

# Smart building & smart infrastructure



In the face of climate shifts, digital advances, and urban expansion, Living Tomorrow envisions a fresh approach to buildings and infrastructure. Beyond static structures, their concept emphasizes adaptability and eco-friendliness. This perspective aims to put the people first, while also addressing urgent environmental concerns.

Recognizing that buildings are integral to communities and ecosystems, Living Tomorrow emphasizes structures that go beyond their basic functions. We envision environmentally positive spaces that enhance inhabitants' lives. With technology and data, the role of smart technologies in reshaping building designs and functions becomes paramount.

This extends to architects' roles, public-private partnerships, and sustainable practices. Innovations such as biomaterials, XR tech, and IoT are set to reshape construction processes.

Collaborations will shape the future of smart structures, enhancing cost-efficiency and sustainability, through IoT integration and long-term maintenance. Circular designs and 3D-printed buildings offer solutions to reduce waste and improve adaptability to handle more complex structures.

Living Tomorrow's vision speaks to a fundamental shift in how we perceive, construct, and experience spaces, thus contributing to the UN Sustainability Development Goals.



## 3 GOOD HEALTH AND WELL-BEING



### SDG 3

# Good health and well-being

Working towards a future of buildings that considers the broader environmental impact, and a harmonious coexistence with nature and technology.

#### What we do now:

- We explore the possibilities of exoskeletons, technology that enhances ergonomics and safety, particularly in demanding physical tasks.
- We promote robots and collaborative robots (co-bots) in the prefab construction phase to revolutionize industries by merging human expertise with machine precision.
- We strive to reduce accidents on construction sites. By leveraging technology, we're actively working towards safer work environments.
- We harness the potential of XR technologies to train individuals effectively, especially in safety protocols. (on display: Xella)
- We integrate technology while focusing on well-being via workspaces that use natural materials, colors, and interactive features such as adaptable lighting, soothing wall projections, and personalized music for relaxation and disconnection.
- Adequate heating, ventilation, managing CO2 levels and water supply are pillars of better respiratory health, quality of life, and mental well-being.

#### Challenges that we aim to tackle in collaboration with our partners:

- Building and infrastructure for mental well-being: could shared buildings and infrastructure counter the potential isolation caused by the digital realm? This raises questions about how our housing and infrastructure will evolve to accommodate these changing dynamics.
- A critical consideration is the health impact of the materials used in construction and the building process itself.
- From material transportation to energy sources, nitrogen emissions are a concern. The excessive nitrogen in the air has led to the halt of several construction projects in the Netherlands.

## 4 QUALITY EDUCATION



### SDG 4

## Quality education

We are harnessing the power of XR technology to revolutionize training methods within the construction industry.

### What we do now:

- We integrate extended reality to transform education into a more immersive and efficient experience.
- Through XR-enhanced training, we create safer learning environments. Trainees can engage in real-world scenarios without physical risks.
- We boost efficiency since trainees can simulate tasks, improve skills, and troubleshoot in a virtual space, saving time and resources.
- We accelerate rehabilitation with an immersive video experience that uses gamification techniques to expedite the rehabilitation process.

## 7 AFFORDABLE AND CLEAN ENERGY



### SDG 7

# Affordable and clean energy

In our aspirations for our project, we're dedicated to advancing our ecosystem and innovation center in alignment with crucial energy goals.

#### What we do now:

- We elevate energy efficiency: our focus lies on creating buildings that go beyond efficiency, embracing an extremely energy-efficient approach that minimizes consumption.
- We integrate solar panels and geothermal systems into our buildings, driving a transition to clean energy.
- By use of advanced energy modeling, we fine-tune energy consumption, enable energy grid balancing in combination with chargers and solar panels, and minimize waste.
- We use digital twins to lay the foundation for energy efficiency from the start (example: Schüco open window detection).
- In our demonstration zone, we offer a glimpse into a clean energy future through a demo showing how a city leverages energy gains and energy balancing.
- We actively advocate for the use of electric batteries, a vital component of clean energy.
- We support Initiatives like grid communities to show how access to modern, clean energy is being provided, promoting clean energy infrastructure.
- We promote home energy solutions encouraging individuals to become energy producers, generating their own clean energy.
- Our commitment extends to the very building process, with a strong focus on resource and energy efficiency.

#### Challenges that we aim to tackle in collaboration with our partners:

- Ensure that everyone has access to reliable, modern energy sources, driving inclusivity and sustainable development.
- Push the boundaries of renewable energy adoption on a global scale.
- Actively promote access to research, technology, and investments in clean energy.
- Present diverse future scenarios, fostering discussions about how to enhance energy efficiency, and a clean energy infrastructure.
- Transcend technicalities, reaching a wider audience and inviting them to be part of the solution.
- Lay the groundwork for new financial models, including private-public collaborations, to bolster the development of essential clean energy infrastructure.

## 8 DECENT WORK AND ECONOMIC GROWTH



### SDG 8

# Decent work and economic growth

We're at the forefront of innovation, merging the power of human capability with cutting-edge technology to enhance the construction industry.

