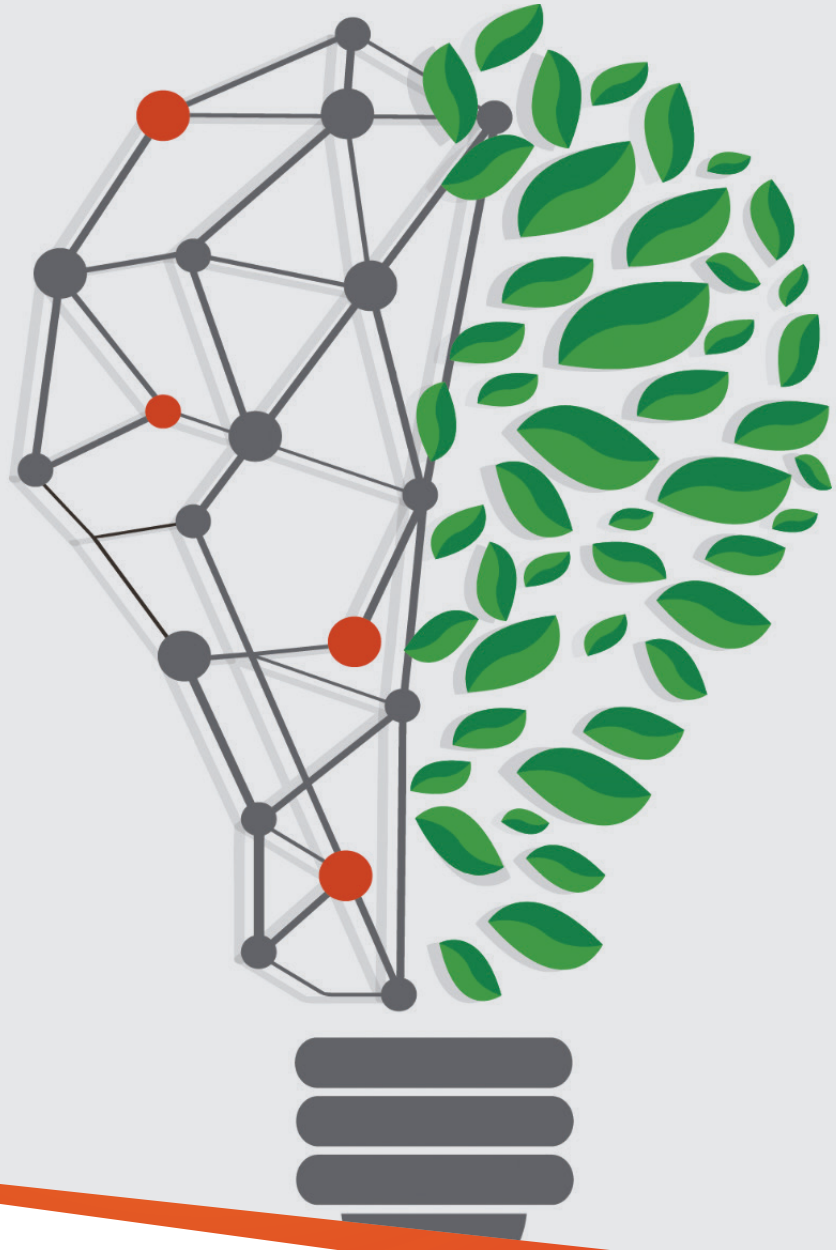

Smart Real-Estate

“THE CASE FOR ENVIRONMENT & ECONOMIC COLLABORATION”

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RYCOM

Smart Tech. Smarter.

Overview

In a non-partisan vision for the future; the bridge between thriving economies and a sustainable environment are smart technologies. Smart technologies in Real-Estate provide quick identification and correction of problems through the use of data extracted from building systems. Data represents the facts needed to make smart economical and environmental decisions for Real-Estate.

Commercial Real-Estate (CRE) is both a global economic engine and a major contributor to the carbon footprint. CRE contributes 30% of global emissions while consuming 40% of the globe’s energy.

