Reykjavíkurborg

Reykjavík, 22. ágúst 2022
MSS22080121

Borgarráð

Reinventing Cities II – Tillaga að viðræðum á grunni samkeppnistillögu

Lagt er til að borgarráð samþykki að fela skrifstofu borgarstjóra og borgarritara að hefja viðræður við teymið Smart Food Campus um lóðarvilyrði á grundvelli tillögu þeirra í samkeppninni Reinventing Cities. Teymið sóttist eftir lóð við steypusílóin við Sævarhöfða og urðu í öðru sæti. Tillagan þótti samt mjög áhugaverð og var farið í að skoða hvort hún gæti fundið sér annan stað í borginni. Niðurstaða þeirrar skoðunar er sú að þetta verkefni gæti verið mikill vegsauki fyrir Gufunes og yrði spennandi viðbót við hverfið.

Greinargerð

Á fundi borgarráðs þann 21. nóvember 2019 var samþykkt tillaga borgarstjóra þess efnis að Reykjavíkurborg taki þátt í öðrum áfanga verkefnisins Reinventing Cities á vegum samtakanna C40 og lagði fram tvær lóðir þar sem kallað var eftir framúrskarandi uppbyggingarverkefnum, bæði frá sjónarmiði borgarþróunar og loftslags- og umhverfismála.

Umræddar lóðir eru við Gufuneshöfn og Sævarhöfða. Í kjölfarið var haldin kynningarfundur um verkefnið í fyrri hluta mars 2020 og viðkomandi þróunarlóðir auglýstar á heimasíðu verkefnisins.

C40 eru samtök yfir 90 stórborga sem vinna saman í baráttunni gegn loftslagsbreytingum. Í þessum borgum búa yfir 650 milljónir manns og þær standa fyrir fjórðung alls fjármagns heimsins.

Um er að ræða tveggja þrepa samkeppni þar sem aðilar leggja í fyrsta fasa fram grófari hugmyndir að mögulegri útfærslu bygginga á reitnum ásamt upplýsingum um bakgrunn teymis. Reglur samkeppninnar eru að stóru leyti tilkomnar frá C40 en heimaborgir hafa innan þeirra ákveðinn sveigjanleika til þess að taka tillit til sérstakra aðstæðna á hverjum stað.

Reykjavíkurborg áskilur sér rétt til þess að hafna öllum tillögum ef framkomnar tillögur ná ekki þeim markmiðum sem lagt var upp með í upphafi verkefnis. Í mars 2021 samþykkti borgarráð að fela umhverfis- og skipulagssviði að skipa matshóp sem gefi innsendum tillögum einkunn á grundvelli matslíkans C40.

Matshópinn skipaði: Birgir Björn Sigurjónsson, Ólöf Örvarsdóttir, Hildur Gunnlaugsdóttir, Hrönn Hrafnsdóttir, Haraldur Sigurðsson og Helene Chartier frá C40.

Í maí 2021 var kynnt sú niðurstaða dómnefndar að verkefnið Vaxtarhús hefði verið með bestu tillöguna við Sævarhöfða en að tillaga teymisins Smart Food Campus hefði engu að síður verið mjög frambærileg. Eftir keppnina höfðu forsvarsaðilar Smart Food Campus samband við borgina og óskuðu eftir viðræðum um aðra lóð undir verkefnið á sömu forsendum og gilda um Reinventing Cities.

Reykjavíkurborg

Eftir að hafa skoðað nokkra valkosti þykir ljóst að Smart Food Campus verkefnið falli vel að framtíðarsýn borgaryfirvalda fyrir Gufunessvæðið sem verður blönduð byggð fyrir íbúðir, skapandi iðnað og atvinnurekstur, menningu, menntun, ferðaþjónustu og sjálfbærar samgöngur.

Hugmyndir Smart Food Campus við Sævarhöfða miðuðust við aðstæður þar en í Gufunesi sé tækifæri til að endurhugsa og útvíkka hugmyndina á stærri lóð með því að byggja grænar íbúðir í bland við Smart Food Campus.

Smart Food Campus er sjálfbær græn matvælaframleiðsla og dreifingarmiðstöð. Kjarni starfseminnar er hátækni lóðréttur landbúnaður (e. Vertical Farm), ásamt dreifingarmiðstöð fyrir netpantanir á matvöru, hverfisverslun, kaffihús og atvinnueldhús fyrir matarfrumkvöðla og smáframleiðendur sem byggir á deilihagkerfi.

Smart Food Campus mun vera líflegur áfangastaður og stuðlar að aukinni innlendri matvælaframleiðslu á hollum og næringaríkum mat, ásamt dreifingu matvæla með mun lægra kolefnisspori sem er í takt við matarstefnu Reykjavíkurborgar. Smart Food Campus mun þannig ekki einungis hafa jákvæð áhrif á nærumhverfi sitt í Gufunesi og Grafarvogi heldur allt höfuðborgarsvæðið. Áætluð lóðarstærð fyrir verkefnið er 7-8.000 m2 og mikilvægt að lóðin sé ætluð fyrir blandaða starfsemi, þ.e. atvinnu-og íbúðarhúsnæði.

Því er lagt til að skrifstofu borgarstjóra og borgarritara falið að hefja viðræður við teymið um lóðarvilyrði á grundvelli tillögu þeirra með sömu formerkjum og öðrum sigurtillögum í Reinventing Cities hefur verið boðið.

Niðurstöður viðræðnanna verða lagðar fyrir borgarráð.

Dagur B. Eggertsson
borgarstjóri

Hjálagt: Reinventing cities II – Steypusíló – tillaga Smart Food Campus

SMART FOOD CAMPUS

JÖRP | TRÍPÓLÍ
VERKÍS | INFARM | KRÓNAN
ELDSTÆÐIÐ | MATÍS

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C40 REINVENTING CITIES
SÆVARHÖFÐI 31 | REYKJAVÍK
FINAL PHASE | MARCH 2021

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DOCUMENT 2 | PROJECT PRESENTATION

how can we turn a pollution icon into a beacon of sustainability?

Powered by waterfalls and hot springs, Iceland has for decades been in the forefront of sustainable energy production. But while the country's geology provides abundant energy resources, its climate conditions impose limitations on open field agriculture. Dependency on imports adds cost and a huge carbon footprint to Iceland's nourishment.

The Smart Food Campus will be the launch pad for Iceland's self-sufficient and sustainable food future. High-yield and commercially viable urban farming, combined with a food startup incubator and a smart logistics hub, will create the synergy to develop and introduce new and hyper local food products. With its own food hall, restaurant, gardens and sky deck the Campus is bound to become the hearth of the new neighbourhood, inviting to socialize and celebrate food culture.

The project will repurpose the abandoned factory into a lively, green, uber-sustainable food production and distribution hub. If concrete has contributed to the scarring of our climate since Roman times, there could be no better way for an old cement factory to find redemption.

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LOCATION

OLD NEIGHBORHOOD, NEW NEIGHBORHOOD.

Spanning 14ha, the local plan for Bryggjuhverfi Vestur replaces the current 4.133m^2 of light industrial buildings with 146.600m^2 of mixed use, mostly residential buildings. It will be a fully equipped, entirely new neighborhood with emphasis on sustainable construction and public transportation infrastructure.

Because cities should be careful not to erase their past, the old cement factory on Sævarhöfði was chosen to remain and tell the story of the place. Once repurposed and renovated, the building will be a landmark setting the tone for the sustainability-focused urban development of the area.

KEY CHARACTERISTICS OF THE SITE.

1-SIZE OF THE SILOS: While silos can be challenging structures to repurpose, the ones on Sævarhöfði are the ideal size envelope for Infarm's industrial-scale vertical farms, the *Growing Centers*.

2-POSITION OF THE SITE WITHIN THE CITY: Because it is in the very center of the capital region, Sævarhöfði is the perfect location for a food distribution hub—confirmed by the fact that Krónan was already considering this area for their first dark store.

Aerial view of the development area.

PROJECT SUMMARY

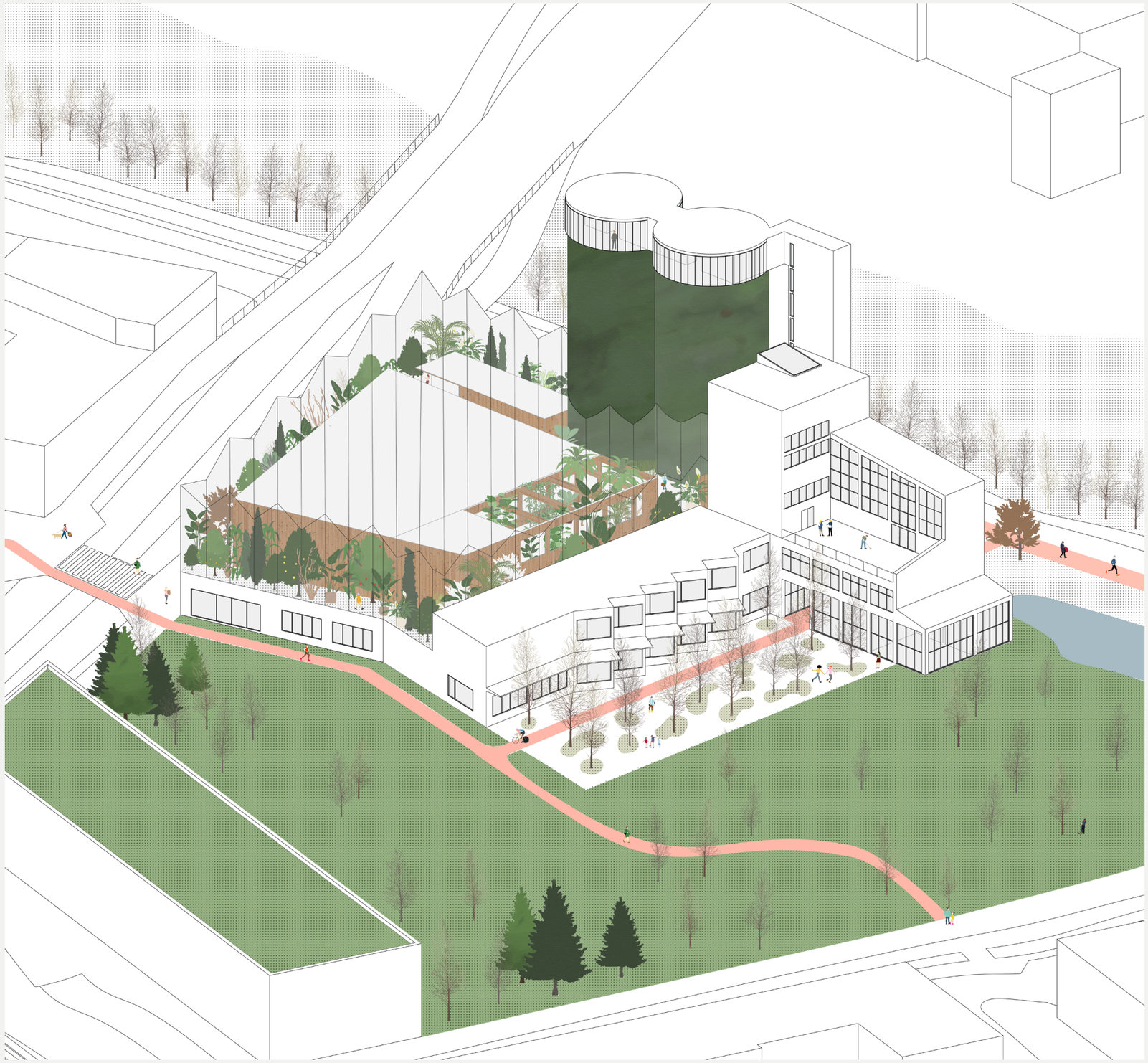
The Smart Food Campus is a platform for innovation in sustainable food production and distribution, with different departments working in synergy.

The main departments are the **VERTICAL FARMS** in the silos and roof, the **FOOD STARTUP INCUBATOR** with its **GREEN FAB LAB**, Krónan's **DARK STORE** (a distribution facility that caters exclusively for online shopping). Other areas create opportunities for public engagement, placing the Campus in the center of the neighborhood's social life: the **ZERO KM RESTAURANT,** the **FOOD COURT** and **FARMERS MARKET**, a multi-purpose **EVENTS HALL**, a **BAKERY** in the northeast corner and a **WINTER GARDEN CAFE** in the southeast corner. Atop of the silos there will be a glazed **SKY DECK** with an elegant lounge and cocktail bar for the neighborhood.

Using **100% GREEN ENERGY**, the Campus will be a beacon of sustainability and a driver of innovation and food sovereignty. The program thoroughly addresses each one of the proposed **CLIMATE CHALLENGES**.

Part of the program will operate in the existing cement factory. Once **UPCYCLED**, this magnificent structure will tell the story of the transformation of the Bryggjuhverfi area into a lively, green and future-proof neighborhood. The **SILOS COVERED IN PLANTS** and adorned with a **GLASS CROWN** will be visible from afar and create a landmark for the community. The old factory's **ACTIVATED FAÇADE** will invite passers by to pop in for a meal, groceries or just to see what's going on in the Campus, which is bound to become a weekend destination for food enthusiasts.

The remaining program will be housed in a **CARBON NEUTRAL NEW BUILDING** which will set new standards in green construction in Iceland, exploring the economically viable use of locally sourced and locally manufactured materials. The Campus will eventually evolve to originate and support a network of urban farms turning under-utilized spaces around the city into sources of fresh food.



PROGRAM

old building | *new building*

FOOD STARTUP INCUBATOR
507 m² 6

The **Food Startup Incubator** conceived by Matís and Eldstæðið will offer an experimental kitchen and rental production facilities for food startups. The incubator will be the perfect platform in which to test new ideas and launch food and beverage-related businesses, creating new green jobs in the city.

GREEN FAB LAB
90 m² 3

In **Fab Labs** almost anything can be made with 3d printers, laser cutters, CNC mills and other tools. The lab will expand the experimentation capabilities of the incubator, creating custom smart devices and prototypes.

FOOD COURT, BAKERY FARMERS MARKET
669 m² 20+

Food stalls and a biergarten—a warm and convivial area facing the park next door, will be a great asset for the locals and an attraction for people from all over the capital area.

In the farmers market the community can buy freshest produce directly from the farms, and a platform for food entrepreneurs to introduce food products developed in the Incubator.

0KM RESTAURANT
205 m² 10+

A place for patrons to taste hyper-local produce and try products developed in the Incubator.

MAIN ENTRANCE

SKY DECK LOUNGE
223 m² 5

From the glass crown atop the silos visitors can socialize and enjoy a panoramic view of Reykjavík and surroundings.

EVENTS HALL
166 m²

The main space of the old factory, with its 8m high ceilings, will be transformed into an events hall, to host community gatherings, concerts, exhibitions, yoga sessions, etc.

SILO FARMS
700 m² 20+

Infarm's Growing Centers—**Vertical Farms** measuring 7x7x24m—will be assembled in the existing silos. The units are self-contained environment systems connected to the electric grid, the district heating network and a water conditioning system.
4 Workstations (40m² each), Plant nursery (15m²), Storage, Disinfection area, Washing Room, Lockers, WC, Break Room, Office, Meeting Room.

WINTER GARDEN
1,048 m² 5

A corner café and green belt above the dark store and around the rooftop farms, accessible directly from the street (bridge level) and from the main entrance.

ROOF TOP FARMS
1,068 m²

The roof above the dark store will be divided into allotments for farming entrepreneurs, schools and businesses. In-house gardeners, shared tools and training programs will be available for enthusiasts of every age. The space is suitable for hydroponics, aeroponics and aquaponic, supporting a great variety of crops.

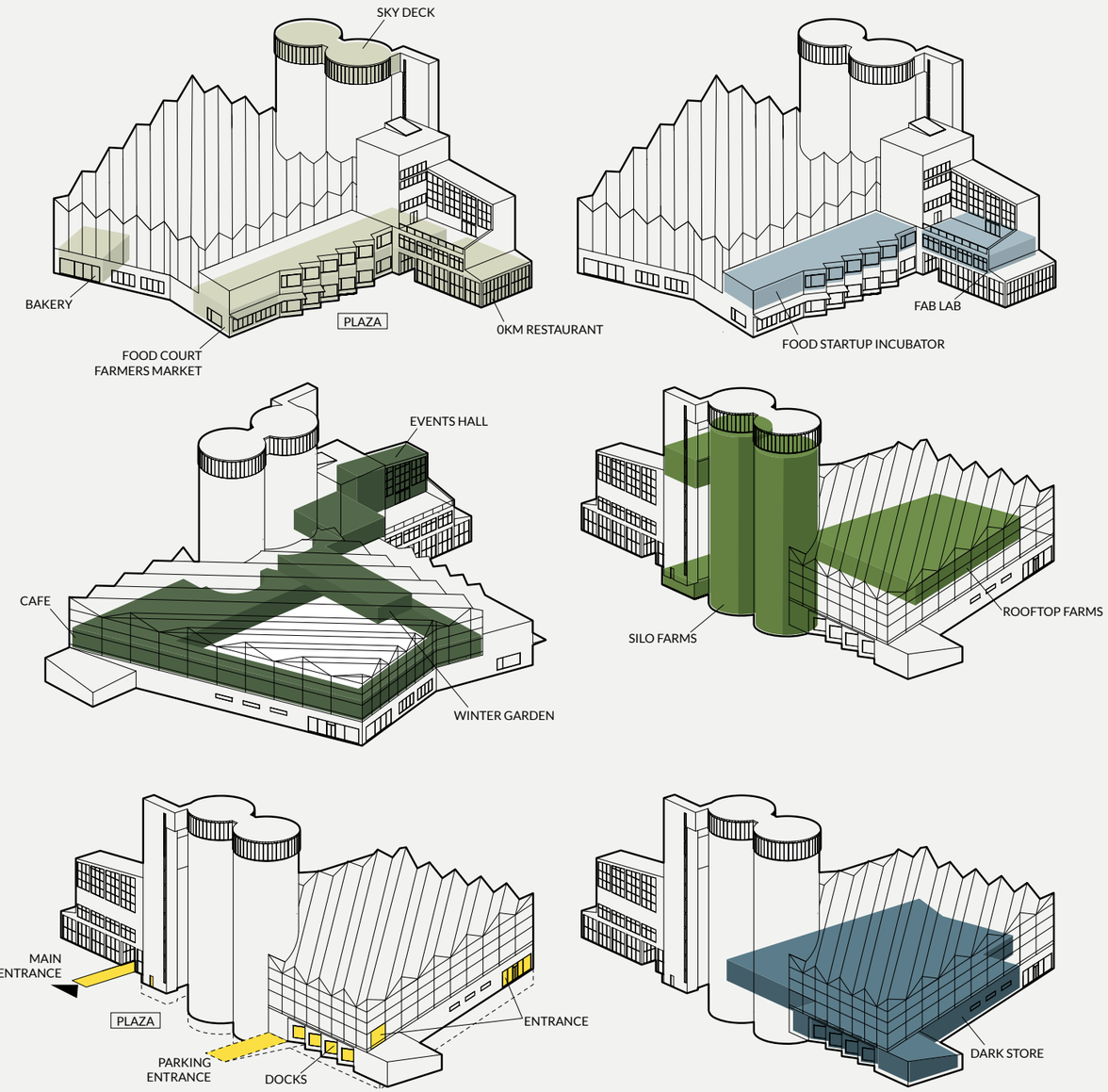
LOADING DOCKS

DARK STORE
2,033 m²

Dark Stores are distribution facilities for online orders. They look similar to supermarkets, but are not accessible to the public. Staff and robots process and package the orders, which are then dispatched in small electric vehicles. Krónan will have Iceland's first large scale dark store at Sævarhöfði, serving the entire capital region.
Mezzanine: Office, Meeting room, Break room, WC, Lockers. Ground Floor: Loading docks, Dry aisles, Cold storage, Packing area, Packed cold storage.

