Collaboratively Disrupting the Building Industry:

evolv1 is a 104,000 sq.ft., three-story Class A commercial office building located in the heart of the David Johnston Research and Technology Park (R+T Park) in Waterloo, Ontario

"It's people. It's people and human relationships. If you create an environment where people can be creative and feel safe, then more comes from them."

The Unique Story of evolv1 *in Waterloo Region*

"We were searching for where to go next with pushing the envelope. We knew it would have to be with the energy generation. So how do we generate energy?"

A report by

The Viessmann Centre for Engagement and Research in Sustainability

"We had a lot of engagement, a lot of ideas of around thoughts of on the building, around what people would want to see. It's interesting in those engagement sessions because we want to present enough information about what the possibilities are, what the building is about, what the constraints may be, but we also want lots of input, lots of thought."

"shift how buildings are built in this community"

Authors:

Manuel Riemer, PhD;
Kai Reimer-Watts, MCC;
Stephanie Whitney, PhD;
& Sherley Leitan-Claymo

Waterloo, Ontario, Canada

Riemer, M., Reimer-Watts, K., Whitney, S. & Leitan-Claymo, S. (2021). Collaboratively Disrupting the Building Industry: The Unique Story of evolv1 in Waterloo Region. Viessmann Centre for Engagement and Research in Sustainability (VERiS). https://researchcentres.wlu.ca/viessmann-centre-for-engagement-and-research-in-sustainability/assets/documents/evolv1story.pdf

Acknowledgements

The image on the front shows the main foyer of evolv1 and is a courtesy of the Cora Group. evolv1 was inspired by Sustainable Waterloo Region and is owned and developed by the Cora Group. evolv1 is a trademark owned by the Cora Group. The building was designed by Stantec.

This report was initiated and created in the context of the evolv1 research program, led by the Viessman Centre for Engagement and Research in Sustainability (VERiS) at Wilfrid Laurier University in collaboration with Sustainable Waterloo Region, York University and the University of Waterloo. This report was created in partnership with Sustainable Waterloo Region as part of this ongoing research collaboration. Members of Sustainable Waterloo Region provided general guidance, information, and reviews of various drafts; but, they were not involved in conducting and analyzing the interviews and did not influence the research team's interpretation of the data.

With great gratitude, we would like to acknowledge the 19 people who agreed to participate in the qualitative research interviews that lasted between 60 minutes and four hours. This report would not have been possible without the generosity of these 19 key stakeholders and their openness to share their part and different perspectives of the evolv1 and evolvGREEN story with us. Each participant had an opportunity to review their quotes and a draft of the report prior to its public release. All procedures were approved by Laurier's Research Ethics Board.

The interviews were conducted in the spring and summer of 2019 by Manuel Riemer, Kai Reimer-Watts, and Sherley Leitan-Claymo. They were analyzed by all authors using standard qualitative content analysis procedures. This report was written by Manuel Riemer and Kai Reimer-Watts with input from Stephanie Whitney and Sherley Leitan-Claymo.

Funding for this report and the related research was generously provided by the Region of Waterloo Community Environmental Fund, a provincial Ontario Research Fund – Research Excellence grant, and a federal Partnership Development grant from the Social Sciences and Humanities Research Council of Canada.

We are grateful for receiving access to use the photographs seen throughout the report provided by a number of generous partners, including: The Cora Group, Sustainable Waterloo Region, Miranda Burton, Livescape, University of Waterloo, and Stantec. Further images were also taken and provided by the authors of the report.

The design for the report was provided by Ericson Balagtas of resolutionstudio.ca

Executive Summary

This report is sharing the unique story of evolv1, Canada's first certified carbon-neutral and net-positive energy commercial multi-tenant office building and the related green economy innovation hub, evolvGREEN, located in Waterloo region. In the spring and summer of 2019, the research team from VERiS at Wilfrid Laurier University conducted 19 qualitative narrative interviews with key stakeholders in the visioning and development process of evolv1 and evolvGREEN. Collectively, the unique perspectives of each interviewee converge into a rich and unique story across five core chapters, which are summarized below, followed by a conclusion.

In the prequel the report first acknowledges that evolv1 is located on the Haldimand Tract, the land promised to the Haudenosaunee, also known as the Six Nations, who have a strong connection to sustainability as illustrated by their seven-generation principle.

The report then identifies three major contextual conditions that significantly contributed to the reason why evolv1 emerged specifically in Waterloo region at this time. First, there is a strong passion for a culture of sustainability present in the region. This is reflected in ambitious GHG reduction goals among the local municipal governments and businesses, sustainability leadership among the regional universities, strong active environmental NGOs, and an active grassroots movement. Second, many participants describe a strong culture of community building and collective action grounded in the Mennonite roots of this community. This was a strong enabling factor for a unique community-driven and -supported integrated effort in both the collective visioning for the building and in its development. Third, through strategic investments by the local municipalities, the presence of multiple institutions of higher education, and the successes of two globally leading tech innovation incubators Waterloo region has emerged as a successful innovation hub. The spirit of innovation in combination with the passion for sustainability was well captured in the proclamation of one participant:

"We need to be known as the sustainability innovation hub of Canada" [P05]

The chapter 'The Dream Emerges', explores the emergence of the dream that will eventually become evolv1, along with its embedded evolvGREEN sustainability hub, as the convergence of multiple visions happening at once. This includes both a community-led vision for a central location for sustainability engagement in the region that emerged from community dialogues hosted by local non-profit Sustainable Waterloo Region (SWR), along with a vision to develop sustainable green buildings that would be zero carbon and net-positive energy in Waterloo region, led by the local building developer the Cora Group. Both visions were informed by separate contexts and processes prior to their convergence, and were supported by several individual 'champions' who helped move them forward. The processes to build the community-led vision were supported by SWR founder Mike Morrice and Executive Director Tova Davidson with extensive community input, eventually leading to the concept of a 'Centre for Sustainability Excellence' as a physical location in the region that would promote the green economy and sustainability. Meanwhile, the Cora Group's exposure to sustainable building design in Freiburg, Germany led the family-owned developer to question what they could do to push the envelope on sustainable building in Waterloo region – with direct leadership from their COO Adrian Conrad, a key champion for the Cora Group's vision for the building. The opportunity for partnership between these two visions emerged when SWR put out a call for Expressions of Interest in 2014, looking for developers and land-owners to partner on the development of a cutting-edge sustainable building, which would include a hub for sustainability innovation. Partnered with the David Johnston Research and Technology (R+T) Park in Waterloo, the Cora Group submitted a competitive proposal, which was accepted. While a partnership between a local developer and local non-profit on a building project was unusual, it helped mitigate some risks from undertaking something so novel and untested, by sharing the load. For instance, SWR secured the support of multiple partners including what would become the building's first anchor tenant, Ernst & Young (EY) Waterloo office, while Cora Group provided the necessary expertise in sustainable building development. SWR, the Cora Group, R+T Park, and EY Waterloo office became the leadership team that would meet regularly over the following years to shape and move this 'converging vision' forward, informed by each of their unique sustainability journeys, expertise, diverse visions and local contexts. Gradually, what was once only a dream is clarified to a specific vision.

The chapter 'Vision to Green Light' explores specific aspects of the visioning process for evolv1 prior to the building vision receiving final approval from the Cora Group to move forward, or what was referred to by several participants as receiving the 'green light'. This explores the collaboration process of the core leadership team including regular meetings for four years at a local restaurant to move the vision forward, which became critical for building the trust, relationships, and creative process necessary to bring multiple diverse visions and objectives together. This also includes navigation of the (mostly productive) creative tensions that emerged amongst diverse partners and objectives, including: 1) The desire to create a clearly green 'signpost' building vs. a building that feels and looks like a standard high quality office building; 2) Getting input and involving the larger community in the development process, but also needing to be pragmatic and sensitive to the timeline and available resources; 3) Continuing a collective visioning process vs. deciding on a vision, making firm decisions and moving forwards. This stage also led to a broad agreement amongst the leadership team of a primary objective for evolv1 being to 'create a new normal' that would disrupt the building sector and, as one participant put it, "*shift how buildings are built in this community [P02]*. To prove the building's technical viability using existing technologies and within a standard development budget, SWR, with the backing of the City of Waterloo, secured support from the Federation of Canadian Municipalities' (FCM) Green Municipality Fund and several other sources to finance an in-depth Feasibility Study. This support enabled the hiring of the Waterloo-based architecture and engineering firm Stantec to lead this study. Stantec was then able to apply its diverse in-house expertise to leading an integrated collaborative design process, bringing together key stakeholders to collaboratively problem-solve and think through the complex interactions of the diverse sustainable building features being proposed. Meanwhile, SWR leveraged their social capital as a community intermediary by engaging other local experts in contributing to this process, convening a diverse array of input and modeling the barn raising and quilt making spirit typical of the region. Discussions of how to address the so-called 'performance gap' of green buildings led to the engagement of community psychologist Dr. Riemer and deeper exploration of the people side of building development, including how to build a deeper 'culture of sustainability' that would enable the building to reach its highest sustainability potential. Importantly, financial support for the Feasibility Study was the only external

government funding involved over the course of this project (not counting research funds). Once this study was complete, clearly proving the viability of evolv1 and that it could be built within a developer's budget, the Cora Group stepped in with a commitment to finance the entirety of the building development, giving it the 'green light' to move forward. The Cora Group's decision to fully finance evolv1 became a key piece in proving the viability and replicability of such projects to other commercial developers.

The next chapter 'Planning, Design and Construction' explores the practical steps of the building's development following the vision's approval, moving evolv1 firmly out of the realm of being solely a vision and increasingly into a clear development plan and then a tangible, physical reality. This includes the final design process prior to building construction, where Stantec explored realistic costing of proposed building features and how to meet construction deadlines, seen as important to further proving that evolv1 could be built on-time and within budget of a small local building developer. Using an 'ideas funnel', Stantec's planning and design teams narrowed down to the specific building features explored in the Feasibility Study that would be included in the final building plan. Local trades and construction teams identified to support the construction process were also engaged by the Cora Group's Adrian Conrad in this final design stage to get their input, ensure the building process would go as smoothly as possible, and ensure that everyone involved was aligned with the shared vision. Once the final design was approved, construction began. Remarkably, while the construction process may have required some additional coordination amongst builders, many aspects of this process were seen as "generally pretty conventional", further demonstrating the viability of undertaking commercial building projects such as evolv1. Recognizing evolv1's unique context, specific contextual factors that could influence the transferability of findings from this case study are also discussed. This includes the importance of all key players believing in the same vision, which appears to have been shaped by two key factors: 1) Using an integrated design process; and 2) Building on local and established relationships. This chapter also explores the shift in leadership on evolv1 that took place at this stage, as the Cora Group increasingly took a leading role in building development, while SWR and others on the leadership team increasingly stepped back in this process. While challenging in some respects, the shift in leadership did enable SWR to refocus its attention into the development of the evolvGREEN sustainability hub that

would eventually be located within the building, securing key partners for this including the Accelerator Centre (AC), Faculty of Environment at the University of Waterloo, and the VERiS Research Centre at Wilfrid Laurier University, enabling the evolvGREEN vision to also slowly materialize concurrently to building development.

The chapter 'Opening, Occupancy and Imagining the Future' begins following the completion of building construction, leading to the grand opening of evolv1 on November 30, 2018, and the official opening of evolvGREEN several months later. The remarkable achievement of the evolv1 building in meeting its high sustainability objectives through integrating existing, already-proven sustainable technologies while also staying within the developer's construction deadline and budget speaks volumes to the potential of this project in setting new standards and 'raising the bar' for more sustainable commercial building construction. With an initial occupancy rate of 95%, the building also proved successful in attracting good tenants that were willing to pay standard market rates for leasing space in a Class A Office Building, while also benefitting from the added features evolv1 has to offer. As an initiative led by several research teams in the evolvGREEN hub, and the building's new Manager of Culture of Sustainability, tenants also began to explore what it might mean to create a new 'culture of sustainability' within the building – empowering building citizens to also play an active role in making the building, their organizations, and their own lives even more sustainable. Since the opening, this has led to multiple 'culture of sustainability' workshops being hosted in the building, and a range of independent sustainability initiatives being undertaken by building tenants. Meanwhile, the VERiS Research Centre and its partners from the University of Waterloo and York University continue to 'build the evidence' for evolv1 by assessing the environmental and human impact of the building, its culture of sustainability and its sustainability performance, as a long-term research project that has enabled turning the building into a real-world 'living lab', to transfer knowledge and strengthen the business case for similar buildings in the future. The achievements of evolv1 have also been recognized already through multiple awards received to date, including being the first building to receive the Zero Carbon Building – Design certification from the Canada Green Building Council (among other awards). Given these achievements and the pioneering path blazed, the chapter ends with a discussion of how evolv1 and evolvGREEN can best be leveraged going forward to inspire others to also 'do better'. This includes two key overarching recommendations from interviewees: 1) To challenge the building sector to 'build better'; and 2) To encourage greater regional sustainability leadership. As put well by one participant:

"evolv1 exists because there were champions who managed to really convince people that this was something you should get behind. I think the next piece of it is you want to get it codified in policy." [P03]

The final conclusion takes us full circle, to reflect on the tremendous journey that was taken to make both evolv1 and the evolvGREEN visions a reality, and the journey forward. This includes the recognition that while technological innovation is undeniably a part of what makes evolv1 successful, it is the *people involved* working together far more than the technology itself that transforms a vision into reality. A reflection on the key factors that came together to shape the remarkable outcome of evolv1 and evolvGREEN include: 1) The importance of visionary leadership and a community intermediary (in this case, SWR) to 'convoke' a shared vision and bring the right players together, building on existing strengths; 2) Having a willing innovative, visionary and committed developer; and 3) Having other actors that were willing to jump in and 'hold the vision' to move it, step by step, into a tangible reality. A discussion of the importance of systems thinking, relationship building and nurturing, and navigating creative tensions productively as they emerge is explored. Finally, evolv1 and evolvGREEN are positioned in the larger global context in which they emerged, as we understand them as one piece of the much broader solutions that are required to address climate change and build a far more sustainable future.

Photo of living wall in evolv

Table of Contents

"I don't think it was a tough sell, I mean, that's why it [evolv1] flourished. It was a good ground floor for it." [P13]

"It's people. It's people and human relationships. If you create an environment where people can be creative and feel safe, then more comes from them." [P04]

"A dream you dream alone is only a dream. A dream you dream together is reality."
- Yoko Ono[1]

Introduction

Welcome! In this report we are sharing with you the unique story of Canada's first commercial net-positive energy and carbon neutral multi-tenant office building, which has received multiple awards in recognition of its pioneering role within the North American context. But, it is really the story about a community coming together around a shared vision of moving sustainability forward. As you will learn in the following pages, it is not by chance that this game-changing building was developed in this region at this time. In this report you will experience the power of people rallying around a collective dream and pulling together their different talents, expertise, and resources to help make this dream a reality. That is the story of evolv1, a remarkable collective undertaking motivated by the desire of the local community to be at the forefront of the sustainability transition; initiated by a local non-profit environmental organization Sustainable Waterloo Region; and privately owned, developed and now operated by a local family-owned developer in Waterloo region, the Cora Group.