CRE stakeholders manage over $50T in global assets, making them a key decision-making group in both the fight against climate change and the preservation of economic prosperity. The CRE environment is aging. In North America the average commercial building age is 40 years and the average workforce personnel age is around 60 years. There are over 250 cranes over the skyline of Toronto, with each crane representing new inventory coming online in the near term. Developed regions of the world are experiencing growing urbanization and by 2050 7.5B people will live in the top 100 cities of the world. This backdrop represents the convergence of inventory demand, acceleration of retro-fitting the built environment, declining available workforce and increasing emission projections.

Now represents the ideal time for CRE to absorb transformational smart technology as it builds new inventory, retrofits the built inventory and retools its staff for a future with reduced labour availability. Smart operations platforms provide CRE with data and tools to manage and optimize both building operations and building emissions. One smart building platform with three very important stakeholder’s – planet, people and profits.

Partisan Fatigue - Economy or Environment?

Economy or environment?
It is not a binary choice, and to view it as such puts us in more peril than we already are.

Both the Paris and Kyoto accords underscored the importance of global collaboration. Partisan views continue to harden the debate and widen the divide on what steps can be taken now to change the trajectory of global warming, while diversifying our economies and creating enough wealth to invest in these changes. Collaboration is the key to our future success in accomplishing environmental change and continued economic prosperity. Collaboration yields actual strategies and timelines where both economists and environmentalists see the same benefits.

Smart technologies in real-estate create a collaboration platform where energy consumption conservation leads to emission reductions. The RYCOM HIVE Platform is built on the latest analytics and data processing capabilities, able to integrate with any building system old or new.

The HIVE platform has the ability to discover and retrieve latent building data and apply science rooted in algorithms, rules and deep analytics to optimize building operations and emissions. The results are compelling and demonstrate the continued improvement possible with smart technologies.

Figure 1.0 shows a sample of 21 buildings serviced by RYCOM Smart HIVE illustrating emissions reduction across several provinces. The reductions vary in range from 400-ton $Co2/m^2$ to 10-tons $Co2/m^2$ annually, with an average reduction of 34 tons $Co2/m^2$ per year.

The variance in emission reduction is largely do to the power source, mix of energy used in the property and duration of HIVE platform operations within the building (some buildings have been using the HIVE platform for less than 12 months).

