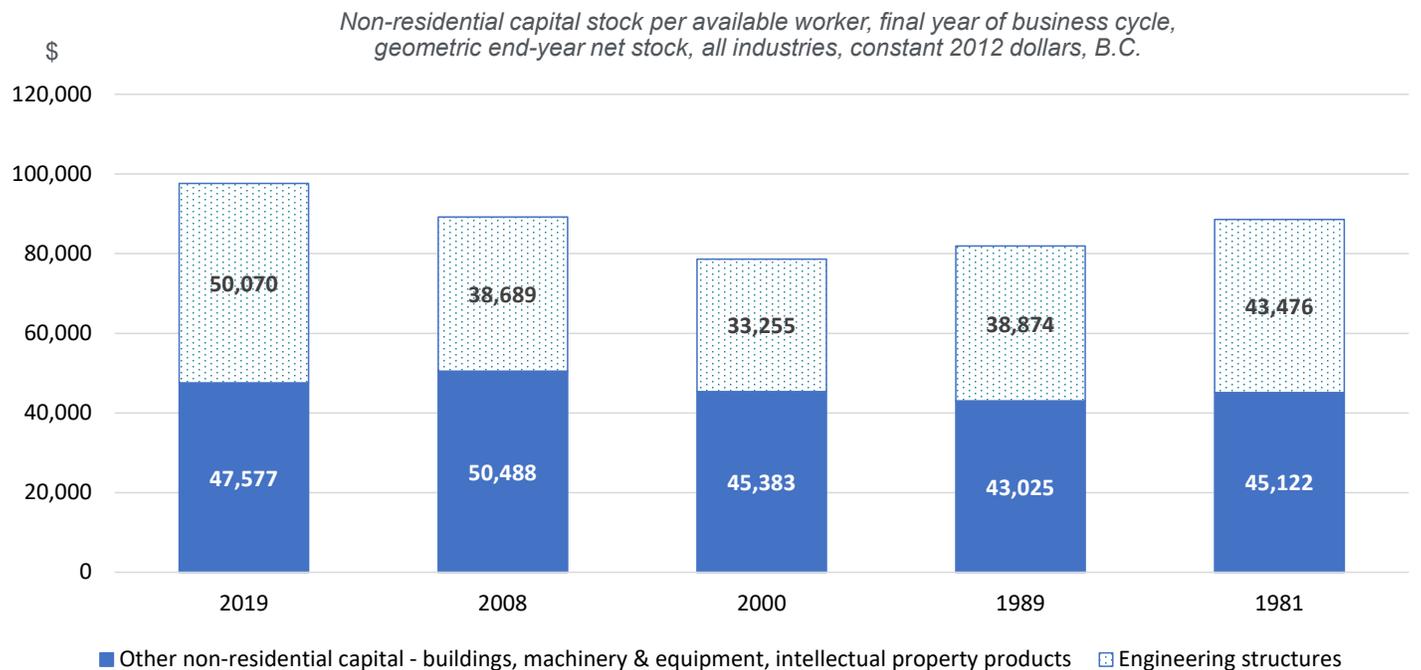
However, compared to the Rest of Canada, B.C. has \$12,900 *more* non-residential capital per available worker (**Figure 11**). B.C.'s advantage is mainly in engineering structures, while it lags the Rest of Canada in stocks of most other types of non-residential capital. For example, B.C. has a slight advantage over the Rest of Canada in transport equipment (within M&E) and mineral exploration and evaluation (within IPP), but not enough to offset the negative capital stock gaps for the rest of M&E and IPP, and also for non-residential buildings.

**FIGURE 5: B.C.'S INTELLECTUAL PROPERTY PRODUCTS CAPITAL STOCK PER WORKER HAS DECLINED**



Source: Statistics Canada, BCBC.