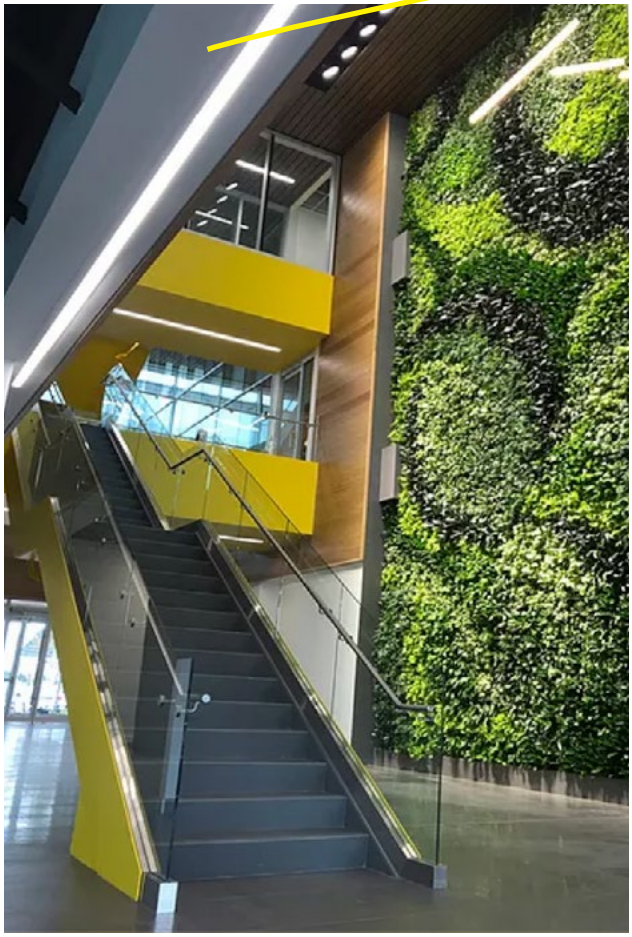
evolv1 is a 104,000 sq.ft., three-story Class A commercial office building located in the heart of the David Johnston Research and Technology Park (R+T Park) in Waterloo, Ontario. It is also right next to a light-rail transit stop, a cross-city cycling and pedestrian pathway to two of the local university campuses and the downtown, and provides ready access to walkable green space. This makes these forms of active and public transport readily accessible options for getting to and from the building, which was a priority for the selection of the location. Among other features, evolv1 boasts a state of the art HVAC system; a passive SolarWall®; a 40 foot three-story living wall; a geothermal well; a 40,000 liter cistern; 28 electric vehicle charging stations; 754 solar panels on the roof, as well as 1440 solar panels covering the parking lot parkade. Together, these technologies are designed to produce 108% of the projected building energy needs on site, displacing 110 tons of CO2 annually, the equivalent to 130 cars. The building tenants include two tech and one financial company as well as a clean tech innovation hub called evolvGREEN developed by four partners: Sustainable Waterloo Region (SWR), The Accelerator Centre (an incubator for tech companies; AC), Wilfrid Laurier University (Laurier), and the University of Waterloo (UW). Both Laurier and UW also house sustainability-focused research centers in evolv1.

1 A line written by Ono many years before, and quoted by Lennon in December 1980, as quoted in All We Are Saying : The Last Major Interview with John Lennon and Yoko Ono (2000) by John Lennon, Yōko Ono, David Sheff, p. 16.

photo of evolv1 building

Over the next 40 years, the world is expected to build 230 billion square meters in new construction – the same as adding the equivalent of Paris to the planet every week (United Nations Environment Programme [UNEP], 2017). The intention was for evolv1 to be a game changer for the building industry. Changing the way we construct and manage buildings is a key factor in meeting humanity's global and local greenhouse gas (GHG) reduction goals, to help mitigate the unfolding global climate crisis that is threatening the wellbeing and livelihoods of millions of people around the world, especially those already marginalized within society. Buildings and their construction, including commercial ones, currently account for more than 35% of global final energy use and nearly 40% of energy-related CO2 emissions (UNEP, 2017). Buildings also offer the greatest (and most economically efficient) potential for emissions reductions, as energy consumption

Photo of evolv1 interior



within existing stock has the potential to be reduced by 30 - 80% using proven and commercially-available clean technologies (UNEP, 2012). Currently available technology allows buildings to not only significantly reduce their environmental impact but actually produce more energy than is needed in their day-to-day use, providing an opportunity to supply this excess clean energy back to the local grid. Some buildings also give back in other ways, such as through green roofs, which can help support local ecosystems and wildlife throughout an urban area. Thus, the barriers

evolv1 is a 104,000 sq.ft., three-story Class A commercial office building located in the heart of the David Johnston Research and Technology Park (R+T Park) in Waterloo, Ontario.

to developing zero-carbon[2], net-positive energy[3], and regenerative buildings[4] have less to do with technology and more to do with motivation and the ability to finance the projects. Perhaps not surprisingly, most green office buildings[5] that have pushed the boundaries of the building industry are owned by institutions, such as governments and universities. The Centre for Interactive Research on Sustainability (CIRS) at the University of British Columbia in Vancouver (http://cirs.ubc.ca) is one example of that, which also served as an inspiration for evolv1. Private commercial developers, however, tend to be primarily driven by the bottom line and the return on investment. An important contribution of evolv1 is therefore the demonstration that a boundary-pushing net-positive multi-tenant office building can be developed within the approved budget and timeline of a private developer with full return on investment and a competitive lease rate.

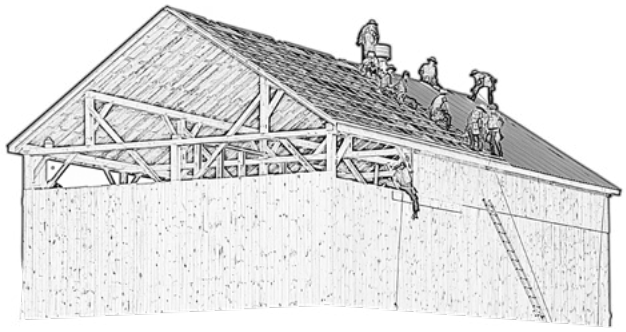
But, the path to get there was a long and hard one. It required the strong commitment of several key individuals and organizations to help push sustainability in this region and in Canada forward. It also required these early leaders to be open to collaboration and engaging in compromises along the way, focusing on the common vision rather than individual interests.

2 According to the Canada Green Building Council, "a zero-carbon building is a highly energy efficient building that produces onsite, or procures, carbon-free renewable energy or high-quality carbon offsets to offset the annual carbon emissions associated with building materials and operations." (Canada Green Building Council, 2021, par. 1)

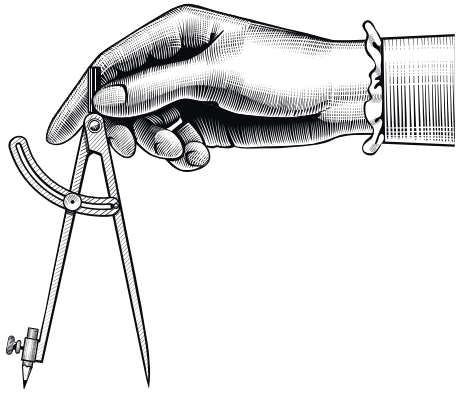
3 A net-positive energy building (NPEB) has been defined as one that "produces more energy than is needed, and [is] exporting it to other buildings or systems, i.e. 'energy storage management or feeding the extra energy produced to the grid'" (Kolokotsa et al., 2011, p. 3068, as cited in Cole & Fedoruk, 2015, p. 116).

4 "Green building strategies, performance goals, and associated assessment methods currently emphasize the ways and extent that buildings should mitigate global and local resource depletion and environmental degradation. By contrast, the emerging notion of 'regenerative' design and development emphasizes a co-evolutionary, partnered relationship between humans and the natural environment, rather than a managerial one that builds, rather than diminishes, social and natural capitals." (Cole, 2012, p.39). That is, in creating buildings with regenerative principles, the designers and developers consider how the buildings can contribute positively to the ecological context they are embedded within.

5 Green buildings also referred to as 'high-performance buildings' or 'sustainable' buildings, can be defined as structures created with the intention of reducing resource use, emissions, and waste while increasing occupant well-being and health (Brown et al., 2010).



There were also important contributions of many other supporters who provided their expertise, time, and encouragement along the way. It is not by chance that this project happened in Waterloo region, a place known for its technological innovation and can-do spirit. The region's shared value for collaboration can be represented in the concept of barn raising, introduced by its unique Mennonite influence. Barn raising is a collective action of a community, in which a barn for one of the members is built or rebuilt collectively by members of the community. Similarly, Waterloo region is also known as the quilt making capital of Canada, influenced by German and Mennonite settlers. While barn raising often mostly involves the male members of the community, quilt making is also a collaborative community endeavor but involves mostly the female members. The development of evolv1 is certainly a reflection of that community and collaborative spirit of co-creation, seen in both barn raising and quilt making in this region.



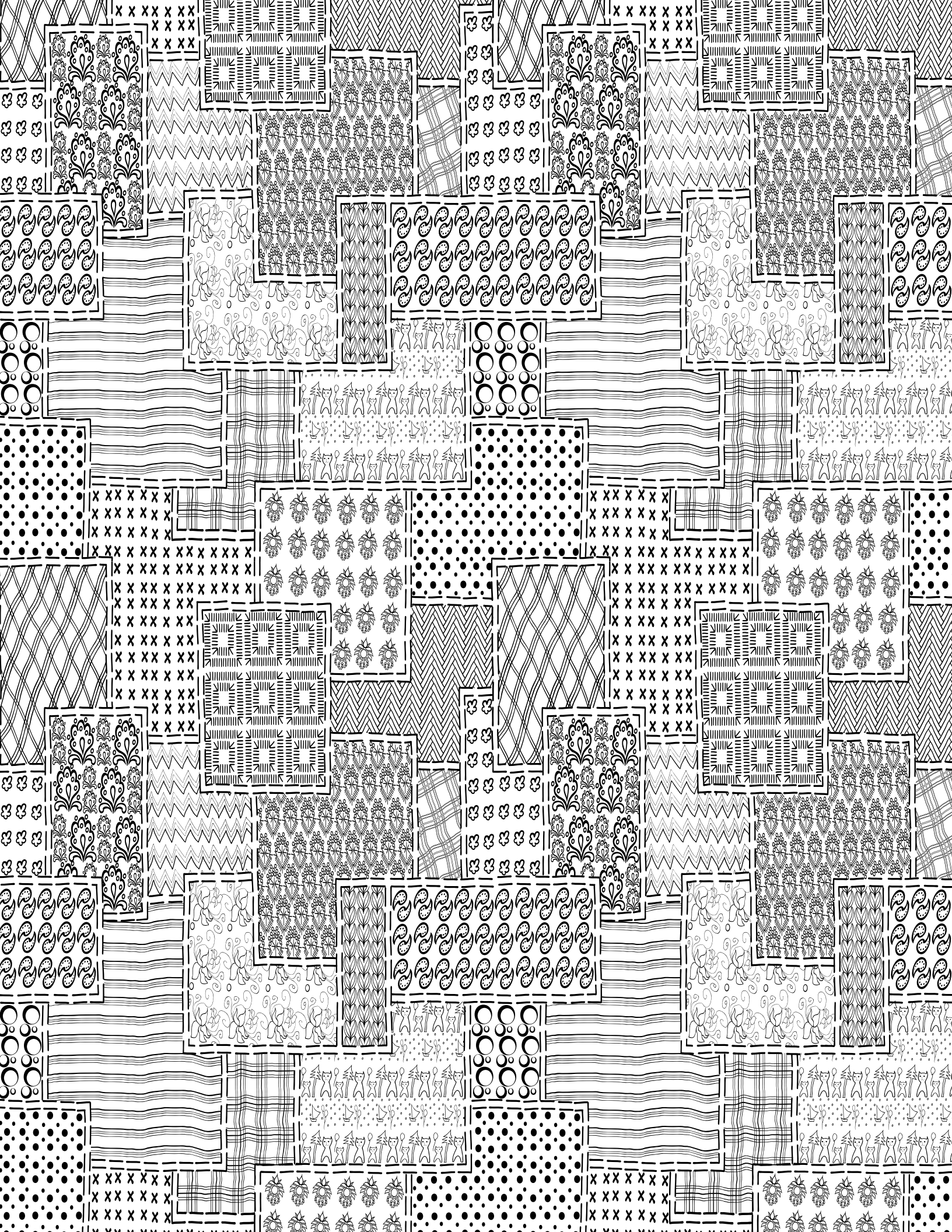
In this report, we would like to share the story of this unique building based on 19 interviews with key stakeholders in the development process. These interviews were collected as part of a larger research study on evolv1 led by the Viessmann Centre for Engagement and Research in Sustainability (VERiS) located in evolvGREEN, the innovation hub on the ground floor of the building. In six chapters we follow the building's development starting with the conditions that provided the soil in which this project could germinate and flourish, and ending with the impact the building has had so far and shared visions for the future. We will conclude with some reflections based on what we, as a research team, learned from talking with all of these amazing people who participated in our interviews. This is their story.

Chapter 1: Prequel

Analyses of historical events often begin with emphasizing the multitude of factors and developments that created the conditions for that event to occur at a specific location and moment in time. Similarly, in order to fully understand how the opening of evolv1 became possible in Waterloo in the fall of 2018 requires us to understand, among other things, the unique culture of Waterloo region as a centre of innovation and collaboration, and the growing leadership on and passion for sustainability both as a region as a whole as well as for the key actors in this story, such as SWR, the Cora Group (Cora), Ernst & Young Waterloo office (EY Waterloo), and the R+T Park.

Context

It would be negligent of us if we didn't start the history and context of the evolv1 building with an acknowledgement of the colonization of the land by white European settlers. The evolv1 building is located on the Haldimand Tract, the traditional territory of the Attawandaron (Neutral), Anishnaabeg, and Haudenosaunee peoples. The land was promised to the Haudenosaunee, also known as the Six Nations, in compensation for their alliance with the British forces during the American Revolution. From early on, however, the Crown disputed the full title of the Haudenosaunee to this land and these disputes continue to this day in what has become one of the longest and most violent land-claim disputes in Ontario history (Filice, 2016). The Haudenosaunee, Attawandaron, and Anishnaabeg peoples, like many other First Nations communities, lived on this land sustainably until they were violently forced off the land, forced to adopt European-Canadian culture, and the land was then exploited for industrial production. As a significant injustice, despite doing very little to cause the climate crisis – a crisis born of the polluting byproducts of industrialization that have directly changed the climate – Indigenous Peoples are among those most impacted by climate change today. This reality requires active efforts toward decolonization, just as it requires decarbonization of our societies and built infrastructures. While evolv1 does not explicitly address the former, it is clearly a leader in the latter, and it is here and on these lands that our story begins.



Waterloo Region's Passion for Sustainability

"They have a passion for a culture of sustainability. You know you are going to have hundreds of people from many different kinds of organizations that are there just to live and breathe sustainability." [P06]

This opening quote was in reference to hundreds of business and organizational leaders who gather every year for the annual Evening of Recognition for the Regional Sustainability Initiative, run by Sustainable Waterloo Region. This evening celebrates those businesses and organizations who have made the most progress towards the environmental sustainability goals they set for themselves and work towards, supported by coaching and tools provided by SWR. This initiative has now become the inspiration for over 300 businesses across eight municipalities, which collectively have reduced over 200,000 tonnes of GHG emissions – the equivalent of taking over 42,000 cars off the road for one year (Green Economy Canada, n.d.). Throughout the region, there are multiple other green organizations and initiatives that reflect a shared passion for environmental sustainability. Some of these, such as Reep Green Solutions, which has helped residents save an estimated 27,000 tonnes of GHG emissions (Reep Green Solutions, n.d.), have been around for a long time (in the case of Reep, since 1999) and are often connected to one of the universities in the region, which themselves have been recognized for their environmental leadership. UW's Faculty of the Environment, for example, is a global leader in climate change and sustainable energy research and is home to prestigious research centres focused on those issues, such as the Waterloo Institute for Sustainable Energy (WISE) and the Interdisciplinary Centre on Climate Change (IC3). Wilfrid Laurier University has shown leadership in water science and the social science areas of sustainability research with research centres such as the Centre for Sustainable Food Systems and VERiS, among others.

The Region of Waterloo and the municipalities within the region have also been showing commitment to tackle the climate crisis and other environmental challenges. Recently, for example, all of the region's municipal governments and the region itself declared a climate emergency / crisis in 2019, for many accompanied by other commitments such as implementing municipal carbon budgets to begin measuring and ratcheting down emissions (including those of buildings), and have also committed to a region-wide community GHG emissions reduction target of 80% below 2010 levels by 2050 (Region of Waterloo, 2018) and an aspirational reduction target of 50% below 2010 levels by 2030 (Fuentes Martinez

& Williams, 2021).These outcomes were largely due to the pressure of grassroots movements, with the 2050 target and added commitments being influenced by collaborative efforts of environmental organizations such as SWR and Reep. As an administrative leader from one of the local municipalities explains:

"We were just putting a new City Strategic Plan in place, right around the time that this [the visioning for evolv1] was happening and I believe the City process and subsequent focus on the environment was at least in part influenced by the visioning process for evolv1." [P14]

Taking all of this in consideration, it is not surprising that several of our interviewees describe a culture of sustainability and a green identity for Waterloo region – a spirit illustrated and built on by evolv1.

Barn Raising & Quilt Making: A Culture of Collaboration

Barn raising, n.
A social event in which members of a community assist in the building of a new barn. *(The Free Dictionary, n.d.)*

"**Quilts** are a creation of something new out of old discarded fabric, and in their making, represent the spirit and coming together of the community."
(Kobeissi, 2017)

When you first move to Waterloo region, it does not take long before somebody will reference the strong culture of collaboration in the region. It is a core aspect of the identity for the region and is also deeply rooted in the long history of the Mennonite community in this area. Barn raising and quilt making are not just metaphors for this community, but strongly valued social practices that are reflective of an emphasis on community and collaboration, which has influenced the remainder of the region to this day.