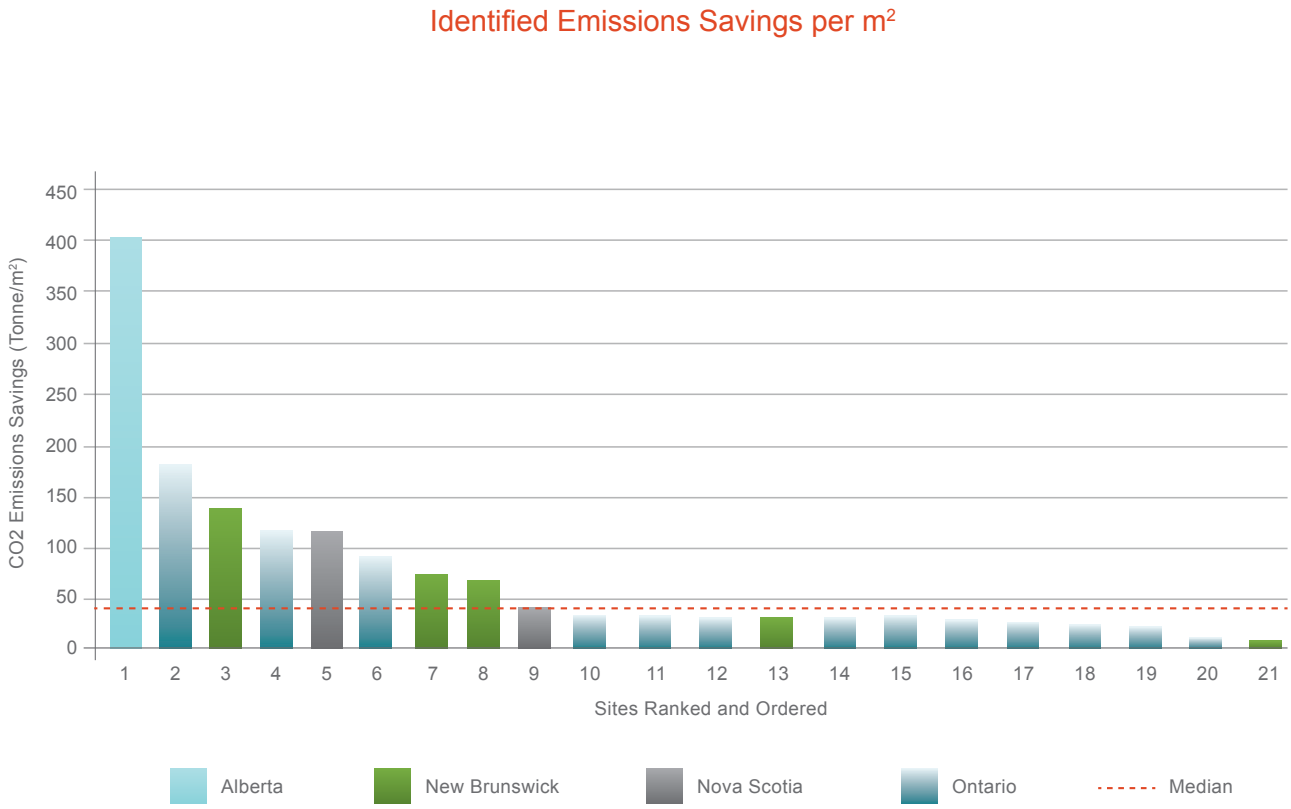


Figure 1.0 Sample of 21 Buildings Annual Emission Reductions with HIVE

In a period of less than twelve months (12) we can identify significant energy savings and emission reductions in properties that have existing sustainability strategies and are certified BOMA Best, LEEDS or similar using no or low-cost controls and maintenance strategies.

Smart building technologies and platforms like HIVE continue to advance and enhance sustainability strategies by offering real-time measures, problem identification and immediate remedies. Smart technology has created the bridge between sustainability and the economic outcomes that support the investments in both strategies.

A convergence of these two initiatives is naturally providing sustainability professionals more runway to enhance the environmental future while enabling building facilities managers to act immediately to reduce consumption, expenses and emissions.

What we are demonstrating is one smart building platform with three very important stakeholder's - planet, people and profits.

Smart Data Bridges Profitability and Sustainability, the New Power Couple

As we achieve new financial outcomes and reduce emissions simultaneously using smart platforms, sustainability and increased profitability emerge as the new power couple in the real-estate industry. A single smart building platform can support sustainability, operations, safety, asset, cyber and property management strategies.

Smart technology platforms are built on three pillars; technology, people and process, all tied together with data. The three pillars need to work in harmony. Relying on any one of these pillars alone will result in less than favourable outcomes. Figure 2.0 illustrates the journey of the RYCOM HIVE platform where smart and sustainability strategies are linked together by the same data. Today’s building data requires considerable work to make it useable and smart. The data harvested comes from different sources, formats, vendors and definitions, requiring normalization and application of industry standards to become useful. To do this we employ many of the emerging industry standards for data tagging (Project Haystack), utilize Application Programming Interfaces (API) to gather data and leverage network technologies for convergence (IP, BACnet, 4g/5g), ensuring cross platform integration and interoperability of disparate building systems.

