Buildings of the FUTURE

Sustainable, Resilient, Hyper-efficient, People-centric

Planning for Sustainability and Resilience working towards a Healthy Building Environment

Kurt Gokbudak; CEM
Solution Architect
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Forecasts project a recovery in 2021, with the total building stock estimated to grow to 1.3 trillion ft\(^2\) in 2029 from 1.1 trillion ft\(^2\).

Source: Global Building Stock Database 2020
The world of your building

〜40% of the world’s CO₂ emission comes from buildings

>350 natural + man-made disasters in the world in 2019

>30% of the energy is wasted in buildings

〜90% of our time is spent indoors

Source:
1. Architecture 2030, 2020
Two major transitions already underway

All-digital, all-electric world

Electrification

50% of energy production will be solar or wind-driven by 2050
Source: Bloomberg New Energy Finance, New Energy Outlook 2019

30% of vehicle stocks will become electric by 2040
Source: Bloomberg New Energy Finance, New Energy Outlook 2019

Electricity consumption doubles until 2050
Source: Global Energy Perspective 2019, McKinsey, 2019

Digitization

IoT 10x more new connected devices than individuals
Source: GSMA 2019

Big Data x5 81 bn GB in 2017, 403 bn GB in 2021
Source: IDC, 2018

AI x6 increase in AI expenditures between 2017 and 2022
Source: International Data Corporation, 2020

Buildings of the future
The foundation of buildings of the future

**Sustainable**
Equipped with flexible energy assets and various electric sources

**Resilient**
Recover quickly and bounce back

**Hyper-efficient**
Seamlessly controlled by end-to-end digital platform

**People-centric**
Designed to be responsive to people
Sustainable

Buildings today
- 30% of the world’s energy
  (Source: IEA, 2020)
- 40% of global greenhouse emissions
  (Source: IEA, 2020)
- Rely on non-renewable energy resources

Buildings tomorrow
- 60% reduction of carbon emissions by 2040
- At least 40% green, renewable electricity
- Influential to decarbonization of other industries
Resilient

Buildings today

- Only as good as their weakest link
- Threatened by weather, cybersecurity, health and outages
- Face peak highs and lows for utilization

Buildings tomorrow

- More than 70% of operations performed remotely
- Automation and predictive analytics to minimize outages and failures
- Cybersecurity protocols to minimize risk level
Hyper-efficient

Buildings today

- ~30% of construction cost is **rework** (source: Procore, 2018)
- **Disconnected**, disparate systems
- Under-utilized assets and space
- **Reactive** maintenance

Buildings tomorrow

- **Digital twin** leveraged from design to build, into the operation and maintenance phases
- Energy and building automation integrated by converging IT and OT systems
- Systems that are **connected** to each other and to the cloud
People-centric

Buildings today
- Required to implement new health and safety guidelines
- Challenged to improve occupant experience
- React to demands for safe and productive environment

Buildings tomorrow
- Monitoring of occupant levels and health indicators
- Significantly improved occupant experiences
- Semi-autonomously identify issues and take actions
Consideration of Ways to Be Sustainable At Home

- **Turn off lights/electrical devices in my home when not in use**
  - Unsure: 55%
  - Wouldn’t consider this: 20%
  - Would consider, haven’t done: 70%
- **Upgrade to energy efficient home appliances**
  - Unsure: 8%
  - Wouldn’t consider this: 10%
  - Would consider, haven’t done: 44%
  - Already has/done this: 38%
- **Install energy efficient windows in my home**
  - Unsure: 10%
  - Wouldn’t consider this: 13%
  - Would consider, haven’t done: 40%
  - Already has/done this: 37%
- **Use fewer electrical devices/appliances in my home**
  - Unsure: 10%
  - Wouldn’t consider this: 20%
  - Would consider, haven’t done: 35%
  - Already has/done this: 35%
- **Install new insulation**
  - Unsure: 14%
  - Wouldn’t consider this: 20%
  - Would consider, haven’t done: 39%
  - Already has/done this: 27%
- **Install a smart thermostat to improve energy efficiency at home**
  - Unsure: 12%
  - Wouldn’t consider this: 17%
  - Would consider, haven’t done: 48%
  - Already has/done this: 23%
- **Use energy efficient home building materials, even if they are more expensive**
  - Unsure: 17%
  - Wouldn’t consider this: 18%
  - Would consider, haven’t done: 46%
  - Already has/done this: 20%
- **Install solar panels or other renewable energy sources at my home**
  - Unsure: 13%
  - Wouldn’t consider this: 25%
  - Would consider, haven’t done: 50%
  - Already has/done this: 12%
- **Install electric vehicle charger at my home**
  - Unsure: 17%
  - Wouldn’t consider this: 40%
  - Would consider, haven’t done: 34%
  - Already has/done this: 9%
What is the connected home?

