The Path to Canadian Housing Abundance

"**We must uphold the mechanisms that underlie creative destruction, so that we do not fall back into stagnation**." John Hassler, Chair of the Committee for the Prize in Economic Sciences.

UNB Transforming Construction 2025-26

Aaron Holm | Partner | Helix Housing Innovation Agency

The Housing Crisis is Accelerating in Severity

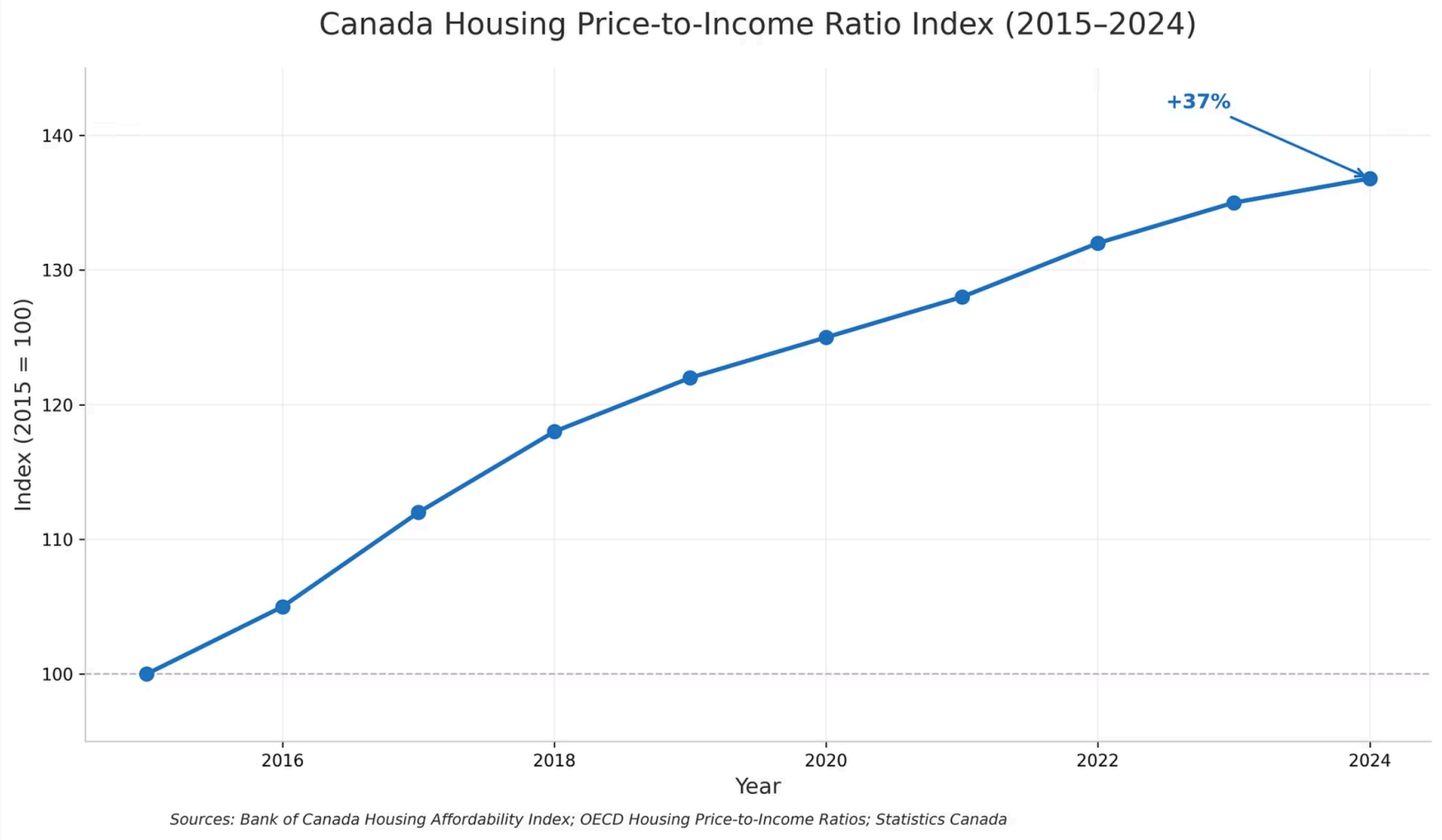
Historical norm (1980-2001): 3-4x income

2010: ~4-5x (beginning of bubble)

2015 (baseline): Index = 100

2024: 37% worse than 2015 - 7x price to income

2024 Toronto & Vancouver = 10x - 14x



Same Working Class Job: 1978 vs 2025

1978: Single-Mother Household (like mine)

Income: 56% of median

Rent: $350/month

Housing cost: 21% of income

Result: ✓ Affordable

2025: Same Position

Income: 56% of median

Rent: $2,500/month

Housing cost: 64% of income

Result: ✗ Unaffordable

3X

Housing burden tripled for the same income bracket

A working-class Toronto family spent 21% of income on rent in 1978. Today, the same working-class family spends 64%. The rent grew 49% faster than inflation. This is Baumol's Disease destroying the middle class.

Choosing to Learn from History

California- $25 Billion Spent

- Costs increased 70%
- Fewer units built
- Crisis deepened

Subsidizing broken systems increases costs

Canada - $35 Billion to Invest

- 35-50% cost reduction
- 2.3x more units
- Transformation in housing delivery

Systems transformation breaks the cost curve

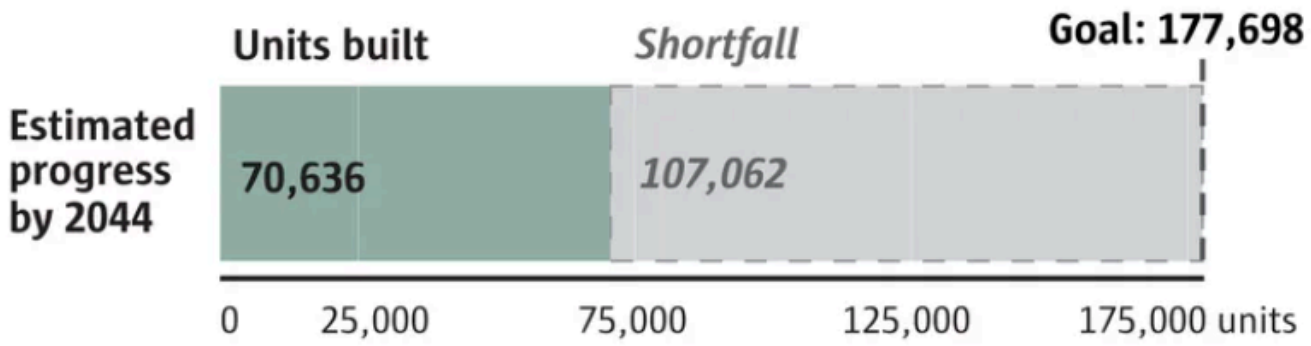
Can We Accept Reality and Choose a Different Path?

The Reality

1. New housing doesn't happen without financing
2. Housing that can't be financed by private debt and equity must be subsidized
3. Continued cost escalation makes it difficult or impossible to finance new housing development
4. New housing targets are fantasies without system reform and cost reduction

Moving too slowly on housing

If King County continues building income-restricted housing units at its current production rate, it will reach only around one-third of its target by 2044.



Seattle Times analysis of countywide Housing Needs Assessment 2025 information (Ava Mandoli / The Seattle Times)

Targets vs Reality

Helix

We use our expertise, networks, and AI to reduce the cost of housing development for our customers.

Creating Housing Systems for our Customers

SoLa Impact / Model-Z Modular

Integrated technology and AI strategy, connecting development and manufacturing units with business development opportunities.