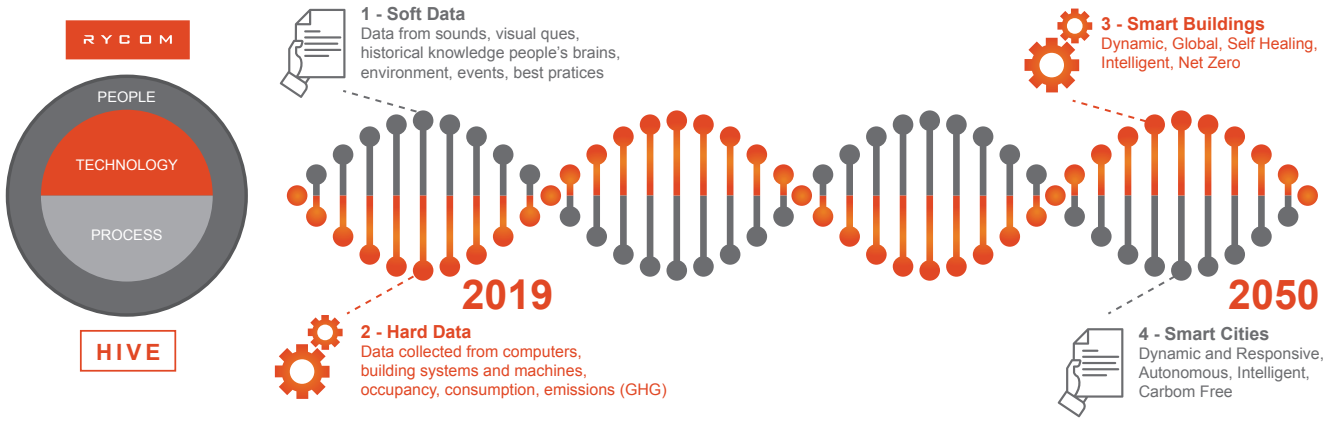


Figure 2.0 Data’s Important Journey

Smart building data increases in value and importance with time. Per figure 2.0, as we integrate soft data (1) with hard data we evolve into a responsive and dynamic smart building (3) which represents the core building block for smart cities (4). Data is the primary DNA building block and the language of choice for everything smart. It represents the foundation of driving investment return to stakeholders and the environment. Data is the new currency of the CRE industry.

As we collect historical building data capturing events, actions, performance and behaviours we ultimately generate a dynamic digital profile of the property.

Applying rules, machine learning and advanced algorithms we evolve to a dynamic, self healing smart building of the future forming the building blocks of Smart Cities. Today’s multi-purpose platform delivers value beyond energy with many actionable events and capabilities;

- Measure ongoing energy usage and GHG emissions
- Ongoing building optimization across all major systems
- Deep data discovery and analysis
- Collecting foundational building data as future currency
- Data driven 3rd party vendor maintenance
- Remote site management and operation
- Occupancy and traffic capture and analysis
- Capital intensity reduction and planning
- Workforce optimization using data to focus on issues with biggest impact with speed and knowledge
- Property reporting on goals and performance or certification compliance

These actionable events and capabilities represent what can be achieved with the data today and does not even touch on what we may be able to do with the data tomorrow, with advances in machine learning and artificial intelligence (AI).

Smart Building Services Outcomes

RYCOM HIVE is a multi-purpose operating platform designed to integrate with building systems, building operating staff, 3rd party property management and building vendors.

A platform is only successful when it drives actions and outcomes from/for these key stakeholdrs. Figure 3.0 illustrates outcomes achieved for 21 properties across Canada ranging in size 7k m^2 to 140k m^2. In these properties HIVE platform is tracking energy consumption, detecting faults, and directing staff and 3rd party vendors to address and resolve issues. We have observed a significant productivity and efficiency impact to adjacent resources like property staff time, 3rd party costs, and tenant experience that will be discussed in future reports. No two properties are alike for many reasons; building age, building use, existing tech and staff within the building are all major contributors to the performance. In the first twelve (12) months HIVE achieved identified savings outcomes ranging from \$4.49/m^2 per year to \$0.37/ m^2 per year, with the average being \$1.77/ m^2 per year. The HIVE platform delivers operating efficiencies measured by energy cost reduction and optimizing property workforce supporting building systems. What is noteworthy is the payback for these platform services based on energy only are less than 12 months. It should be noted that issues and projects requiring more effort or capital have been identified in the properties that will drive further savings, efficiencies & productivity in the next 12 to 24 months. The outcomes achieved in first year plus the identified issues and projects represent a compounding savings and productivity effect on the property’s operation.