This plays out in many ways. For example, Waterloo region consists of a regional government (the Region of Waterloo) and seven municipalities and townships, which all have to work together effectively to make the governance and services in this region work. These local governments often engage in

what one participant described as "friendly competition", pushing each other to always do better.

As another illustration of the collaborative culture, over 30 years ago the region created the first Crime Prevention Council, a network of government, police, social and health agencies, community organizations, and local residents, which together wanted to build a strong community where people flourish and crime is prevented downstream. This council became the model for many other councils across Canada and the world. There are similar networks in the region for immigration, social services, and mental health, among others.

Wilfrid Laurier University has been at the forefront of community-engaged research and learning, long before it became mainstream. It is home to one of the top community psychology programs in the world and the only one of its kind in the English-speaking part of Canada. Similarly, the University of Waterloo has many collaborative programs with industry, government, and community partners, including one of the first co-op programs in Canada. Conestoga College, one of the largest colleges in Canada, also runs many of their applied programs in collaboration with various community partners.

These are just a few of the many examples that reflect the collaborative community-oriented heritage of the Mennonites who settled in this region, not to mention the deep community orientation of the Indigenous Peoples who came before any settlers here and still call these territories home. It is within this culture of collaboration that amazing things can happen, as expressed well by this interviewee who is deeply embedded within this culture:

"If you are passionate enough and tenacious enough and empathetic enough, big ideas can be brought to life. Particularly in this community where the whole barn raising entrepreneurial culture is so strong." [P02]

SWR, who inspired this project and played a key role in engaging the partners who made this building happen, embraces this value for collaboration very clearly in their motto: "We do everything in collaboration!" In doing this work, SWR builds upon their own growing reputation as an intermediary[6] organization that is able to engage partners to take on ambitious collective projects

and foster them to a successful completion. Specifically, SWR's ability to engage with the business community in the region has been highlighted as very positive, as represented in this quote:

"I started to develop a great relationship with Mike [Morrice, founder of SWR] and, we would get together two to three times a year with a check-in, and I was intrigued with how Sustainable Waterloo Region was starting to blossom and I was just really impressed with how Mike engaged with the business community." [P10]

Over years of practice and community engagement, the leaders and staff at SWR have developed many personal relationships like this one and were able to draw from these relationships when searching for partners for the evolv1 project, along with a network of advisors and supporters. The quote above is from a retired leader of EY Waterloo (Ernst & Young), the professional services firm that will later play a key role as the anchor tenant for evolv1. Initially, a young employee had suggested that EY leadership should engage with Mike Morrice, who had just recently founded SWR as a way to engage the regional business community in reducing their carbon footprint. Being intrigued, the leadership started conversations with Mike that shifted their perspectives on sustainability, which resulted in a strong commitment to reduce their local office's carbon footprint. Eventually, it became clear that EY Waterloo's ambitious goal of reducing their carbon footprint by 20% by 2020 was not feasible within their current office building, setting the pathway towards their investment into evolv1.

Similarly, another key player in this project, the Cora Group, had already developed a positive reputation as a local company invested in the community and with strong relationships with local contractors and the trades, prior to developing evolv1. They had also developed a reputation for developing sustainable buildings throughout the region, and were always looking for opportunities to push this envelope further as the founder of the company explained.

6 An intermediary organization facilitates a collective process among two or more parties for the purpose of moving collaboratively towards a shared goal. In many cases, the intermediary organization is the backbone of a collaboration providing project management, communication, and networking services.

This reputation and the ability to bring together a team behind a shared vision of an ambitious building project turned out to be critical for the success of this project,

> *"Hats off to Adrian - as he's bringing in new people, he's making sure they're aligned. So while it feels like all the stars are in alignment, in fact it's real work to make that happen and make sure everyone is together." [P18]*

Photo of Adrian

as expressed in the quote to the left in relation to Cora's lead, Adrian Conrad.

This relationship and trust-building of the Cora Group included their positive relationship with the R+T Park related to the University of Waterloo, which we will introduce below. The R+T Park also had strong established relationships with the City of Waterloo and the Region of Waterloo, enabling them to help shape the political context in which evolv1 emerged and thrived. In time, the Cora Group as the developer and the R+T Park as the land-owner submitted the winning bid to develop and build the net-positive office building, later to be branded as evolv1.

A Flourishing Ground for Innovation

As the quote above suggests, Waterloo region is not only known for its collaborative community spirit, but also as a hub for innovation. This region is often referred to as the Canadian version of Silicon Valley, located in Southern Ontario in what has become known as the "Toronto-Waterloo Tech Corridor – or Innovation Corridor" (Gillespie, 2020). While not limited to technology development, tech has certainly been at the centre of innovation in this area. Through strategic investments by the local municipalities;

the global success of the telecommunications company BlackBerry (formerly Research in Motion); the presence of one of the top engineering universities in the world (UW); and the successes of two globally leading tech innovation incubators (Communitech and the Accelerator Centre); all have contributed to Waterloo region emerging as a successful tech innovation hub. Today, Waterloo region has the second highest density of tech startups in the world, along with headquarters of some of the biggest tech companies in the world, such as Google (Gillespie, 2020).

It is within this fertile ground of innovation, which spreads beyond tech, that a collaborative effort to build a game-changing high efficiency green building would emerge. From very early on, this spirit of innovation was invoked when the early proponents of the evolv1 building (referred to during its conceptualization phase as the Centre for Sustainability Excellence or CSE) were envisioning the building as a key contributing factor for turning Waterloo region into "the sustainability innovation capital of Canada", as expressed in the quote below by an interviewee recalling a conversation during a board meeting.

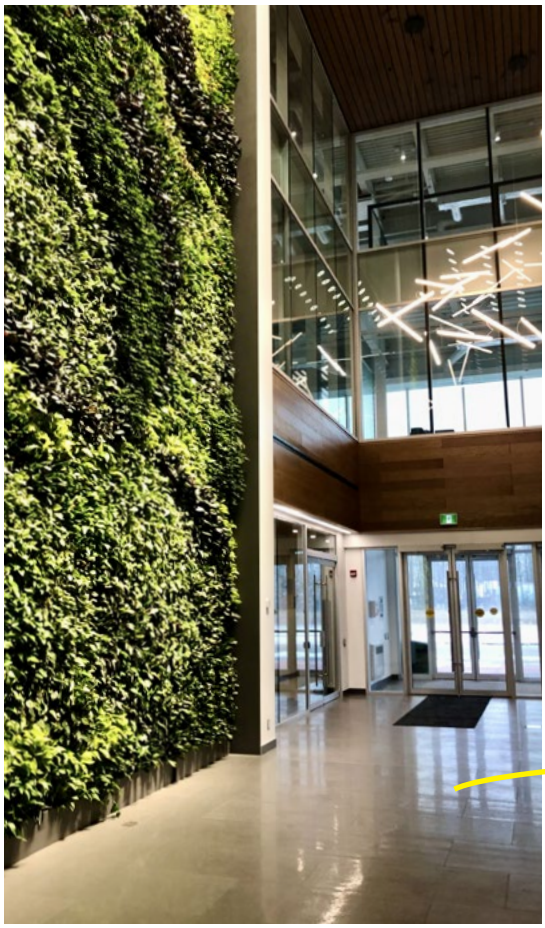


Photo of evolv1

"We need to be known as the sustainability innovation hub of Canada, because, if you look at a lot of things that have happened there [...], this is a vision for Waterloo region [...] we are the sustainability innovation capital of Canada. I'm not saying we're the greenest city. I'm saying this is where the innovations happen. Then, other communities are coming here to learn what's happening, and how do we scale, that way enabling other communities to take whatever piece works for them." [P05]

Several of the leading innovators mentioned above will appear in the next few chapters as key players in the development of the CSE vision/evolv1. The University of Waterloo, for example, is the current land-owner of where the building will be located. In 2004, the university opened the R+T Park, which brings together a community of "leading companies, brilliant talent, leading researchers, and pioneering startups"[7] in what is one of Canada's largest innovation parks. Investing in the evolv1 project was not a difficult sell to the R+T Park because of their own ambitions in regard to sustainability innovation as shared by this participant:

"evolv1 is a project that really builds upon the Park's own sustainability ambitions and vision. It's not an easy task, but we want to push the Park to be a leader in the community on how to do things differently, being able to do things with a little bit more of an innovative bent." [P03]

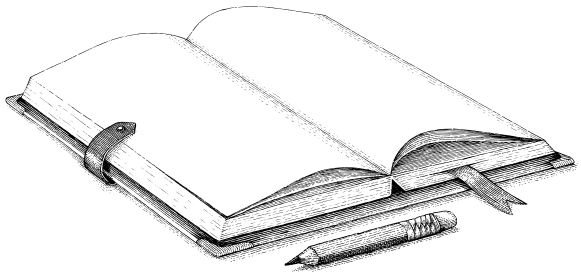
7 *https://rtpark.uwaterloo.ca/about/*

In summary, it should be clear from this description that there is a unique context in Waterloo region that provided the fertile soil in which an ambitious and forward-thinking project like evolv1 could emerge and flourish.

With this background in place, the stage is set for the story of how evolv1 and evolvGREEN within it began with an initial collective dream for a cool game-changing building and sustainability hub, to their grand openings and the impact they continue to have ever since.

Photo of LRT and motorized scooters

> *"I don't think it was a tough sell, I mean, that's why it [evolv1] flourished. It was a good ground floor for it." [P13]*



Great dreams often emerge not as a single spark, but as multiple converging visions happening at once – to create something bigger and richer through collaboration than would have been possible if the dream was pursued only in isolation. So it was with the evolv1 building and embedded evolvGREEN hub for sustainability that emerged in parallel – while these dreams started in multiple different forms and places separately, it was the convergence of these distinct visions that ultimately helped make them a reality.

Chapter 2:
The Dream Emerges

In 2012-2013, SWR had begun hosting community dialogues to inform its future strategic plan, and one of the key messages that emerged was the desire for a central location for community and government-led sustainability engagement in the region, in the form of a 'green economy' hub centering sustainability – which at the time was being informally dubbed the Centre for Sustainability Excellence (CSE) after other similar centres in Canada and worldwide[8].This input from the local community led SWR to begin exploring possible viable locations throughout Waterloo region that such a hub could conceivably be hosted in. In alignment with the core purpose of the hub to centre and promote the green economy and sustainability, it quickly became clear that this vision was tied to the need for a physical sustainable building to locate it in. Several options were initially discussed and explored – however, in the end this hub found its home in the newly-built evolv1 building in the R+T Park in Waterloo. How did this happen?

A community-led vision for sustainability

To answer this, we can look in part to a parallel train of thought that SWR founder Mike Morrice and several others had begun exploring around the same time, of how to push buildings in Canada to new, higher levels of sustainability. This exploration emerged in part in response to a recognition of the growing urgency of climate change, and the significant impact of building emissions as a percentage of total global emissions, especially within the commercial building sector. The question was:

"Could we actually help shift how buildings are built in this community?" [P02]

8 The Centre for Interactive Research on Sustainability at UBC in Vancouver (https://cirs.ubc.ca/building/) and the Centre for Social Innovation in Toronto (https://socialinnovation.org/) are two important examples of building concepts that inspired the initial vision of the CSE.

This was a bold question, especially considering that SWR had no experience to date in building design or development – however, as a community-driven non-profit organization SWR already had plenty of experience in community-building for sustainability, and dreaming big. The process – though difficult – effectively built the capacity of the community to believe *"that this is actually possible" [P05].* However, to get there they would need great persistence and many partners.

Inspiration from nearby and abroad

Closely aligned in time with SWR's community-driven exploration, the Cora Group was also taking next steps in its exploration of sustainable building design, and looking for how to push the envelope further. By this point, Cora had already been lead developer on a few LEED-certified high-performance buildings throughout the region, and so had significant proven experience in high-end sustainable building development. Now, they wanted to go one step further by developing a building that would generate more clean energy than it would use, and with that push the entire building industry in Canada in new directions. The point was to be not only sustainable, but also disruptive – to build a building that would be replicable by many other private developers, and in doing so help shift the entire building sector to be more sustainable.

This vision for developing sustainable buildings was inspired by a family trip by Manfred and Penny Conrad to Freiburg, Germany – a city known internationally for its sustainable building design, including a whole city quarter featuring green buildings whose development started in the 1970s (International Making Cities Livable Council, n.d.). The trip left the family so inspired by what was being done internationally, that it informed a deep commitment to push the idea for what is possible for sustainable building much further back home in Canada. Within the Canadian building community there was already a broad recognition that Canada's building sector was, in many ways, lagging behind the high sustainability standards that could be seen elsewhere, and that it was time to step it up. In considering what they could do to push sustainability still further, past even LEED standards, the Cora Group struck upon a novel idea: to develop an office building that was so sustainable, it would be certified zero carbon and generate even more clean energy than it actually used. Would a net positive clean energy, zero carbon office building in the cold climate and long winters of Canada even be possible? Could it be done on a developer's budget, and rented at market rates? If so, such a building would fundamentally disrupt the building market

"What are people see[ing], what are the possibilities, what is the vision to sort of fill this out a little bit further and to get people on board? It was an interesting dynamic to have done that, because you're asking engineers, architects, researchers, building experts, developers to come to these [community dialogues], for a building that they may or may not work on, with their competitors and share their ideas – and that was a very interesting request to them because of course a lot of those people and those organizations don't do those kind of things." [P05]

Photo of Community Meeting

in Canada, perhaps even driving sustainable building as the new standard for building development. However, to take this from a vision to a proven concept and then a physical building would take a long-term commitment and the right opportunity.

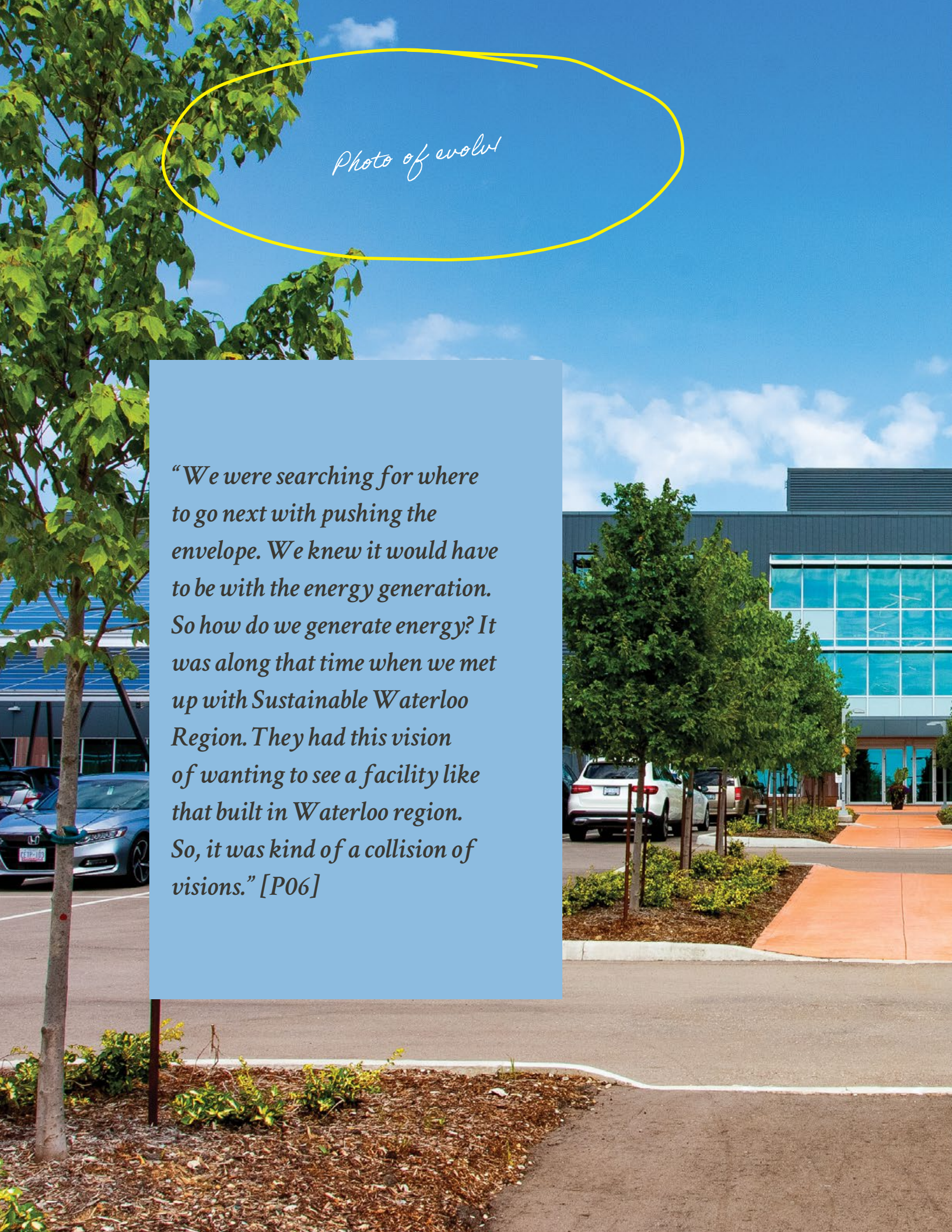
Partnership for a highly sustainable building and hub for sustainability

That opportunity for partnership came when SWR put out a call for Expressions of Interest (EOI) in June of 2014, looking for potential developers and land-owners to partner on the development of a cutting-edge sustainable building in Waterloo region, which would also become a hub for sustainability work in the region. This eventual partnership between the Cora Group and SWR would result in a four year journey from building conception to creation and then finally, evolv1 and evolvGREEN's grand openings. The partnership also proved highly useful in mitigating some risks from undertaking such a novel, as-yet-untested project for both partners by sharing the load: SWR was able to secure grants to co-finance a feasibility study, necessary to help demonstrate proof of concept, and brought in additional partners including the EY Waterloo office, a future anchor tenant, while Cora Group provided the necessary expertise in sustainable building development, managing and leading this complex, multi-year process. Both partners benefited from this relationship, reducing risk while ensuring a strong end result that met major components of the original vision.