**FIGURE 6: B.C.'S NON-RESIDENTIAL CAPITAL STOCK PER WORKER IS EXPANDING DUE TO ENGINEERING STRUCTURES**



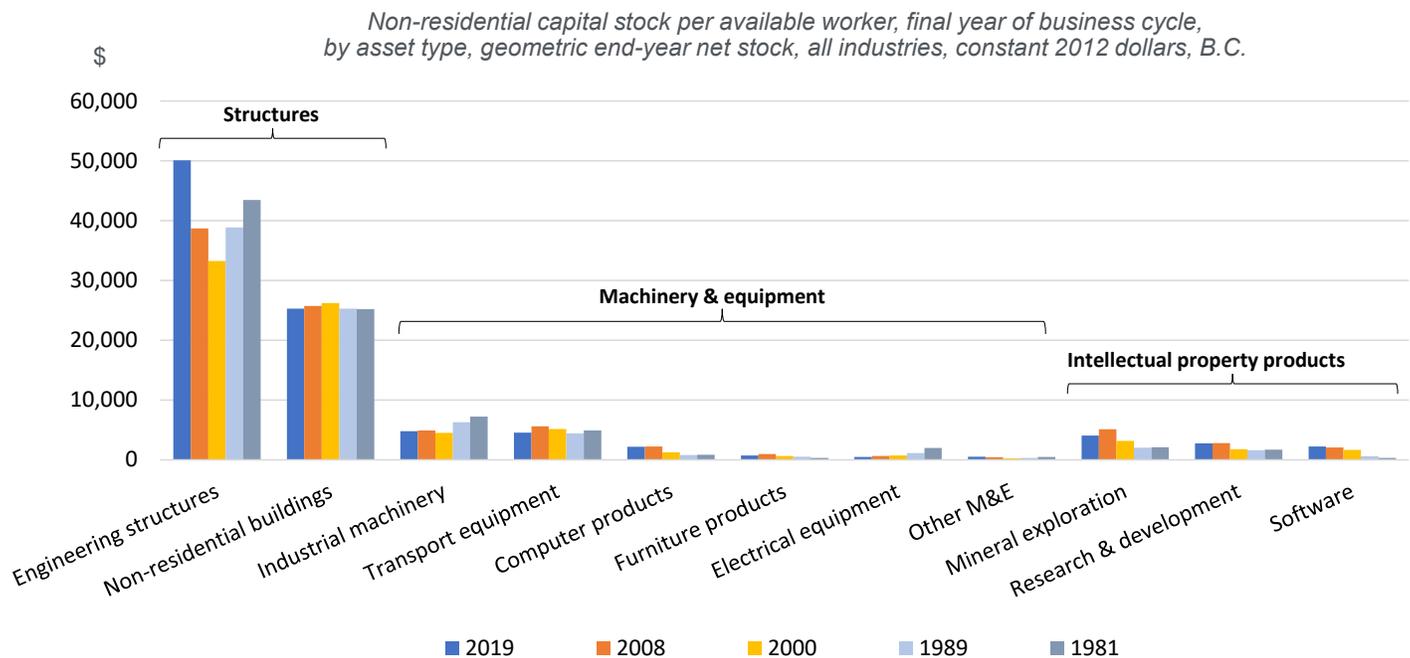
Source: Statistics Canada, BCBC.

**FIGURE 7: B.C.'S NON-RESIDENTIAL CAPITAL STOCK PER WORKER IS EXPANDING DUE TO ENGINEERING STRUCTURES**



Source: Statistics Canada, BCBC.