UNDERGROUND PARKING 2,164 m²

60 cars, Bike lockers, EV chargers, Changing rooms with shower.



COMMUNITY

Iceland has strived for innovation in many fields, including green energy (Landsvirkjun), genetics (DECODE), prosthetics (Össur) and ecotourism. In the same spirit, the Smart Food Campus will propel the country into the vanguard of food sovereignty, food safety, food security and food sustainability.

The Campus will be a landmark and gateway for the Bryggjuhverfi neighbourhood, and also play a pedagogical role. Local schools - especially the one planned on the adjacent lot - will have opportunities to get involved letting the kids watch their lunch grown in one of the rooftop farm allotments, or produce gadgets and devices in the green fab lab. This engagement will promote a healthy diet and foster the kids' interest in science and nature.

ENGAGEMENT WITH LOCAL COMMUNITY.

Because the site is in an industrial area that will be completely redeveloped, the local community doesn't exist just yet. The discussions will have to encompass the entire capital area, also because the Smart Food Campus will provide products and services for the whole city and surroundings. During the design phase, in addition to consultations with the planning authorities and industry leaders and specialists, focus groups will be held and online surveys sent out to gauge the interest of the community in different parts of the program. The design development will be guided by the findings.

PUBLIC SPACES, HEALTH AND WELLNESS.

While the food court, the farmers market, the restaurant, the sky deck, the café and the events hall will all be meeting points for the immediate neighborhood, the roof top farm and green fab lab will create opportunities for less casual engagement—courses, workshops, info sessions.

The production of the Smart Food Campus will benefit the entire population of the capital region, promoting healthy and nutritious fresh food, free from pesticides. Bringing the farm closer to the people will raise awareness and educate about where our food comes from, the supply chain, and how technology can help us navigate safely into the future.

TEAM & PARTNERS

CONCEPT AND DESIGN

Rafael Campos de Pinho /JÖRP ARCHITECT AND URBAN PLANNER graduated in 2004 in Brazil, established his architecture practice in Iceland in 2017. Previous experience includes the development and construction of affordable homes for low income families in Belo Horizonte, Brazil; a few years at PK Arkitektar in Iceland; and a stint in advertising, working with major agencies in Brazil and Europe, which culminated with two Cannes Lions awards. In 2020 co-founded JÖRP, a design and development agency, currently working on a 60 apartment development for first-time buyers in Reykjavík (Vaxtarhús-Sjómannaskólareitur), a 75 apartment development in Hamranes, Hafnarfjörður, a carbon neutral apartment building in downtown Reykjavík and an ultra-sustainable prefabricated small house that will be premiered at Design March 2021.

Johann Örn Logason /JÖRP LAWYER with a master's degree in International law and a wide range of experience having worked in finance (VISA Iceland), government (as a lawyer in Reykjavik City's Construction and Property Division) and politics, (as a member of the Permanent mission of Iceland to the Council of Europe in Strasbourg). Before co-founding JÖRP DESIGN+DEVELOPMENT Jóhann was the managing director and owner of Galdrasmíði a construction company involved a wide range of commercial and governmental real estate projects.

Andri Gunnar Lyngberg Andrésson and Ásta María Þorsteinsdóttir /TRÍPÓLÍ ARKITEKTAR
- an Iceland-based architectural office established by architects Andri Gunnar Lyngberg Andrésson, Guðni Valberg, and Jón Davíð Ásgeirsson. Trípólí is engaged in all aspects of architecture and urban design and is working on projects of all sizes – ranging from masterplans to single family houses – parallel with research, writing, curating, and lecturing. Trípólí's approach is rooted in research and theory, and they rely on continual dialogue with experts and consultants, across various backgrounds and professional fields in every stage of the design process. Trípólí's goal is to take an innovative and considered approach to form, structure, and material, in addition to a sensitivity and respect for the character of each unique place. Instead of adhering to a particular architectural style or dogma, the aim is to make work that is contemporary yet rooted in its historical, social, environmental, and economical context.

Rosario Badessa ARCHITECTURAL ILLUSTRATOR, graduated in architecture from Mediterranea University of Reggio Calabria in 2012 and worked as an architect in Italy and Switzerland before establishing his architectural visualization studio in Lisbon. Since 2018, the studio has worked with architecture offices all over Europe developing images that try to convey not only the architecture envisioned by its designers but an atmosphere of what the project and intervention aims to be in the space and community it belongs.

PARTNERS AND CONSULTANTS

Ragnar Ómarsson /VERKÍS CONSTRUCTION ENGINEER, CHAIRMAN OF GREEN BUILDING COUNCIL ICELAND. Verkís is the oldest engineering company in Iceland, established in 1932. With 320 staff in Iceland and abroad, the company's capabilities include: Project preparation and planning; Building design, including power plants, transport structures, residential housing, industrial buildings, and service facilities; Design of all special systems required in structures; Project management, both during design stage and at the construction site; Project supervision; Safety, environmental, and health consultancy.

Andrea Rosen /INFARM SMART CITY LEAD. InFarm wants to bring super fresh, locally grown produce to everybody. Their future-proof, hyper-efficient, cloud-connected indoor farms create perfect conditions for different kinds of plants to grow no matter where the farms are installed. Headquartered in Berlin and with more than 1.000 farms in stores and distribution centers across 10 countries in Europe and North America, InFarm is one of the world's leading vertical farming companies. InFarm's Smart City unit develops the future vision of how cities can achieve self sufficiency in food production. Andrea will be responsible for implementing vertical farming into the Smart Food Campus. Infarm developed the FARMING AS A SERVICE business model where they design, build, install, own and operate the farms, delivering the ready-to-sell produce to local distributors.

Renata S. Blöndal /KRÓNAN HEAD OF BUSINESS DEVELOPMENT. With 23 locations and thousand employees Krónan is the fastest growing player in the Icelandic grocery market. Krónan promotes healthy eating, offering an ever growing catalogue of organic, vegan and "free from" products and fresh produce, and reduces food waste by transparently offering at a discount products that have had the packaging damaged, or that are past the best-by-date but deemed safe for consumption. Krónan will have their first dark store in the Campus, delivering online orders and freshly farmed produce.

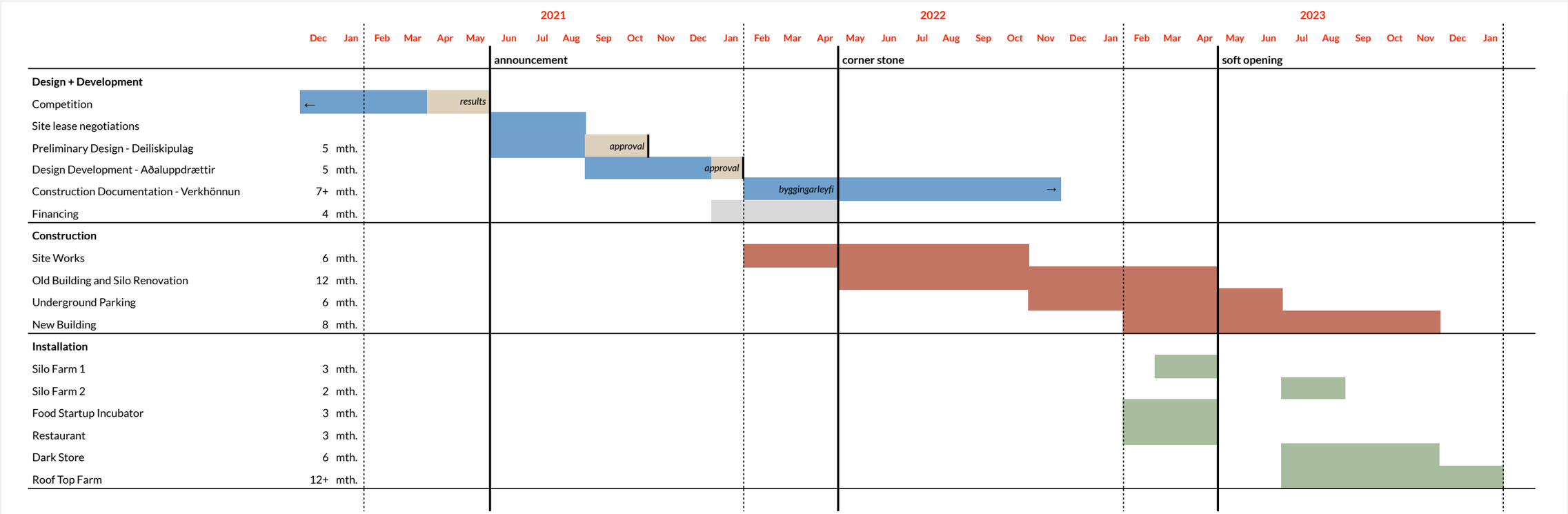
Bryndís Björnsdóttir /MATÍS HEAD OF INDUSTRY SOLUTIONS, RESEARCH & INNOVATION. Matís is one of the leading research, development and testing organizations working in the global food industry. Their expertise spans from fisheries and agriculture, through product development and marketing to chemical, microbiological and genetic analysis. Whether it be HACCP, utilization techniques, or biomolecules, if it is related to food and biotechnology, Matís has the know-how to help. Their expertise will be a crucial asset in the FOOD STARTUP INCUBATOR, experimental growth and production facilities in the Campus.

Eva Michelsen /ELDSTÆÐIÐ BUSINESS DEVELOPMENT SPECIALIST. Eldstæðið is a shared culinary space and incubator for food entrepreneurs and small food producers. Established in early 2020, its goal is to assist entrepreneurs and promote the evolution of the Icelandic food industry by creating an accessible way for new companies to enter the market.

TIMELINE

The Smart Food Campus is not a utopian idea—It's an actionable response to an existing need. It's a no-nonsense program that is ready to be deployed.

The partners are fully operational companies that recognize the synergy opportunity in the Campus and are ready to engage. The stakeholders are looking for green investment opportunities. The Campus can be up and running with little to no changes in the immediate surroundings. As a matter of fact, it will be an advantage for the future community to have the Campus kickstarting development in the area, and a green landmark setting the sustainable identity of the soon-to-be neighborhood.



ANSWERS TO PHASE ONE JURY REMARKS

THE SELECTION COMMITTEE, C40 AND THE CITY OF REYKJAVÍK INVITE YOU TO:

Clarify and improve your project regarding its integration in the local context, and specifically the adequacy of the uses/activities you are proposing for the site with the expectation of the City and with the specific challenges that the neighborhood and the City are facing.
The pertinence of the project is explained throughout this presentation. The fact that the site is in an area that is yet to be developed creates an opportunity to set high standards for the future neighborhood - an opportunity that comes with great responsibility! The program is in line with the overall sustainability expectations of the City, and focuses on something that is relevant to Reykjavík and any city: food.

Specify the carbon reduction strategy of your project and provide more details on the solutions proposed to address the 10 Challenges for Climate. We specifically encourage you to include in your final proposal a comprehensive assessment of your project's carbon footprint and to provide quantified objectives. We advise you consider using the KPIs listed in the Appendix B 'Guidance to Design a Low-Carbon, Sustainable and Resilient Project' and use recognised sustainable standards and certification processes.
KPIs will be found throughout this presentation for each pertinent climate challenge. In the "CARBON ASSESSMENT" section there is an overview, and further information can be found in the "Performance Monitoring Protocol (document 3)"

Specify the business model, and the legal and financial set-up of your project.
The business model is explained in the accompanying document "Legal Setup and Financial Arrangement (document 4)".

Adjust and complete your team (by collecting the contracted commitments), specifically on the financial aspects and on the operational phase, to ensure a proper implementation of your project in the future.
The operational partners in the Smart Food Campus are robust businesses that already run their operations in other locations. Krónan has 23 stores in Iceland and employs 891 people. Infarm, with more than 700 employees, operates 1068 farms across 10 countries and 30 cities worldwide. Eldstæðið opened its doors in the summer of 2020 and is already operating close to full capacity. With these three interconnected anchors the viability of the Campus is guaranteed. More information in the accompanying document "Legal Setup and Financial Arrangement (document 4)".

SPECIFIC REMARKS REGARDING RELEVANCE OF THE PROJECT TO THE SPECIFICS OF THE SITE:

Architectural adjustments need to be made in order to enhance the building transformation to support innovative architecture and the goal of upcycling.
The "ARCHITECTURE AND URBAN DESIGN" section will illustrate the architectural goals of the project for both the old and new structures, while section "2. LIFE CYCLE ASSESSMENT AND SUSTAINABLE MATERIALS MANAGEMENT" addresses the upcycling and renovation.

The team needs to show how the architectural structure can be in close connection with the future urban environment in Bryggjuhverfi vestur.
The Smart Food Campus will be the gateway to this entirely new neighborhood, and it is our mission to make it an attractive and meaningful landmark which is also functional in providing nourishment, recreation and work opportunities. The "ARCHITECTURE AND URBAN DESIGN" section will illustrate the relationship between the project and the proposed local plan for the area.

Technical solutions need to be detailed on how to manage the vegetation on the structure.
Many examples of moss or ivy-covered walls can be seen around Reykjavík, and surprisingly they remain green even in the winter months. Because of the scale of the silos, some creative solutions will have to be employed to make sure that their whole 42 meters of height will be clad in greenery. The technical solution can be found in section "8. BIODIVERSITY, URBAN RE-VEGETATION AND AGRICULTURE".

SPECIFIC REMARKS REGARDING THE RESPONSE TO THE 10 CHALLENGES FOR CLIMATE :

The project demonstrates good environmental ambition, focusing on agricultural innovation and food production. The team should pursue this goal and provide more details on how the project fits into the wider surrounding area.
The section "8. BIODIVERSITY, URBAN RE-VEGETATION AND AGRICULTURE" further explains the farming aspects of the project, while info on food production can be found in sections "5. ECOLOGICAL SERVICES FOR THE NEIGHBORHOOD AND GREEN JOBS" and "COMMUNITY".

The team should keep the focus on sustainable materials (challenge 2) and develop the design proposal according to the goal of carbon neutrality.
Materials and carbon footprint are discussed in section "2. LIFE CYCLE ASSESSMENT AND SUSTAINABLE MATERIALS MANAGEMENT."

The creation of green jobs related to food production and beyond is a valuable asset of the project, the team is encouraged to develop this aspect further.
Although the farms and other operations in the Campus will indeed create jobs, the real value in terms of job creation will stem from the Food Startup Incubator, which will help entrepreneurs kickstart their food related businesses. Iceland is experiencing a boom of new brands and locally produced food products, many of which originated at Matís or Eldstæðið. The trend is likely to continue and the facilities in the Campus will be Eldstæðið's new and expanded headquarters. Community involvement, business creation and green jobs are discussed in sections "5. ECOLOGICAL SERVICES FOR THE NEIGHBORHOOD AND GREEN JOBS." and "COMMUNITY".

More details and explanations could be provided on the mobility strategy (challenge 3) and solutions to address climate adaptation and resilience (challenge 4)
Reducing food miles and optimizing logistics are the core premises of the Smart Food Campus. More than just addressing low carbon mobility, the project is promoting a dramatic reduction in the need for transportation. Food production will be a short electric vehicle ride away from the customer's table. Food produced locally, as opposed to thousands of kilometers away, is exposed to far less uncertainty. Climate change can eventually disrupt transportation and break a long, fragile supply chain. Climate events can destroy crops on the other side of the world, and prevent them from arriving in Iceland. Building food sovereignty and independence is an absolute key for climate adaptation and resilience. The Smart Food Campus will help Reykjavík become a more future-proof city. More on the topic in sections "3. LOW-CARBON MOBILITY" and "4. CLIMATE RESILIENCE AND ADAPTION".

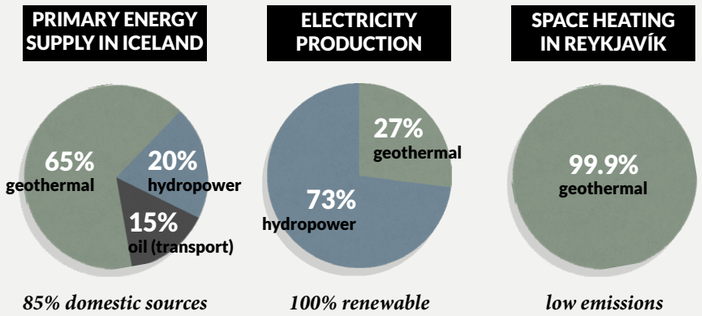
CLIMATE CHALLENGE #1

ENERGY EFFICIENCY AND LOW-CARBON ENERGY

CLEAN ENERGY USAGE.

According to the Ministry of Industry and Innovation, “85% of the total primary energy supply in Iceland is derived from domestically produced renewable energy sources. This is the highest share of renewable energy in any national total energy budget.”*

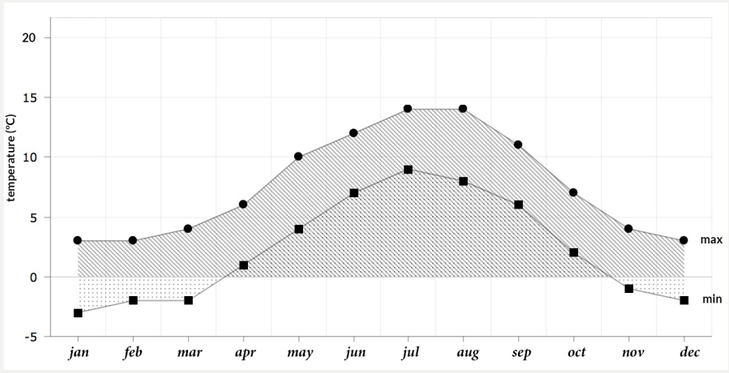
The only sector that still relies on fossil fuels is transportation, and the adoption of electric vehicles has been going at an incredible rate. Iceland has a pristine energy future ahead.