The Cora Group's early vision for evolv1 also included a philosophy of 'no compromise' on occupant well-being and comfort for sustainability, following the belief that tenants should not have to sacrifice their own well-being and comfort for the building to be sustainable. This vision centered an emphasis on the positive health benefits and increased comfort of sustainability features, including improved indoor air quality, temperature control, and natural light, many of which can now be enjoyed regularly by the building's occupants.

While Cora Group was ultimately responsible (and paying for) the building development, with stakeholder input, the question of how to best embed a sustainability hub within the building remained. Inspired by other similar centres for community and sustainability engagement, such as the Centre for Social Innovation (CSI) in Toronto and elsewhere, the original idea expressed

Photo of evolv1 interior



"We were searching for where to go next with pushing the envelope. We knew it would have to be with the energy generation. So how do we generate energy? It was along that time when we met up with Sustainable Waterloo Region. They had this vision of wanting to see a facility like that built in Waterloo region. So, it was kind of a collision of visions." [P06]

"Giving back or regenerative building is something we did speak about. Can we have a green roof and living walls outside? We did actually have living vine on the south exposure, but it was cut out at the end. Not because of the cost, but because we didn't think it was going to survive with the climate. The key for us is that the building is designed to give back in energy to the grid and not use fossil fuels." [P06]

by both community and SWR was for the sustainability hub to embody a similarly attractive, thriving location for community, while also being embedded within a larger regenerative building that 'gave back'. The Centre for Interactive Research on Sustainability (CIRS) at the University of British Columbia embodied one such example of how this could be possible. Broadly, regenerative building is a process whereby buildings are designed to not only take resources from the natural environment, but to also give back in a productive, cyclical relationship. Typically, this means designing with consideration of the natural ecosystems that a building is embedded within, to ensure a reciprocal relationship where the building can play an integral role in also supporting and sustaining local ecosystems, along with its human inhabitants.

While in the end this is not what the evolv1 building became, some important elements of giving back still remain: such as the production of more clean energy than is used by the building, feeding surplus energy back to the grid, and the recycling of water through the geothermal system, ensuring all water taken from underground aquifers is given back to ensure no net water loss to these natural systems.

A leadership team emerges

There were two other partners who ended up converging on the vision for evolv1, and together with SWR and Cora Group formed a diverse "leadership team" of four core partners to carry the evolv1 building vision forward: EY Waterloo office and the R+T Park. As described in the previous chapter, it is important to emphasize that the major partners who ended up converging on this building development all had already begun their own sustainability journeys prior to meeting. In addition, EY International had already established a vision for all branches worldwide to transition to what was termed the "Office of the Future", including significant changes pertaining to improving both the well-being and productivity of employees that each branches' offices would need to incorporate. These pressures meant that moving spaces into a 'new and improved' office environment was already high on the priority list of Greg McCauley, the Managing Partner of the EY Waterloo office. Hence, when Mike Morrice with SWR first introduced the vision for a highly sustainable, attractive office building to Greg in its earliest stages, he was keen to be involved – later leading EY Waterloo to become evolv1's anchor tenant.

The R+T Park meanwhile had existing relationships with both SWR and the Cora Group, as well as an existing commitment to sustainability leadership.

This commitment came in part from being owned by the University of Waterloo (UW), which has a well-established Faculty of Environment, and considers sustainability to be a core part of its own institutional mandate. As such, the R+T Park already maintained an internal focus on attracting the right companies and projects in, that would align with its core values and help the Park to lead on sustainability.

Local context shapes the vision

At the time the evolv1 building vision began to emerge more fully in 2013-2014, the R+T Park was being led by Founding Director Carol Stewart, who was also a long-time supporter and ambassador of SWR. By this time, the Cora Group had already built two high-performance green buildings (HPGBs) within the R+T Park, and with these projects a reputation for sustainable building. There was the recognition from these development experiences that sustainable building required a different model for developers, with often larger upfront investment and the same or similar returns. Hence, to pursue such a model requires investors who are passionate about sustainability, with a desire to be on the cutting edge of sustainability leadership to prove such projects can be done within a Canadian market-driven context. Within the Park, the Cora Group had by this point already demonstrated itself to be one such developer. It became a clear and obvious decision for the Cora Group and R+T Park to later partner on a joint proposal submission when SWR put out its formal expressions of interest (EOI) to select a developer and a land owner. The fact that the Cora Group (as the developer) and the R+T Park owned by the University of Waterloo (as the land owner) submitted a joint application was perceived as an important strength, giving their application an important edge.

As the evolv1 building concept developed, so too did the initial vision driven by SWR's community consultations for a dedicated sustainability hub to be located within the building. As yet unnamed, this hub gradually emerged as a tangible and distinct entity within evolv1, under the leadership of SWR, UW's Faculty of Environment, the newly emerging Viessmann Centre for Engagement and Research in Sustainability (VERiS) at Wilfrid Laurier University, and the Accelerator Centre (AC). In 2017, the R+T Park itself had a major leadership transition, as Carol Stewart moved on and her role became filled by Mike Pereira, the AC's previous Manager of Marketing. Both Carol and Mike, along with Gary Pooley (then volunteer Chief Financial Officer at the AC), played vital roles in encouraging the AC to join the partnership for the development of this sustainability hub at evolv1, and in particular to encourage the

AC to develop an incubator for clean tech innovation to contribute to the hub. *"We have to think incubation, you know we've got one of the best incubators in the world on the campus, how do we fold them into this conversation?" [P12].* As the R+T Park facilitated meetings between these diverse partners both the evolv1 building project and embedded sustainability hub developed; this hub would eventually be called 'evolvGREEN'.

The Accelerator Centre in Waterloo also had an existing vision they were already pursuing for supporting the growth of cutting-edge clean tech innovation through an incubator model. As the vision for a sustainability hub slowly developed, this eventually piqued the interest of Gary Pooley as a logical next phase for the AC to get involved with, and a potential site to locate a new clean tech incubator. Gary became responsible for developing the business plan for the incubator with the particular help of Alan Taylor from SWR, recruiting and screening the first companies that would benefit from this incubator, now permanently housed within the evolvGREEN sustainability hub they helped to envision. As said by one interviewee from the AC: *"It was clear it was time to put research and ideas into action: the Accelerator Centre was approached to join the quest for a clean economy." [P07]*

In the end, four pathways converged to help shape evolv1, with four distinct but common visions held between each organization: SWR, the Cora Group, R+T Park and EY Waterloo. This convergence formed the foundation of a diverse "leadership team" for the evolv1 building development to come that would continue to meet regularly over several years, to navigate the continued evolution of this project.

"I think the idea of how grand the vision was for that space to inspire, I think that really came to light from the beginning, from those community sessions. Which was, imagine Waterloo region had a world-leading space, wouldn't that be cool? Not just cool, but wouldn't that be a bit of a mark of what this community is really all about? It was a pretty big vision out of that session." [P19]

A diversity of visions

In charting the evolution of a vision, it is important to emphasize that this early vision was not homogenous, and instead initially included multiple diverse interpretations and perspectives. For the hub itself, there were at least two different early interpretations for what this hub could include: one was to develop it as a sustainability centre with co-working space for "all things environmental", accessible to the broader community (much like the CSI model, above); the other was to develop it more as an innovation hub for incubating the next generation of innovative sustainability companies and solutions, similar to the model followed by Communitech for early start-up tech companies in Waterloo region. As one interviewee put it,

"I was seeing that positive impact from Communitech. And so, I think that became a big part of our conversation. How do you not just create a space, but create a community that can thrive as part of the broad dream?" [P19]

In the end, the final evolvGREEN hub for sustainability embodied a sort of merger between these two visions, with a space inhabited by cutting-edge sustainability organizations in the region to collaborate and collide together, including a clean tech incubator led by the AC and supported by SWR (see Chapter 4). However, while a valuable space for sustainability innovation, to what degree this became a community space remains an ongoing challenge for evolvGREEN tenants to navigate together (an additional challenge now during the restrictions of the COVID-19 pandemic).

From early on there were also different ideas for what the building itself could be, informed by both the Cora Group's visioning process and SWR's community consultations. This ranged from a building that would centre technological innovations – for instance, to achieve net-positive clean energy production – to one that would centre commercial replicability, to influence the broader building sector. Another popular idea was a building that would centre regenerative design practices (described above), and yet another a building that would emerge as a powerful symbol in the region, visually showcasing its sustainability identity. These visions were of course not entirely mutually exclusive, but they did have some significant differences – in the end, the final evolv1 building that emerged also illustrates both a merger of and in some cases compromise between these diverse visions. For instance, to be most efficient and stay within budget, a significant challenge became

deciding what technologies to include to meet the building's sustainability targets while not adding cost unnecessarily by 'over-designing'. This required an integrated design approach and embracing of simplicity in the design process, discussed more in further chapters.

"We tend to assume that it must be something so forward thinking or some new technology that is driving change down the road where, in my mind, it's the opposite. We need to revert back to simplifying the building. Simple integrated solutions, things that we can adopt from other geographical regions, and just focus on having a really energy efficient and tight building envelope." [P04]

Championing the vision

Some key people informed the early stages of this vision, working hard to solicit a broader range of community input from local community leaders to help shape the vision as it formed. Mike Morrice, the original founder of SWR, played a central, early role in 'floating the idea' for both a sustainability hub and physical green building past others in his (and the organization's) broader network, finding significant resonance. This stage of 'floating the idea' was still nebulous, with the idea not yet pinned down – but it painted a clear enough picture of a collective vision to encourage many significant community leaders to feel inspired, step forward, provide input and offer their support. This was the first, early stage of creating a collective vision, tied to the dream of a sustainability hub in a physical place in Waterloo region that community-led sustainability work could be done in, and that they could call home.

Mike's personal dream spurred him in 2014 to leave SWR and transfer lessons learned from that organization to a new enterprise that aimed to spread these best practices Canada-wide: Green Economy Canada[9]. In the process, Mike passed the torch for SWR's leadership to Tova Davidson, SWR's current Executive Director (ED) and leader since January 2014. Tova entered at a critical time in the vision's development, when the idea for developing a green building to house this sustainability hub was just beginning

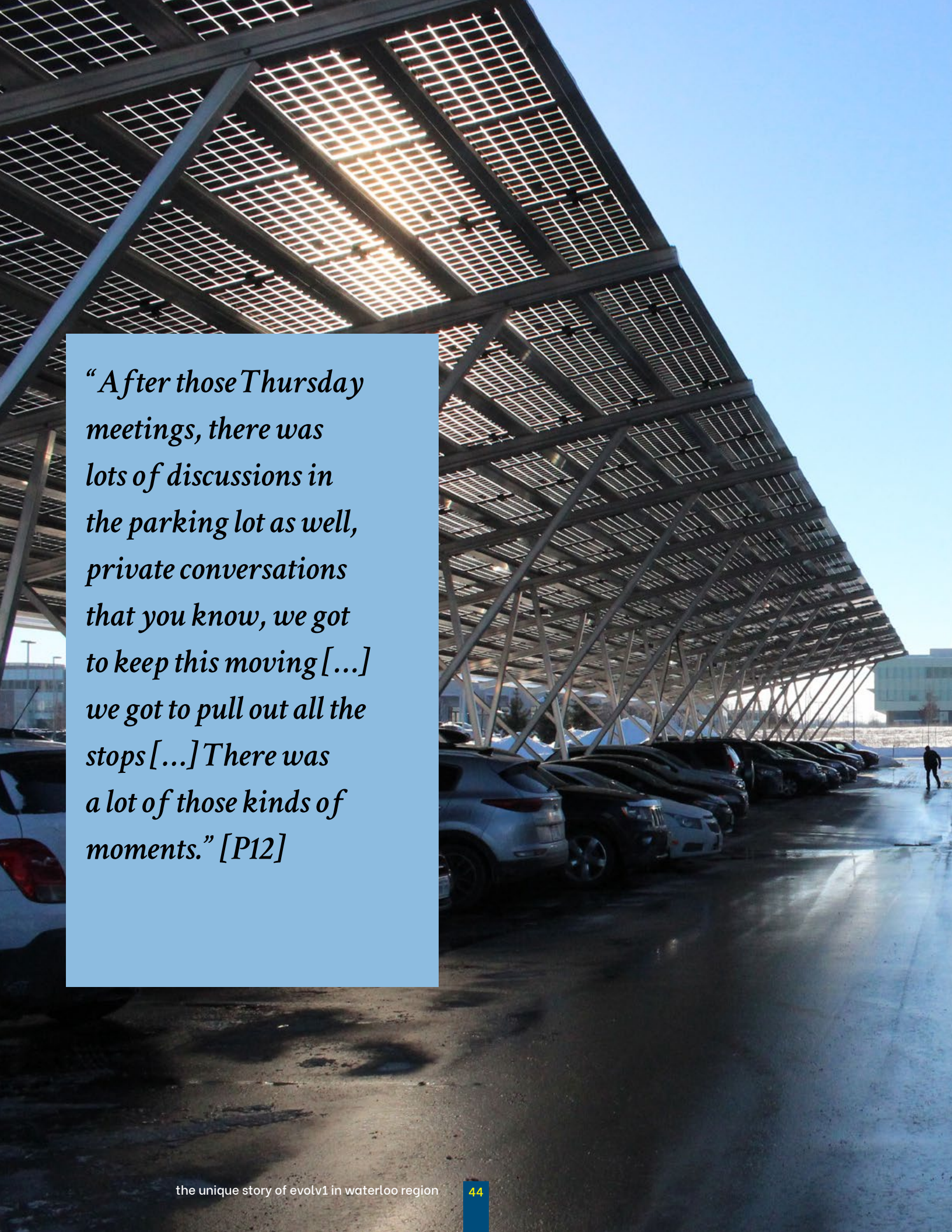
photo of Mike

9 Link to Green Economy Canada: https://greeneconomy.ca/

photo of Tova

to emerge. As SWR's new ED, Tova took it upon herself early on to help champion this vision, taking it still further from concept into (eventually) a tangible reality. Her background as an executive in the marketing industry had prepared her well for this role. In partnership with SWR's then-project manager for evolv1 Allan Taylor, along with support from other SWR staff, the organization hosted an Open House with community stakeholders, multiple Public Information Sessions, and consulted with experts to further develop the building ideas and concept between 2015-2016. In June 2014, this led to a formal request for Expressions of Interest (EOI) from SWR to the broader community, for both an interested developer and available land on which to build a cutting-edge green building in the region. Among other requirements, the initial EOI criteria included the need for a site within Waterloo region, near a transit stop, and a minimum one acre. Without any experience in building development themselves as an organization, support from experts in the community was clearly critical. It came as a pleasant surprise for the SWR team to have 5 responses in total to this initial EOI, reviewed by both their team and board, of which one – a joint application from the R+T Park and the Cora Group – was eventually selected to move forwards.