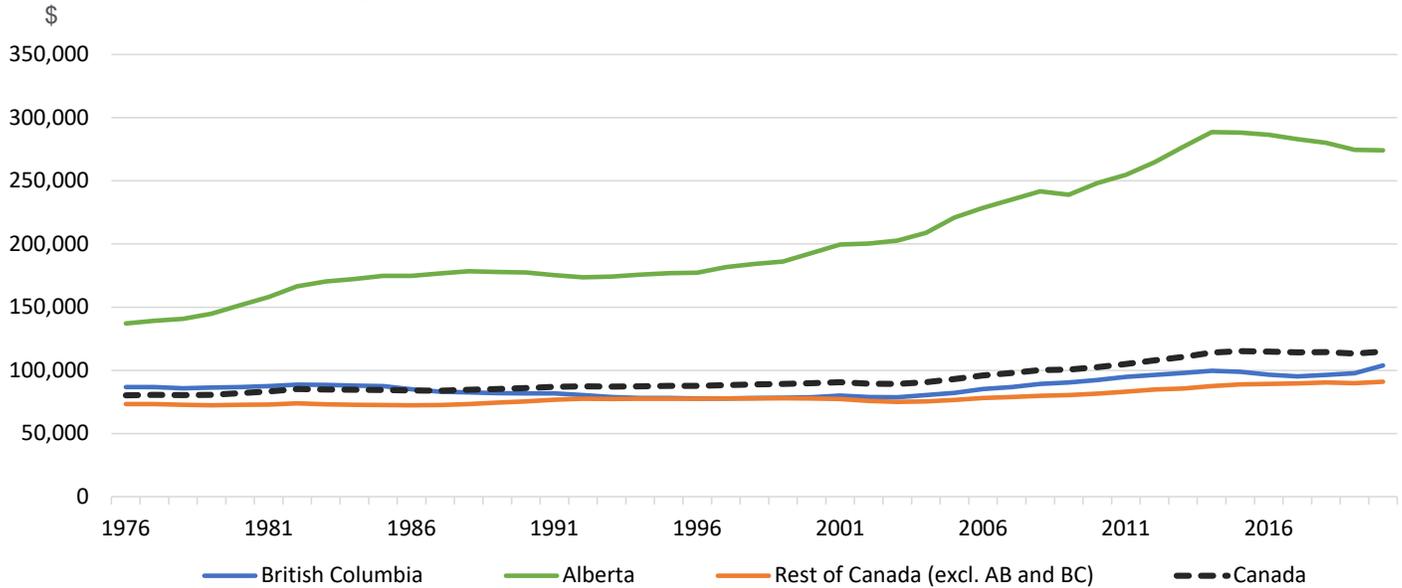
**FIGURE 8: B.C.'S NON-RESIDENTIAL CAPITAL STOCK PER WORKER IS MOSTLY FLAT EXCEPT ENGINEERING STRUCTURES**



Source: Statistics Canada, BCBC.

**FIGURE 9: OUTSIDE ALBERTA, CANADA'S NON-RESIDENTIAL CAPITAL STOCK PER WORKER HAS BARELY GROWN IN DECADES**

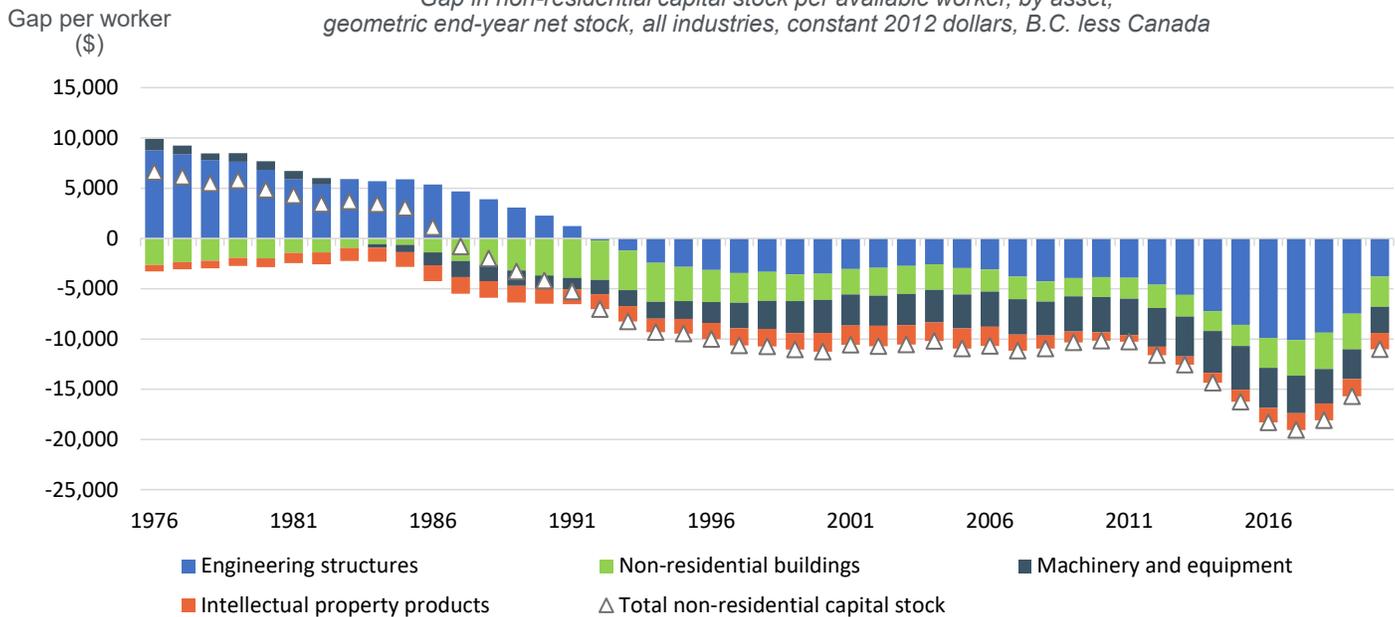
*Total non-residential capital stock per available worker, geometric end-year net stock, all industries, constant 2012 dollars, annual*