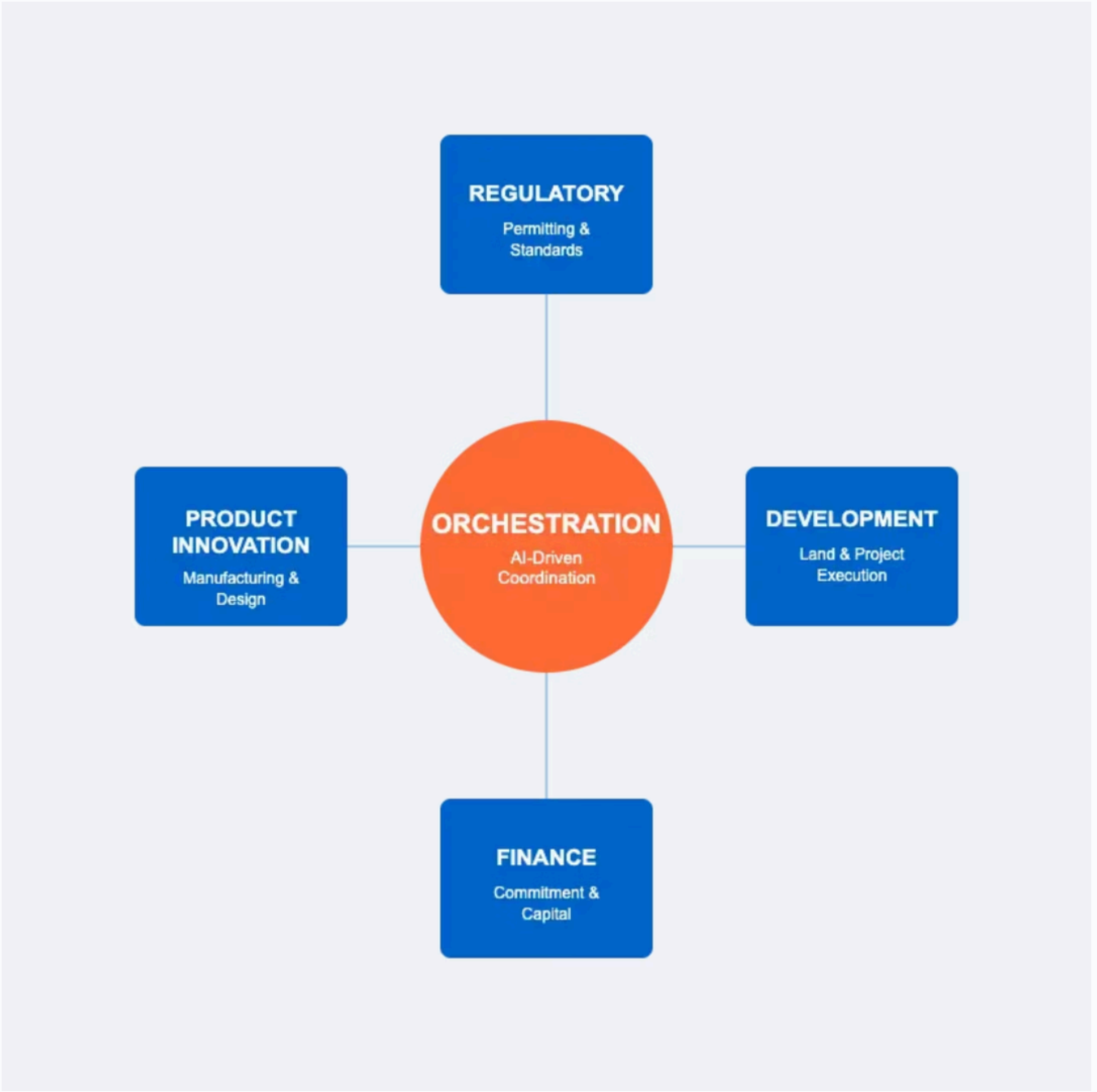
Earth Force Technologies

Forest-to-housing initiative, integrating supply chain, productization, and financing strategy for mass-timber housing production.

Rohe Homes

Go-to-market and architect partner strategy for Vancouver-based modular builder.

Helix Innovation Model



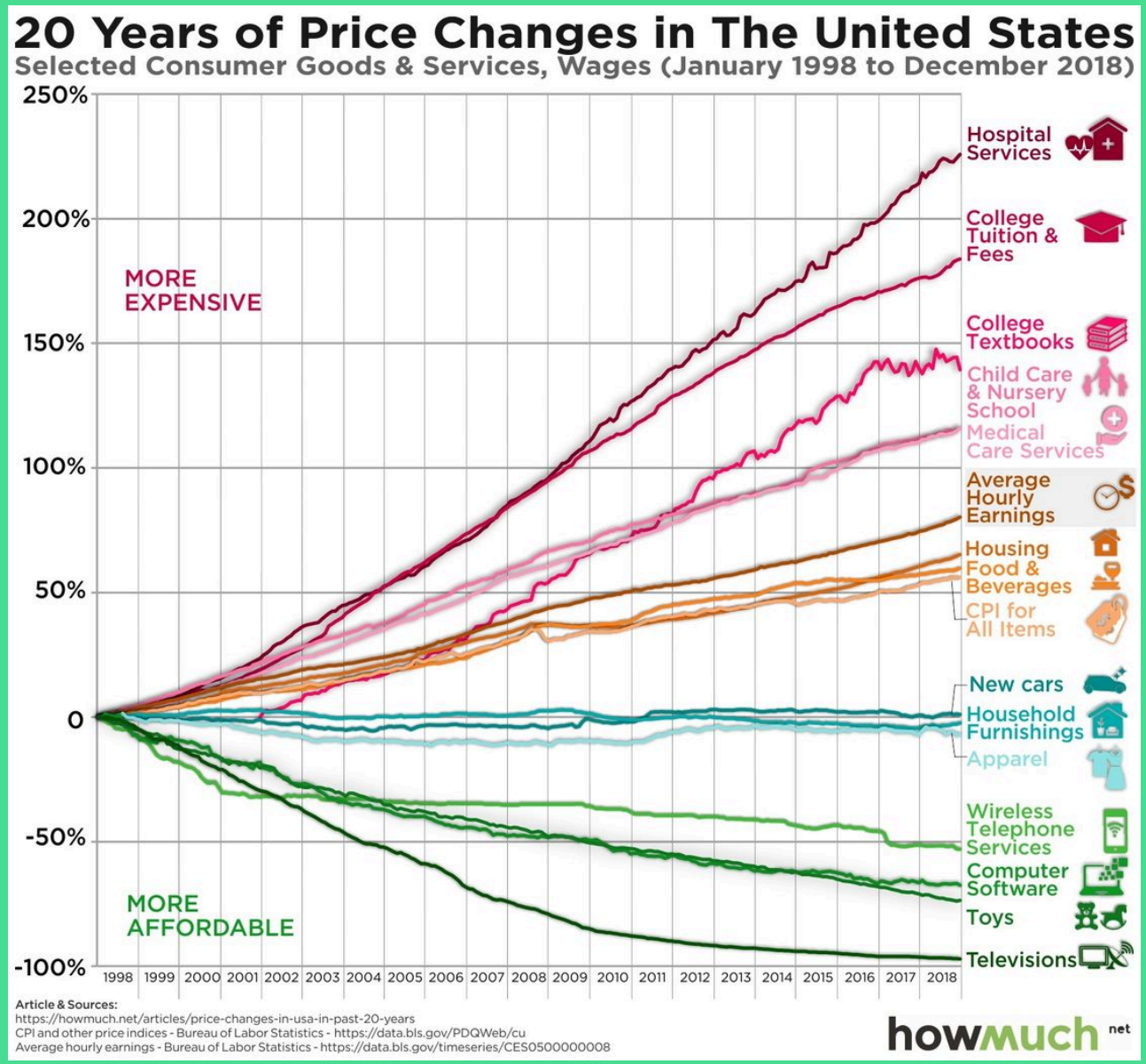
A Return to Housing Abundance: What will it take?