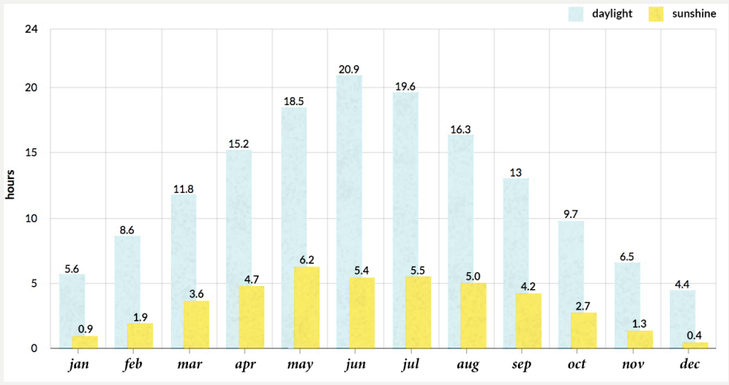
Because the electricity available in Iceland’s grid is clean, reliable and inexpensive, generating or storing electricity on site isn’t justifiable. But reducing food miles and the associated fossil fuel usage is absolutely necessary. Growing more food locally will reduce the overall carbon footprint of the food supply chain.

In addition to using only clean energy, the Smart Food Campus will recycle 4m^3/sec of waste water at 30°C that is currently drained from the district heating system into the ocean. This will at the same time reduce the amount of energy required for heating, and cool down the water before it is drained, avoiding thermal pollution.

average monthly temperature in reykjavík



average daylight/sunshine in reykjavík



ENERGY EFFICIENT LIGHTING AND HEATING.

“Vertical farming sounds fantastic until you consider its energy use” is an argument that often follows a pitch for urban farming. But in Iceland traditional agriculture is hardly available, so the only alternative to indoor farming is importing. One strategy that vertical farms commonly employ to lower energy usage and cost is to give the plants only the part of the spectrum they need—reds and blues. That’s why many farms look pink. Meticulously monitored LED arrays will emulate the ideal natural conditions for each species, using the minimum amount of resources.

In arctic climates keeping indoor farms at the ideal operating temperature will require heating throughout most of the year. Because the smart Food Campus will be in a geothermal heating district, the production will be at the same time more sustainable and less expensive than in places where geothermal is not available.

ENERGY EFFICIENT DESIGN.

HVAC systems don’t need a cooling element until outside temperatures go above 20-24°C. Global warming models predict that by the end of the century only 3% of summer days will see temperatures above 20°C in Reykjavík. The vertical farms and other parts of the Smart Food Campus will have user-controllable, natural ventilation systems to keep the air inside fresh. The rooftop greenhouses in particular could become too warm in the summer, but this problem can be mitigated with roof vents and solar shading.

Walls and roofs in Iceland are not as heavily insulated as in other Nordic countries. With abundant geothermal heating, it’s preferable to save on construction materials and reduce the embodied carbon of the building without increasing the building’s lifetime emissions.

** https://www.government.is/topics/business-and-industry/energy/#:~:text=Renewable%20energy%20provided%20almost%20100,supplier%20of%20electricity%20in%20Iceland.*

GEOTHERMAL DISTRICT HEATING—SOCIAL BENEFITS.

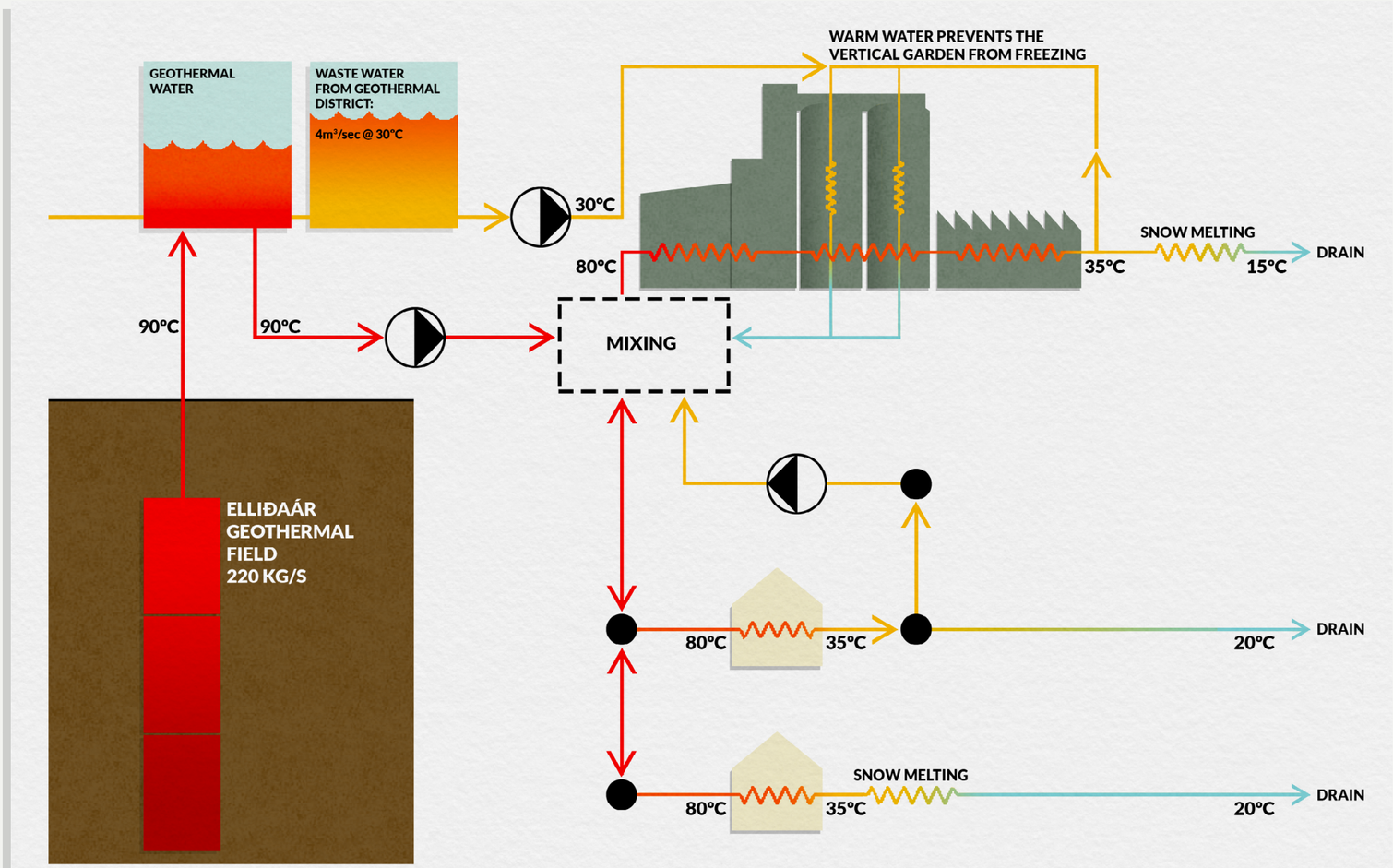
With a network harnessing 750 MW thermal power from steam, and a water distribution system generating 60 million cubic meters of hot water, Reykjavik's is the world's largest and most sophisticated geothermal district heating system. This natural resource has been used since 1930 and massively alleviates the City's dependence on fossil fuels, making it one of the cleanest cities in the world. CO_2 emissions have been reduced from 1944 to 2006 by up to 110,000,000 tons, delivering savings of up to 4 million tons CO_2 every year. Geothermal has also contributed to Iceland's transformation from one of Europe's poorest nations in to one that enjoys very high living standards.

EFFICIENT CONTROL AND MONITORING.

The Infarm farms are cloud-connected and remotely controlled by a team of experts that collect 50.000 data points—humidity, temperature, CO_2 level, intensity of light, water level, fertilizer quality—to optimize growth, maximize flavour and nutritional value, while using no more than the minimum required amount of resources. Since most of the activities in the Smart Food Campus are energy-intensive businesses, their managers will have an economic incentive to monitor consumption and keep it as efficient as possible.

KEY PERFORMANCE INDICATORS (KPIS):

	SOURCE	TOTAL USAGE kWh/year	CARBON FOOTPRINT per m² CO_2 kg/m²/year	TOTAL CARBON FOOTPRINT CO_2 kg/year
electrical grid 73% HYDRO	LIGHTING	32,892	0.06	245
	VENTILATION	51,297	0.09	382
	EV CHARGERS (22 kW 8 units)	11	0.00	0.08
	VERTICAL FARMS	824,964	106.1	5199
27% GEO	KITCHEN (STARTUP INCUBATOR)	22,320	0.3	141
district heating 100% GEO	HEATING	425,908	0	1363
	HOT WATER	55,080	0	176
		1,412,472	107	7,506



Simplified diagram of the district heating system

CLIMATE CHALLENGE #2

LIFE CYCLE ASSESSMENT AND SUSTAINABLE MATERIALS MANAGEMENT

The Smart Food Campus design principles will aim at a high rating BREEAM certification. Verkís, which counts with a team of over 300 engineers and specialists, has been involved in the decision making since the earliest stages of the project and will provide their expertise throughout the design and construction phases to guarantee the highest degree of sustainability performance. The architecture design team will also count with at least one BREEAM AP (Design & Site) architect in the relevant stages.

RETROFITTING THE CEMENT FACTORY.

Embracing the Cradle-to-Cradle design ethos, the Campus will be designed to suit the program, but planned in a way to maximise the usage of the existing building. All of the factory's 1,641 m^2 of floor area and ___m^3 of structural concrete will given a new life.

The shape and volume of the silos could have been a tricky starting point for upcycling, but fortunately Infarm's Growing Centers—the most vertical of all vertical farms—fit perfectly one in each silo. The farms are self-contained weather systems, which can operate in the silos with just minor adjustments. It will not be necessary to insulate the silos, as the farms are functional even in Iceland's lowest temperatures. The remaining areas of the cement factory will require different degrees of renovation.

LOW CARBON CONSTRUCTION MATERIALS.

1- MASS TIMBER (CLT, GLULAM):

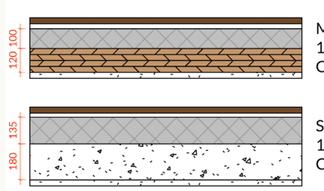
Trees take CO_2 out of the atmosphere and store carbon in the wood. A timber building has several tonnes of carbon sequestered within its structure, which can offset the embodied carbon of other construction materials and processes employed, possibly leading to a net zero carbon structure.

The new building and the structural elements added to the upcycled cement factory will be mainly CLT and glulam. In addition to being a low-embodied carbon solution, the use of prefabricated mass timber structures dramatically reduces material waste on site.

Iceland is starting to develop its forestry industry, but at least for the next couple of decades timber will have to be imported. All the timber used in the Smart Food Campus will be sourced from sustainably managed forests in Europe, to keep the carbon footprint of production and logistics down to a minimum.

Mass timber also has an edge for being lighter to transport and having better thermal performance, reducing the need for insulation.

Life cycle impact of external wall with a thermal transmittance of U = 0,275 m^2K/W.



Mass timber wall:
120mm CLT; 100mm rock wool insulation
Carbon footprint = 19 kg CO_2eq/m^2

Standard concrete wall:
180mm concrete; 135mm rock wool insulation
Carbon footprint = 93kg CO_2eq/m^2

2- LOW CARBON CONCRETE (LCC):

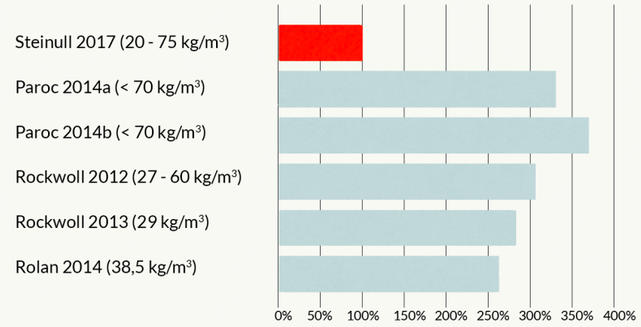
For the foundations and inevitable concrete parts, green concrete reinforced with locally sourced volcanic ash will be used. While standard concrete has 400kg CO_2/m^3, green concrete contains only 300kg CO_2/m^3 or 25% less carbon. Further reductions will be considered by using C25/30 concrete instead of C30/37 (high strength concrete) where possible.

3- ICELANDIC ROCK WOOL:

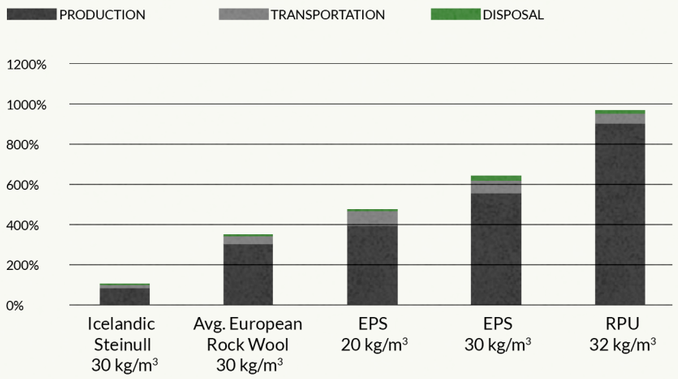
One of the few materials that can be entirely sourced locally is rock wool insulation. A Life Cycle Assessment has shown that Icelandic rock wool outperforms rock wool from other producers and has a smaller footprint than other insulation materials.

In addition to lower emissions from production, using Icelandic stone wool will dramatically reduce the carbon footprint of transportation. A truck delivery from Sauðárkrókur to Reykjavík will be responsible for 15 kg CO_2eq per ton of material, while the sea freight from Denmark alone will emit 84 kg CO_2eq/ton.

CARBON FOOTPRINT OF ICELANDIC ROCK WOOL STEINULL vs. OTHER PRODUCERS



CARBON FOOTPRINT OF INSULATION MATERIAL WITH THERMAL RESISTANCE OF R = 2,7 m^2K/W, RELATIVE TO ICELANDIC STEINULL



4- GLASS:

A great amount of glass will be needed to cover the Smart Food Campus' roof top farms. Gladly, glass is a material that can be recycled in close loop over and over again. Thanks to glass recycling, significant amounts of raw materials are saved and natural resources are preserved. Glass recycling also helps in saving energy as cullets melt at a lower temperature than raw materials. When glass breaks down, it remains safe and stable, and releases no harmful chemicals into the soil. So even when it isn't recycled, it does minimal harm to the environment.

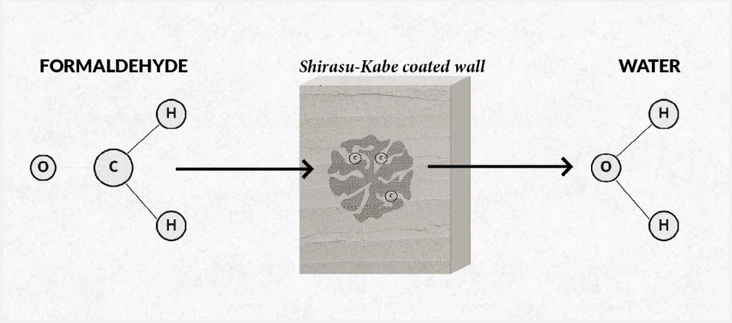
Double or triple glazed glass will be specified in different areas of the project at a later design stage, in order to find a good balance between thermal performance, embodied carbon and cost.

5- AIR PURIFYING PAINT:

Keeping the air fresh and odorless is extremely important in a food production facility. In addition to an efficient ventilation system, the Campus will count on a coat of air purifying paint on every painted surface.

Air purifying paints such as Shirasu-Kabe are made of fine volcanic soil (shirasu) composed of minuscule irregularly shaped particles with many internal cavities. These cavities can store and release moisture and also trap molecules of odors and other chemicals. That's how the material can condition humidity and deodorize the room, and also break down volatile organic compounds (VOCs) like formaldehyde, glycol and benzene.

Even though mass timber manufacturers claim that VOC levels in the glue utilized in their elements are very low, the air purifying paint on the walls will ensure the best possible air quality in the building.



CONSTRUCTION WASTE.

Site waste materials will be sorted into separate key waste groups either on-site or off-site through a licensed contractor for recovery, with the goal of avoiding most of the construction waste from ending up in a landfill.

Data obtained from measuring and monitoring site construction waste will then be used to check performance against BREEAM targets and benchmarks, analyse the effectiveness of any solutions implemented and strive for continual improvement.

Although BREEAM does not include demolition and excavation waste in its resource efficiency benchmark, material extracted from excavation will have an efficient destination: the adjacent embankment which will form the ground for the westernmost portion of Bryggjuhverfi.

FLEXIBLE DESIGN.

The new building in the Campus is a flexible space by default. Future alterations will be facilitated by the fact that the wooden structure is organized in a regular grid. The open rooftop space also offers possibilities for purpose reassignment.

END OF LIFE.

According to economic viability, glue-less mass timber products will be employed. Because of the inseparable glue layer, CLT has limited recyclability. A number of suppliers—NurHolz, Thoma Holz, Massivholzmauer, Bio Xlam—produce cross-laminated timber without glue. In addition to creating a healthier building with fewer chemicals, it will make the structure completely recyclable.

CLIMATE CHALLENGE #3

LOW-CARBON MOBILITY

As of March 2020 more than half of new cars sold in Iceland were plug-in hybrid or full electric, and Tesla Model 3 was the top selling car of any kind. Iceland ranks second in the world for EV adoption, only behind Norway. With government incentives and an ever-growing infrastructure for plug-in vehicles, the country will quickly replace most of its existing fleet with zero-emmissions alternatives.

The City is also doing a great job expanding and improving the public transport network with the soon to be implemented *Borgarlína* (Bus Rapid Transit system) which will pass right by the Smart Food Campus, and creating smoothly paved cycling lanes throughout the city.

But once the domestic moblity system has been completely decarbonized, a problem that will remain is the inevitable shipping of imports into the country. Food usually travels a long way before hitting the shelves of supermarkets in Iceland.

FOOD MILES: THE LONG HAUL.

One third of the food produced worldwide is wasted. According to the UN food waste is responsible for 7% of global greenhouse emissions. One of the drivers of such waste is the way produce is distributed.

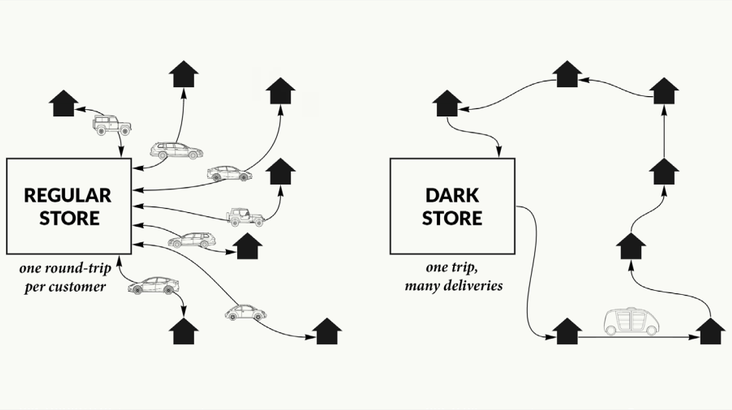
The longer the supply chain, the more vulnerable it is. The longer food has to travel, the more likely it is to expire due to poor stock management. And the faster it has to travel, the larger carbon footprint it will leave behind.