Identified Cost Savings per m^2

Costs Calculated over Life of Project

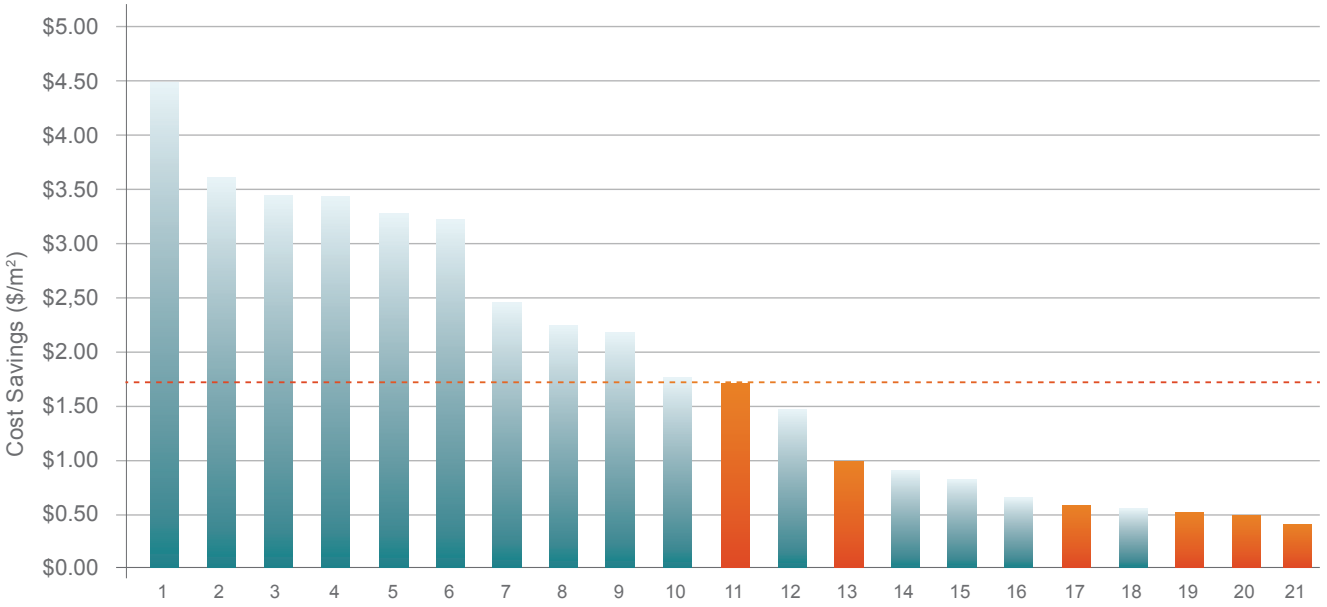


Figure 3.0 RYC0M HIVE Services Cost Savings per m^2

Our operating principals and processes of smart operating platforms are based on lessons learned in the real-estate industries and adjacent markets. Simply said real-time performance tracking, continuous optimizations and maintenance lowers cost of operation and ownership while reducing your emission footprint over the lifespan of the asset. In Figure 4.0 we illustrate this traditional approach vs a smart tech enabled approach