A Framework for Market Transformation

1. Housing Costs: Theory and History
2. Cost Reduction Recipes & Challenges
3. The Abundance Opportunity

35% Housing Cost Reduction in 10 Years: Crazy or Possible?

Housing Costs: Theory and History



Baumol's Cost Disease

How it Works

Rising Productivity in Manufacturing

Technology and automation dramatically increase output per worker. Today's worker produces far more than 50 years ago—allowing higher wages without raising prices.

Stagnant Productivity in Services

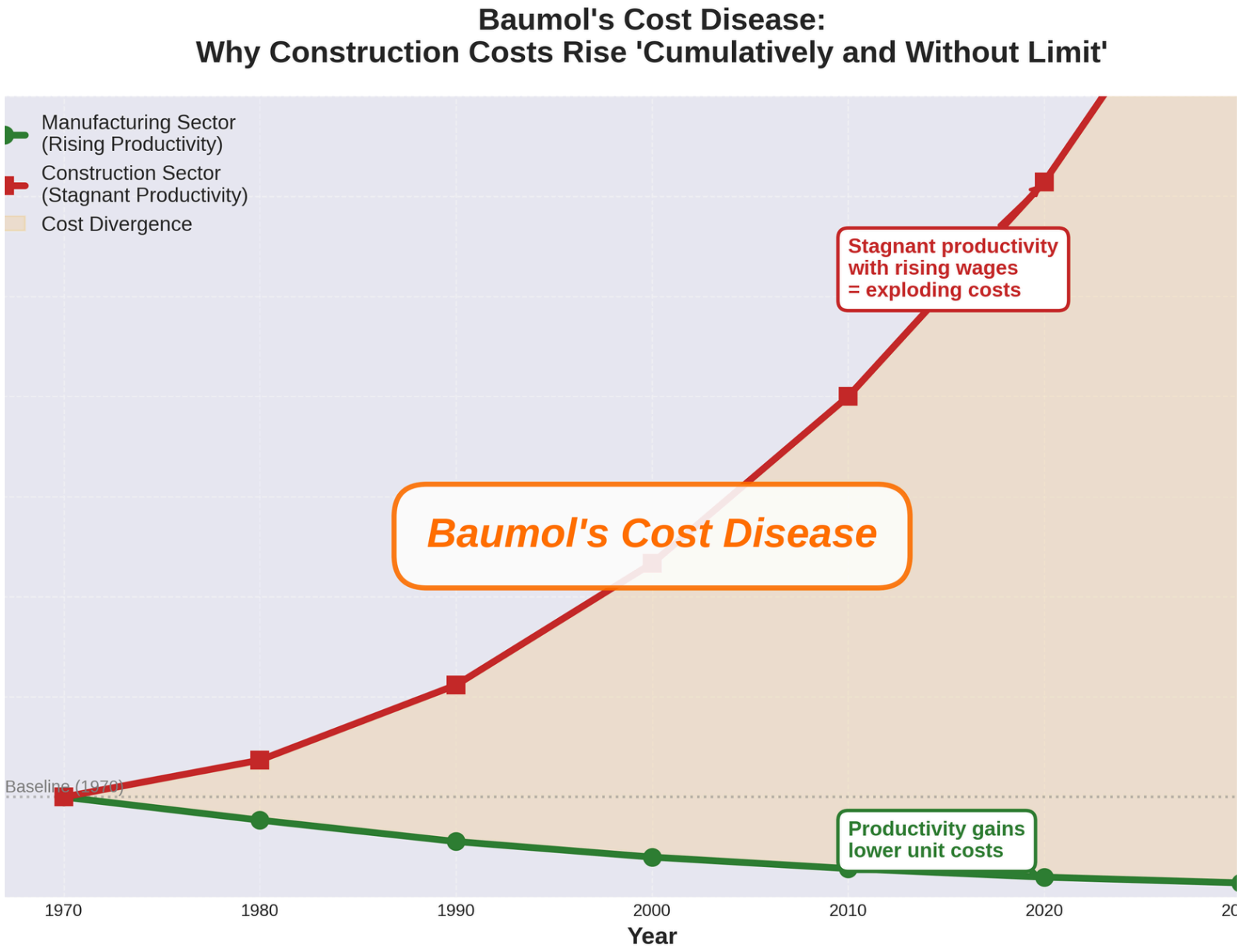
Many services see little productivity growth. A Beethoven string quartet requires the same musicians and time today as it did 200 years ago.

Cross-Sector Wage Competition

In competitive labor markets, service sector wages must rise to match manufacturing wages—or lose skilled workers to higher-paying industries.

Inevitable Rising Costs

Unable to offset rising wages with productivity gains, service sectors must pass costs to consumers through higher prices.



How it Works in Housing

2025 Nobel Economics Prize: Creative Destruction

"In some societies, people who are part of status quo and very successful based on previous technologies gain political power and influence, and are able to arrange things so that it's very difficult for new technologies to displace them. That helps to protect their interests, but also inhibits economic growth [and] stops new technologies from being implemented." - Peter Howitt - 2025 Nobel Laureate

Status Quo View

- Protect existing industries from disruption
- Preserve current employment structures
- Incremental improvements to existing systems
- **Result: Productivity stagnation**