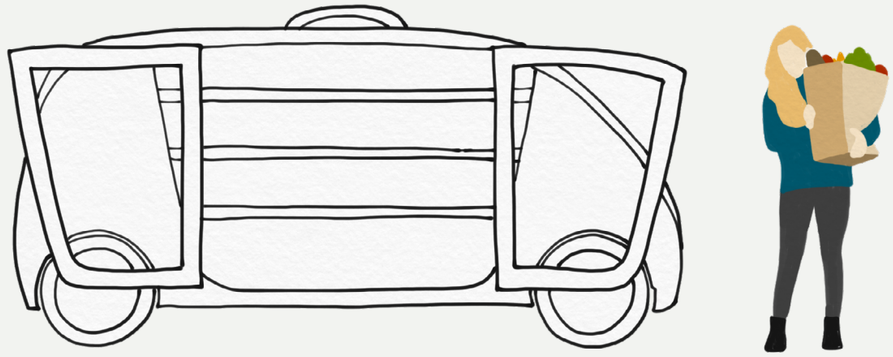
Besides, produce starts losing nutritional value the moment it's harvested. People want and need fresh produce, but in many places local growth is not possible due to the lack of fertile soil or adequate climate. Some food products like corn, soy, sugar cane, really only grow in specific kinds of soil and sun exposure. But many fruits, vegetables and leafy greens can be grown indoors, in any season, anywhere—even in the Arctic.

If grown locally, produce from vertical farms has an up to 90% smaller carbon footprint than imported equivalents, in addition to being fresher, tastier, more nutritious and independent from external circumstances.

Local, low carbon and innovative food production is the core activity of the Smart Food Campus. The production will be distributed to stores around the city and through online orders, and also in the Campus' own farmers market, conveniently placed for neighbors commuting by bike, public transport or on foot to do a quick stop on their way home.

Low-mileage food is not just a fancy label—it's a recipe for food sovereignty, safety, security and sustainability.





TeleRetail and Robomart are examples of autonomous delivery vehicles

DARK STORE*.

**dark stores are distribution hubs for online order processing only.*
They look similar to supermarkets, but are not accessible to the public.

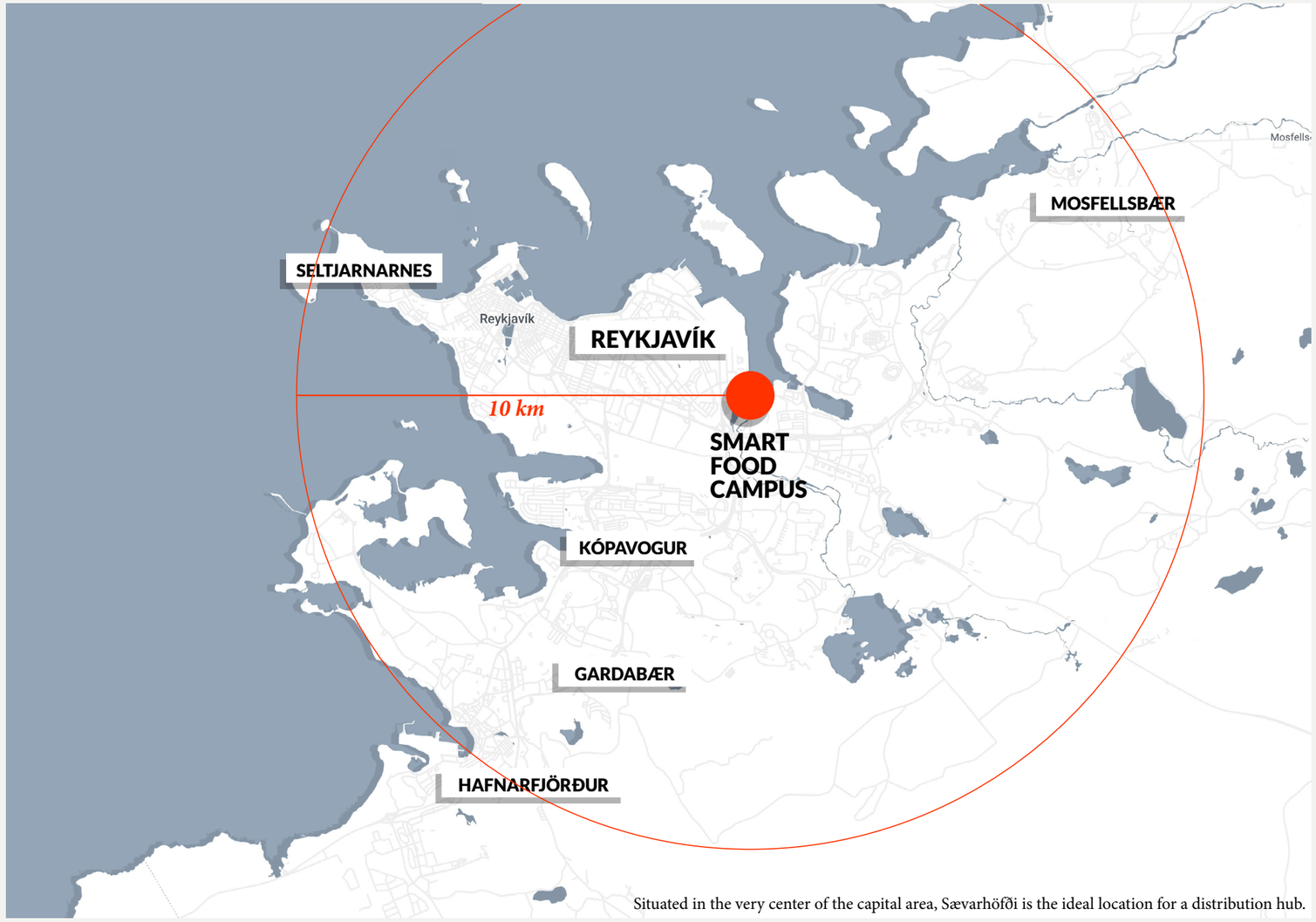
One of the outcomes of a year of reduced mobility and restrictions was the wide adoption of online shopping. The trend was previously slow to grow in Iceland but in 2020 it took off and merchants had to adapt very quickly. Betting that the habit will outlive the pandemic, Krónan started to plan its first dark store.

Sævarhöfði's central position within the capital area is the ideal location for the distribution hub that will process and dispatch online orders for the whole capital area. For the produce grown in the vertical farms or products made in the experimental kitchens, that will mean zero-emmissions logistics, from cradle to table.

TRAFFIC REDUCTION.

Instead of many individual cars traveling to the grocery store and back, there will be delivery vehicles servicing dozens of customers at a time, thus reducing the overal number of cars on the streets.

In 2021 the first road legal, autonomous and electric delivery vehicles are starting to operate in California*. It would be reasonable to assume that such vehicles will be omnipresent in the very near future. These machines controlled by Artificial Intelligence software can reduce the cost of transport by up to 90% while enabling 24/7 on-demand deliveries.



Situated in the very center of the capital area, Sævarhöfði is the ideal location for a distribution hub.

** https://techcrunch.com/2020/12/23/nuro-can-now-operate-and-charge-for-autonomous-delivery-services-in-california/*

CLIMATE CHALLENGE #4

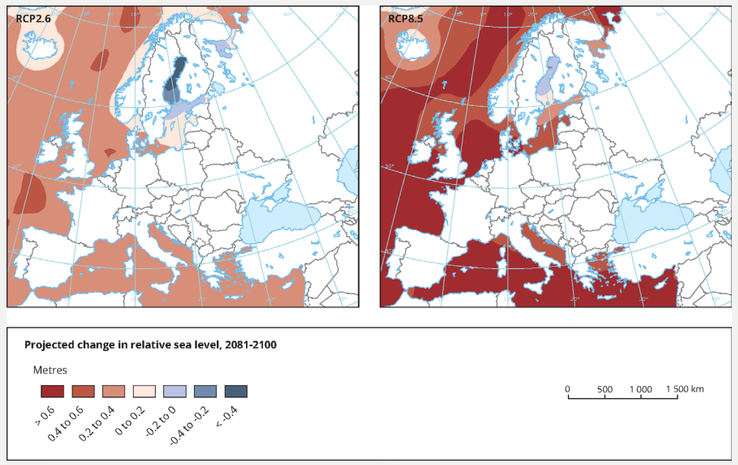
CLIMATE RESILIENCE AND ADAPTION

RISK ASSESSMENT.

While temperature rise doesn't pose a threat to Iceland—at least in the next 100 years or so—increased flooding, sea level rising and even harsher winds are almost certain. In addition to that, the land in Reykjavík has been sinking throughout the centuries. Sea level rise poses a real threat to buildings and structures near the shoreline.

The most pessimistic reports set a coastal flood with a return period of 100 years at 4.33m when factoring in 3.7°C global warming and the Reykjavík land-sinking of 0.4m by the end of the century. The ground floor at the old cement factory on Sævarhöfði is only 5.5m above sea level—but so is the entire Bryggjuhverfi Vestur neighborhood.

More effective than creating flood barriers specifically for the Smart Food Campus would be a coordinated effort with the City to prevent floods in the entire peninsula and landfill.



European Environment Agency (www.eea.europa.eu/data-and-maps/figures/projected-change-in-relative-sea-level)

THE FUTURE OF AGRICULTURE.

Agriculture has always been at the mercy of unpredictable weather, and a rapidly changing climate is making it an even more vulnerable enterprise. While in some regions warmer temperatures may increase crop yields, the overall impact of climate change on agriculture is likely to be negative, reducing food supplies and raising food prices.

By 2050 human population is expected to increase to 10 billion. Currently we use 80% of the globally available arable land. To produce enough food for everybody in the next 30 to 40 years we will need additional land the size of Brazil. That amount of farmable land mass simply doesn't exist. And even the land that is currently farmed has now been degraded below optimal levels.

Countries and communities need to focus on building food sovereignty—the right of people to define their own food system, regardless of external factors. Depending on global food players and on a long, complicated supply chain puts our diet in a fragile state, sensitive to currency fluctuations, political turmoil and climate change. Smart cities of the near future will make an effort to control their food supply chain.

FOOD SUPPLY CHAIN CONTROL AS A RESILIENCE DRIVER.

In arctic and sub-arctic locations where traditional farming is largely impossible, vertical farming can provide fresh produce year-round at a lower cost than importing from more southernly locations. Urban farms are also less susceptible to disruption than the long supply chains necessary to deliver traditionally grown produce to remote communities.

Indoor farming is facilitated in Iceland by the availability of green electricity, the geothermal heating and abundant clean water. Other countries with less favourable circumstances—Holland for example—have succeeded in creating a thriving industry out of indoor agriculture, so there is no reason why it shouldn't work in Iceland.

CLIMATE CHALLENGE #5

ECOLOGICAL SERVICES FOR THE NEIGHBOURHOOD AND GREEN JOBS

GREEN JOBS.

The various departments of the Smart Food Campus will create employment opportunities for a number of people of different specialties. But the real job-creating value of the Campus will come from the Food Startup Incubator, which will help entrepreneurs launch their food businesses. These companies will often outgrow the Incubator—as is the case with many companies that started at Matís or Eldstæðið—and become strong recruiters.

Also, by substituting imports with domestically produced goods, many production jobs that would have otherwise taken place abroad will be brought to Iceland.

GREEN GROWTH SUPPORT.

School kids and entrepreneurs of every age will be encouraged to participate in the Green Fab Lab activities and workshops. Green Fab Labs foster an open source symbiotic economy through green entrepreneurship—for example promoting distributed recycling, where plastic waste turns into items of value through fused particle fabrication and 3D printing.

Along with the incubator, the Green Fab Lab will stimulate innovative projects by empowering inventors to build smart devices, custom parts, high tech farming sensors—almost anything one can imagine.

The rooftop farming area will offer space for local schools, where kids can see their lunch grow; allotments of different sizes that can be rented by aspiring urban farmers or starting businesses; training programs in collaboration with agricultural colleges, and much more. It will prepare the next generation in sustainable agriculture and be the launch pad for other urban farming initiatives that will eventually occupy other vacant and underused spaces around town.

The Smart Food Campus will be an accessible entry point for food entrepreneurs and a stage for community engagement in the world of high tech and hyper local food.

The shared kitchen at Eldstæðið.

CLIMATE CHALLENGE #6

SUSTAINABLE WATER MANAGEMENT

According to a UNESCO report, 70% of the freshwater withdrawn from rivers, lakes and aquifers of the world is used in agriculture. By 2050, feeding a planet of 10 billion people will require an estimated 50 percent increase in agricultural production and a 15 percent increase in water withdrawals.

Agriculture also plays a major role in water pollution. Conventional farms discharge large quantities of agrochemicals, organic matter, drug residues, sediments and saline drainage into water bodies, and pesticides sprayed onto crops move downward through the soil and contaminate the groundwater. These practices make farming more economical and food more affordable—but in the long run they are not sustainable.

EFFICIENT WATER USAGE.

Vertical farming—be it hydroponics, aquaponics or aeroponics—is highly efficient and requires up to 95% less water than conventional agriculture, and about 1/3 of what conventional greenhouses consume. Some of the technology used in vertical farming today was motivated by the initiative of NASA to find an efficient way to grow plants in space in the 1990's.

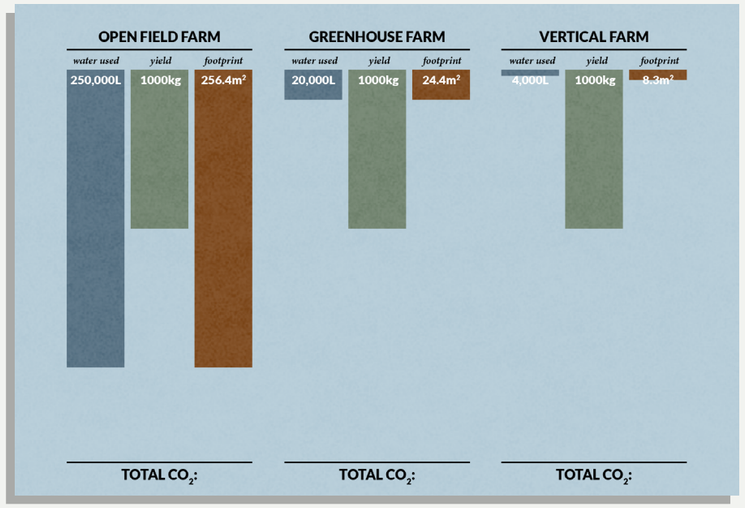
Infarm farms are connected to a water conditioning system, where fertilizers are added to the water before being distributed through the farm's shelves. Any excess water that comes out goes back into the conditioning system where it's filtered and enriched with nutrients before flowing onto the plants again.

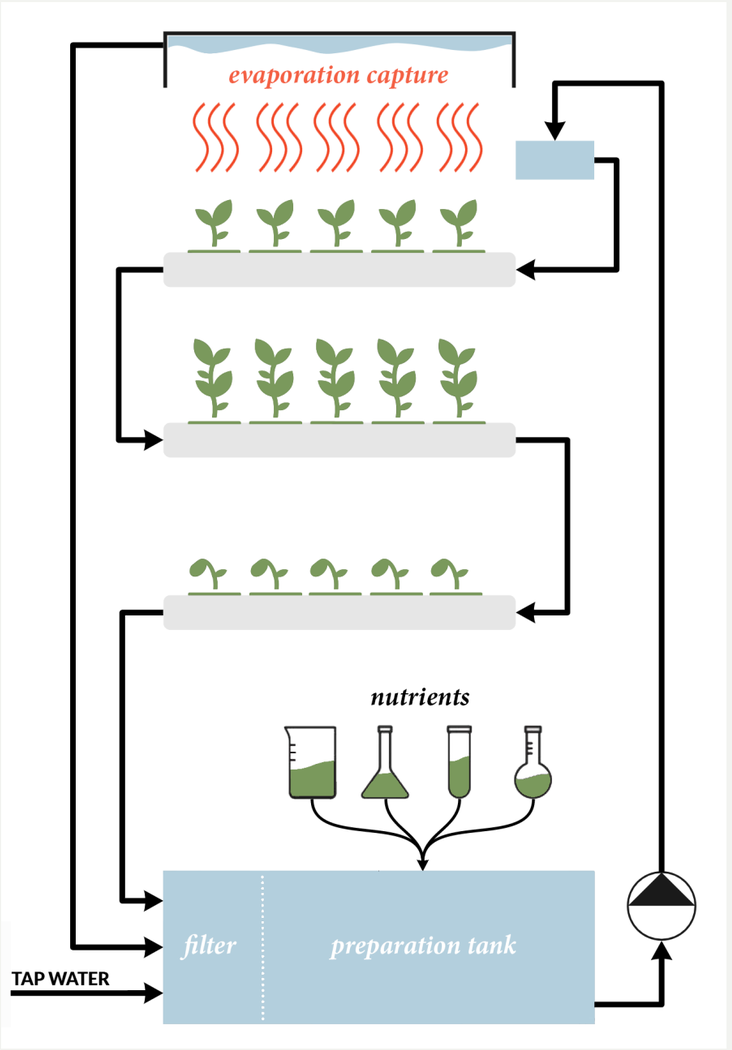
Only 5% of the water is used by the plant for weight gain—the rest simply evaporates. Condensation water is captured and pumped back into the system, so the overall water waste is very low, and the little water that is wasted is free from hazardous substances.

WATER SCARCITY MANAGEMENT.

Freshwater resources are still abundant in Iceland and tap water is pure natural spring water, free from additives like fluoride and chlorine, which can be toxic to plants. Indoor farms can use Icelandic water straight out of the tap.

RESOURCES USED IN THE PRODUCTION OF 1000kg OF LETTUCE





CLIMATE CHALLENGE #7

SUSTAINABLE WASTE MANAGEMENT

SUPPLY CHAIN WASTE.

According to a UN Environment report around 14% of the world's food is lost after harvesting and before reaching the retail level. Another study specific to the United States paints an even worse picture: 40% of all food is lost or expires in the trajectory "from farm to fork to landfill".

Part of this waste could be mitigated by shortening the supply chain. Growing food close to its final destination will minimize mishaps along the way, and the fresher the product on the market, the less likely it is to be discarded by the final consumer.

CONVENTIONAL AGRICULTURE WASTE.

Open field agricultural wastes include discarded pesticide containers, plastics, bags and sheets, tires, batteries, old machinery, oil, packaging waste and much more. A study in England reveals that plastic packaging from agriculture represents 1.5% of country's overall waste. Slurries and manure also add to the pile of waste unless utilized as agricultural fertilizer.

The InFarm vertical farming system however gives plants only what they need: nutrients, water and light. No soil, no waste.

FOOD STARTUP INCUBATOR AND FAB LAB.

The kitchen in the Food Startup Accelerator along with the Green Fab Lab will be the perfect platform for food entrepreneurs to develop their products. The proximity with a strong distribution hub (Krónan's dark store and the farmers market) will help bring their product to market.

A great example of a recent project that would have benefited from the synergy in the Smart Food Campus is product designer Björn Steinar Blumenstein's "Catch of the day". Embracing the ethos of cradle-to-cradle and the circular economy, Björn produces spirits by distilling salvaged fruits, collected from food importer and supermarket dumpsters. He designed and built an open source distilling machine—exactly the kind of project that takes place in a Fab Lab—and hand produces each bottle of vodka from a singular find, be it bananas, grapes, or pineapples.