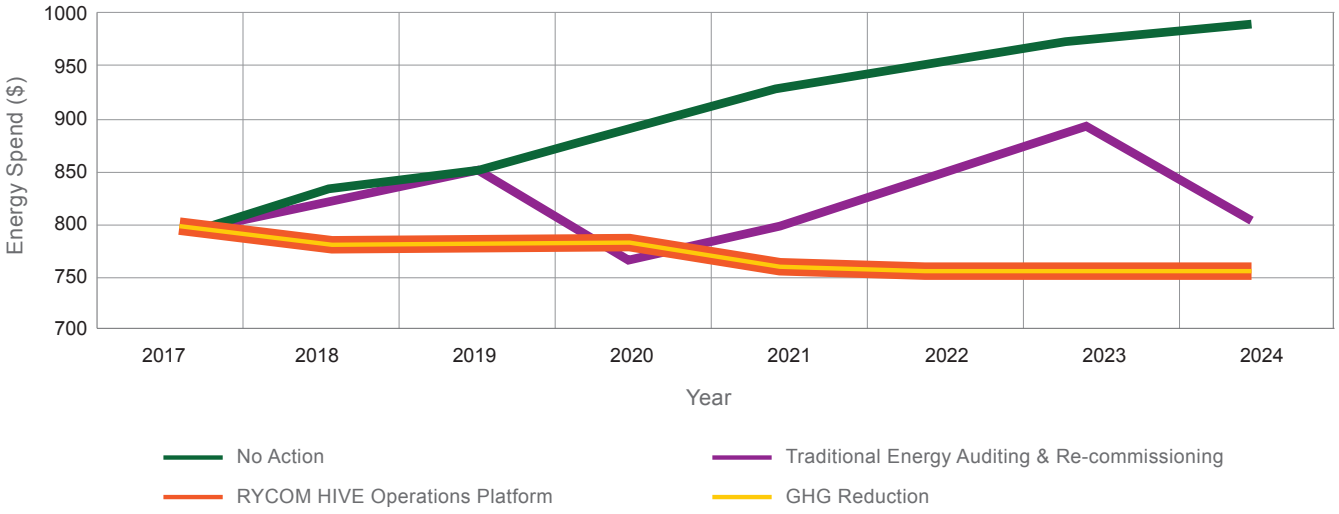


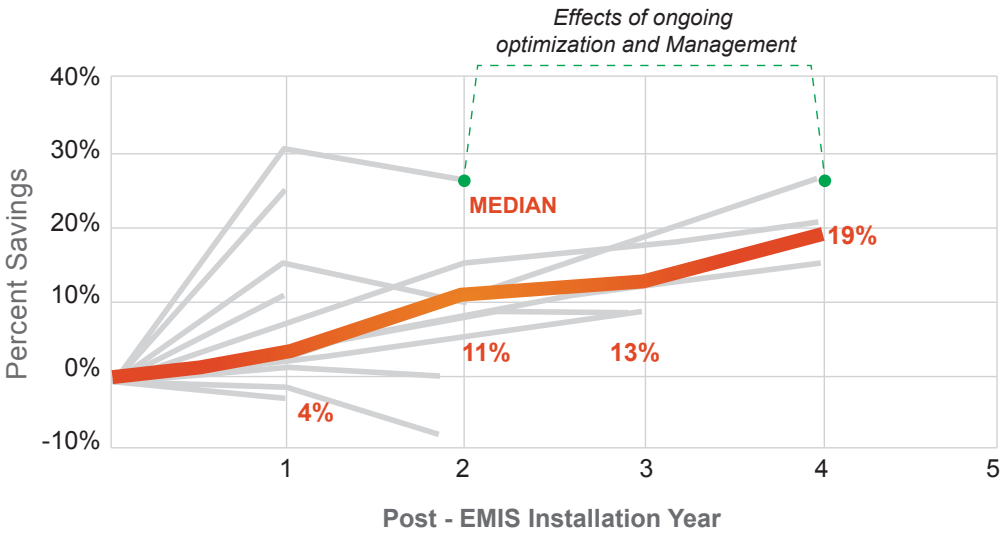
Figure 4.0 Real-estate Industry Experience Curve

Smart platforms have a positive and sustainable impact to building operations and emissions. In the built environment today, your options are “do nothing” - not really an option, or “traditional energy auditing and re-commissioning every 3 to 5 years” during these periods building systems drift, and performance suffers with operating costs and emissions climbing up and increasing over time. This approach is not very efficient and has a negative impact to ongoing operating costs and GHG emissions. Ideally the use of multi-purpose smart platforms ongoing data analysis supported by ongoing commissioning creates an accountability process that provides optimal building operation.

The RYCOM HIVE platform deliberate approach to applying technology, people and process assures outcomes and knowledge transfer to property staff. RYCOM injects subject matter experts within the property staff, hosting monthly meetings to address, resolve and prioritize issues.

The Lawrence Berkley Lab issued a comprehensive report 04/19 “Synthesis of Year Two Outcomes in Smart Energy Analytics Campaign”. The report highlights the total energy savings (%) achieved using data to continuously optimise the energy consumption of the property, Figure 5(a). We compare Berkley 1st year results to our 12 months results Figure 5(b), where RYCOM data shows total annual energy savings projected for the year, resulting in similar total building energy reduction results as the findings from Berkley.