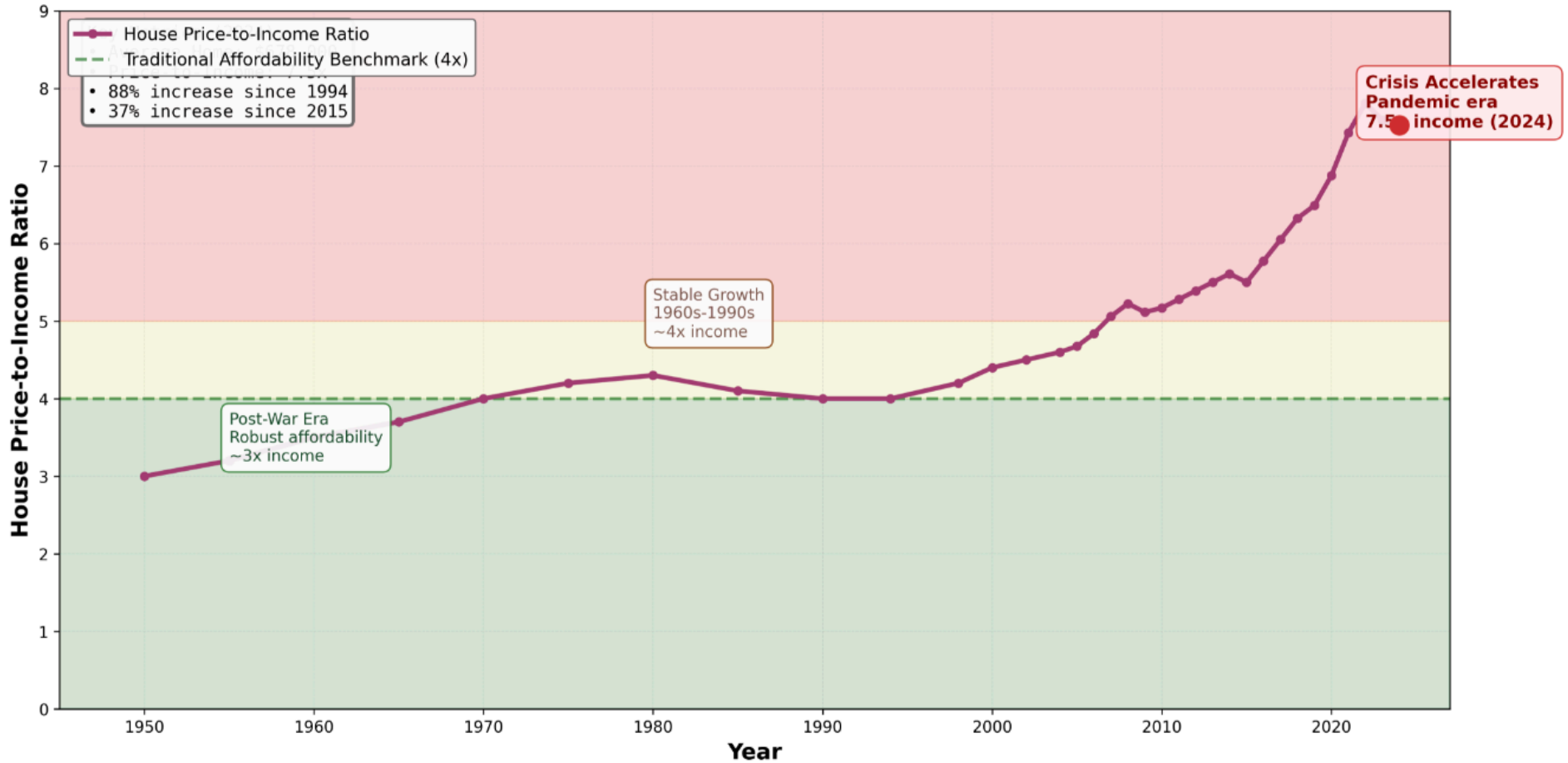
Nobel Prize Insight

Economic growth requires **creative destruction**

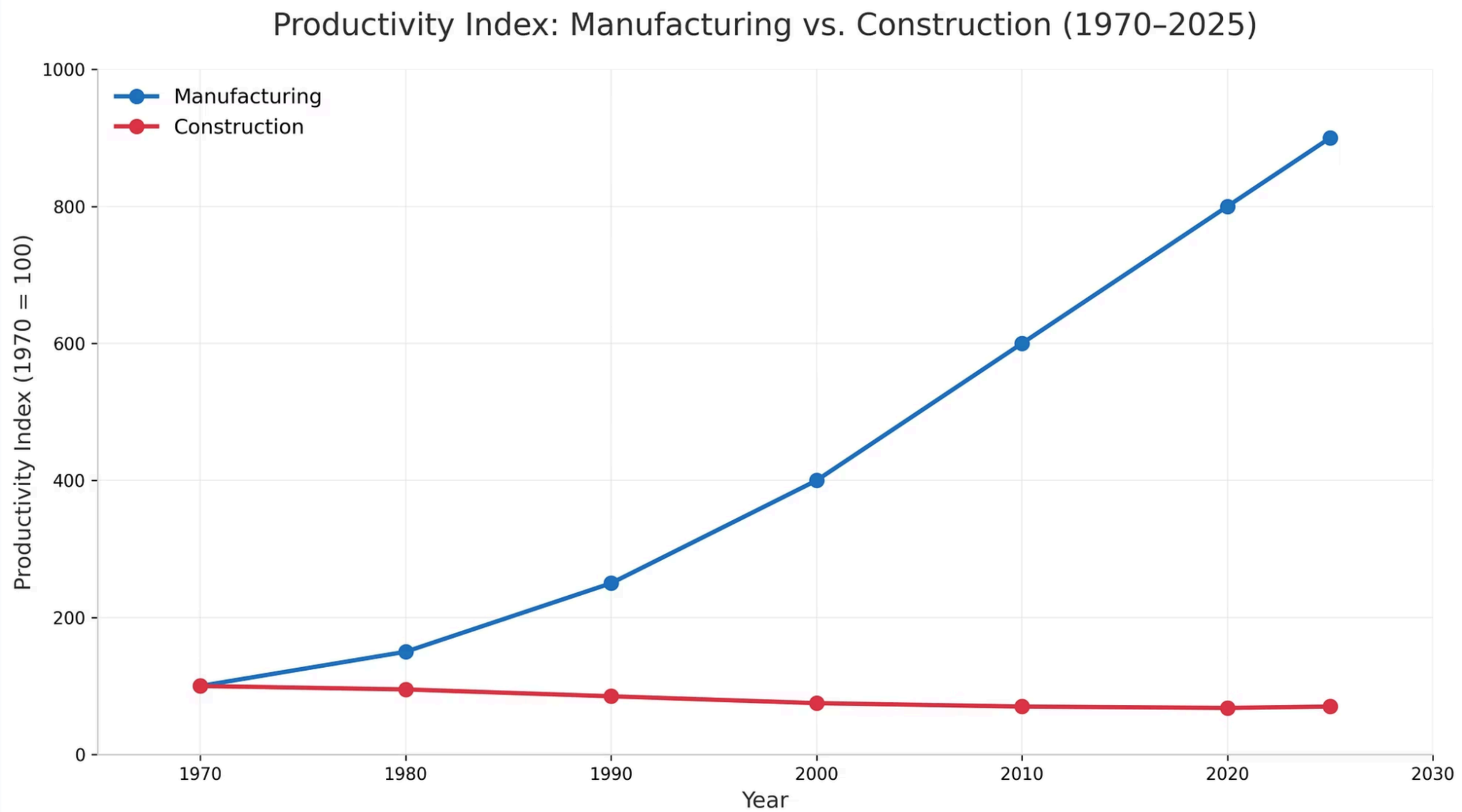
- New systems must displace inefficient old systems
- Innovation creates MORE jobs, not fewer
- **Result: Productivity transformation**

The Canadian housing market, created mainly in a period of abundance after World War 2, has exited an extended phase of stability.

Canadian Housing Affordability Crisis: Price-to-Income Ratios (1950-2024)



Sources: Historical data from CMHC, Statistics Canada, and housing market analyses (1950-2005); OECD Housing Price Database (2005-2024).
Methodology: Price-to-income ratio = Average home price ÷ Median household income. Traditional affordability benchmark is 4x annual income.
2024 data reflects Q3 2024 OECD index value of 136.8 (base year 2015=100), translating to approximately 7.5x income ratio.


Productivity Index: Manufacturing vs. Construction (1970–2025)
Manufacturing
Construction
Productivity Index (1970 = 100)
1000
800
600
400
200
0
1970
1980
1990
2000
2010
2020
2030
Year
Sources: BLS, Construction Industry Institute, McKinsey Global Institute

Productivity in Housing Construction vs Manufacturing

Manufacturing Productivity: +900%

Driven by:

- Automation
- Learning curves
- Quality control
- Standardization

Example industries: automotive, aerospace, electronics

Construction Productivity: -30%

Stuck in:

- Project-by-project
- Fragmented supply chains
- No learning curves
- Result: costs rising while other industries fell

This gap represents construction's opportunity—IF we adopt manufacturing principles

Sources: US Bureau of Labor Statistics; McKinsey Global Institute; Statistics Canada productivity data

Cost Reduction Challenges and Recipes

Moving Construction Indoors is not the Same as Manufacturing

1

Demand-Side Fragmentation Prevents Scale

- Developers operate project-by-project with no long-term commitments, leaving factories idle between orders.
- Manufacturing efficiency requires repetition (10-25% cost reduction comes from building thousands of identical units), which is rarely achieved.
- Factories face high fixed costs but low utilization, preventing economies of scale and keeping costs high.

2

Soft Costs Still Subject to Baumol's Disease

- Soft costs account for **40% of total project expense**,
- Even if modular cuts hard construction costs by 20%, if soft costs continue to rise due to the Baumol effect, overall savings are minimal. For example, a 13% manufacturing improvement might yield only 8% total project savings.

3

Regulatory Barriers Eliminate Cost Advantage

- Building codes often do not accommodate modular construction.
- Permitting processes treat modular homes the same as traditional stick-built, leading to lengthy delays (249 days average).
- Local inspectors are often unfamiliar with factory production processes, and each jurisdiction imposes different requirements, hindering standardization.