Source: Statistics Canada, BCBC.

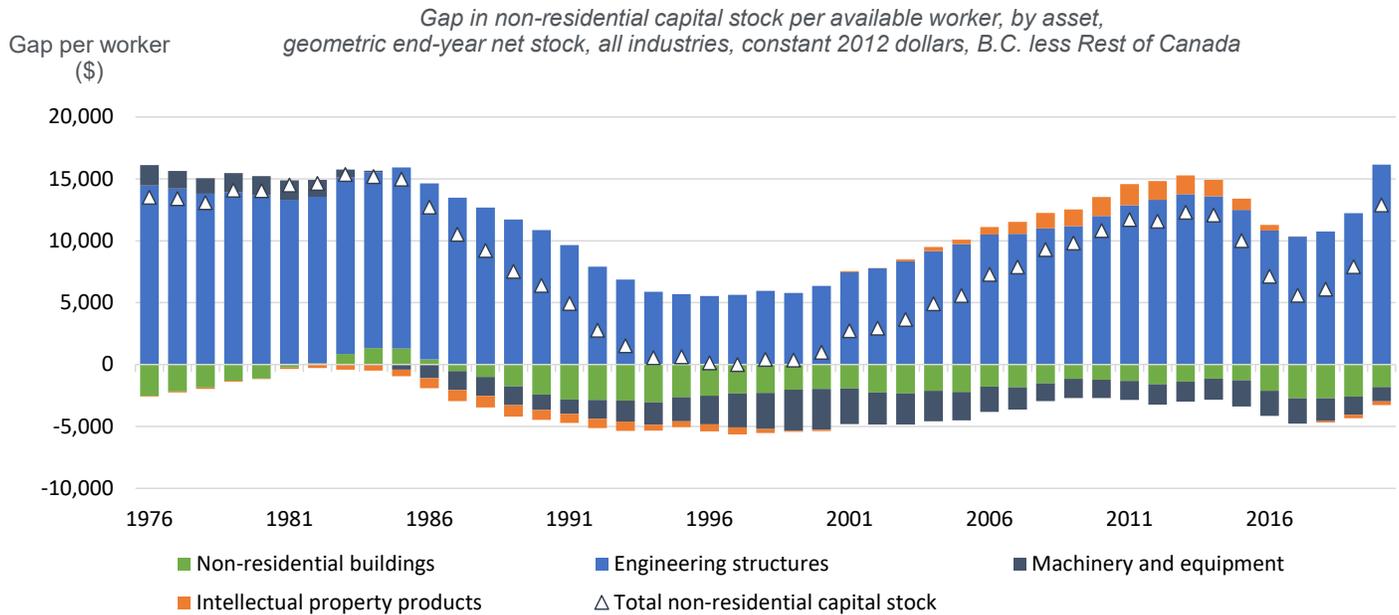
**FIGURE 10: B.C.'S ECONOMY OPERATES WITH AROUND \$11,000 LESS CAPITAL STOCK PER WORKER THAN CANADA**

*Gap in non-residential capital stock per available worker, by asset, geometric end-year net stock, all industries, constant 2012 dollars, B.C. less Canada*



Source: Statistics Canada, BCBC.