"Catch of the day is fighting food waste - one spirit bottle at a time. Spirits produced from leftover fruits prolongs the 'best before' date to infinity - since alcohol over 23% can never go bad. Armed with a simple open-source distilling machine, Björn Steinar is seeking innovative ways to fight food waste, and at the same time the project serves as an icebreaker in a very important discussion."

CONSTRUCTION WASTE.

It is difficult to give exact figures of construction waste produced on a typical construction site, but it is estimated that it is as much as 30% of the total weight of building materials delivered to the site. Typical construction waste products can include insulation and asbestos materials, concrete, tiles and ceramics, wood, glass, plastic, bituminous mixtures, tar, metallic waste, contaminated soil, stones, gypsum, paints, varnishes, adhesives and sealants, and the list goes on. Demolitions create yet another overwhelming amount of useless debris.

In the Smart Food Campus construction waste is minimized in 3 efforts:

– Upcycling instead of demolishing the existing structure;
– Using pre-fabricated mass timber elements instead of cast-in-place concrete, which has been Iceland's go-to material for decades;
– Working with a detailed BIM model—a digital carbon-copy of the building, in order to make precise material take-off schedules and minimize over-ordering or inaccurate estimating.

The main structural materials added are Glulam and CLT. These engineered timber products are manufactured off-site to millimetric precision. A mass timber construction site generates much less waste than the concrete equivalent. Some manufacturers go the extra mile and deliver the CLT elements wrapped in a reusable canvas, as opposed to the customary single-use plastic wrap. Once the elements are unloaded the canvas is sent back to the factory to wrap a new shipment.

At the Rombach—NurHolz CLT factory in Southern Germany, the timber elements are wrapped for delivery in a reusable canvas.

CLIMATE CHALLENGE #8

BIODIVERSITY, URBAN RE-VEGETATION AND AGRICULTURE

VERTICAL GARDEN.

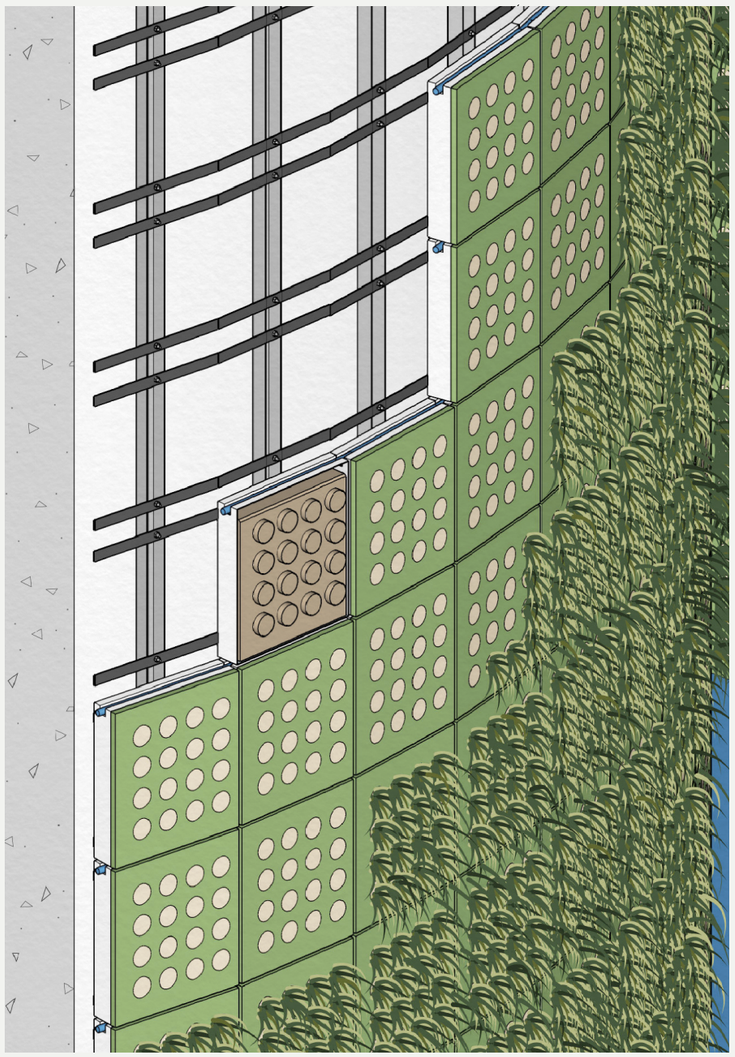
The ecological value of the Sævarhöfði site is quite low. This currently grey and deserted piece of land is an urgent opportunity to develop greenery introducing new plant species and create an exemplary micro-cosmos of thriving vegetation.

Incorporating natural elements into the built environment, a practice known as biophilic design, has been proven to reduce stress, enhance cognitive function and creativity and improve well-being in general.

Using sophisticated vertical garden systems and elegant lighting design, the silos will be covered in evergreens. Carefully picked species will live throughout the seasons with a little help from excess heating pumped from the indoor farms.

Visible from all over Reykjavík, the towering gardens will be a warm and welcoming landmark in the neighborhood, and reflect the ecological strength of the Smart Food Campus.

A lush ivy-covered façade on Sóleyjargata, in 101 Reykjavík, photographed in January 2020. It remains green throughout the winter.



A vertical garden system such as GSky Pro Wall (pictured) will be installed on the external surface of the silos.

LOCAL AGRICULTURE.

Keeping the world nourished has always been a challenge. With the rate at which the population is growing, and with a climate crisis looming, food production and distribution will have to undergo radical changes, and starting immediately if we want to survive as a species.

Holland is one of the world's biggest exporters of fruit and vegetables—in spite of its tiny territory and electricity generated primarily from gas (52%) and coal (27%). Iceland, with abundant geothermal heating and 100% green energy, has much better conditions for indoor farming and could produce most if not all of the fruit and vegetable consumed domestically.

Technology and know-how can do a lot to help us grow more produce locally, with a smaller environmental impact and less dependency on external factors. The Smart Food Campus will be a driver of such innovation, pushing the boundaries of indoor farming and local food and beverage production.

In May 2020 the Union of Horticultural Farmers in Iceland and the Government signed an agreement to promote development and innovation in agriculture with a focus on climate action. The goal is to increase the domestic production of vegetables by 25% and be fully carbon neutral no later than 2040. The Smart Food Campus farms will be a huge opportunity to introduce production of food that doesn't normally grow in Iceland.

EMULATING REMOTE ENVIRONMENTS.

Local produce has always been quite limited in Iceland. With vertical farming it's possible to recreate the environmental conditions—light, temperature, humidity CO_2 levels—of any place on earth and produce the ideal conditions for each crop. Instead of shipping food we import environmental data and grow the food locally.

Fresh local produce is safer, contains more nutrients, tastes better and produces a much smaller carbon footprint than imports. Plus, vertical farming requires 75% less fertilizer than traditional agriculture, zero pesticides, fungicides and herbicides and takes up 99,5% less space.

InFarm farms currently support 65 species. Each 7x7x24m farm produces about 1,500kg of herbs, 2,000kg of leafy greens or 2,800kg of salads per month. In 25m^2 InFarm yields as much as 10,000m^2 of traditional farmland.

Everything grows year-round under perfectly controlled conditions, regardless of location and climate. The farms are connected to a central cloud-based brain that learns, adjusts and improves itself constantly, so each plant grows better than the one before.

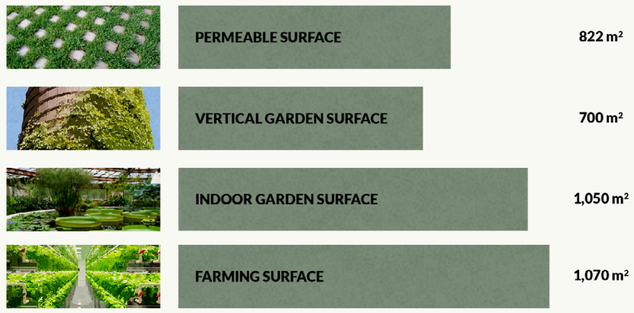
In addition to the farms in the silos, the entire roof of the dark store will be dedicated to cultivation. Allotments will be available to the general public and small farming businesses. The connection with the distribution hub, the experimental kitchen and the rest of the Campus will be a great advantage to anyone who wants to join the urban farming community.

WINTER GARDEN.

While access to the farms will be fairly restricted due to sanitary reasons, a lush winter garden in the main hall of the old cement factory will be open for visitation.

A mid-winter trip to this artificially warm but veritably green ambient will prove therapeutic. The main hall with it's 8 meter high ceiling will be a multi-purpose space for events, concerts, exhibitions, workshops, a valuable space for the community in the neighborhood and beyond.

VERTICAL FARM	OUTDOOR/GREENHOUSE
Not affected by seasons, multiple harvests a year.	Yield varies substantialy between seasons.
Predictable and controlable output, quality and taste.	Output varies according to external adversities.
Closed and sanitized environment, pest control unnecessary.	Some form of pest control usually needed.
Layers controlled individually, multiple crops posible at the same time.	Limited by one type of climate.



A vertical farm consists of crops stacked onto shelves, where plants grow in a thin layer of circulating water with nutrients. Vertical farms are selfcontained environment systems that can operate indoors regardless of climate, season or location. They're remotely controlled by farming-as-a-service providers such as Smart Food Campus partner Infarm. Besides nutrients, the operation only requires clean water and electricity–resources that Iceland has in abundance. If 40% of the produce imported into Iceland comes from greenhouses in the Netherlands, it would be reasonable to assume that all of these imports could eventually be grown right here in Iceland, just a few km from the table. Produce starts losing taste and nutritional value as soon as it's harvested. The less food travels, the better it is for our health and well-being, and the smaller its carbon footprint.

ENERGY EFFICIENCY AND CARBON ENERGY CONSUMPTION

Energy modelling analysis has been made to identify the energy performance of the project and the carbon footprint of the energy usage. The energy analysis is also used to compare and assess possible design proposals in order to reduce the energy demand and lower the energy carbon footprint.
The energy performance software SIMIEN was used make these assessments and based on local regulations.

The analysis of the building's energy consumption is based on an assessment of activities that will be in the building and an estimation of what activities could occupy the remaining free spaces of the building. The underground parking is assumed to be an unheated space. About 20% of the parking spaces will have EV charging and it is estimated that the energy demand of each charger is about 1,4 kWh/year.

The analysis made is detailed enough to provide a basis for the project benchmark regarding the energy performance of the project. More detailed analysis will be made at a later stage.

MAXIMUM YEARLY ENERGY USAGE AND CO_2 EMISSIONS

ELDSTÆÐI	500 m²
VERTICAL FARM	49 m²
REST	4412 m²

	HYDRO kWh/m²/year	HYDRO kWh/year	GEO kWh/m²/year	GEO kWh/year	HYDRO+GEO kWh/m²/year	TOTAL kWh/year	CO_2 kg/m²/year	**TOTAL CARBON FOOTPRINT CO_2 kg/year**
VERTICAL FARMS	12,290	602,224	4,546	222,740	16,836	824,964	106.1	**5199**
KITCHEN (STARTURP INCUBATOR)	33	16,294	12	6,026	45	22,320	0.3	**141**
EV CHARGERS (22 KW 8 UNITS)	0.003	11			0	11	0.00	**0.08**
LIGHTING	7	32,892			7	32,892	0.06	**245**
VENTILATION	12	51,297			12	51,297	0.09	**382**
HEATING			97	425,908	97	425,908	0	**1363**
HOT WATER			12	55,080	12	55,080	0	**176**
TOTAL	**12,342**	**702,717**	**4,667**	**709,755**	**17,009**	**1,412,472**	**107**	**7,506**

EV Charging 22kW *1.4* *kWh/year*

ENERGIPOST	**ENERGIBEHOV**	**SPESIFIKT ENERGIBEHOV**
1a romoppvarming	425,908 kWh	108.9 kWh/m²
1b ventilasjonsvarme (varmebatterier)	45,049 kWh	11.5 kWh/m²
2 varmtvann (tappevann)	55,080 kWh	14.1 kWh/m²
3a vifter	50,895 kWh	13.0 kWh/m²
3b pumper	402 kWh	0.1 kWh/m²
4 belysning	32,890 kWh	8.4 kWh/m²
5 teknysk utstyr	47,901 kWh	12.2 kWh/m²
6a romkjøling	00 kWh	0.0 kWh/m²
6b ventilasjonskjøling (kjølebatterier)	00 kWh	0.0 kWh/m²
total netto energibehov, sum 1-6	**658,125 kWh**	**168.2 kWh/m²**

CARBON ASSESSMENT

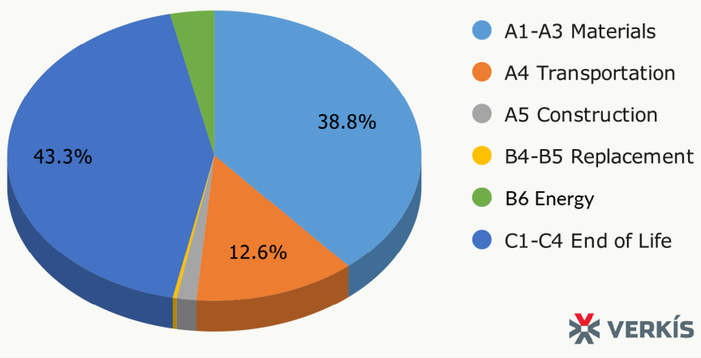
A quantitative assessment of the carbon footprint of the proposed building was done with a high-level life-cycle analysis of the building following the method laid out in the ÍST EN 15978:2011 Environmental performance of buildings and using OneClickLCA. For the calculations, the life-cycle of the buildings was set to 50 years and environmental information of building materials based on product from OneClickLCAs database resembling the most. At this stage only core materials of the building structure were included, excluded are all finishes and technical equipment.

The carbon footprint assessment was done on the building materials (A1-A3) as well as the construction process itself (A4), transport to building site (A5) and end-of-life aspects of the building (D). The building materials that were included in the assessment are those that are being added new to the current structure.

The carbon footprint of the building is estimated at 257 kg CO_2e/m^2 while "Business As Usual" buildings are at 666 kg CO_2e/m^2. The table and graph below show estimated embedded carbon by life-cycle stages.

LIFE-CYCLE STAGES	GLOBAL WARMING kg CO_2e	
A1-A3 Materials	1,264,420	38.79%
A4 Transportation	410,313	12.59%
A5 Construction	49,794	1.53%
B4-B5 Replacement	10,130	0.31%
B6 Energy	1,412,472	43.34%
C1-C4 End of life	112,249	3.44%
	3,259,378	

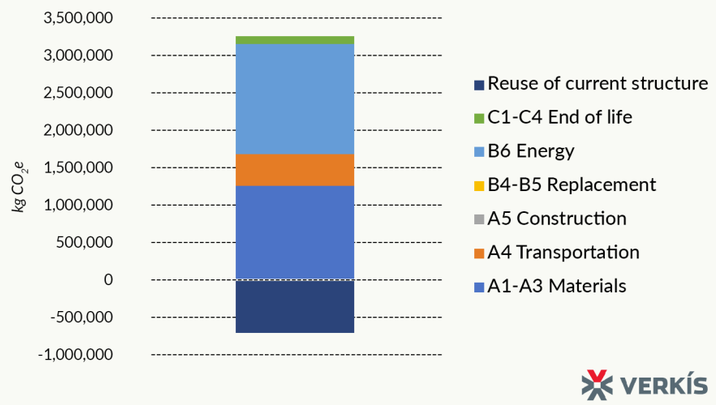
GLOBAL WARMING POTENTIAL BY LIFE-CYCLE STAGES



The largest building elements contributing to the carbon footprint are glass for the greenhouse and the glass crown, concrete and steel rebars for strengthening the concrete.

By reusing the current structure of the silos and factory, use of concrete and steel is saved. The embedded carbon footprint of the structures currently on site are estimated to be 730.000 kg CO_2e.

GLOBAL WARMING BY LIFE-CYCLE STAGES



Excluded from the calculations are possible carbon withdrawals/ sequestration from vegetation. The silos will be covered with ivy/moss and a grass roof on the new expansion. Recent studies show that carbon sequestration of green roofs, walls and other ornamental landscape systems surpasses the carbon footprint of the structural materials used in those systems, during their lifetime, thus providing carbon withdrawals for the whole project. Even though the analysis does not include all activities of the project at this design stage, it does provide enough information about the carbon performance to make a realistic benchmarking for the project as a whole. More detailed analysis will be made at a later stage.

FINAL CONCLUSION:

CALCULATION PERIOD: 50 YEARS
BENCHMARKED CARBON FOOTPRINT FROM ALL LIFE-CYCLE STAGES: 260 KG CO_2e/m^2

ARCHITECTURE AND URBAN DESIGN

Sitting on the corner of two important main streets - Breiðhöfði (new boulevard between Krossmýratorg and Bryggjutorg, and its bridge) and Sævarhöfði (running parallel to the cliff and connecting Grafarvogur and Elliðarósa) - the project will be a landmark and a connector easing the transition between the upper and the lower neighbourhoods.