4

No Systems Integration

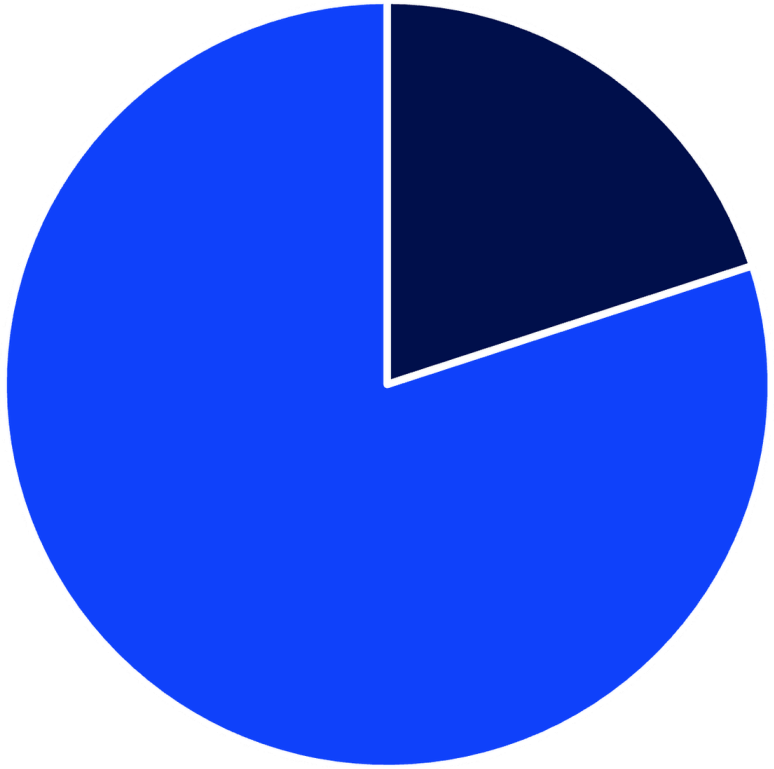
- The entire housing value chain remains fragmented. Modular factories operate as isolated components - most frequently commodity inputs - rather than integrated parts of a cohesive system, preventing true end-to-end efficiency gains.

Housing is Predominantly Built by Small and Medium Sized Builders

Canada's housing construction remains highly fragmented with 147,490 licensed firms producing ~250,000 units annually. Large builders like Mattamy (~8,000 units/year) represent only a small fraction of total market activity. This fragmentation limits economies of scale, prevents adoption of advanced manufacturing methods and AI orchestration, and contributes to construction productivity decline.

Market Share by Builder Size

- **Large Builders**
  - Average production: Varies widely, from hundreds to 8,000+ units annually
- **Small & Medium Builders**
  - Includes vast majority of 147,490 firms
  - Moderate percentage of output generated by firms employing fewer than five workers
  - Compete on price but "struggle to scale digital site management and modular investments"



The vast majority of Canadian housing output comes from small and medium-sized builders, highlighting a highly decentralized market structure.

Productivity has declined **30% since 1970** (vs. 900% improvement in manufacturing)

Canadian Public Investment Across Sectors

Production vs. Consumption: A Tale of Two Strategies

Canada's public investment strategy reveals a fundamental disparity: while critical sectors focus on building systems, innovation, and production capacity, housing primarily channels funds towards consumption and maintaining the status quo.

MANUFACTURING

Production & Automation: 40%

R&D & Innovation: 25%

Workforce Training: 15%

Focus: Competitive production systems.

SUPPLY CHAIN

Infrastructure (ports, rail): 50%

Tech & Automation: 25%

Data & AI: 15%

Focus: System efficiency & capacity.

HEALTHCARE

Digital Health & AI: 30%

Research Infrastructure: 25%

Med Device/Pharma Mfg: 20%

Focus: System capacity & innovation.

MICROCHIPS

Fabrication Facilities (fabs): 60%

R&D & Design: 25%

Workforce Development: 10%

Focus: Domestic production capacity.

HOUSING

Buyer Subsidies: 35%

Project-by-Project Funding: 30%

Non-Profit Operators: 20%

Focus: Subsidizing existing delivery system.

Production system innovation in housing: less than 1%

The Nature of Subsidies

Other Sectors

Question: "How do we transform the production system?"

Manufacturing productivity: +150% since 1970

Healthcare AI investment: 22x projected growth

Housing

Question: "How do we subsidize today's costs?"

Construction productivity: -30% since 1970

Housing AI investment: 3.5-6x projected growth

Key Insight: Canada invests in transforming how we make cars, chips, and medical devices. For housing, we subsidize consumption, assuming continued cost escalation.

The Takeaway: Every productive sector receives investment to build better systems. Housing receives subsidies to perpetuate broken ones. The $13 Billion Build Canada Homes opportunity: shift from subsidy distribution to production transformation.

California's Cautionary Tale: Creating the Subsidy Cost Premium

15 Years and $25+ Billion in Subsidies That Led to Increased Costs

California's experience from 2009-2024 serves as a critical lesson: massive government investment, intended to stimulate affordable housing, paradoxically drove costs to unprecedented levels.

Los Angeles (Measure HHH)

- **Total Investment:** $1.2 billion (2016-2024)
- **Cost per unit:** $350,000 (2016) $596,000 (2024)
- **Change**: +70% increase despite subsidies.

San Francisco (Housing Bonds)

- **Total Investment:** $2+ billion (2015-2019)
- **Cost per unit:** $700,000 - $1,000,000+
- **Result:** Slowest production rates in state history.

San Jose (Affordable Housing Bond)

- **Total Investment:** $950 million (2016)
- **Cost Escalation:** Continuous upward trajectory.
- **Delays:** 4-7 years from funding to occupancy.

Statewide Spending Summary

Total California Affordable Housing Subsidies (2010-2024):

- State bonds and programs: $15+ billion
- Local bonds and measures: $10+ billion
- Federal subsidies (LIHTC, etc.): Additional billions

Total: $25+ billion invested

Result: Costs increased 50-100% across major markets.

The Subsidy Paradox

Each additional funding source adds $17,659 in transaction costs.

Subsidies don't reduce cost - they become cost floors.

The Math That Doesn't Work:

$25 billion invested ÷ ~50,000 units produced = $500,000 per unit

- Vs. Market-rate construction: $300,000-$400,000 per unit
- **Subsidy premium: $100,000-$200,000 per unit**

California spent $25+ billion and saw costs double. This demonstrates that subsidies without systems transformation don't solve housing crises—they finance them at ever-increasing costs. Breaking this cycle requires production innovation and policy reform, not just more funding.

Cost Reduction Recipe

1

Container Shipping

90% cost reduction

✅ Product Innovation: Standardized 20/40ft containers (McLean, 1956)

✅ Systems Orchestration: Integrated port cranes, ships, trucks, rail

✅ Regulatory Framework: International standards (ISO 668), port regulations

✅ Market Commitment: Long-term shipping contracts enabled infrastructure investment

❌ Failure Mode: Early attempts with non-standard containers – technology existed but no system integration.

2

Renewable Energy

89% solar cost reduction

✅ Product Innovation: Panel efficiency (15% → 22%+)

✅ Systems Orchestration: Grid integration, battery storage, smart inverters, forecasting

✅ Regulatory Framework: Net metering, interconnection standards, renewable portfolio standards

✅ Market Commitment: Power Purchase Agreements (15-25 year contracts, $50-100B+ annually)

❌ Failure Mode: Cheap panels without grid standards = stranded assets and curtailment.

Cost Reduction Recipe

EV Batteries

90% cost reduction (from $1,415/kWh to $139/kWh, 2010-2024)

✅ Product Innovation: Lithium-ion chemistry standardization, gigafactory design
✅ Systems Orchestration: Integrated mining, refining, cell production, pack assembly
✅ Regulatory Framework: IRA tax credits, safety standards (UL 2580), environmental regulations
✅ Market Commitment: Tesla's battery supply agreements, automotive OEM partnerships

Sources: IEA, BloombergNEF (EV Battery costs); Innovation-driven growth research; McKinsey productivity analysis

Key Insights

The Pattern is Universal

All major industrial cost reductions follow this four-component framework.