(a) Berkley Results Year 1 = 4%, Year 2 = 11% and more in later years



Identified Savings
by Month of Service

(b) RYCOM Canadian Results for 20 participants, Continuous optimization, Year 1=7.32%

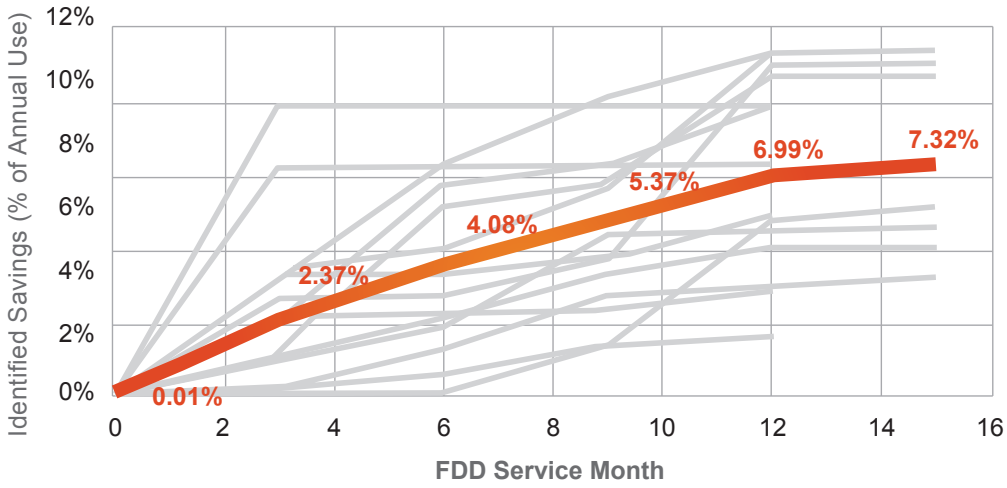


Figure 5.0 Comparing RYCOM and Berkley Energy Reduction Results

The Berkley report highlights continuously improving energy savings in years 2 ,3 & 4, with energy savings averaging 19% in year 4.

RYCOM's findings to date support the strength of the platform improving over time, as building operators and 3rd party vendors become accustomed to the process. For instance, a problem or opportunity identified, and fixed mid heating or cooling season achieves only partial season savings. The following heating or cooling season the property realizes a full season worth of savings from the improvements made the previous season. Both the Berkley and RYCOM findings support that smart buildings equipped FDD improved HVAC scheduling, adjustments of zone temperatures and other abnormal system behaviour helping achieve 10X performance.

Conclusion

In both the Canadian and US examples, planet, people and profit all win. The results demonstrate that smart technology platforms create a collaborative environment for both sustainability and economic CRE strategies to succeed. This collaboration paves the way for complete smart building integration with the smart cities of the near future. Table 1.0 illustrates key metrics supporting our conclusion that environment and economic goals can work in concert with each other and are worth investing in. Consider the following recommendations when planning your next real-estate development, retro-fit or fiscal budget:

- Make a five (5) year smart technology plan for your building or portfolio
- Merge sustainability and technology performance strategies and goals
- Leverage the data from smart operating platforms to measure and track daily emissions volume and improvements and share the data with all stakeholders
- Use real-time building data to optimize and build your resiliency strategy
- Build and own the digital profile of your building summarizing trailing performance and forecasting the future
- Set goals for both GHG & energy reductions and measure and equate ton’s reduced and dollars saved, per Table 1.0

Description	Amount	Units/Yr.
Energy Savings	7.32	%
Emission Reductions Average	34	Tons/m^2
Emission Reductions Hi	406	Tons/m^2
Emission Reductions Lo	10	Tons/m^2
HIVE Payback Period	5 to 12	Months
Energy Savings Average	1.77	$/$m^2$
Energy Savings Hi	4.49 greater 12 months	$/$m^2$
Energy Savings Low	0.37 less than 12months	$/$m^2$

Table 1.0 First twelve months of HIVE services showing environment & economics summary

On a recent flight from Paris to Toronto it occurred to me that the crew and the plane were only in a hands-on mode at take-off and landing, for the rest of the 7 hours journey a computer flew the plane. It would seem to me that we have reached the point in real-estate where smart technology can now deliver the same level of autonomous performance, precision and control in a stationary building that an auto pilot can in a moving jet travelling at 900Km/hr

> "If you want to do something new,
> Stop doing something old."
>
> *Peter Drucker*

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