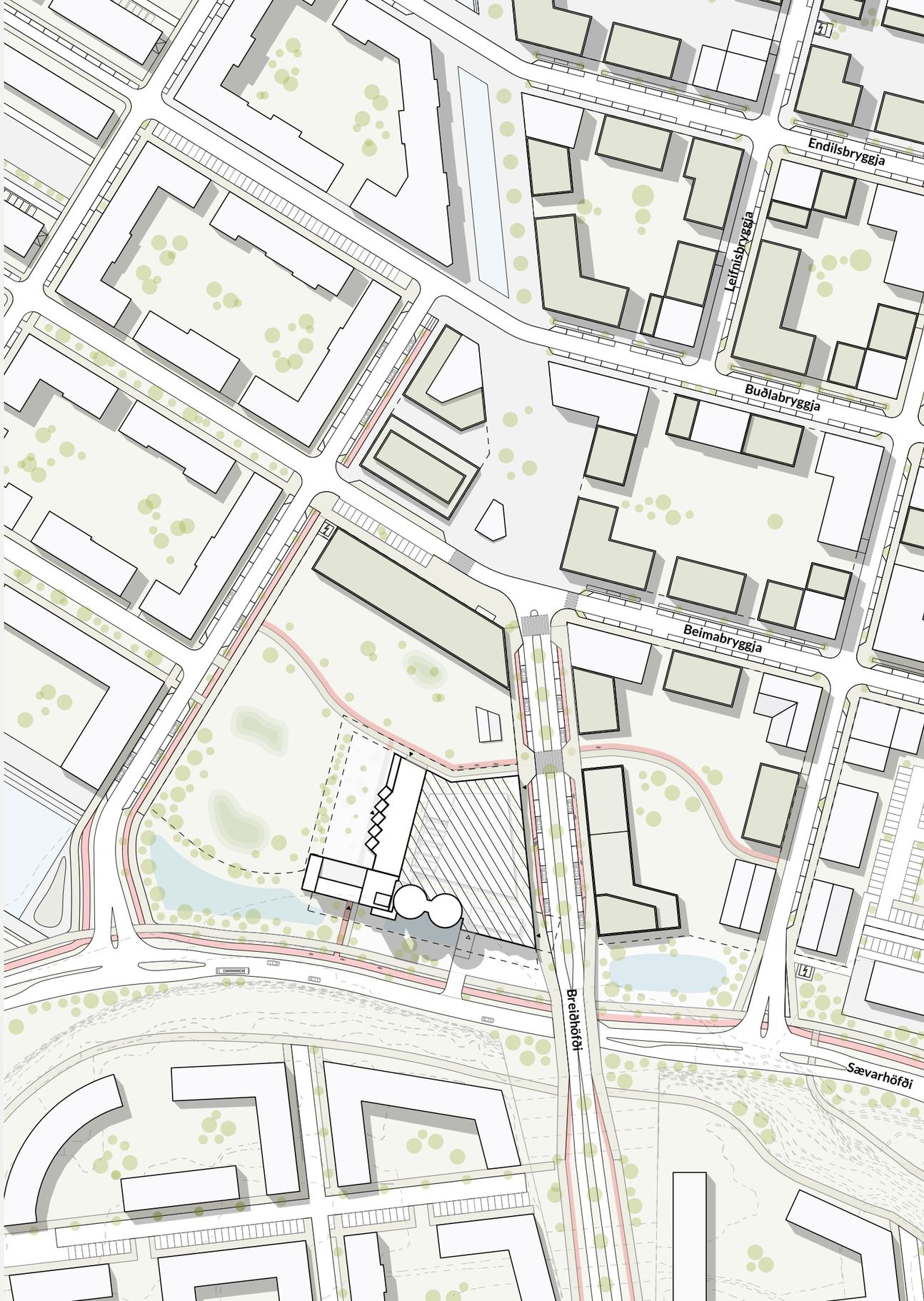
Old hardware, new software.
The existing factory building will be completely repurposed and renovated, but without altering its general form. Traces of its past life will remain as evidence of evolution and improvement, and give the neighborhood the character and depth which is often missing in newly developed areas.

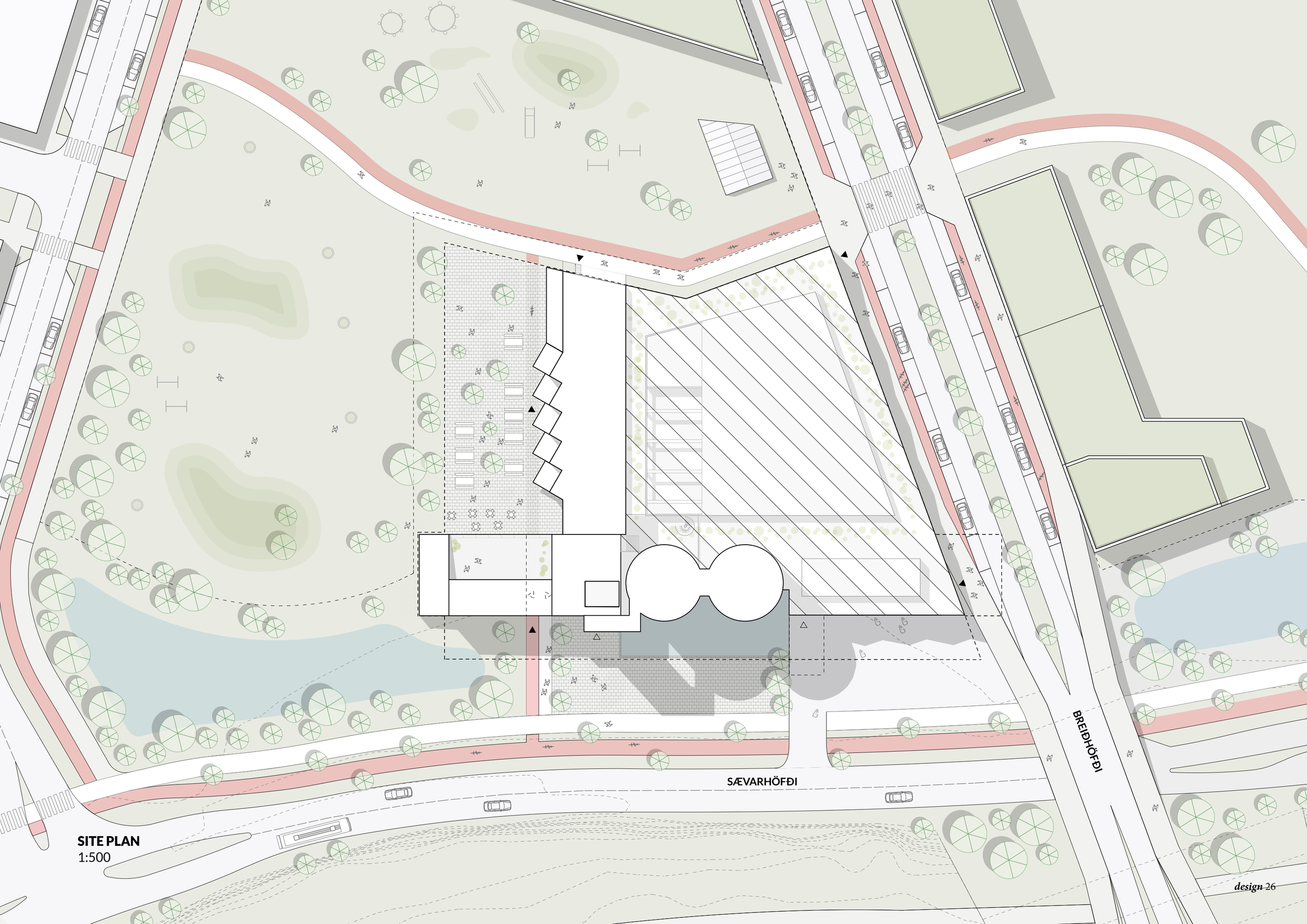
A place to dwell, work, or just to drop by.
The Campus' rich and diverse program will attract people of every age, gender, and class, providing a truly diverse meeting point. The outer layer of the Campus is inviting and permeable from every angle - literally from every corner - and disguises some of the more introverted activities that take place in its core. Offering convenience, places of recreation and work, the building will be a unique neighbourhood magnet constantly surrounded by street life.

"Good architecture is open—open to life, open to enhance the freedom of anyone, where anyone can do what they need to do. It should not be demonstrative or imposing, but it must be something familiar, useful and beautiful, with the ability to quietly support the life that will take place within it."

- Anne Lacaton, Pritzker Prize laureate.

Design Goals.
- To create a cultural institution on the basis of local and sustainable food production.
- To create a unique and attractive building without compromising the character and physiognomy of the existing structure and preserving the heritage of the site.
- To attract all kinds of people from the vicinity, from all over the capital region and also tourists.
- To help prepare the city for a new reality and paradigm where self-sufficiency and resilience are valuable attributes.
- To create an iconic landmark that will be a key player in Reykjavík's youngest and most promising neighborhood.





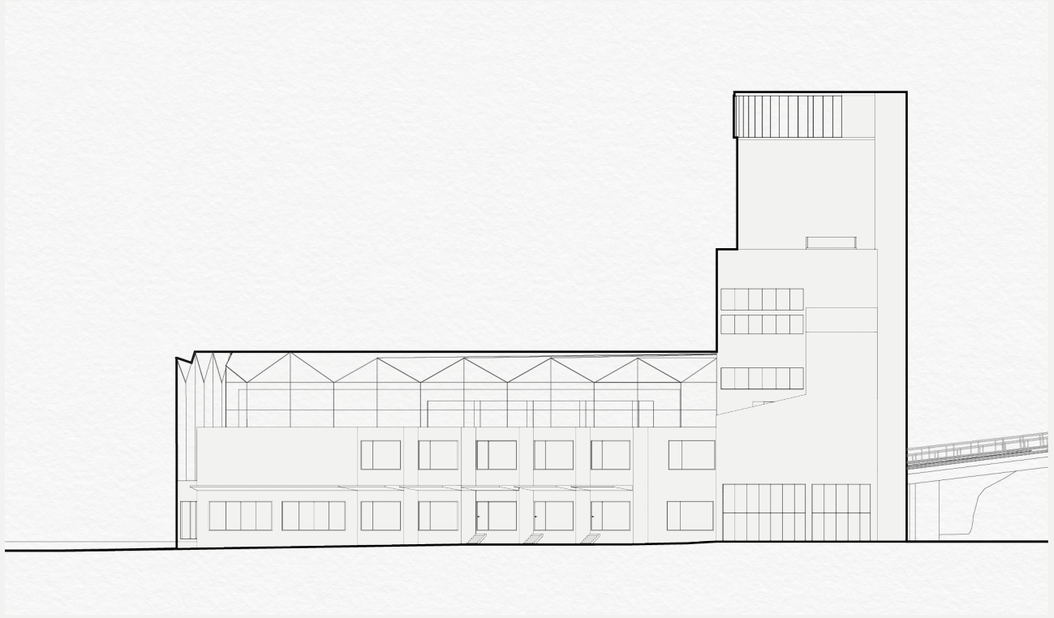
SITE PLAN
1:500


smart city campus


smart food campus

Elevation East
1:500

Elevation South
1:500



Elevation West
1:500

Elevation North
1:500

A twofold intervention.
On one hand the cement factory building and office wing will be discreetly extended to accommodate the new program. The added spaces will morph seamlessly with the existing building.

In order to protect the existing concrete and prevent frequent heat changes which cause the concrete to crack, it will be covered with icelandic rock wool insulation and finished with an untreated aluminium cladding - lending the building a soft and gentle appearance in its new context without compromising its original character or physiognomy. Most of the roof will be replaced by a new and well insulated turf-clad roof.

The first two floors will be thoroughly renovated and adapted to meet the requirements of the restaurant, the farmers market and food court, the food startup incubator and the fablab.

The main entrance on Sævarhöfði leads to the restaurant to the left, the foyer to the right, and through to the inner plaza/biergarten in the northwest part of the site. With its enormous windows and glazed curtain walls, the southwest corner of the Campus will be very permeable and inviting. The restaurant faces the pond and the neighbouring park, with the possibility of outdoor seating in the warmer days of summer. The plaza offers a barrier-free transition between the park and the Campus. For the cyclist, pedestrian or driver approaching the building from west-Sævarhöfði, the Campus will present itself gradually and pleasantly integrated to the park and the pond. For those observing it from afar, the green silos topped by a glass crown will stand out in the landscape, especially when lit and green like an oasis in the middle of winter. By standing before the entrance, under the passage or in the plaza, one can see a lot of what's going on inside the building. That will create a warm and convivial atmosphere.

Section BB

From the public foyer with it's grand staircase one can access the underground level (parking and part of the vertical farm program), the food court and farmers market on the ground floor, and the remaining floors above.

The lobby on the second floor gives access to the green belt (winter garden) and the more restricted parts of the Campus - namely the fab lab and the food startup incubator.

The machine hall on the 3rd floor will remain in a more raw state, preserving its grandiose proportions and fenestration, offering the community a spectacular multi-purpose event space ideal for a wide range of activities - yoga sessions, concerts, conferences, exhibitions, parties. Adjacent to the hall will be a spacious terrace overlooking the plaza and the neighboring park.

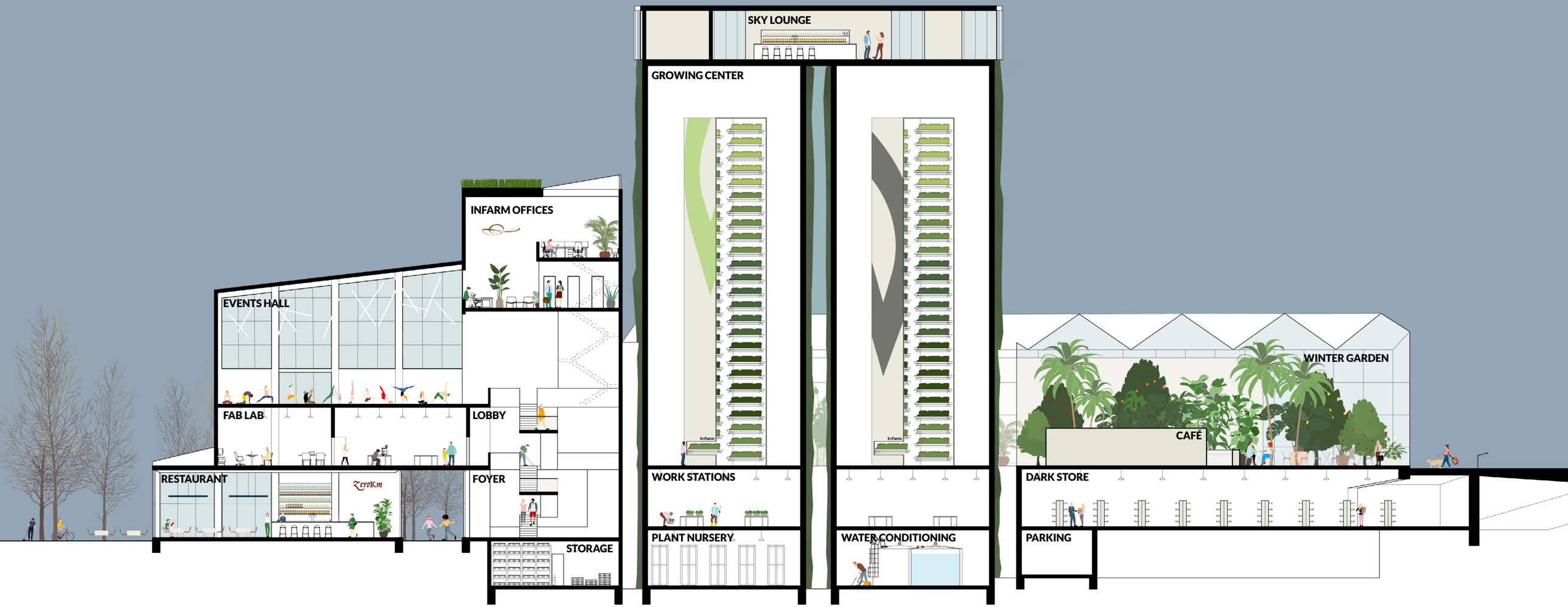
The silos, which host the main vertical farming facilities, are symbolically clad in evergreens to represent the stark transition from grey, polluting industrial icon to a soft, warm and friendly monument to nature. The silos are crowned with a glazed extension, from which one has the most spectacular view to the Capital region and the surrounding mountains.

The new building, on the other hand, is a completely different construction. Using lighter, sustainable materials - timber, glass, ceramic tiles - it will offer a strong yet complementing visual contrast to the existing structure.

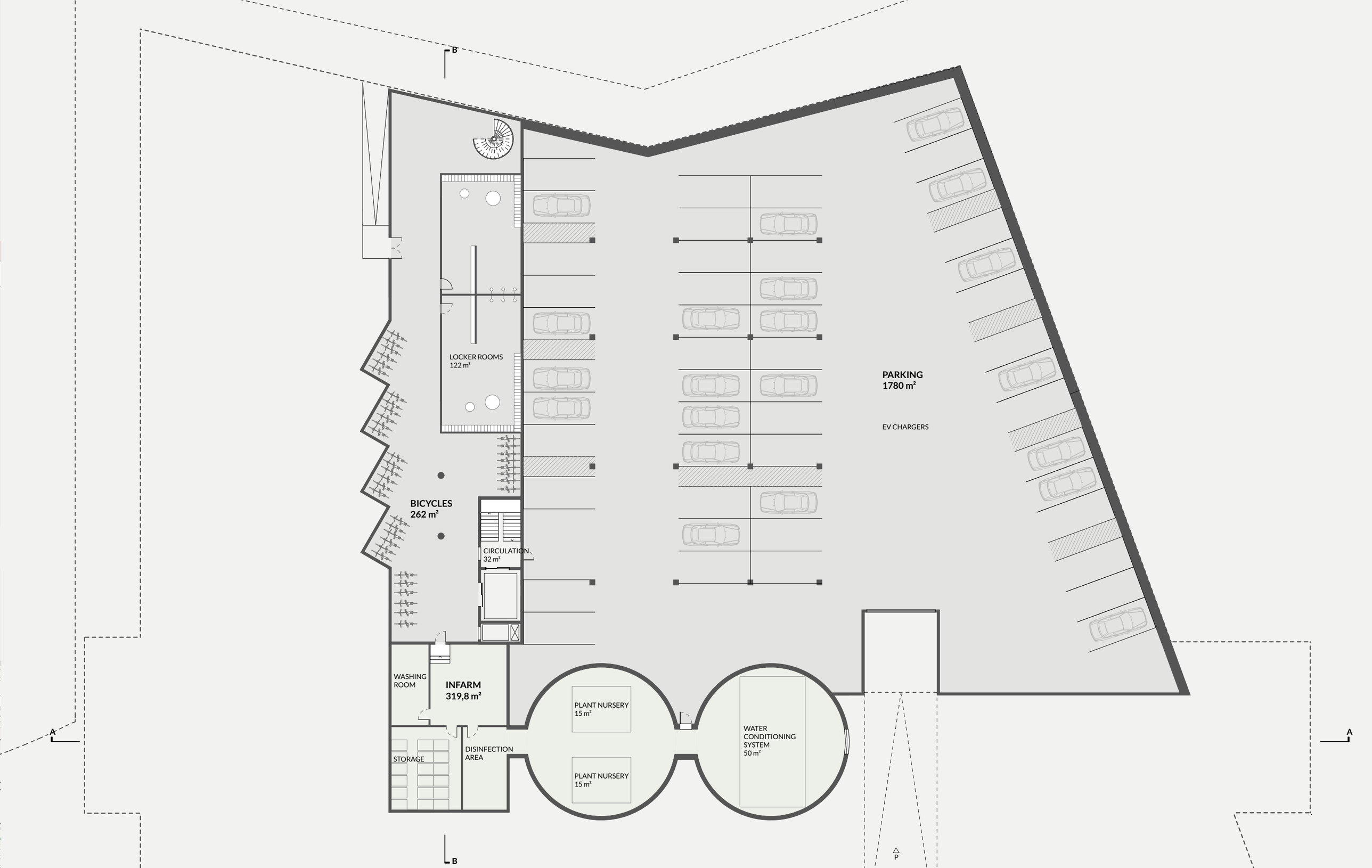
The basement is dedicated to electric vehicle parking and charging stations, and a complete bicycle parking and infrastructure - lockers, changing rooms with shower, bike repair station - to facilitate and incentivize bike commuting.

The ground floor will be entirely dedicated to the dark store, except for a small bakery in the northeast corner. The Sævarhöfði-facing loading docks will be minimally disruptive of the plaza, since they fit snugly between the silos and the bridge.

Above the dark store, and disguising what would otherwise be an unattractive warehouse-like volume, will be a glass-enclosed green belt (winter garden), accessible from the west through the old factory building and also from the southeast corner, where visitors can walk in from the bridge to find the botanical café. Concealed within the green belt is a wood-clad volume with more space dedicated to vertical farming and aquaponics.