Integration is Vital

Isolated improvements fail; coordinated systems succeed.

Housing Has All Necessary Building Blocks

The technology, regulatory tools, and market mechanisms exist.

Housing Compared

Success Stories (2015-2025)

Solar Panels

Cost: -60% (from $7.50/W to $3/W)

Policy: ITC + Manufacturing scale

Volume: 10x increase in production

EV Batteries

Cost: -90% (from $1,415/kWh to $139/kWh)

Policy: IRA + Gigafactory investment

Volume: 15x increase in production

LED Lighting

Cost: -90% (from $40 to $3 per bulb)

Policy: Efficiency standards + Mass production

Volume: 50x increase in production

Housing (Same Period)

Canadian Construction

Cost: +51% since 2020

Policy: Subsidies WITHOUT productivity reform

Volume: Stagnant/declining starts

California Affordable

Cost: +83% (HHH program)

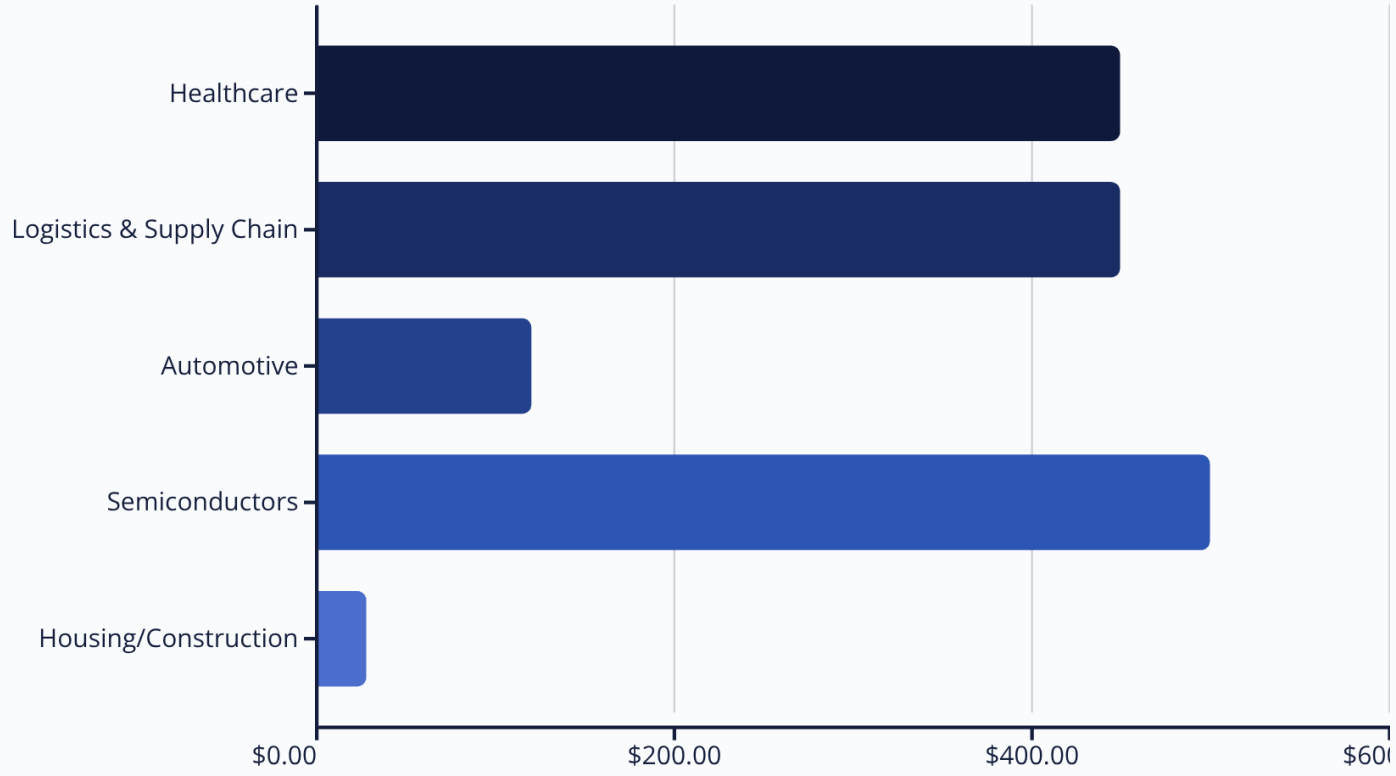
Policy: Funding without process reform

Volume: Far below targets

> **Manufacturing learning curves deliver 10-25% cost reduction per doubling of volume. Housing development subsidies — costs went UP.**

Sources: NREL; BloombergNEF; Statistics Canada; LA Controller; Terner Center

The Global Housing AI Investment Gap



The Paradox

Housing: Our most fundamental need receives 1/16th the AI investment of logistics optimization.

The Root Cause

Project-by-project fragmentation prevents systems-level AI investment that transformed manufacturing, healthcare, and logistics.

The Opportunity

Canada's $35B BuildCanada investment exceeds the entire global housing AI market.

Housing/Construction investment is **16x smaller** than the average of comparable industries by 2035.

The Construction Productivity Crisis Explained: While manufacturing achieved 9x productivity gains since 1970 through automation and systems thinking, construction productivity declined 30%. This investment gap shows why—and where the opportunity lies.

Sources: Future Market Insights, Grand View Research, Precedence Research, Market Research Future (2024-2025 reports)