#### What we do now:

- We revolutionize the way construction workers operate by introducing exoskeletons. These wearable devices amplify human strength, creating a synergy between the individual and technology.
- We extend our dedication to safety to immersive training methods. Through extended reality (XR), we're equipping workers with essential safety skills and knowledge.
- We combine the inherent abilities of people with the capabilities of technology, introducing a new era of construction where safety and efficiency go hand in hand.

#### Challenges that we aim to tackle in collaboration with our partners:

- Workforce evolution: as new skills and competencies become essential, preparing the workforce requires significant investments in education and training.
- Redefining space and time with XR: reinventing how we utilize both space and time, creating more dynamic environments.
- The integration of remote services introduces new complexities that need to be addressed, from communication to coordination and security.
- Shifting role of the architect: no longer just designers but also orchestrators of technology, influencing the integration of safety and creating spaces that harmonize with the digital age.
- Leveraging technology to enhance safety measures, ensuring that construction sites are safer for workers and that risk is minimized.
- The rise of robotics introduces collaboration between humans and machines.

## 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



### SDG 9

# Industry, innovation and infrastructure

In the dynamic landscape of the building industry, we're embracing technological innovations that are shaping new horizons.

#### What we do now:

- Robots and collaborative robots (co-bots). These technologies are redefining the way we build, augmenting human efforts with precision and efficiency.
- Cross Laminated Timber (CLT), prefab structures and standardized approaches: the building methods of today are evolving to meet the demands of efficiency and sustainability.
- New technologies like exoskeletons, 3D-printed elements, and prefab components are changing the face of construction, enabling rapid and unique structures.
- Windows have evolved into multifunctional elements, incorporating screens and solar panels to enhance energy efficiency and comfort.
- Infrastructures are becoming highly adaptable, promoting flexibility within spaces.
- A smart future includes optimized energy use, and IoT-driven innovations that reshape the industry's approach.
- New eco-friendly materials such as carbstone, circular building blocks without cement, absorbing more CO2 than they emit.
- BIM modeling: the integration of 3D visualization, 4D (time), 5D (cost), and 6D (environmental) up to 10D, transforms how we visualize, plan, and execute projects.

## 11 SUSTAINABLE CITIES AND COMMUNITIES



### SDG 11

# Sustainable cities and communities

Addressing the challenges within SDG 11, we're driving toward a future of sustainable urban development.

#### What we do now:

- The tension between preserving nature and creating integrated living spaces requires a balance between giving areas “back” to nature and promoting integrated living.
- Circular building shifts our perspective on structures. Buildings take on multiple functions throughout their life cycle, as versatile elements within a broader societal framework.
- The traditional concept of homeownership evolves. The rise of rental, co-housing, and innovative models makes us reconsider how we build, focusing on safe, affordable, and adaptable living spaces.
- The urban landscape transforms with vertical farming and green areas on buildings contributing to sustainability and food security.
- The challenge of social isolation (partly caused by digital divide) drives us to reimagine living spaces. A focus on community connection and multi-purpose designs becomes essential.
- The evolution of public-private partnerships and Europe's role in shaping sustainable urban development is a crucial consideration.
- We're reshaping the fabric of urban planning. This involves reconsidering green spaces, residential areas, and gardens in a more holistic context.
- As sharing communities expand, the financing of buildings and infrastructure undergoes transformation, demanding innovative financial models.

**16** PEACE, JUSTICE  
AND STRONG  
INSTITUTIONS



SDG 16

# Peace, justice and strong institutions

Embracing challenges as opportunities to create a future where innovation is accompanied by security, ethics, and justice.

## What we do now:

- The secure use of data and cybersecurity are paramount, to protect sensitive information in an increasingly digital world.
- Employing digital twins allows for real-time monitoring, control, and testing, enhancing the safety and efficiency of complex systems.
- Legal frameworks for Innovation are pivotal in fostering innovation, providing a favorable environment for advancements that are aligned with peace and justice.
- As buildings grow in complexity, augmented Reality (AR) aids in maintenance, contributing to the secure management of intricate structures.
- By utilizing exoskeletons to assist workers in lifting tasks, we promote their well-being and safety, addressing challenges related to physical strain.

## Challenges that we aim to tackle in collaboration with our partners:

- The ever-expanding digital landscape poses challenges to preserving privacy and cybersecurity.
- The integration of AI introduces ethical considerations. We're striving to harness AI's potential responsibly, ensuring that it aligns with ethical and just practices.
- The use of sensor data in a safe way to make life of people hyper-convenient.
- Ensuring that future digital mobility services (such as autonomous mobility on demand) are also involving ecosystem partners in the field of security and liability, guaranteeing safe experiences for users.
- Our commitment to safety will be reinforced through initiatives like employing thermal imaging and AI to detect patterns and proactively intervene in potentially risky situations.

**17** PARTNERSHIPS  
FOR THE GOALS



**SDG 17**

## Partnerships for the goals

We are embracing open innovation, partnerships, and data interoperability to transform homes smart and sustainably.

### **What we do now:**

- Open Innovation Ecosystem: creating an environment of open innovation, where collaboration and creativity flourish.
- Circularity in the Home: reimagining how homes function through discussions on future scenarios, cooperative research, and experimentation
- Interoperable data systems to share and apply information effectively. This connectivity cultivates knowledge sharing and elevates informed decision making.