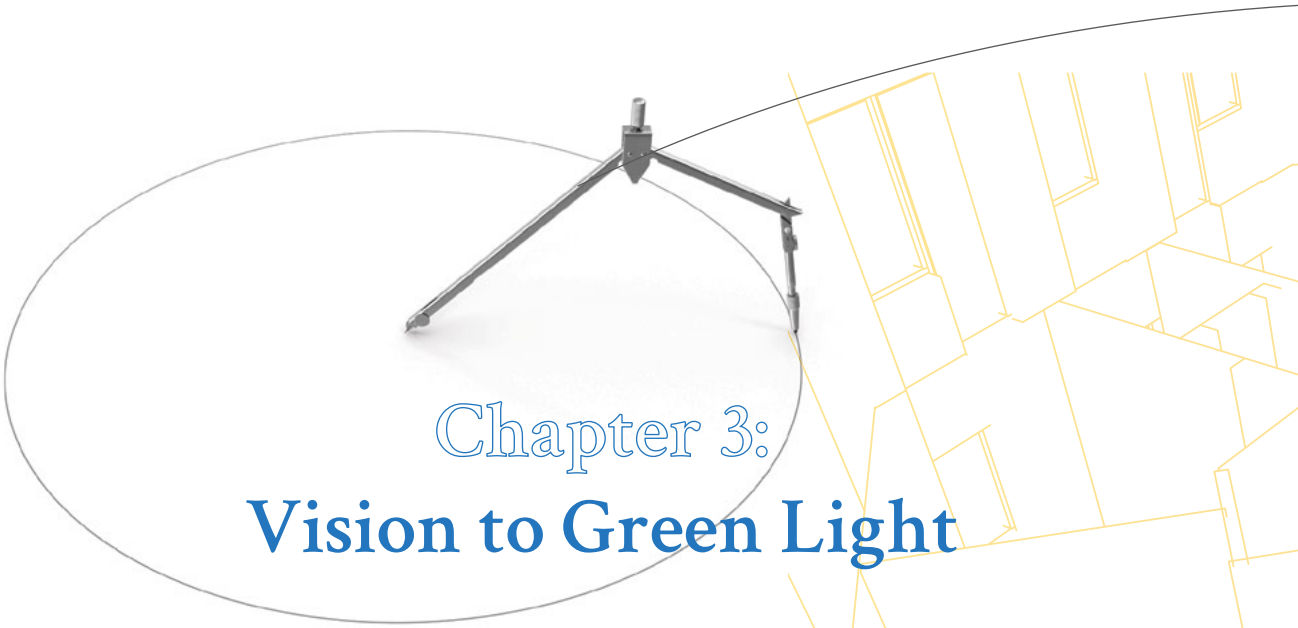
"Sustainable Waterloo Region provided very important people resources, to project manage the efforts and great leadership in terms of "okay, what's the next step, what do we have to do?" And so I have often reflected along the way, without their involvement this project just wouldn't have come to fruition in the way it did, because they did a lot of heavy lifting. And critical project management to keep this dream moving forward. It was critical." [P10]



"After those Thursday meetings, there was lots of discussions in the parking lot as well, private conversations that you know, we got to keep this moving [...] we got to pull out all the stops [...] There was a lot of those kinds of moments." [P12]

Photo of evolv1 parking lot with solar panels

"Cora is a local company with a good solid reputation, and understood the community dynamics and understood the local real estate and construction markets and had the ability to work with community groups like SWR to make this all work. And, because it's a small company, they're [...] more nimble and [...] do things a little more out of the box. And so their selection was a big turning point in realizing this thing." [P08]



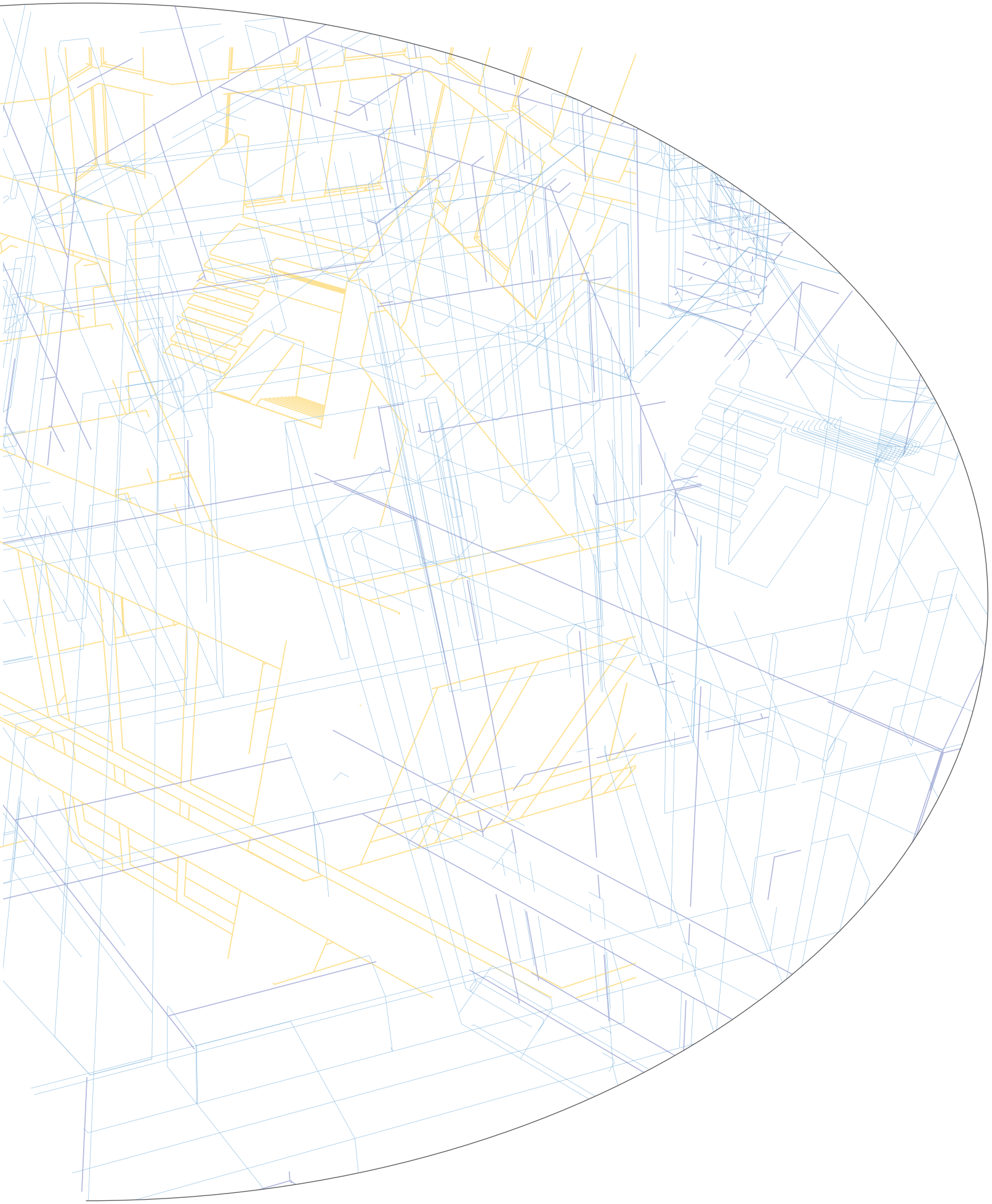
Chapter 3:
Vision to Green Light

Introduction

"We had our meetings ... every few weeks for breakfast where we just talked about how to take this idea further. What are we going to do because it was just a vision at the time." [P05]

Once an application was selected and the successful applicants notified, it became necessary to establish the core leadership team to meet regularly to discuss the development of what eventually became known as 'evolv1' and together help carry the vision forwards. This leadership team also encompassed a diversity of interests involved in the building, including a not-for-profit (SWR); building developer (Cora Group); research park owned by a university (R+T Park, University of Waterloo); and anchor tenant (EY Waterloo office). EY Waterloo had by this point made a commitment to being a future building tenant, and true to its word would later become evolv1's first anchor tenant. These four partners met regularly over breakfast at a restaurant in Waterloo every few weeks to discuss building development and negotiate a shared vision forwards.

These regular meetings continued for 4 years as the project evolved – nearly the full duration of the project – demonstrating the steadfast commitment of these four stakeholders to making evolv1 happen and playing an important role in the overall building development process. These regular meetings over shared meals were critical for building the trust and relationship necessary to engage in the kind of creative process and tensions needed to bring multiple visions and objectives together, into one that is both shared and operational.



Core leadership team for evolv1

THE CORA GROUP
Developers & Managers of Commercial Real Estate

sustainable WATERLOO REGION

EY
Building a better working world

UNIVERSITY OF WATERLOO

Creative tensions: from collective dream to shared vision for the building

What began as a collective dream with many potential directions forward needed to move into a shared, concrete vision – a difficult, complex process that was not without its (creative) tensions. Having a diversity of interests working together through both areas of agreement and disagreement / tension was clearly key to ensuring that those with a vested interest in the project were at the table and had a say in its ongoing development. This balance of voices allowed the team to better navigate the 'dream' of evolv1 and over several years move it steadily from concept to reality.

Creative tensions doubtless emerged in the creative process of building something new, with overlapping yet still differing opinions on key aspects of the building vision. These early creative tensions included, among others:

- A tension between creating a clearly green 'signpost' building vs. a building that feels and looks like a standard high quality office building
- Getting input and involving the larger community in the development process, but also needing to be pragmatic and sensitive to the timeline and available resources
- Continuing a collective visioning process vs. deciding on a vision, making firm decisions and moving forwards

These tensions can be considered, for the most part, productive tensions since they pulled the development team between the choices of dreaming big and also being time-sensitive and pragmatic. It is clear that while it is great to have a dream, if it just stays a dream then it will never become an actual tangible reality. In order to become a reality, a concrete vision is necessary and practical concerns of how to realize it must be considered – however what exact vision to pursue was ultimately the site of some contention.

In relation to the first tension mentioned above, the Cora Group did make a firm decision for evolv1 to look similar to other common office buildings with many of its sustainability features hidden, rather than have it stand out visually as an obvious 'green building'. Part of the reasoning for this was that in order to truly disrupt the commercial building sector, it was important that evolv1 be highly replicable by other commercial building developers, and not perceived as too 'outside of the norm' that its new, more sustainable

approach to building design would not be more widely adopted. In this sense, appearing 'like' other office buildings provides an advantage, as it may help make the finished building more relatable to other projects that commercial developers already tend to do. The Cora Group's intention with evolv1 was to try and help create a new normal for the building sector, rather than what may be perceived, if it was too obviously 'green', as simply an exception to the norm. In the end, these decisions allowed Cora Group to build a Class A Office Building that delivers superior tenant comfort; is rented at market rates; is highly replicable by other commercial building developers; and just "*happens to be sustainable" [P06].*

"It's not that we're creating a demonstration building, we're creating a new normal. This is technically and financially viable today, and so having the developer take that as his starting point, to me that's the most critical piece." [P11]

However, this decision to locate many of the building's sustainability features behind-the-scenes was not aligned with the initial vision by others, and did create a tension with the desire to leverage the building for further community-level and building tenant sustainability education (i.e. a 'teaching green building') – something that is harder to do when key features are hidden. One of the original community visions for a new, sustainable building in Waterloo region was for that building to also become a clear visual symbol for sustainability to inspire and further motivate others to action. In a sense, the final building involved a compromise between these different dreams. Today, when viewing evolv1 from the road or even inside it may be difficult to pinpoint many of its core sustainable features, however a few key features remain clear: a vast array of solar panels covering the building parking lot clues visitors in to the unique work happening here, as does the massive living green wall in the building's atrium. Other features continue to operate behind-the-scenes, yet remain key to the building's sustainability performance (described further below).

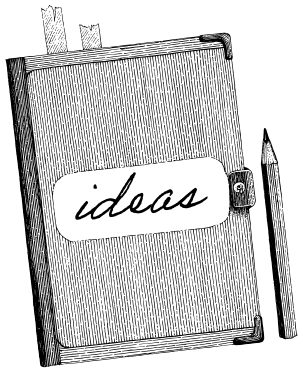
The second creative tension was balancing receiving sufficient input from community in the development process with the need to also be pragmatic and sensitive to the timeline and available resources of the project. Shaping the first part of this, multiple targeted community consultations were hosted between 2015 and 2016 by SWR, including with architects, engineers, sustainability consultants, environmental NGOs, and researchers, among others. This contributed greatly to informing a more people-first perspective in building design.

Photo of urolit's living green wall

"The community forum was effective in creating dialogue around us moving into actually designing a building, and to have some kind of a forum for discussion around what we're starting to learn about the performance gap [described below]." [P01]

Dr. Manuel Riemer, director of the VERiS research centre focused on the human dimensions of sustainability, is also a community psychologist and professor at Wilfrid Laurier University and was invited by the core leadership team to help inform this people-first perspective. This proved an important complement to architects' typical traditional focus on building technology. Local architecture and building engineering companies with interests in sustainable building design also provided unique insights to this initial community consultation process. While valuable, this also produced some tensions between the voluntary engagement of firms interested in supporting this exciting new process and the use of knowledge shared, making for difficult calls when it came to selecting specific partners for a future building feasibility study and the final architectural design of the building (discussed below). However, it is clear in retrospect that these forums were extremely valuable for honouring and building on community vision in the overall building design process and to build upon the strength and collective wisdom in the community.

At a certain point, though, those involved had to funnel ideas into concrete decisions and make difficult calls to move the team out of this visioning and conceptualization phase, and into actualizing one specific vision in line with considerations of available time and resources. This relates to the final creative tension of note, of the specific timing of when it made sense to move from this visioning phase and into actualization – including the desire among some stakeholders involved to continue a collective visioning process longer, while others felt the need to decide on a clear vision, make firm decisions and move forwards. During this visioning phase, SWR clearly embodied the role of intermediary, playing a critical role in both hosting and convening multiple actors to participate in these early community dialogues. However, valuable as this was at a certain point it was important to move away from the visioning process and start making specific decisions about the kind of building evolv1 would eventually become.



"This is what every engineer and every architect dreams of: "there's a blank canvas, show me what you can do", and your thoughts are: "Thank god somebody actually wants to listen, because you're so used to being told assumptions like "wow, this is expensive, you shouldn't do this". The opportunity ahead of us was very different. So, with that mindset, you think creatively, you innovate more, you integrate with the team, there's exploration of ideas and you're motivated to really hit that end goal." [P04]

In reflection, diverse groups of actors involved in a project can naturally result in some tensions in this visioning and development process as their members all bring different perspectives - yet when these processes go well and are given the space they deserve, it can lead to better decisions. Since in today's market-driven economy it is clear that 'time is money', one reflection from this process is of the importance of making space for these creative tensions to be worked through constructively, which often requires accounting for some additional time and potential upfront cost for a project to ensure it's not rushed, but to instead 'do it right'. This is particularly important when experimenting with new, more sustainable forms of building development, as in the case of evolv1.

The good news is, as was found with evolv1, that making these upfront investments is time well spent that can often end up saving time and money down the road in the development process. Particularly because building (currently) novel, highly sustainable buildings like evolv1 is a complex, sometimes untested process, it is important to take an integrated design approach involving the many actors implicated in the building's development early on in the process. This process is described further below, and was supported by a feasibility study used to 'prove' the evolv1 vision first before moving into building development. It is to this that we turn to next.

Feasibility Study

"Our goal is to build in Waterloo the largest net positive commercial building in Canada. To be net positive means to add more value than a building needs to operate. Specifically, the Centre for Sustainability Excellence *(working name)* aims to:

- generate more ***energy*** than it uses,
- send zero ***waste*** to the landfill,
- treat waste ***water*** onsite and harvest rainwater; and
- purify its indoor ***air***."

Source: Sustainable Waterloo Region (2015)

This quote from the initial backgrounder prepared by SWR expresses the shared vision for the building that the team landed on. The feasibility study provided an important test of whether that vision realistically could be translated into an actual building design. In the following, we will review the purpose of this study, the process of carrying it out, and its outcomes.

Purpose: Making the dream real

The purpose of feasibility studies in construction projects is to conduct preliminary studies in the early stage of a project to address any doubts people may have about the project and identify potential challenges. In the case of evolv1, the leadership team wanted to know whether their ambitious vision of a net-positive energy and carbon-neutral building could be realized within a typical budget and timeline of a similar commercial project, so that it can be replicated and scaled. Areas to be assessed included energy, water, waste, air quality, iconic architecture, and engaging people. The process of conducting the feasibility study also provided SWR and its partners an opportunity to engage a variety of experts in the local community to help shape the design of this building, including the first author of this report.