The Abundance Opportunity

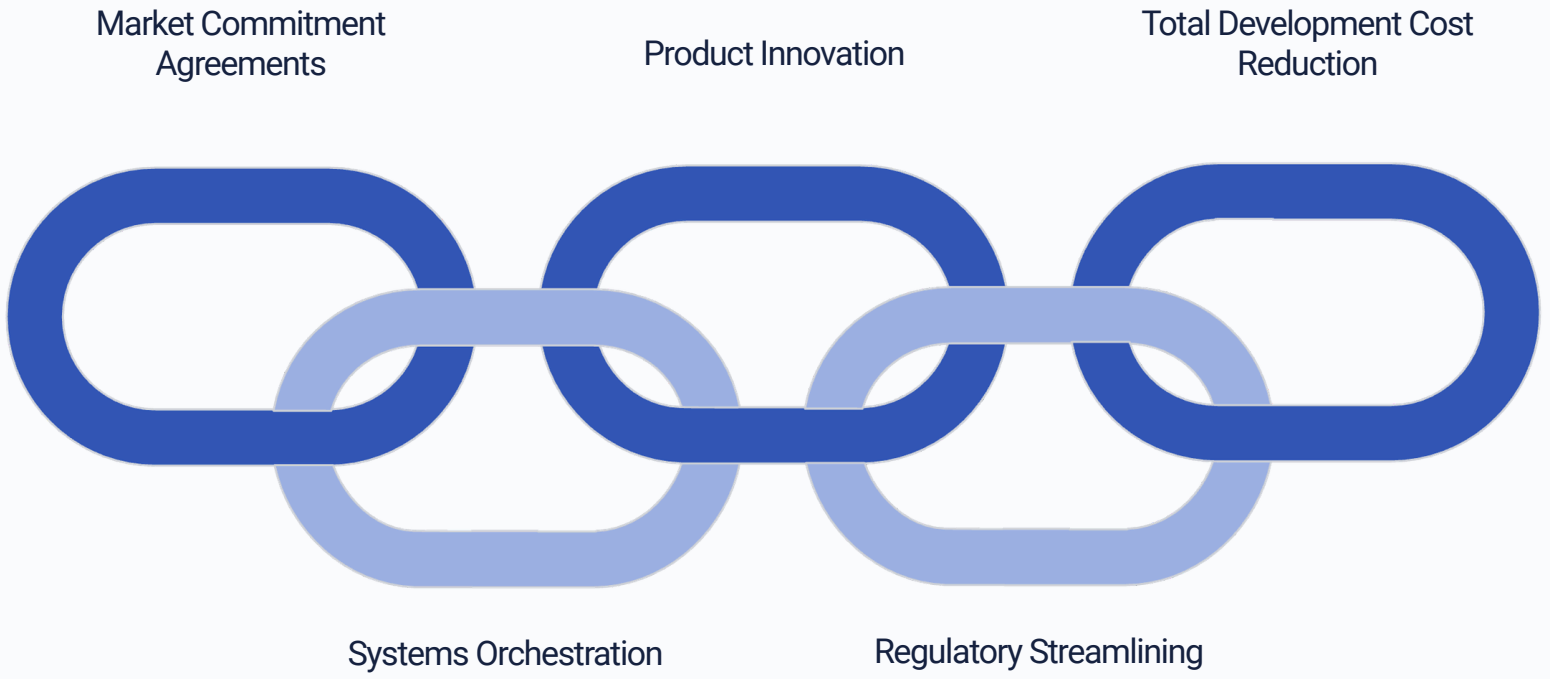
Returning to Abundance

- **Product innovation**
  Develop products that can be manufactured and flow into housing production systems
- **Regulatory reform**
  Incentivize review and approval mechanisms that reward systems based approaches and cost reduction
- **Financial support**
  Provide early stage, growth stage, offtake, and capacity expansion funding
- **AI Systems Orchestration**
  Invest in AI to spur a new generation of technology to connect end-to-end housing production ecosystems and incentivize elasticity
- **Reporting obligations**
  Require system participants to show how they're driving down costs

Canada's Housing Transformation: A Systems-Level Strategy

Four Interdependent Forces for 35-50% Cost Reduction

Isolated improvements fail. Integrated systems succeed.



California's lesson: Subsidies without systems reform become cost floors, not cost reductions. Canada can choose a different path.

Product Innovation, Prototyping, and Manufacturing

Design for Manufacturing

- Products engineered for manufacturing
- Standardized, repeatable systems
- Optimized for quality and efficiency
- Product mapped to housing typologies
- Short run prototyping to validate assemblies
- High quality product data flows into manufacturing

Scale Production Infrastructure

- Facilities to build at volume
- 10-25% cost reduction per production doubling
- Quality improves while costs fall
- Continuous product development, prototyping, and manufacturing innovation cycles
- Integrated into housing development orchestration model

AI Orchestration

- Connected across the supply chain
- Housing dashboards track performance
- Visibility to supply and demand signals
- Public reporting
- Connects builders, regulators, investors, developers, and public agencies

Products designed for manufacturing + Manufacturing capacity to produce them at scale = Cost reduction at scale

Investment must enable the complete system—from design innovation to production infrastructure.

Advanced Market Commitments for Housing Supply

What Are Market Commitment Agreements?

Long-term contracts (3-7 years) between investors, developers/builders, and manufacturers, often backed by public commitmets, that guarantee purchase of housing units before production begins.

Common in mining, energy, pharma, and agriculture — but missing in housing. This absence prevents manufacturing economics from working.

Four Critical Commitments

- Production Capacity
- Land & Development
- Financing
- Pre-Approved Designs

🚀 What This Enables

- ✓ Continuous Production: 80-90% utilization vs. 30-40% with project-by-project
- ✓ Learning Curves: 10-25% cost reduction from repetition
- ✓ Economies of Scale: Bulk purchasing, optimized supply chain
- ✓ Lower Finance Costs: Manufacturing-style financing vs. construction loans
- ✓ Workforce Development: Stable employment enables training and productivity gains
- ✓ Supply Chain Optimization: Long-term supplier relationships, just-in-time delivery

3-5x

Productivity Improvement Potential

Transforms housing from custom construction to manufacturing process

Systems Integration Unlocks AI Orchestration

AI Coordinates Workflows

- It connects disparate systems and stakeholders across complex value chains.

AI Automates Repetitive Tasks

- Frees human professionals to focus on judgment, creativity, and problem-solving.

AI Enables Standardized Customization

- Achieves manufacturing efficiencies while retaining flexibility for unique requirements.

AI Improves with Scale

- Continuously refines processes and outcomes through data-driven learning curves.

> **"Every industry that embraced AI orchestration saw 30-70% productivity gains within 5 years—manufacturing, logistics, healthcare, finance. We're not early adopters—we're dangerously late."**

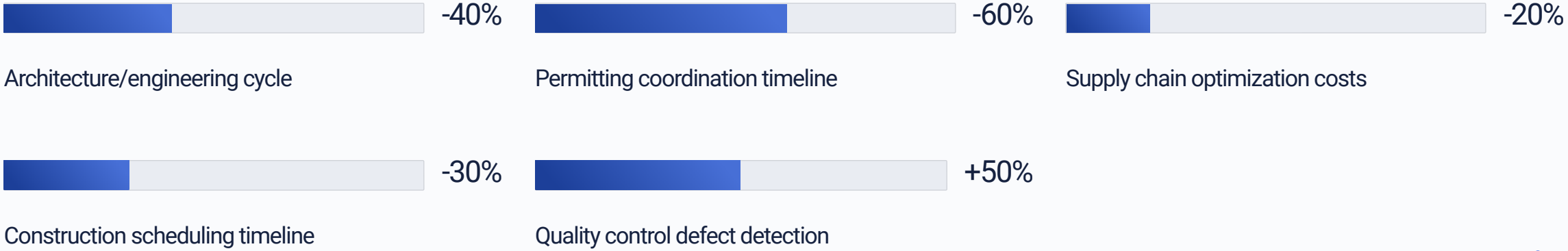
Housing isn't uniquely resistant to technology & AI —it's just the last sector to attempt coordination and harness these transformative patterns.

Sources: McKinsey AI impact studies; Healthcare AI transformation reports; Education technology research; Samsung C&T construction AI

Housing AI Orchestration: The Untapped Potential

- Housing Transformation (Potential)
  - Complexity Level: Actually LOWER than healthcare/education
  - Fewer variables than patient diagnosis or student learning
  - More standardizable than medical treatment or curriculum
  - Regulatory complexity similar, not greater
  - Physical constraints more predictable than human behavior

AI Orchestration Potential (2025-2035)