Section AA


B
LOCKER ROOMS
122 m²
BICYCLES
262 m²
CIRCULATION
32 m²
WASHING
ROOM
INFARM
319,8 m²
STORAGE
DISINFECTION
AREA
PLANT NURSERY
15 m²
PLANT NURSERY
15 m²
WATER
CONDITIONING
SYSTEM
50 m²
PARKING
1780 m²
EV CHARGERS
A
A
B
P

Level -1
1:250

B

WC

COLD STORAGE

STAFF

FREEZERS /
COOLERS

STORAGE

BAKERY
100 m²

PLAZA/
BIERGARTEN

DRY AISLES

DARK STORE
1920,2 m²

PACKING /
PACKED COLD STORAGE

CIRCULATION
32 m²

FARMERS MARET /
FOOD COURT
569,1 m²

COOLER /
FREEZER

KITCHEN /
STAFF

WC

0 KM
RESTAURANT
204 m²

FOYER

INFARM
209 m²

WORKSTATIONS
(2 x 40 m²)

WORKSTATIONS
(2 x 40 m²)

LOADING DOCKS /
DELIVERY DOCKS

A

A

CIRCULATION
13,6 m²

MAIN ENTRANCE

B

P

Level 1
1:250

B

CIRCULATION
22 m²

DARK STORE
MEZZANINE
113 m²

MEETING ROOM

LOCKERS

A

A

B

P

Level 1 MEZZANINE
1:250

B

WALK - IN
COOLER/FREEZER

DRY STORAGE

WC

FOOD STARTUP
INCUBATOR
395 m²
WORKSTATIONS

CIRCULATION
32 m²

FISH TANKS

WATER
CONDITIONING

WATER TANKS

SHARED TOOLS

ROOFTOP FARM
1068 m²

LOBBY
74 m²

OFFICE /
MULTIPURPOSE
118 m²

FAB LAB
90 m²

LAB EQUIPMENT

CIRCULATION
13,6 m²

INFARM
GROWING
CENTER

INFARM
GROWING
CENTER

WINTERGARTEN
810,7 m²

KITCHEN

STAFF

BAR

A

A

B

Level 2
1:250

B

WINTER GARDEN
238 m²

BALCONY

WC

EVENT HALL
166,4 m²

CIRCULATION
13,6 m²

INFARM
GROWING
CENTER

INFARM
GROWING
CENTER

A

A

B

Level 3
1:250

B

A

WC

INFARM
132 m²
OFFICES

CIRCULATION
13,6 m²

B

INFARM
GROWING
CENTER

INFARM
GROWING
CENTER

A

Level 4
1:250

B

A

SKY DECK LOUNGE
223 m²

BAR

WC

STORAGE

CIRCULATION
24 m²

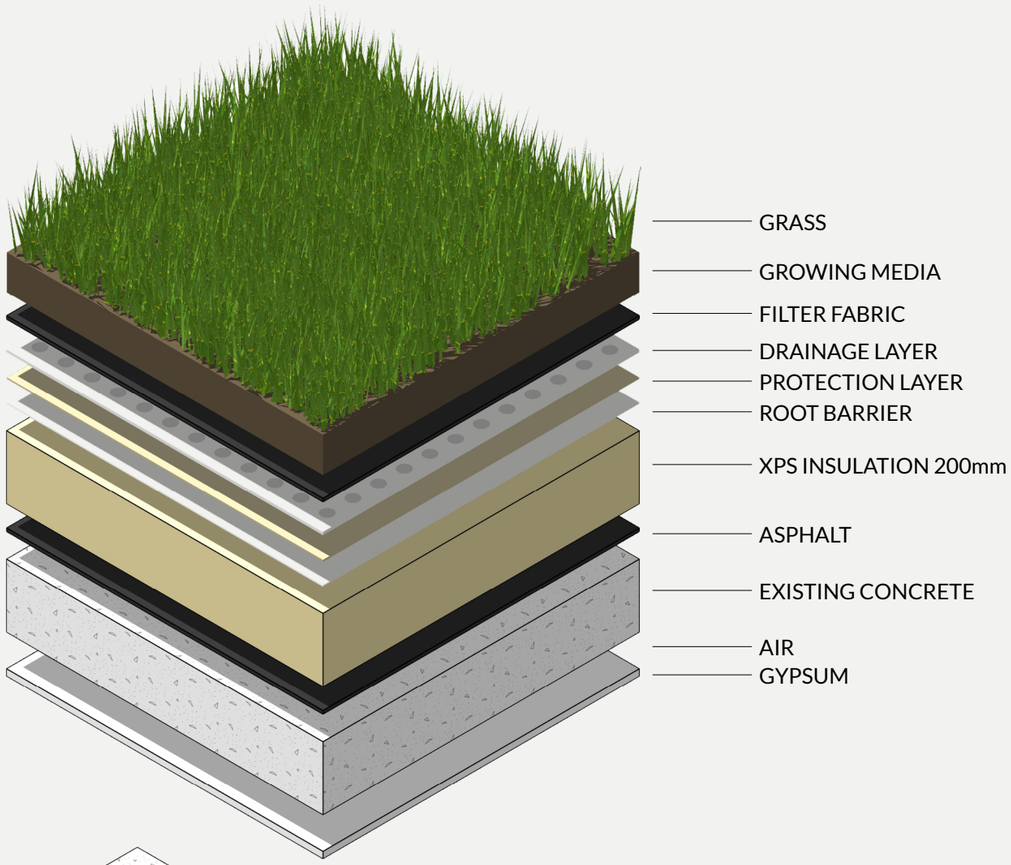
B

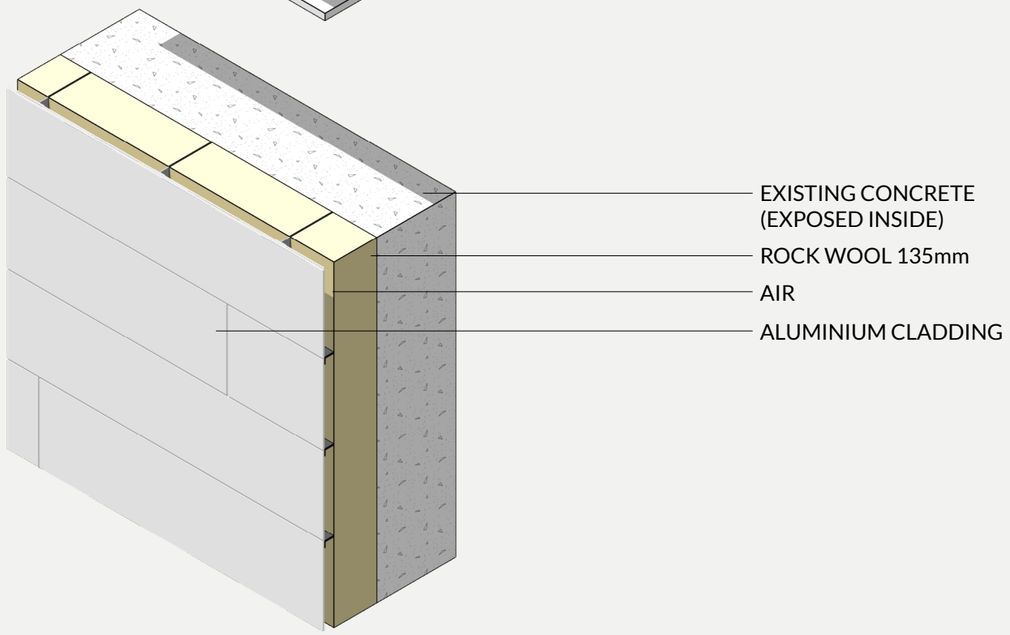
A

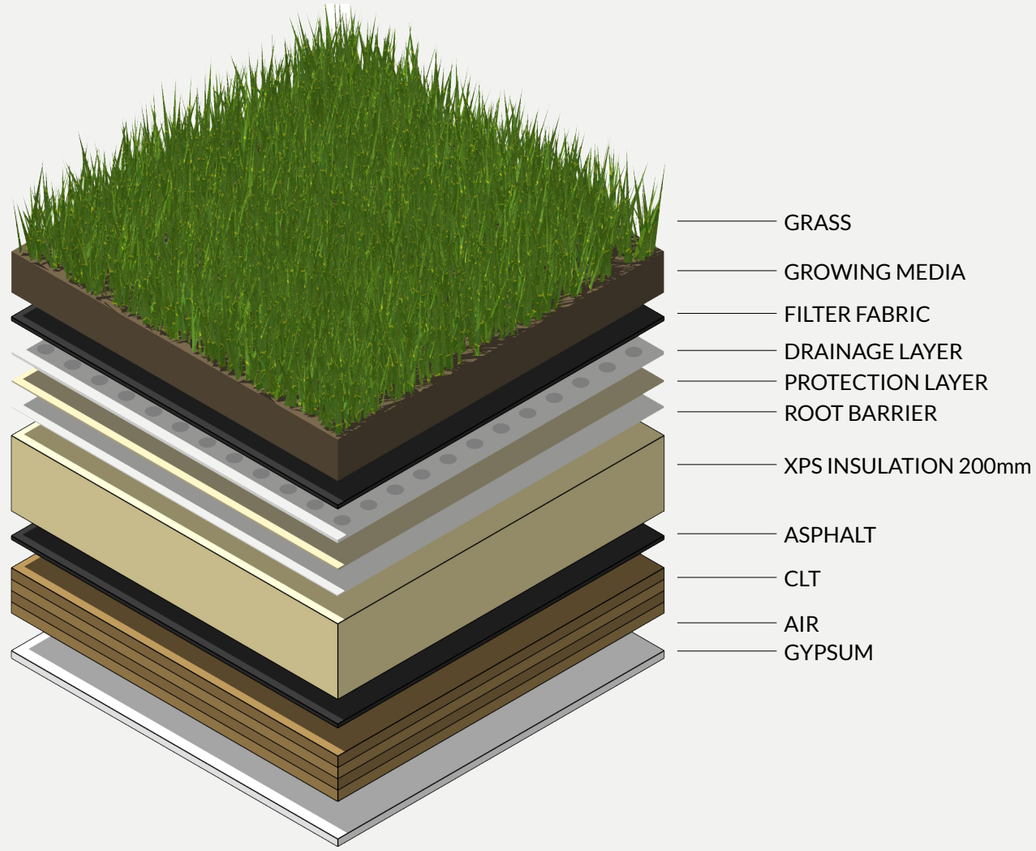
Level 5
1:250

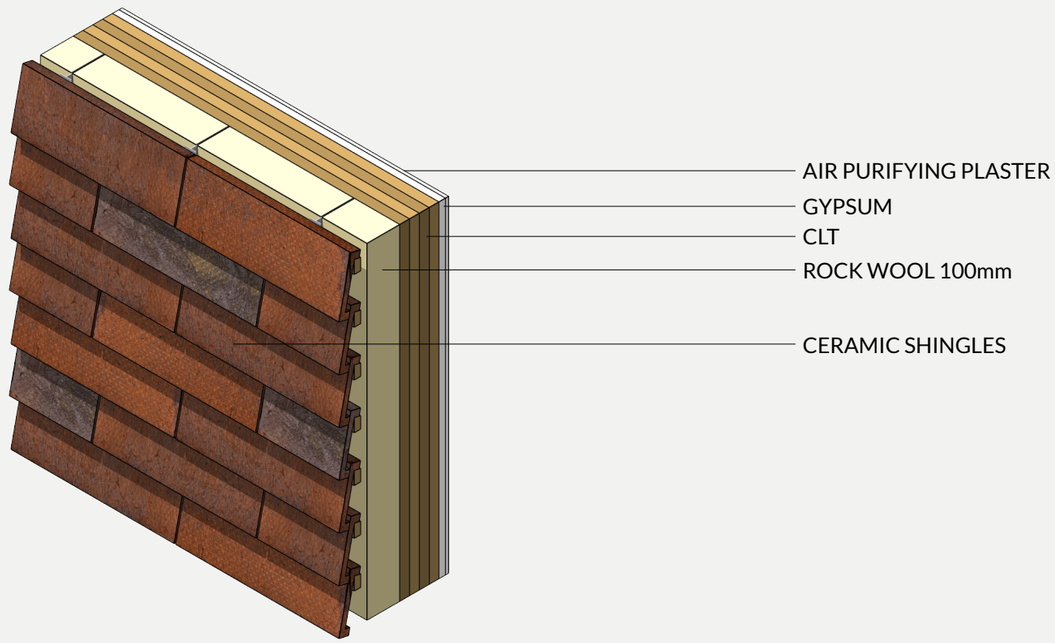
CONSTRUCTION APPROACH

old building | *new building*







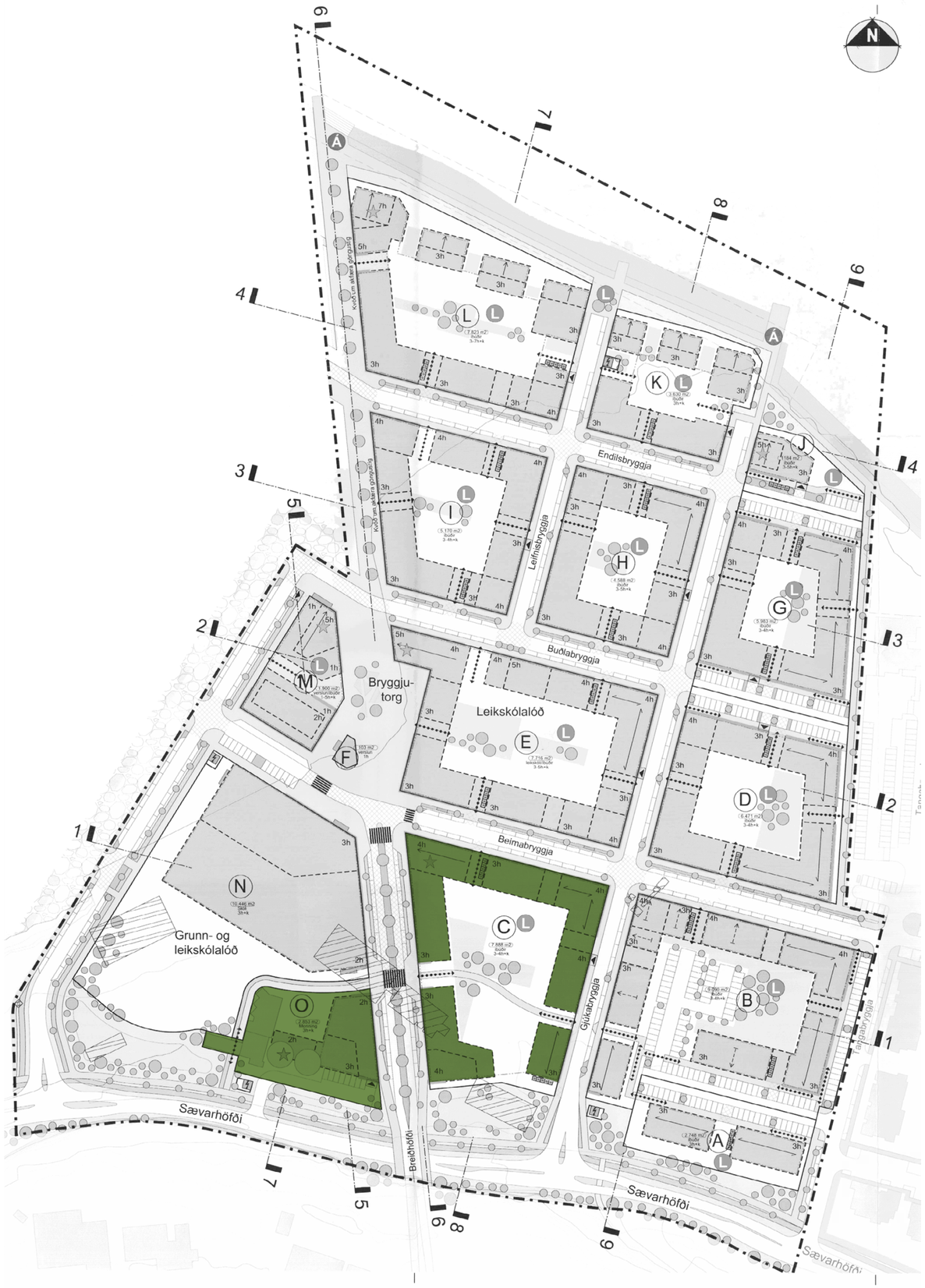


FURTHER DEVELOPMENT

Considering the growth of the innovative food sector in the past few years in Iceland, one can expect that the Smart Food Campus will quickly become too small for the demand. Other food businesses will certainly be attracted to the area and Krónan will need a larger facility in the near future.

As Reykjavík grows and matures as a city, it should depart from its monocentric configuration and cultivate its secondary centers. If Grafarvogur is bound to become a film production district, with the Smart Food Campus Bryggjuhverfi will be on track to become the gourmet district of Reykjavík.

The Sævarhöfði 31 plot doesn't have room for growth, but an expansion area will be crucial for the Smart Food Campus to realize its full potential as a catalyst. To create that possibility the City should consider allocating the neighboring plot C for further development of the Campus.



The Reykjavík Grapevine

Enter Eldstæðið: Reykjavík's Latest Food Tech Incubator Prizes Community

Published March 15, 2021

Words by
Shruthi Basappa
Photo by
Art Bicnick & Haraldur Guðjónsson Thors

Brought to you by

Eva Michelsen is showing me around Eldstæðið, Reykjavík's latest commercial kitchen for food entrepreneurs and small producers. The kitchen is a modern all-white and stainless steel affair, with only the synchronised movements of people tempering chocolate, shaping patties and packing kormas belying the industrious air of what really goes on in its quiet, sanitised spaces.

I first met Eva Michelsen, a spirited food tech entrepreneur, when she was organising the Nordic Kitchen Workshop in 2018. Over the next two days, amongst a room full of food start-ups, participants shared the trials and hurdles of getting their product to market.

Between now and then, she has gone on to start Eldstæðið, a commercial kitchen impressive not only for its ambition, but also for bringing six food vendors to store shelves in just six months of operations! So if you recognise names like Arctic Pie, Bao Bao Buns, Anna Marta pesto, Keto Eldhúsið's ready to eat meals, Ella Stína's vegan patties, Svava Sinnep and The Grumpy Whale Hot Chocolate, they are all working out of Eldstæðið.

Eva Michelsen. Photo by Haraldur Guðjónsson Thors.

A new solution for an old problem

As many learnt during the pandemic, especially around Christmas, one simply does not whip up Sarah Bernhardts in their kitchen to sell online. "Packaged food products are a whole other thing," Eva smiles knowingly. With a confectionery business of her own, Michelsen Konfekt, she knows first hand the many challenges with being a small producer.

"The hurdle for a lot of people is knowing where to start. What are the rules, what is packaging, what is a quality handbook? It can all get overwhelming."

But when there is MATIS, the government-run kitchen, why Eldstæðið? "They're a test kitchen and they only allow one producer at a time," Eva clarifies "There is limited storage space. Eldstæðið, on the other hand, is a fully equipped commercial kitchen where up to three producers can work alongside one another at a time. We have shared infrastructure and offer a community and network of shared experiences," she shares.