"Being able to achieve the vision in a manner where the group could say 'Hey, this could be replicated and doesn't require government at the table to help fund the infrastructure cost.' That was huge." [P10]

Process: Creating a well integrated whole through an integrated collaborative process

The first step in being able to conduct the feasibility study was to finance it. A feasibility study for projects of this scope is rather rare, as one of our interviewees explained. This required the group to find external funding for the feasibility study. SWR, as the intermediary organization, took the lead on this and managed the whole process, which turned out to be another example of the importance of collaboration in this project. SWR identified an opportunity through a request for proposals (RFP) from the Green Municipality Fund of the Federation of Canadian Municipalities (FCM). In fact, it was likely this RFP that introduced the management team at SWR to the specific concept and term of a "feasibility study". This RFP required 50% matching funding, which SWR was able to secure through a variety of sources (including an upfront investment from the Cora Group) and strategies as explained by a key informant:

"We collected other funding from the Region and the City of Waterloo and the Kitchener-Waterloo Community Foundation and one other place. That was then matched by the Green Municipal Fund to do this feasibility study. Before we submitted that application, we engaged several different engineering and architecture firms and went through the vetting process for them, interviews, and then selected one to move forward and submitted in partnership with them the proposal to the Green Municipal Fund for the matching funding. We actually had all of engineering and architecture firms take on the risk of completing the work despite... whether we were successful or not successful on the grant." [P01]

While multiple strong proposals were submitted, Stantec was eventually chosen as the firm to conduct the study. They were selected not because they made the lowest bid, but because they had all of the needed expertise available in-house and were able to submit a very strong proposal that provided a lot of value for the proposed costs. Being able to draw on a variety of relevant internal experts with significant experience in sustainable building design, was an important factor in the success of the feasibility study and later the design of the actual building as explained by one of the Stantec team leads:

"We got together internally with our team in Stantec and we looked at it from a fully integrated team of architecture, mechanical and electric engineering, sustainability, analysis, everything in one from the word go. We felt by having a fully in-house integrated team, there would be multiple experts who would help in expediting the feasibility study. This could work internally and then also with client outreach, with the community outreach and the analysis piece." [P04]

When considering the building's complete design, it was important to plan out the complex interactions of the diverse sustainable building features, rather than design and assess each component in isolation or simply assume the latest technological innovation would be key to meet the targets. In addition, newer technology can often be quite complex in its operation and it can become very difficult to manage without a significant amount of training, which can negatively affect the performance of the building and, thus, contribute to the performance gap (see below). Hence, using the *right* technologies – not necessarily the newest or most complex - which are then designed to work together in the most optimal way possible, becomes key to optimizing building processes for increased sustainability. In order to truly arrive at a holistic building that could work as a complex system of interactive parts, much like a human body, it was important for Stantec's engineers to think through the building's components as one comprehensive model.

"An integrated solution means everything is interconnected, if you've got a more efficient envelope it means your mechanical system is smaller. If you've got a more efficient envelope with more efficient glass, it means, well maybe I don't need to bring heating to that envelope, maybe I can put in a different type of distribution system." [P04]

"If you just pick little bits of technology and don't think about it as an integrated whole, you will fail... the same way we had a team that was totally integrated and all had a common goal, when you design a facility like this, you have to think about integration. How everything works together. Everything supports everything." [P16]

The key to creating such a well integrated solution was using a process that would create the environment in which people can openly exchange their ideas.

"It's people. It's people and human relationships. If you create an environment where people can be creative and feel safe, then more comes from them." [P04]

Under the leadership of one of its main sustainability experts, the Stantec team used an '*integrated design process*' approach to create such an environment that will help the team to collaboratively problem-solve and think through these complex interactions, searching for areas of maximum sustainability, tenant benefit and greater efficiency within the available budget. An integrated design process is one where:

"An integrated team of key stakeholders (e.g., owner, architect, contractors, suppliers, users) is developed early on in the design process, and the members intensely collaborate in 'ecocharrettes,' that is, inclusive brainstorming sessions, to define and agree on project goals pertaining to sustainable design and construction and to collectively decide about some important aspects of the project design." (Azari & Kim, 2016, p.1)

SWR was able to support this process by engaging a broad array of local experts who were willing to provide their input at no cost. Being able to draw from their social capital was an important contribution that SWR could make, especially as a small non-profit organization with a very modest annual budget. This also made this process really feel like a barn raising and quilt making effort and created a broader feeling of community ownership for the project. Drawing on a diversity of ideas and expertise created significant strength at this stage of conducting the feasibility study as one person involved explained:

"We had a lot of engagement, a lot of ideas of around thoughts for the building, around what people would want to see. It's interesting in those engagement sessions because we want to present enough information about what the possibilities are, what the building is about, what the constraints may be, but we also want lots of input, lots of thought. We didn't want to put any sort of boundaries on people's thinking. We really want the breadth of input. So, as we went through a series of engagement

sessions, we start by getting the input and then starting to get feedback as ideas develop. We said "Okay this is what you're telling us, this is how it could shape into a building and here are some of the features. Here's what's important, here's what you said that was less important." That whole process was all pretty exciting and really important in terms of developing the feasibility study." [P18]

One of the experts being engaged in this process was a close collaborator of SWR, Dr. Riemer, the first author of this report and an expert in the psychology of sustainability. SWR and their partners learned that many high performance green buildings had suffered from a so-called performance gap. This gap refers to the observed difference between the expected performance according to the design of the building and the actual performance once the building is in operation. This gap has, at least partially, been attributed to the behaviour of the building manager and the occupants. That is, the potential of the building is not being reached because of the way it is being used, pointing to the importance to not only work on the integration of physical building components with each other but also the interaction of the building with the people who are operating and using it. For this reason, SWR added the people or behavioural side as another key consideration early in the development process.

"So how do we actually get to the impact that we desire which is net positive energy, water, waste, and air quality? And so we presented this idea of the building and the people having an effect on the outcomes for the building and for the people; it was sort of a four-way [interaction between these]." [P01]

To prevent this performance gap and address the people side, Dr. Riemer and his colleagues developed a comprehensive approach to developing a culture of sustainability among the building occupants (see Chapter 4) as well as inform the design team from Stantec about building features that can be leveraged to nudge people into sustainable behaviours and promote occupant wellbeing. This included a recommendation to develop an inviting open and central staircase and to include natural elements such as wood and plants. Dr. Riemer's team also conducted a survey with employees of EY and companies located within the R+T Park at the time, as well as focus groups with employees of EY as the largest future tenant of the building, and were

sketch of evolv1's construction

hence able to contribute information on tenant interests to the design team as part of the integrated design approach. This included a desire for outdoor space for shared lunches and a café for meetings with clients and after-work get-togethers. This work helped to emphasize a people-first approach to the selection of key building features and designs with a focus on the human dimensions of the design process.

While this level of broad engagement was perceived as very helpful, it also meant that the overall feasibility period ended up taking longer than what Stantec had intended or hoped for, which drove the cost for them up. Thus, over the course of the study they kept increasing the pressure to funnel all of those ideas into a final solution and report.

"You get broad ideas and you keep analyzing those ideas against criteria until you get to the decision point of the final input that will ultimately lead to the solution. It became clear very early on, that while this was a feasibility study about an amazing opportunity in an amazing facility, it had to result in what could be a realistic and feasible building for the next stage. And, so that drove a lot of the activities around this "Ideas Funnel" and kept the focus on narrowing the information to what was important, to keep decisions moving forward. That focus was extremely important." [P18]

Outcome

It really was the interplay of multiple parties pushing each other to strive for the best while keeping the project realistic that resulted in such a strong outcome in the end. SWR was pushing the team's ambitions in regard to the iconic sustainability goals of the project ("We can do better") and getting broad

engagement, Cora emphasized the financial feasibility and a desire to create a building that is highly sustainable but feels like any other high-class Type A office building and promotes occupant wellbeing and productivity, while Stantec ensured that the project was well designed and able to move forward in a reasonable amount of time while following an integrated design process. The high level of community engagement proved to be valuable for honouring and building on community vision in the overall building design process and to build upon the strength and collective wisdom in the community.

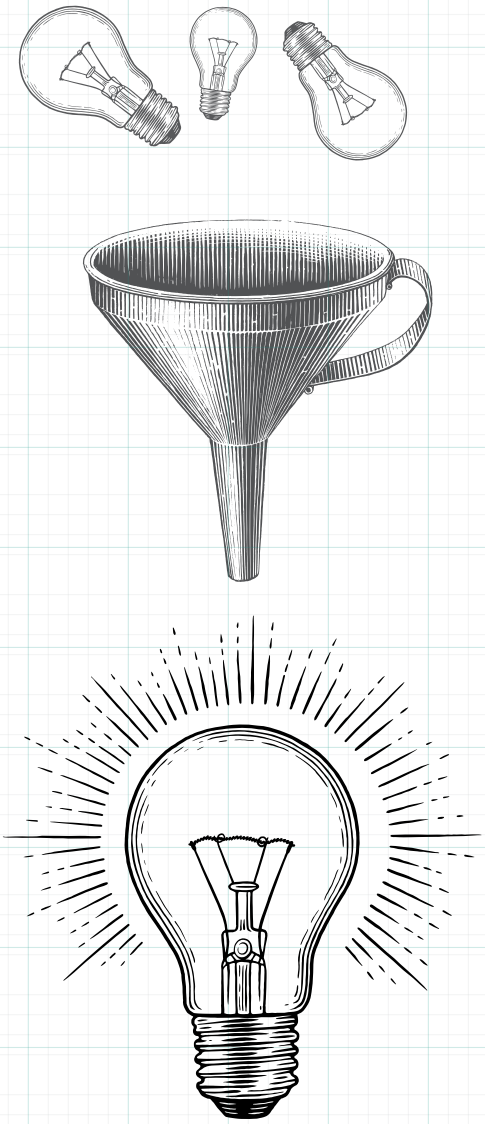
The outcome of this community barn raising and quilt making effort was a report that showed it was feasible to build a net-positive commercial multi-tenant office building that uses rainwater for the bathroom facilities and the watering of the green wall. Processing the waste on site was not immediately seen as feasible and postponed to be addressed at a later time. But, more than that, it created the necessary buy-in from key stakeholders to move forward with the project, especially the Cora Group. Many of our participants described the end of the feasibility study and Adrian giving 'the green light' to begin the planning and construction of the building as a pivotal moment in the evolv1 story. Many of the design aspects captured in the report were eventually transferred into the final design of the building. And, because the report was (at least partially) funded with public money, SWR was able to share the feasibility study report broadly so that others could learn from it.

The end of the feasibility study and Adrian giving the 'green light' was also an important turning point in the leadership of the project. Up to this point, SWR was a main driver of the project, holder of its vision, and led its project management. With the end of the feasibility study and the commencement of the construction process that power and role transferred over to Adrian and the Cora Group. While it was not an easy process for the key staff at SWR to let go of this key role and power, it was important in establishing the replicability of evolv1. After all, the building was supposed to be build within the budget and the timeline of a private commercial developer.

As a silver lining, stepping back from a focus on building development did provide SWR with more space to then lead the crucial development of the evolvGREEN hub described below, which is now an important hub for sustainability innovation convening multiple partners and is embedded in the evolv1 building. Throughout the project there were lessons that stepping back, while hard, can also sometimes open up new opportunities.

"And so that was it, there was no, 'well let's see how far we can get'; it was, 'this is the goal' we need to achieve. Ultimately, the feasibility study had shown it can be accomplished, so the direction was 'let's make it happen'." *[P18]*

Photo of evolv1 interior



"That's one of the key issues I find on projects generally, the more broadly you engage, the more difficult it is to get decisions. And so, trying to keep groups moving towards valuable input and making decisions, narrowing things down is really important. I think early on [...] we presented the idea of an 'ideas funnel'." [P18]

Chapter 4: Planning, Design and Construction

Through the funnel to realizing the vision

After months of dreaming, visioning, and stakeholder engagement and after Adrian Conrad and the Cora Group gave the "green light" for financing and developing the building, the final design process and then the construction of the building could commence. As our interviewees highlighted, the insights from the feasibility study proved to be very valuable in the final design and planning phase and many of the building features from the design study were kept.

"It [the final design process] included an examination of all the systems and putting it through a much more rigorous costing exercise. What are the systems going into it, are they giving us value for what they're doing or not. And we ended up actually [integrating] almost all the systems that came out of the feasibility study into the final building." [P18]

Realistic costing and meeting construction deadlines became a key focus at this stage, following the leadership team's realization that a key contribution of evolv1 to "push the building industry to do better" was the fact that it was being commercially built within the budget of a relatively small (but visionary) local building developer. This fact demonstrated the replicability of evolv1 and pre-empted any criticism that this is a niche project that is only feasible with external funding.

"On the one hand it's frustrating that there wasn't any government funding to support our project. On the other hand, it's probably great there

wasn't, because not having the funding forced us to create something that's truly replicable." [P06]

"At the level of a local developer doing this with the intent this will be something that other developers can therefore do, throwing down the gauntlet is extremely rare and extremely visionary. Because even when big corporations do it, they don't necessarily say, 'We're doing this to prove it can be done so others can do it.' They're more proving it to be done to increase their public stature, and drive internal goals. This is about saying: 'Okay, development industry, why aren't you doing better?' " [P18]

What may be remarkable in the construction process was that while there were "some additional things to work through from a coordination point of view" that required some additional time and planning, the process was "generally pretty conventional." Thus, there may really no longer be any valid excuses of why the building industry actually "couldn't do better".

As in any case study analysis, however, there are specific factors that need to be carefully considered in regard to the transferability of the findings from this case to other contexts. One key aspect here is that all key players believed in the same vision that had emerged from the earlier engagement process. Based on the analysis of our interviews there are two key factors that contributed to that: using an integrated design process and building on local and established relationships.

In the case of evolv1, key stakeholders who were involved at some point in the design process included members of the leadership team, various experts from the community, the design team itself, the tenants, and members of the construction company and trades.

Another contributing factor was Adrian's engagement of construction teams of mostly local companies and trades people, who he had established relationships with or wanted to support, such as the local startup Livescape that created the impressive three-story green wall in the atrium and was started through the Accelerator Centre's clean tech incubation program. In selecting these, Adrian took great care that these teams were aligned to carry through the vision for the building.

"The selection of the teams and how they operate is key, and as new members join the teams, it's really about making sure that they will exhibit that shared focus and purpose. Hats off to Adrian for as he is bringing in new people, he is making sure they're aligned." [P18]

This ability of Adrian, as the key leader at this stage, to engage local teams and rally them around the shared vision that emerged from the integrated design process was highlighted by our interviews as critically important for the success at this stage but also as something that is more the exception rather than the rule in the development industry. With these success factors coming together it became possible to move together on a vision that was being shared by all major stakeholders and, ultimately, in a building that was exciting for the tenants to move into, commercially profitable for the developer, and a way for the community to further its goal of being a sustainability leader.

While in retrospect, there was a general recognition of the critical importance of the skills and type of leadership that Adrian provided at this stage, transitioning the full leadership to him was not an easy process for all parties involved. Especially for the key players from SWR, it meant stepping back and letting the commercial development process take its course. While this felt different from the highly collaborative and community-driven visioning process up to this point, it was an important factor in ensuring that evolv1 becomes commercially replicable. With the end goal clearly in sight, "the funnel" became more narrow and the importance of building "within the approved budget and the regular timeline of a commercial developer" became a central focus. A key lesson learned here is that a project of this nature requires different types of leadership and different processes at different key stages. This mean that early leaders need to be able to step back and let other people with the right skills for the next stage take the reign.

"That's an interesting dynamic you know, who's the leader, who's doing what, why's this person doing it? Is there a power balance among these organizations? Because you're dealing with a university, a developer, a giant multinational company and a small not-for-profit. And who has what role, and who's the lead and why are they the lead and all of that kind of stuff." [P05]

Photo of evolvGreen entrance

This takes courage and ongoing reflection as well as the ability to put aside personal goals for the greater good of the shared project. Importantly, stepping aside from the main construction of the building freed up critical time for SWR to lead the development of another aspect of the original dream: a hub for local sustainability activities and leadership to be located within the building.

Inspiring change from within evolv1: evolvGREEN

SWR was able to engage the AC, the Faculty of the Environment at UW, and Laurier (represented by VERiS) in a partnership to create this sustainability hub in evolv1. While different models for this sustainability hub were considered over the visioning phase, this group of partners eventually settled on an innovation hub for a clean economy and called it evolvGREEN. The shared vision is to offer a community approach to driving the clean economy to leading changes that will reduce environmental impact and improve wellbeing. The mission of evolvGREEN is to inspire change, lead innovative research, and accelerate commercialization. It is the region's foremost collaborative workspace for entrepreneurs, researchers and clean economy supporters.