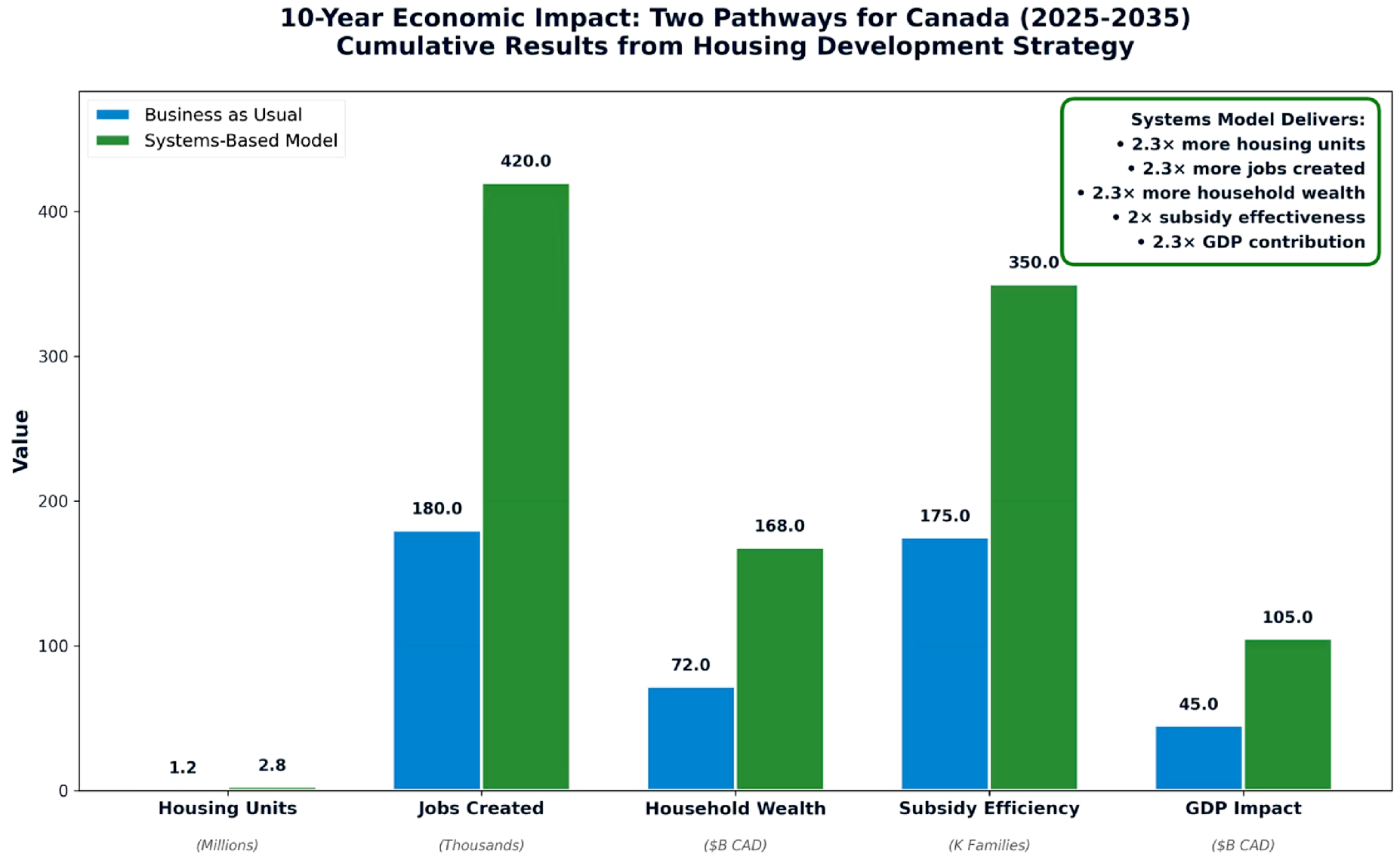


Stakeholder Benefits

Federal Government	Provincial	Municipal	Builders	Workers
35% cost savings	Faster approvals	Reduced strain	Higher margins	Better wages
More units built	Job growth	Increased Tax base	Increased Certainty	Increased safety
GDP growth	Regional supply chains and economic growth	Less strain on social services	More projects	More jobs

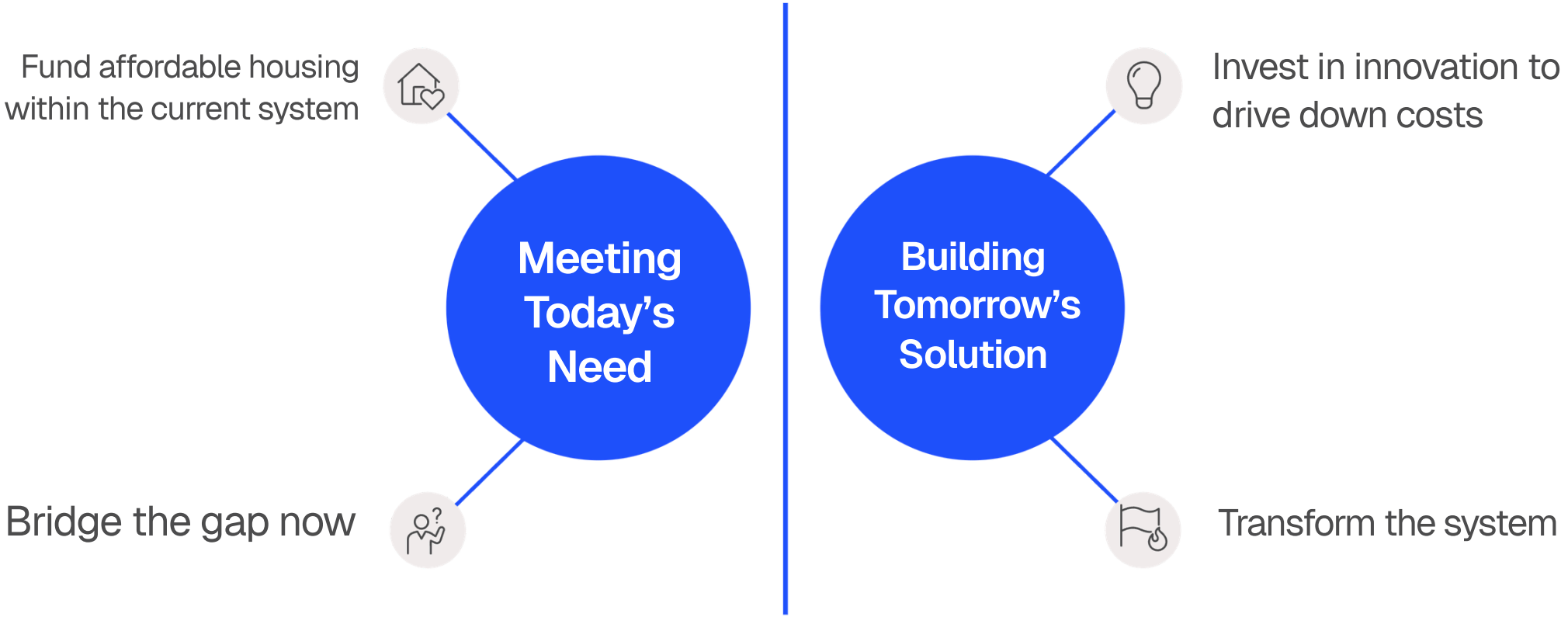
*Source: Helix Housing Innovation Agency

Could Housing Innovation Spur an Economic Boom?



Methodology: Housing units based on BCH capacity projections (3.5M target over 10 years). Jobs calculated using NAHB multipliers (3.5 jobs/unit direct+indirect). Household wealth assumes $60K average equity accumulation per homeowner over decade (down payment + principal + appreciation). Subsidy efficiency represents families served with 35BBCHaffordablehousingfund : BAUat200K/unit vs Systems at 100K/unit. GDPimpactusesCMHCeconomicmultipliers(40K GDP contribution per housing unit).
Sources: CMHC, NAHB Economics 2024-2025, Statistics Canada, BCH Program Documentation

Balancing Public Investment for Housing Impact



Sustainable housing abundance requires addressing immediate needs while investing in long-term cost reduction.

The Courage to Build Differently

What Doesn't Work

❌ Subsidizing broken systems (California: $25B spent, costs up 70%)
❌ Protecting status quo (Construction productivity: -30% since 1970)
❌ Incremental improvements (Modular alone: still trapped in Baumol's Disease)

What Does Work

✓ **Manufacturing learning curves** (Solar: -60%, Batteries: -90%)
✓ **Systems orchestration** (Amazon: 1.6M packages/day)
✓ **Creative destruction** (Nobel Prize: Innovation drives growth)
✓ **Integrated transformation** (4 forces working together)

Canada has $35 billion to invest, a housing crisis to solve, and every lesson from global successes and failures at our fingertips. No country has ever had this combination of resources, need, and knowledge. We can be the first to get it right.

Let's Build the System That Builds Canada

Helix Housing Innovation Agency

Aaron Holm is a Partner at Helix, a housing innovation agency that uses expertise, networks, and AI to reduce the cost of housing development for customers.

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