Why should someone choose Eldstæðið and not go it on their own instead? "Do you have 15-16 million króna?" Eva quips, bluntly. "I did the numbers and if I had to take on a loan, I simply wouldn't have done it," she confesses. "The hurdle for a lot of people is knowing where to start," she explains. "What are the rules, what is packaging, what is a quality handbook? It can all get overwhelming. Because I am responsible for a lot of the things at Eldstæðið—fire safety, insurance, pest control—the undertakings of the producers are a lot easier," she explains.

"If I was a governmental agency, I couldn't say no to anyone, but being privately run like this, I can stipulate my own conditions—for instance, we don't allow deep frying, we are flexible with our opening times. We can do what we want to, when we want to," she laughs jokingly.

Culinary community

As we walk around the facilities, Eva excitedly shares that they are looking forward to new blast chillers, as the swanky coolers are already proving insufficient due to the rising demand for a spot at Eldstæðið. "There is a growing waiting list," she beams proudly.

There is a tangible barrier to entry for novice home cooks looking to scale their operations. When legalese and licenses can stifle that entrepreneurial spirit, Eldstæðið is a "one-stop shop," as Eva succinctly describes. With their Icelandic and English policy in place, it has naturally proven popular with New Icelanders wanting to share their taste of home as well.

Besides the kitchen area, there is an event space, conference and meeting rooms. "Each month we get a food entrepreneur to tell their story. We've had Óskar from Omnom, we're expecting BitaViking next," Eva shares. "I know first hand how paralysing it can be to take that leap of faith. So this is about creating this network, to create these shared experiences."

"What we offer is a community."

Visit Eldstæðið at Nýbýlavegur 8. For more information click here.

Join Extra Crunch

Infarm raises $170M in equity and debt to continue building its 'vertical farming' network

Steve O'Hear @sohear / 4:00 AM GMT • September 17, 2020

Comment

Image Credits: Infarm

Infarm, the vertical farming company that has built a network of urban farms to grow fresh food closer to consumers, has raised $170 million in new investment in a "first close" of a Series C.

Leading the round — which is expected to reach $200 million and is a mixture of equity and debt — is LGT Lightstone, with participation from Hanaco, Bonnier, Haniel and Latitude. Existing Infarm investors Atomico, TriplePoint Capital, Mons Capital and Astanor Ventures also followed on. It brings the company's total funding to date to more than $300 million.

That's likely testament to the speed of new retail partnerships over the last 12 months. They include Albert Heijn (Netherlands), Aldi Süd (Germany), COOP/Irma (Denmark), Empire Company's Sobeys, Safeway and Thrifty Foods (Canada), Kinokuniya (Japan), Kroger (U.S.) and Marks & Spencer and Selfridges (U.K.).

With operations across 10 countries and 30 cities worldwide, Infarm says it now harvests more than 500,000 plants monthly, and in a much more sustainable way than traditional farming and supply chains. Its modular, IoT-powered vertical farming units claim to use 99.5% less space than soil-based agriculture, 95% less water, 90% less transport and *zero* chemical pesticides. In addition, 90% of electricity used throughout the Infarm network is from renewable energy and the company has set a target to reach zero emission food production next year.

Founded in 2013 by Osnat Michaeli, and brothers Erez and Guy Galonska, Infarm's "indoor vertical farming" system is capable of growing herbs, lettuce and other vegetables. It then places these modular farms in a variety of customer-facing city locations, such as grocery stores, restaurants, shopping malls and schools, thus enabling the end-customer to actually pick the produce themselves. To further scale, it also installs Infarms in local distribution centres.

The distributed system is designed to be infinitely scalable — you simply add more modules, space permitting — whilst the whole thing is cloud-based, meaning the farms can be monitored and controlled from Infarm's central control centre. It's also incredibly data-driven, a combination of IoT, Big Data and cloud analytics akin to "Farming-as-a-Service."

The idea, the founding team told me back in 2017 when I profiled the nascent company, isn't just to produce fresher and better-tasting produce and re-introduce forgotten or rare varieties, but to disrupt the supply chain as a whole, which remains inefficient and produces a lot of waste.

"Behind our farms is a robust hardware and software platform for precision farming," explained Michaeli at the time. "Each farming unit is its own individual ecosystem, creating the exact environment our plants need to flourish. We are able to develop growing recipes that tailor the light spectrums, temperature, pH and nutrients to ensure the maximum natural expression of each plant in terms of flavor, colour and nutritional quality."

On that note, I caught up with two of Infarm's founders to get a brief update on the Berlin-headquartered company and to dive a little deeper into how it will continue to scale.

TechCrunch: What assumptions did you make early on that have turned out to be true or, more interestingly, not panned out as expected?

Osnat Michaeli: When we first chatted about four years ago, we were 40 people in Berlin and much of the conversation centered around the potential that our approach to urban vertical farming might have for retailers. While for many it was intriguing as a concept, we couldn't have imagined that a few years later we would have expanded to almost 10 countries (Japan is on its way) and 30 cities, with partnerships with some of the largest retailers in the world. Our assumptions at the time were that retailers and their customers would be attracted to the taste and freshness of produce that grew right in front of them in the produce section, in our farms.

What we didn't anticipate was how much and how quickly the demand for a sustainable, transparent and modular approach to farming would grow as we, as society, begin to feel the impact of climate change and supply chain fragility upon our lives, our choices and our food. Of course we also did not anticipate a global pandemic, which has underscored the urgency of building a new food system that can democratize access to high-quality, amazing-tasting food, while helping our planet regenerate and heal. The past few months have confirmed the flexibility and resilience of our farming model, and that our mission is more relevant than ever.

In terms of signing on new retailers, based on your progress in the last 12 months, I'm guessing this has gotten easier, though undoubtedly there are still quite long lead times. How have these conversations changed since you started?

Erez Galonska: While lead times and speed of conversations can vary depending upon the region and retailer. In mature markets where the concept is familiar and we're already engaged, deal conversations can reach maturity in as little time as three months. Since we last spoke we are already working with most of the leading retailers that are well established in Europe, U.K. and North America. Brands which in each of their markets are both forerunners in a retail industry rapidly evolving to meet the demand for consumer-focused innovation, while proving that access to sustainable, high-quality, fresh and living produce is not only possible, but can be available in produce aisles today, and every day of the year, with Infarm.

I'm interested to understand where Infarms are installed, in terms of if the majority is in-store and consumer-facing or if the most scalable and bulk of Infarm's use cases are really much larger distribution hubs in cities or close to cities, i.e. not too far away from places with population/store density but not actually in stores. Perhaps you can enlighten me on what the ratio looks like today and how you see it developing as vertical farming grows?

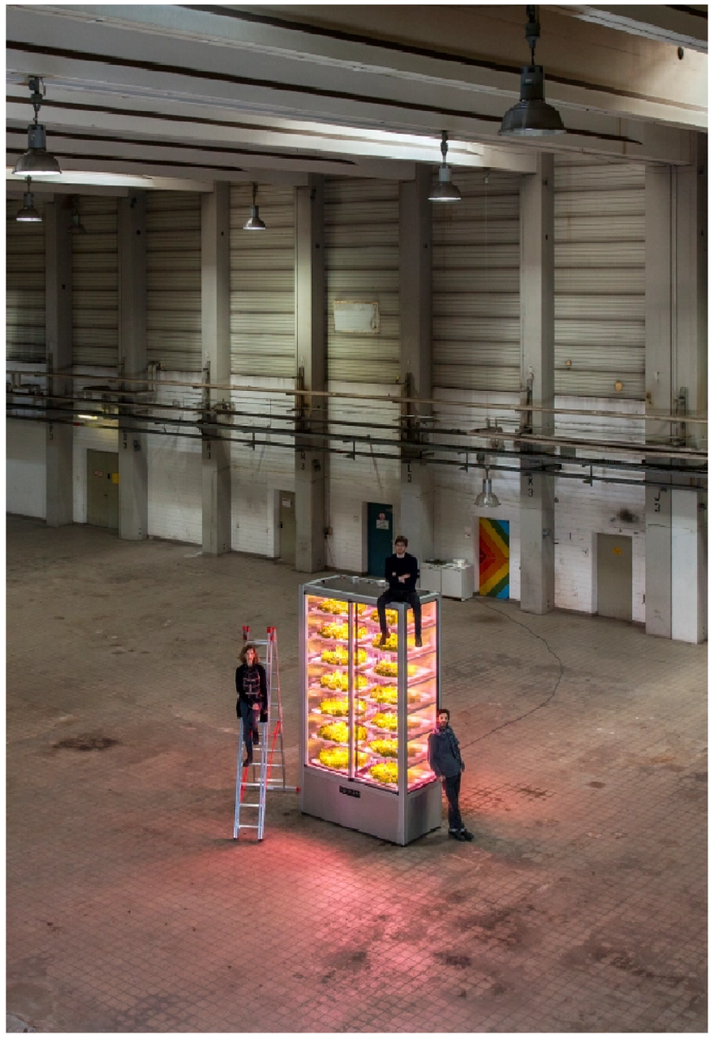
Erez Galonska: Today across our markets, the split between our farms in stores and in distribution centers is roughly 50/50. However, as you anticipate, we will be expanding our network this year with many more distribution hubs. This expansion will likely lead to an 80/20 split as early as next year, with the majority of our regions being served with fresh, living produce delivered throughout the week from centrally located hubs. This not only offers retailers and restaurants flexibility in terms of volumes of output, and the ability to adapt the presentation of our offerings to floor areas of different sizes, but it also allows us to begin to serve whole regions from our next-generation farms under development today.

Based in our hubs, these farms will deliver the crop equivalent of an acre or more of fresh produce on a 25 m2 footprint, with significant further savings in energy, water, labor and land use. We believe this technology will truly challenge ideas of what is possible in sustainable, vertical farming and we look forward to talking about it more soon.

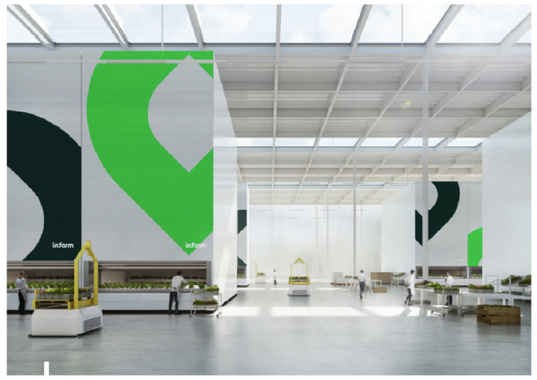
Lastly, what are the main product lines in terms of food on the shelves?

Osnat Michaeli: We have a catalog of more than 65 herbs, microgreens and leafy greens that is constantly growing. Our offerings range from the known and common varieties like Coriander, Basil, or Mint, to specialty products like Peruvian Mint, Red Veined Sorrel or Wasabi Rucola.

Because our farms give us excellent control over every part of a plant's growth process, and can imitate the complexity of different ecosystems, we will be able to expand the diversity of Infarm produce available to consumers to include root vegetables, mushrooms, flowering crops and even superfoods from around the world in the near future. What you see today with Infarm is still only the beginning.



InFarm to Launch a Network of Commercial-Scale 'Modular' Indoor Farms



by Jennifer Marston

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InFarm, a company best known for bringing modular hydroponic farming units to grocery stores, today introduced its Growing Center facility, a combination high-capacity farm and distribution center. The company plans to build out 100 of these facilities by 2025 in major cities all over the world, with the total amounting to 1.5 million square meters of farmland, according to a company press release.

Berlin, Germany-based InFarm already operates a network of smaller, cloud-connected hydroponic farms across the world. These modular units are typically found in the produce section of major grocery retailers, from Marks & Spencer in the UK to Kroger in the U.S. to Aldi in Germany. The pod-like farms are modular, meaning they can vary in size depending on location. And because the leafy greens inside the farms are grown on-site, the buying public gets access to more freshly harvested produce that hasn't traveled the length of a country to reach store shelves.

With its Growing Center initiative, InFarm is essentially scaling up the modular-farm concept. Dozens of InFarm's modular units, each between 10 and 18 meters (about 33 to 59 feet) high, make up one Growing Center. InFarm says these facilities take six weeks to build and will be able to generate "the crop-equivalent of 10,000 m2 of farmland."

InFarm's existing units in grocery stores are all cloud controlled, so that environmental elements like CO2 levels, farm temperature, light and pH levels, and plant growth cycles can be set, monitored, and managed remotely across the entire network. In other words, if one combination of those elements works for, say, basil, that "recipe" can be replicated across the entire network.

Growing Centers will plug into this network, so that the entirety of InFarm's units are connected to "a central farming brain," according to the company's Chief Technology Officer Guy Galonska. "We've collected more than 300 billion data points throughout our farming network to date. These data enable us to perfect our growing recipes and improve yield, quality and nutritional value, while reducing the production price constantly," he said in today's press release.

While plenty of smaller vertical farms exist nowadays, much of the attention of late has been on larger, commercial-scale facilities that produce pounds of leafy greens that number in the millions. Last year, AeroFarms, Kalera, Plenty, BrightFarms, Nordic Harvest, and many others saw both major funding and significant expansion. Driving a lot of this activity is that commercial-scale farms can produce more delicate types of produce (e.g., leafy greens) closer to consumers, eliminating the need for lengthy shipping times that can damage plants.

All of these companies promise produce grown more efficiently, with less water and energy required than would be with traditional farming. However, at this point, most data is siloed within each company, so it's difficult to find a truly universal, objective point of view when it comes to efficiency and energy savings. That doesn't however, mean the numbers are all a smokescreen. In fact, of all the things the controlled ag sector did in 2020, proving itself as an important and viable part of the future farming system was the most important. While the role of this method will constantly evolve, its presence will remain a given for the foreseeable future.

For its part, Infarm says its Growing Centers will be located "in major urban centers." So far, 15 are either planned or under construction across, London, Paris, Copenhagen, Tokyo, Vancouver, Seattle, and Toronto. InFarm has not said which of these facilities will open first.

UMHVERFIS STOFNUN

19. nóvember.2019 | 11:36

Fyrsta svansvottaða verslunin hér á landi

Á myndinni eru Hjördís Elsa fyrir hönd Krónunnar og Guðmundur Ingi ráðherra.

Umhverfis- og auðlindaráðherra, Guðmundur Ingi Guðbrandsson, veitti í dag Krónunni svansvottun fyrir tvær verslanir, verslun að Akrabraut í Garðabæ og verslun fyrirtækisins í Rofabæ í Árbæ. Um tímamótaskref er að ræða í sögu umhverfisvottunar hér á landi, þar sem þetta er í fyrsta skipti sem verslun fær svansvottun.

„Það er gríðarlega verðmætt fyrir Umhverfisstofnun að fá inn Svansleyfishafa sem er sýnilegur í umræðunni í samfélaginu og nálægt neytendum," segir Elva Rakel Jónsdóttir, sviðstjóri hjá Umhverfisstofnun.

Viðmið Svansins fyrir dagvöruverslanir

Viðmið Svansins fyrir dagvöruverslanir voru upprunalega þróuð árið 2003 og hafa tekið nokkrum breytingum síðan þá. Vottunin er heildræn nálgun á þeim umhverfisávinningi sem má ná af rekstri dagvöruverslana. Þar ber helst að nefna vöruúrval, orkunotkun, úrgangsstjórnun og matarsóun. Einnig er hugað að innkaupum verslananna sjálfra þar sem lögð er áhersla á umhverfisvottaðar vörur og þjónustu. Svansvottun hér á landi er eitt af fjölþættum verkefnum Umhverfisstofnunar.

Fjölþættar aðgerðir

Meðal aðgerða sem Krónan hefur gripið til er aukin áhersla er á úrval vara með umhverfisvottun og hefur fyrirtækið auðkennt þær í verslun, auk matvöru með lífræna vottun. Einnig var ráðist í að gera hollari vörur sýnilegri á sama tíma og sælgæti hefur verið fjarlægt af afgreiðslusvæði. Matvörur sem nálgast síðasta söludag eru lækkaðar í verði og settar á svæði merkt „síðasti séns – minnkum matarsóun". Þá er Krónan einnig í samstarfi við aðila sem koma brauðmeti í áframnýtingu sem dýrafóður. Nýjar verslanir hafa verið hannaðar með orkusparnað að leiðarljósi og umhverfisvænni kælikerfi. Dregið hefur verið úr plastnotkun með því að auka úrval af fjölnota burðarpokum til muna en auk þess voru tekin skref til að færa ferska kjötvöru úr plastbökkum yfir í umbúðir úr aðgreinanlegum pappa og plastfilmu.

Umhverfisvænar lausnir

Fyrirtækið hefur einnig lagt áherslu á að rýna úrgangsmálin og dregið umtalsvert úr almennum úrgangi. Mikill árangur hefur náðst í að draga úr sóun á pappír og pappa en fyrirtækið hætti að prenta út fjölpóst 2016. Sama ár var ráðist í það verkefni að nota fjölnota kassa í innflutningi á ferskvöru sem spara um 162 tonn af pappakössum á ársgrundvelli. Fleira mætti nefna s.s. stefnumótandi ákvarðanir Krónunnar sem hafa leitt til gagngerra breytinga á rekstri og þjónustu verslananna sem skila sér í umhverfisvænni lausnum og vitundarvakningu meðal viðskiptavina.

Jákvæðir viðskiptavinir

„Við hjá Krónunni erum ákaflega stolt af því að vera með fyrstu matvöruverslanirnar sem fá Svansvottun á Íslandi. Ferlið með Umhverfisstofnun er búið að vera mjög lærdómsríkt og gagnlegt fyrir okkur. Við erum staðráðin í að halda áfram vinnunni og fögnum því aðhaldi sem vottunin veitir okkur. Ég vil þakka viðskiptavinum okkar og starfsmönnum, sem hafa af jákvæðni og með opnu samtali tekið þátt í þessu ferli með okkur," segir Hjördís Elsa Ásgeirsdóttir, markaðsstjóri Krónunnar.

Norræna umhverfisvottunin 30 ára

Norræna umhverfismerkið Svanurinn var stofnað af Norrænu ráðherranefndinni árið 1989 og fagnar því 30 ára afmæli um þessar mundir. Ísland var með frá upphafi, ásamt Noregi, Svíþjóð og Finnlandi og bættust Danir við í samstarfið nokkrum árum síðar. Í janúar á þessu ári undirrituðu forsetisráðherrar Norðurlandanna sameiginlega yfirlýsingu um kolefnishluthlaus Norðurlönd og undirstrikuðu þar með vilja sinn til að vera leiðandi þegar kemur að baráttunni gegn loftslagsbreytingum. Í yfirlýsingunni er Umhverfismerkinu Svaninum lyft sérstaklega upp sem eitt af þeim tólum sem er til staðar til að hvetja neytendur til að haga sinni neyslu með þeim hætti sem lágmarkar álag á umhverfið og loftslagið.

*__KRÓNAN__ was the first store in Iceland to receive the Nordic Swan Ecolabel.
By December 2020 every Krónan store was Swan-labeled.