"One of the benefits I think we have of this project is that there are multiple different partners with different structures, so we have academic, we have non-profits, and we have for-profit partners." [P01]

The development of evolvGREEN was not easy as each partner had their own objectives and institutional processes. Many decisions about the design of the shared space, its financing, the governance model, and the nature of the ongoing collaboration had to be made which took over two years. But, the unique opportunity of having a hub set up in this groundbreaking sustainable building, the patience, skilled facilitation and management of SWR and the personal relationships among the key leadership and development team as well as their commitment to the shared goal, made it possible to sustain the efforts over

time and successfully create evolvGREEN. From our interviews with some of the key stakeholders in the development of this hub, it also became clear that the diverse skills and backgrounds of the collaborative team were a key factor in creating the hub. But, even though the interior design, the initial financing, lease agreements, governance model, and collaboration agreement were all finally settled, the ongoing operation and use of the hub still had to be determined and intentionally created.

"So okay we've got this facility, evolvGREEN. We've got a collaboration agreement. How does it run?" [P09]

A related question was how a shared culture and identity could be nurtured so that evolvGREEN actually feels like a collaborative innovation hub and not just a shared space, while still maintaining the unique identity of each partner.

"We made it: Now that we're here, let's take the next steps and ask ourselves, how do we create and promote a new culture? We were talking about that with our areas of the physical space. Such as, when you go back to our space you want to feel like you're a part of evolvGREEN, but you also want to feel like you're at the AC. And that was the intent of the project: the united evolvGREEN culture; but is there a way that you could still feel like you're at the Accelerator Centre that's a part of evolvGREEN at the same time?" [P07]

This is an ongoing process, which has not been straightforward but has been positively influenced by the Culture of Sustainability work (see next chapter). The successful grant applications for creating a shared research project about evolv1 and setting up a living lab in the building (see next chapter) also contributed positively to the development of the hub.

"Suddenly the idea came up that Laurier could be part of that hub and that we could create a research centre. So, I don't recall exactly how that actually unfolded but suddenly, we were creating the centre and the centre became part of the hub." [P15]

With the foundation of evolvGREEN, the dual visions of evolvGREEN as a crucial new sustainability hub and evolv1 as the sustainable building to house it, along with its other tenants, slowly collided and fused together – much like the original visions for the project so many years ago.

"A great story is when evolvGREEN had their grand opening. It was 1 o'clock on a sunny, Friday afternoon, -13 degrees Celsius outside up from a -25 degree night. It was the cold day we have to design buildings for. People in the audience were talking about how the buildings where they worked were cold and unable to warm up. evolv1 was comfortable with the heating system on bypass. The solar wall was bringing in fresh air warm enough that evolv1's heating system wasn't even on." [P06]

Chapter 5: Opening, Occupancy and Imagining the Future

Following an initial dream, an aspiration, and many years of collaboration and hard work, there came at last the official opening of evolv1. This celebration took place on November 30, 2018 and was well-attended, with significant guest speakers, key partners, political leaders and local media in attendance. Following this several months later was a celebration to mark the opening of evolvGREEN as a new sustainability hub in the region now located in evolv1, with similarly good attendance and media attention. Significantly, despite being mid-winter and well below freezing outside when the evolvGREEN opening occurred, the inside building temperature remained comfortable. This was accomplished due not to burning fossil fuels, but thanks in large part to a passive solar thermal wall installation, geothermal system, and top-of-the-line HVAC system moving this passive heat as required throughout the building. Attendees at the opening commented that the result was a more comfortable temperature than experienced even in more traditional office buildings in the region.

Importantly, the building team was able to achieve all of this through integrating existing, already-proven sustainable technologies, while also meeting the deadline and budget for building construction that had been set: coming in within budget, and on time. From early on, evolv1 also proved successful in another critical sense: it attracted good tenants, with a strong initial occupancy rate of 95%. These tenants have remained with the building since and are diverse, encompassing to date a professional services firm (EY); an IT company (TextNow); an artificial intelligence company affiliated with RBC (Borealis AI); research centres and an academic program from two local universities (UW and WLU); a clean tech incubator (AC); and a local sustainability organization and not-for-profit (SWR), which got it all started. Proving the financial viability of the building, tenants were also willing to pay the standard market rate for leasing space in a Class A Office Building, while also benefiting from the additional features evolv1 has to offer over a conventional office building.

Photo of listing of evolv1 tenants

"The goal of this building was to disrupt the industry and disrupt the status quo by proving that you can build a highly sustainable building at market rate rent without going into a territory that's unrentable and non-competitive. The belief was always you can't do it because you'll never be able to get those costs back. And, we've proven you can do it, so I don't get what your excuse is now, right? And so, my hope would be we can start to do those same things and say, why not set a new standard and codify it?" [P03]

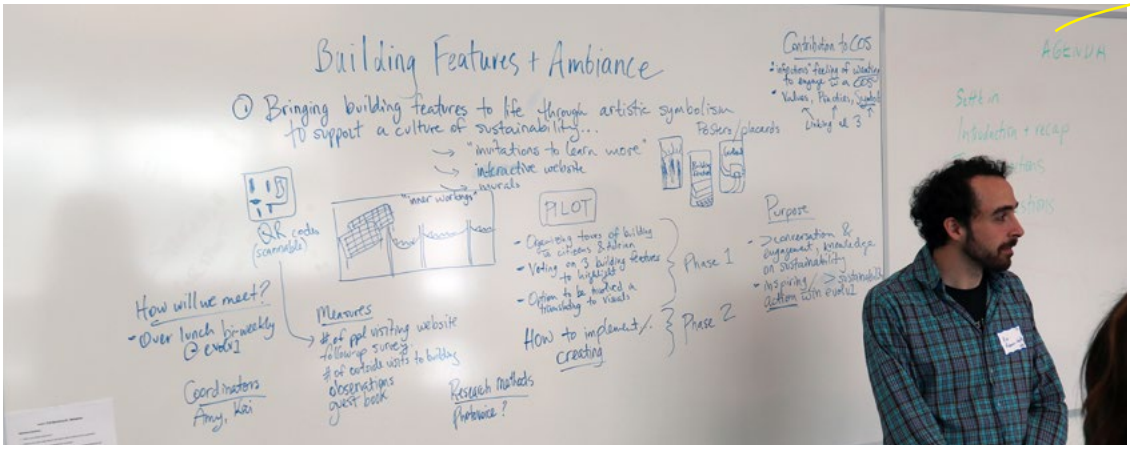
More than a physical building: Creating a Culture of Sustainability

In addition to being celebrations of a job well done, both the evolv1 and evolvGREEN openings centered around the future of sustainability work that would be led and nurtured by the people and organizations in evolv1, and by the building itself [10]. This work includes an ongoing effort to create a 'culture of sustainability' (COS) amongst building citizens in evolv1, encouraging all who move through the building to get inspired and strive to also be more sustainable. A new, part-time Manager of Culture of Sustainability position dedicated to creating and inspiring this culture within the building was created, managed by SWR and supported by funds from the evolv1 research project (see below).

To create this COS has required ongoing engagement with building tenants, starting with a series of COS workshops in 2019 that were well-attended and freely available to building occupants or 'citizens', co-hosted by the Manager of Culture of Sustainability for the building (operating out of SWR) and Dr. Sean Geobey from the University of Waterloo, a member of the research team. The initial COS workshops empowered building citizens to self-organize in small groups and lead multiple sustainability initiatives both within their respective organizations and the broader building, with support from the COS Manager.

10 See Dreyer et al. (2021), for a description of the theory of change that informed the COS strategy in evolv1.

Photo of COS workshop



This resulted in, among other outcomes, citizen-led sustainability workshops and community-building groups, including daily walks and encouragement of active transport; building sustainability signage, including highlighting key building features in a public slideshow within the building; several lunch-and-learns on sustainability within tenant organizations, and more. It has also involved a series of very popular free building tours led by the Cora Group available to any building citizens interested, to educate participants on key sustainable building features and what can be learned from them in participants' personal efforts to make their own lives more sustainable. SWR has also led building tours exploring the visible aspects of sustainability, the culture, and the process of building a COS.

This work remains ongoing, though has admittedly become more challenging during the new era of social distancing and work-from-home protocols brought by the COVID-19 pandemic, requiring ongoing adaptations in the approach needed to help build this culture. One participant described their vision for a COS in evolv1 in the following way:

"To me you look at that and immediately see, wow people, this is a culture of sustainability! So it would be like things like that: where you would come to the parking lot, there would be all these e-cars loading up; there would be bikes; and then there would be you know, community gardens, people growing some vegetables that maybe can be shared with local shelters or something like that, so it's also that connection to the community and the social aspect. It would be people coming through the doors and learning about sustainability. It would be people in the building doing events together where they're talking about sustainability. There's

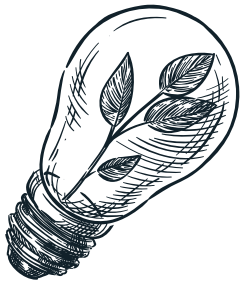
these cooking events where we share meals. But, yeah, I think actually, like a lot of what I was talking about has this visible aspect that you would immediately be able to tell." [P15]

This transition to a COS also involved tenant organizations taking steps to become more sustainable as individual enterprises, including their operations as organizations. An anchor tenant EY, for example, decided to go paperless and make sustainability a core pillar of their company's strategic mandate, with additional suggestions to have an audit / advisory group for sustainability; empowering EY Waterloo to engage clients on sustainability and share with others, including knowledge-sharing with other EY locations; and possibly an expansion of EY services to clearly support environmental initiatives in their business model. At the AC, there was an emphasis on the hope for AC to become a world class clean tech incubator, graduating companies that make a significant contribution to sustainability work, many of which could remain located in Waterloo region. At TextNow, there was the suggestion for the organization to continue to be part of this larger collective vision of sustainability, increasing its company's focus in this area. For the local universities, it was emphasized how important it is for universities to *"walk the talk" [P11]* on sustainability and be willing to try new things, taking the long view. Finally, at SWR, there was the emphasis on continuing work to benefit the broader community, including the suggestion to potentially explore building retrofits for SWR's future strategic plan, such as by choosing iconic buildings in the region as first examples for building retrofits, and potential social housing projects.

"What will happen in due course is that the building will start to produce numbers on 'here's how we're performing': energy use, giving back, are we hitting the net positive targets or not [...] in order to achieve success, the citizens of the building may have to make some adjustments to act differently. And so, a key test will be whether the citizens can change." [P10]

This movement toward sustainability also expanded into the surrounding R+T Park. Among the park management and the university who owns it, there was an emphasis on increasing the Park's own sustainability mandate, inspiring older buildings in the Park to "raise it up a notch" while also focusing future growth in the Park primarily on projects that can demonstrate a similar (or higher) sustainability focus as evolv1. There was also discussion on the need to bring more sustainable transport solutions into the R+T Park, in addition to the existing options already available to access the building. Employees working at the building have shared that they have changed their environmental behaviours not only when they work at evolv1 but also at home (e.g., sorting waste). This all speaks to the inspirational power of evolv1.

Within evolv1, it was emphasized that there will need to be an ongoing process of education and engagement for building citizens on sustainability practices, shared in a variety of communication formats. Such engagement will continue to strengthen a growing COS and empower citizens to "*measure up*" *[P01]* to the potential of being in the building, increasing the building's own sustainability performance.



Building the evidence: The Living Lab

In order to support this COS development work, capture changes over time, and assess the impact and performance of the building, the VERiS Research Centre (led by Dr. Riemer and including Drs. Simon Coulombe, Noam Miller, and Stephanie Whitney as well as PhD students Bianca Dreyer and later Kai Reimer-Watts) in partnership with SWR and York University (Dr. Joel Marcus) and the University of Waterloo (Drs. Paul Parker, Sean Geobey, and David Mather) as well as the Cora Group, the tenant organizations, and several other partners were successful in obtaining over $1.3 million in research funding to support the development of a real-world 'living lab' in evolv1. Funding was obtained through prestigious federal, provincial, and regional grants, demonstrating the broad interest in this groundbreaking building. This report is one outcome of that research.

Given evolv1's high sustainability performance and the emphasis on building a COS within the building, there is clearly a lot to be learned from researching this building and people's interactions with it. The integration of a variety of tools and technologies as a 'living lab' spread throughout the building helps support this ongoing sustainability research collaboration. These tools include the ability to both monitor the building's comfort factors (temperature, noise levels, air quality, etc.), along with collecting basic, non-identifying information on human movement within and use of the building to better inform future green building design. This research work will provide greater insight on what spaces are most used within the evolv1 building and for what purposes, along with insight on how the design of spaces may also play a role in encouraging more sustainable behavior and contribute to wellbeing and productivity. The research team was also given access to building performance data by the Cora Group (electricity generation and use, water use, waste production, etc.), which will allow them to assess if the building is able to meet the original targets. Developing an empirical evidence-base will strengthen the business case for building similar buildings in the future.

Photo of evolv1's living lab

Recognition of the Achievement

The achievements of the building itself have already been recognized through the multiple awards evolv1 has received to date. This includes being the first building to receive the Zero Carbon Building – Design certification from the Canada Green Building Council (CaGBC), and in June 2018 the first building to receive a Zero Carbon award, also from CaGBC. evolv1 was also selected by CaGBC to participate in a two-year pilot of its new Zero Carbon Building Standard, as one of 16 elite projects participating across Canada. In 2020, evolv1 was awarded LEED Platinum CS, the highest possible LEED level. All of this is in addition to the significant milestone of being Canada's first commercially driven, multi-tenant office building designed to be net positive energy and zero carbon. These awards reflect that when assessing the building's environmental performance to date, it is clearly off to a good start. In addition, the building continues to receive significant media and professional attention, resulting in over 1000 people touring through the building to date to learn about its sustainability achievements, and how evolv1 can continue to influence future economic development in and beyond Waterloo region.

Photo of tour of evolv1

Challenging the building sector to 'build better'

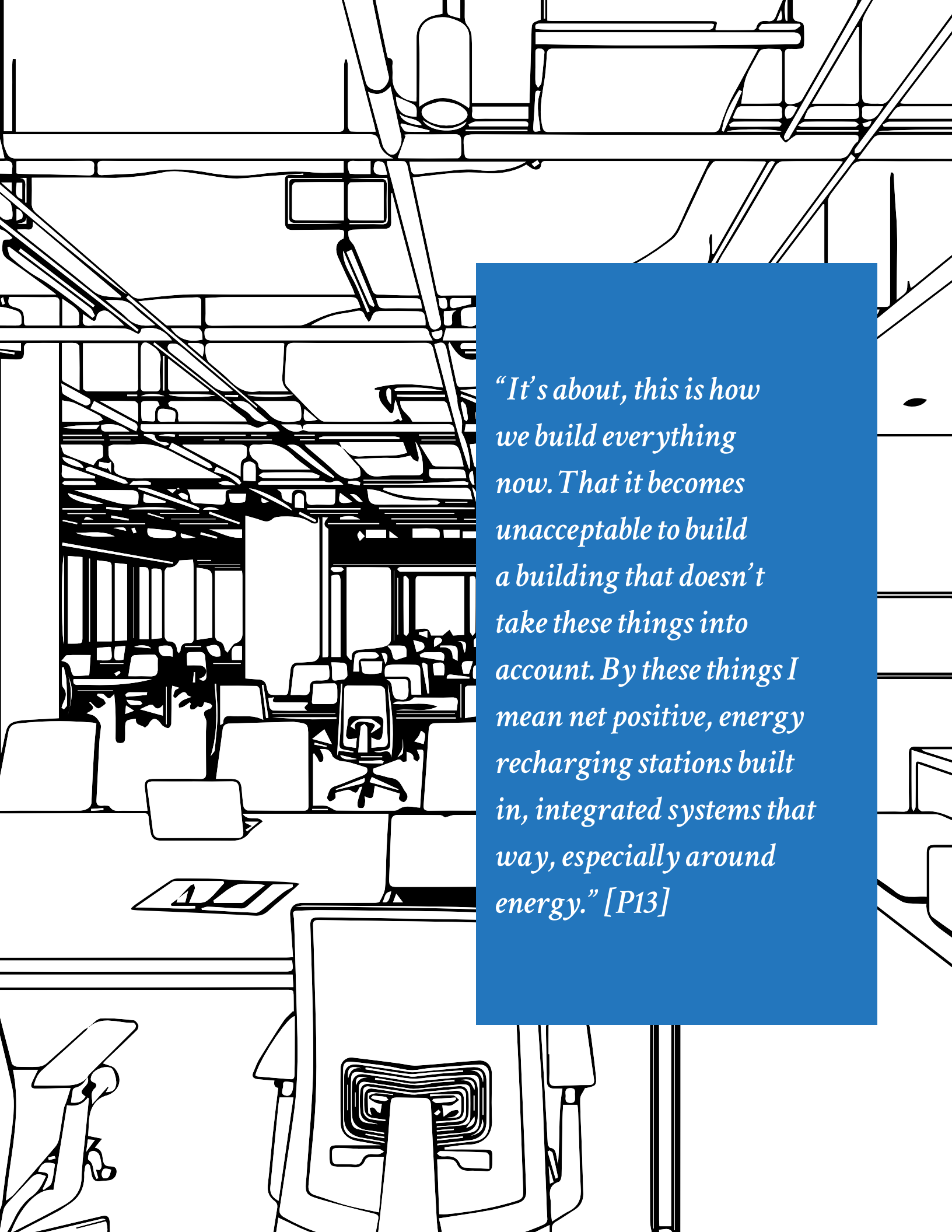
Given the many achievements to date, a critical part of the evolv1 and evolvGREEN story is now the need to share these stories further to also inspire others to action, as one participant shared with us: "*Tell that story to others and make it scalable and repeatable, with lessons learned along the way" [P08].* It is clear that to many key building stakeholders interviewed for this report, evolv1 is not meant to be a one-off project, but rather the start of a critical transition within the broader building sector and society as a whole to raise the bar for sustainability action. As one interviewee put it:

"Our built environment is stationary it's not going anywhere... if you can't address the building stock, we have no chance of saving the planet. This is an easy win, this is a win for the environment, a win for the economy, we got a win on this one. There is no second choice in my opinion, because transportation is harder, consumerism is harder, life cycles are getting shorter, now products are just thrown away, so we have to win in the built environment as a base to move on to others." [P11]

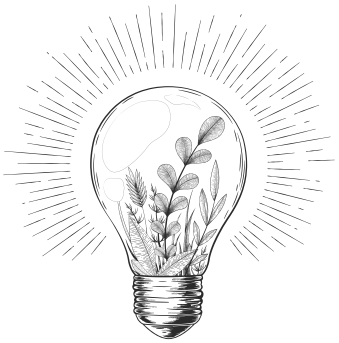
When asked about the future of evolv1, interviewees representing different stakeholder groups had multiple suggestions for how to tell this story to better maximize the building's impact. Multiple interviewees spoke to the need to see evolv1 as a 'turning point' and point of leverage that can be used to change how buildings are built moving forward, challenging the broader building sector to 'build better'. This included the desire to see the replication of key sustainability features and integrated design principles used in creating evolv1 in other future building projects. It also included a recognition that the sustainability solutions required within the building sector are largely available and within reach, and that there is a need to challenge this sector to incorporate these solutions more broadly into all future building projects, raising the bar of what is acceptable building construction within

the sector. One way to do this could be through reforming existing building codes to include higher mandatory sustainability standards for building. There was also an emphasis on the need to "win" in the built environment by demonstrating an increased focus on sustainability, as a way to inspire greater commitments across other sectors also – responding to the clear challenge of climate change with bold leadership from this sector.

"The spirit of this project is that it's to be disruptive, and that it can be duplicated and replicated and developers should be defaulting to this type of development versus the traditional." [P12]



"It's about, this is how we build everything now. That it becomes unacceptable to build a building that doesn't take these things into account. By these things I mean net positive, energy recharging stations built in, integrated systems that way, especially around energy." [P13]



Encouraging regional sustainability leadership

"It's an opportunity to tell a story that isn't being told about our region. I saw an opportunity to be able to tell the world that Waterloo is a leader in sustainability and from this evolv1 project (including evolvGREEN) we could potentially build a whole cluster of companies that are leading in this space." [P14]

Our interviewees also shared ideas for how evolv1 could be leveraged to encourage greater sustainability leadership across Waterloo region. There was a recognition that evolv1 continues to build on and strengthen the region's reputation as a key place for 'barn raising' and sustainability innovation, and that the Region of Waterloo could now leverage the building to develop higher sustainable building policy standards. It was argued that evolv1 could be seen as an opportunity for the Region to encourage future similar projects that work at the intersections of the economy and environment, such as clean tech and green buildings (among others) as important economic drivers for the region. The recognition of the importance of telling evolv1's story to the region's own reputation and future economic development has not been lost on the Waterloo Economic Development Corporation (EDC), which prior to the COVID-19 pandemic led regular tours of the building. In short, the evolv1 building clearly raises the bar and demonstrates *"what is possible" [P16]* in our region and more broadly in Canada, and should serve as a motivator for future similar projects, scaling its impact.

In total, it is heartening to see that not only has evolv1 achieved a great deal already as a building, but it has also contributed to inspiring more dreams and visions to raise the bar on sustainability action still further. It is clearly the hope of many who have been touched in some way by the evolv1 project that the building's impact will not stop here, but will continue to grow – catalyzing and supporting a far broader, growing movement for sustainability action.

"evolv1 exists because there were champions who managed to really convince people that this was something you should get behind. I think the next piece of it is you want to get it codified in policy. Are we going to put it somewhere in a real policy to say we expect that this part of the City of Waterloo and this part of the Region of Waterloo should be the leader in innovation and sustainable design?" [P03]

Photo of the Make Change Classroom

"It's not just 'can we build a bunch more evolvs', but can we actually change the culture of how we think about the built environment? Both residentially, commercially, retrofits, new builds, all of that." [P13]

Chapter 6: Conclusion

"The idea that more is possible – even if you start to self-doubt." [P05]

The evolv1 building and evolvGREEN sustainability hub within it both started as little more than shared dreams and visions, which through unlikely collaborations and hard work between diverse stakeholders eventually took form to become powerful, concrete realities. These collaborations built upon existing strengths in the communities of Waterloo region, including the inherent 'barn raising and quilt making spirit', and innovation that this region is known for. However, while technological innovation is undeniably a part of what makes evolv1 successful, it is clear from this story that it is the *people involved* working together far more than the technology itself that transforms a vision into reality. This work includes 'dreaming big', while also navigating the perhaps inevitable creative tensions that emerge in pursuing something that is both new, highly innovative and significantly ambitious.

In the end, there were many different factors that came together to shape the outcome that is evolv1 and evolvGREEN today: these include, to start, the importance of the visionary leadership of a community intermediary such as SWR, which was able to both nurture and 'convoke' a shared vision alongside the broader community, bringing the right players together and building upon relevant strengths that exist in the community. As an environmental non-governmental organization SWR was less bound by commercial interests and the profit-orientation that is prevalent in the building industry and thus could keep pushing the envelope by asking what else is possible. The success factors also include having a willing innovative and committed developer, the Cora Group, and other actors that are willing to jump in and help 'hold the vision', moving it pragmatically away from being only an abstract idea and into tangible reality.

This multi-year journey requires a willingness to 'pass the torch' between actors as appropriate to each stage of the journey, and the particular diverse skill sets and expertise that each stage requires. In turn, it requires a level of self-awareness from each actor of how they fit into and can best contribute to the shared success of this journey, complementing the contributions of others, which may not always be immediately obvious and may require shifting one's own contribution as required as the journey progresses. The complexity of

bringing together a diversity of actors to contribute to an emerging shared vision both requires a strong understanding of *who* to bring to the table to best move the vision forward, and *how* to best balance the diversity of actors and voices involved while navigating creative tensions as necessary as they emerge.

This in turn requires some level of systems thinking from contributors, as those managing the project in particular need to take a holistic view of how different pieces are working together as the vision is slowly actualized in real time – from the effective and efficient integration of building system components, to the integrated design process of bringing a diverse team of actors together to effectively achieve the vision. Fundamentally, this requires a significant mind shift away from thinking of the development process piecemeal and in siloes, and toward a far more systems-oriented and relational way of doing things that, when done well, results in a truly 'collaborative co-creation', making tangible a shared vision.

"We should be doing many more things in a collaborative way. Projects are much more, I would say overall successful when they're collaborations and I look back and I'd say the same thing [...] collaborations are an important way to accomplish things that one entity just couldn't do on their own." [P09]

Another lesson from the evolv1 and evolvGREEN journeys is that both compromise and creative tensions – while often challenging to navigate at the time – are not necessarily bad things, given the right conditions in which to work through these tensions effectively as they emerge. By acknowledging the relational (as well as technological) challenges that are likely to emerge in pursuing a bold vision from the outset, they can then be dealt with together in a much more productive, instead of destructive, spirit. Relational challenges may often be more sensitive than technological and hence prone to avoidance, yet rather than avoiding or denying these, it is clear for the success of this project that openly articulating and dealing with these challenges as they emerged was key. To do this required a high level of trust and investment in the relationships involved over the full duration of the visioning

and development process, to create the conditions for tensions to be worked through most productively. The decision for the core evolv1 leadership team to meet every three weeks over breakfast for multiple years, for example, was not accidental, but rather a core part of building the depth of relationship required to be successful in collaboratively conceptualizing and actualizing a bold shared vision.

We highlight the importance of relationships here in part since it is clear that across the broader development sector and research literature in this field, building technology itself often receives the majority of the attention and credit in building projects. Yet, part of the groundbreaking nature of evolv1 is the fact that all of the technologies required to build it *already existed* – they just needed to be brought together effectively. What mattered most in the end was not new technology, but rather a shared vision of how to identify the right clean technologies out of the many options that exist and how to best bring these together in the context of this new building and the people who would one day occupy it - something which could only be achieved by people working effectively in relationship together. Healthy relationships between the people involved facilitated the ability to both 'dream big' and to integrate the technologies themselves in a relational way, enabling them to be most efficient and mutually supporting throughout the building. Critically, both the effective integration of technologies and the working relationships of the people involved require shifting from an individual mindset to a relational worldview. This relational worldview can be seen reflected in both the Mennonite 'barn raising and quilt making spirit' and Indigenous philosophies that have shaped Waterloo region to date, among others – reflecting also the uniquely local context that helped shape this project.

Visions for an uncertain future

Looking to the future, it is clear that the global context that evolv1 emerged and exists within remains clouded by significant warning signs and uncertainty. While evolv1 emerged in part in response to the climate crisis, which remains ongoing, it was also affected by the global COVID-19 pandemic, which has shaped the world profoundly over the course of writing this summary report. These global contexts clearly shape local realities around the world, including here in Waterloo region, and we have a responsibility as citizens and people of this planet to take these contexts seriously and respond. Part of the value of evolv1 and clear message from stakeholders involved is the hope for it to be a replicable project that greatly influences the building sector to rise to the

significant challenges of the times and 'do better'. evolv1 has demonstrated that a high-performance, zero carbon green building can be built within the budget of a private developer without compromising on timeline, and can be done so within the context of a harsh, cold Canadian climate. Given the significant stakes of the global climate crisis that will shape all sectors and parts of our economies in the years to come, along with the proven economic viability of high-performance green buildings like evolv1, the argument for significant action to codify green buildings as 'the new standard' for *all* new builds going forward has never been stronger. Waterloo region, and more broadly Canada as a whole, has a unique opportunity to be at the forefront of pioneering leadership in this regard, for a far more resilient and sustainable future.

evolv1 and evolvGREEN have both demonstrated what is possible when people rise to meet the major challenges of our times, working together to achieve a collective shared vision. While green buildings alone won't solve the climate crisis, they do remain a significant contributor to reducing the overall impact of the building sector while also ideally improving overall occupant satisfaction and wellbeing, and providing a respectable return on investment to their investors. Achieving such a vision as seen manifested in evolv1 and evolvGREEN has clear and immediate benefits for all actors involved, including building tenants, core stakeholders, the broader community, and for the broader future of Waterloo region. As a large part of the intention of the actors involved is clearly to have the vision expand and continue – to shape, in the words of one interviewee, "*how buildings are built in this community*" *[P02]* – it is up to all of us to ensure this happens. Far from being a demonstration project, the evolv1 vision can instead become a catalyst or leverage point for a far brighter, more sustainable future in Waterloo region and beyond.

We applaud all those involved in making the powerful visions of evolv1 and evolvGREEN a reality – now is the time to ensure the spirit behind these projects, including their boldness in meeting the times we are in head-on, is empowered to continue. In the end, it takes people working together with a stubborn commitment to pursue big dreams and a collaborative, can-do spirit that makes bold visions happen – and in a time of great change, bold visions for a far more sustainable future are clearly what is needed. Let's take the many lessons learned from this experience to heart, and continue the vision forward.

evolv1 Story Report Reference List

- Azari, R. & Kim, Y. (2016). Integration Evaluation Framework for Integrated Design Teams of Green Buildings: Development and Validation. *Journal of Management in Engineering, 32*(3), 1-14. https://doi.org/10.1061/(ASCE)ME.1943-5479.0000416
- Brown, Z., Cole, R. J., Robinson, J., & Dowlatabadi, H. (2010). Evaluating user experience in green buildings in relation to workplace culture and context. *Facilities, 28*(3/4), 225–238. https://doi.org/10.1108/02632771011023168
- Canada Green Building Council. (2021). *CaGBC® Zero Carbon Building Standard: Frequently Asked Questions.* www.cagbc.org/CAGBC/Zero_Carbon/CaGBC_Zero_Carbon_Building_Standard__Frequently_Asked_Questions.aspx
- Cole, R. (2012). Transitioning from green to regenerative design. *Building Research & Information, 40*(1), 39-53. https://doi.org/10.1080/09613218.2011.610608
- Cole, R. J., & Fedoruk, L. (2015). Shifting from net-zero to net-positive energy buildings. *Building Research & Information, 43*(1), 111-120. https://doi.org/10.1080/09613218.2014.950452
- Dreyer, B. C., Riemer, R., Spadafore, B., Marcus, J., Fernandes, D., Taylor, A., Whitney, S., Geobey, S., & Dennett, A. (2021). Fostering cultures of sustainability in a multi-unit office building: A theory of change. *Frontiers in Psychology, 12*, 1-13. https://doi.org/10.3389/fpsyg.2021.624311
- Filice, M. (2016, June 3). *Haldimand Proclamation*. The Canadian Encyclopedia. www.thecanadianencyclopedia.ca/en/article/haldimand-proclamation
- Fuentes Martinez, A., & Williams, J. (2021). *Case study: 50by30WR creating community and municipal buy-in for ambitious climate action.* Tamarack Institute. https://www.tamarackcommunity.ca/library/creating-community-and-municipal-buy-in-for-ambitious-climate-action

- Gillespie, A. (2020, December 17). Canada's Silicon Valley The Vital Importance of Advancing the Toronto-Waterloo Tech Corridor. *The Canadian Business Journal*. www.cbj.ca/canadas-silicon-valley-the-vital-importance-of-advancing-the-toronto-waterloo-tech-corridor/
- Green Economy Canada. (n.d.). *Green Economy Canada*. www.greeneconomy.ca/
- International Making Cities Livable Council. (n.d.). *Freiburg: City of Vision*. www.livablecities.org/articles/freiburg-city-vision
- Kobeissi, L. (2017, April 19). *The 'Quilt-Wall' that tells a museums story.* Museeum. www.museeum.com/the-quilt-wall-that-tells-a-museums-story/
- Kolokotsa, D., Rovas, D., Kosmatopoulos, E., & Kalaitzakis, K. (2011). A roadmap towards intelligent net zero- and positive-energy buildings. *Solar Energy, 85*(12), 3067–3084. https://doi.org/10.1016/j.solener.2010.09.001
- Reep Green Solutions. (n.d.). *About.* www.reepgreen.ca/about/
- Region of Waterloo. (2018, May 29). *Region of Waterloo Planning, Development and Legislative Services Community Planning*. www.regionofwaterloo.ca/en/regional-government/resources/Environment/Report-to-Regional-Council-on-CAWR-Long-term-GHG-Reduction-Target-May-29-2018.pdf
- Sustainable Waterloo Region. (2015). *Backgrounder: The Centre for Sustainability Excellence*. www.sustainablewaterlooregion.ca/
- The Free Dictionary. (n.d.). *barn raising.* www.thefreedictionary.com/barn+raising
- United Nations Environment Programme. (2012). *Building design and construction: Forging resource efficiency and sustainable development*. Sustainable Buildings and Climate Initiative. www.studylib.net/doc/18820994/building-design-and-construction
- United Nations Environment Programme. (2017). *Global Status Report 2017*. www.worldgbc.org/sites/default/files/UNEP%20188_GABC_en%20%28web%29.pdf

Funders

We are grateful for the support of our funders, whose generosity continues to support the broader research program that explores growing cultures of sustainability of which this study is a part. Specific funding for this report was provided by a Community Environment Fund from the Region of Waterloo.

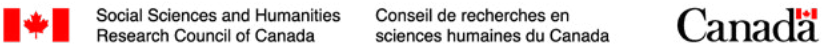


Photo of evolv1 in winter

Authors:

Manuel Riemer, PhD;
Kai Reimer-Watts, MCC;
Stephanie Whitney, PhD;
& Sherley Leitan-Claymo

Waterloo, Ontario, Canada 2021