**FIGURE 11: B.C.'S CAPITAL STOCK PER WORKER ADVANTAGE OVER REST OF CANADA IS IN ENGINEERING STRUCTURES**



Source: Statistics Canada, BCBC.

**DISCUSSION**

For Canada, the expansion of the non-residential capital stock per available worker over time has been overwhelmingly concentrated in Alberta. In the Rest of Canada, it has barely grown since the 1970s. The failure of business gross investment to meaningfully exceed depreciation, and therefore to expand the non-residential capital stock per available worker, helps explain Canada's serially low growth in labour productivity ([Williams 2021b](#), [Williams 2022](#) and [Williams and Finlayson 2022](#)).

B.C.'s overall capital stock per available worker is increasing. However, the increase is concentrated in residential structures and (non-residential) engineering structures. An expanding stock of residential

structures does not necessarily add to the economy's future productive capacity other than through the consumption of housing-related services.<sup>2</sup> Residential structures (note, this metric excludes land values) are by far the largest capital asset class in British Columbia – more than double the size of the engineering capital stock. In fact, B.C.'s residential structures capital stock per available worker in 2020 was 12% larger than the *entire* non-residential capital stock, having surpassed it in about 2015.

B.C. has a modestly smaller non-residential capital stock per available worker than Canada – but only because of Alberta's positive impact on the national average. Compared to the Rest of Canada, B.C. has a modestly larger non-residential

capital stock per available worker. The advantage is concentrated in engineering structures. However, the rest of B.C.'s non-residential capital stock was only slightly larger in 2019 than in 1981 and it has been shrinking since 2008. Other than engineering structures, B.C. lags the Rest of Canada in stocks of most other non-residential capital assets per available worker.

**Federal and provincial policymakers should holistically review and reform the structural impediments and disincentives to non-residential capital investment.**

<sup>2</sup> Households purchase the housing services produced by residential structures from each other (market rent) and themselves (homeowner imputed rent). It is a closed system because the transactions largely take place *within* the domestic household sector. Therefore, unlike the non-residential capital stock, a larger stock of residential structures has little scope to raise households' market incomes in aggregate and over time. It does not add to the "economic base" by bringing export earnings into the economy. One exception is where housing services are sold ("exported") to non-resident households - but this has the disadvantage of reducing the available housing stock, and raising the price of housing services, for local workers.

## CONCLUSION

Policymakers should be unnerved by the unbalanced nature of growth in the capital stock per available worker in Canada and B.C. They should question whether this model of economic growth is sustainable. Higher stocks of *non-residential* capital per available worker are needed to grow labour productivity, real GDP per capita, and real market incomes. This means gross non-residential investment must increase and *must exceed depreciation* – the rate that assets wear out and become obsolete. However, outside Alberta, Canada’s non-residential net capital stock per available worker has barely grown since the 1970s.

Federal and provincial policymakers should holistically review and reform the structural impediments and disincentives to non-residential capital investment. Areas to reform include: the outdated federal and

provincial tax systems; byzantine regulatory approval systems; punitive corporate taxes on business scaling around and beyond \$0.5 million of net income; in B.C., an inefficient provincial sales tax (PST) regime; the B.C. carbon tax’s lack of revenue neutrality and its lack of relief for energy-intensive, trade-exposed industries unlike the backstop federal carbon tax; high internal barriers to cross-Canada trade; and Canada and B.C.’s retreat from international trade since about 2000. Further discussion of these structural impediments can be found in [Williams \(2022\)](#).

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