Sustainable
Integrate solar and EV charging

Resilient

Efficient

Personal
What is the connected home?

Sustainable

Resilient
Connect easily to solar, generator, and battery backup sources

Efficient

Personal
What is the connected home?
What is the connected home?

Sustainable

Resilient

Efficient

Personal
Gain digital control over lighting scenes and where you send backup power during outages.
The path to more sustainable and net zero homes

Net zero homes are growing in popularity because they produce as much energy as they consume, resulting in a zero energy bill and a carbon-neutral home.

There is an ever-increasing array of tools and technologies that make net zero homes achievable, including:

- Solar panels
- Energy-efficient certified appliances
- Geothermal pumps
- Smart thermostats
- Weather-sealed doors and frames
- Radiant floor heating
- Home energy management systems
Attitudes Towards Smart Home Products

36% of consumers believe smart home products should be standard in newly built homes.
Ways to make a home more sustainable and net zero
The Connected Home Solutions approach to sustainable homes

- Keeps tabs on a home's electrical activity from anywhere via a phone or tablet
- Provides insights into energy use for greater savings
- Sends mobile alerts when appliances turn ON or OFF
- Integrates with Amazon Alexa®, Google Home™, Philips Hue, Wemo® Insight, and more
Countering consumption with efficiency
Safety, security and energy efficiency are high in the perceived benefits of smart home technology.

The home safety and security are the #1 priority of consumers, and the biggest perceived benefit for installing smart home.

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home safety/security (Net)</td>
<td>67%</td>
</tr>
<tr>
<td>Enhances home safety</td>
<td>50%</td>
</tr>
<tr>
<td>Superior home security</td>
<td>45%</td>
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Reducing my energy consumption                | 60%        |
Lower energy costs                            | 60%        |

Efficiency in energy costs and in energy consumption is perceived as a major benefits for buying and installing smart home products.

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Convenience</td>
<td>51%</td>
</tr>
<tr>
<td>Peace of mind while away from home</td>
<td>47%</td>
</tr>
<tr>
<td>More comfortable at home</td>
<td>45%</td>
</tr>
<tr>
<td>Ability to personalize to my preferences in order to manage my home better</td>
<td>40%</td>
</tr>
<tr>
<td>Contact-less / Touch free options</td>
<td>26%</td>
</tr>
<tr>
<td>Provides a better ‘work from home’ experience</td>
<td>19%</td>
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Enabling buildings of the future

**Sustainable**
Equipped with flexible energy assets and various electric sources
- Maximizing electrification
- Active energy management
- Positive energy buildings
- Resource-efficient design leveraging software
- Sustainable retrofits

**Resilient**
Recover quickly and bounce back
- Remote operations
- Power reliability
- Cybersecurity

**Hyper-efficient**
Seamlessly controlled by end-to-end digital platform
Better decision making, impacting:
- People needs
- Space resources
- Asset efficiency
- Energy cost

**People-centric**
Designed to be responsive to people
- Safer buildings
- Healthy buildings
- Comforts and experience
Putting control in the hands of users

<table>
<thead>
<tr>
<th>Occupant engagement</th>
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<tr>
<td>EcoStruxure™ Engage Enterprise</td>
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<table>
<thead>
<tr>
<th>Feature</th>
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<tbody>
<tr>
<td>Room booking</td>
<td>Helpdesk</td>
</tr>
<tr>
<td>Company directory</td>
<td>Dining</td>
</tr>
<tr>
<td>Indoor navigation</td>
<td>Access control</td>
</tr>
<tr>
<td>File maintenance ticket</td>
<td>Comfort control</td>
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Schneider Implements Pilot Study on Healthy Buildings

**Situation**
- Schneider Electric implemented pilot studies across 21 different buildings throughout the globe.
- The team outfitted the buildings, with a family of sensors which measured CO2, VOC, Humidity, temperature, noise, and light.

**The Solution**
- The goal of the study was to connect the data streams and look at the performance of each element in aggregate.

**Results**
- Building managers empowered with this data adjust air quality management, decreasing complaints and increasing employee satisfaction.
- It is possible to use the IoT sensor information on health to automatically control the building.
Tenant’s **happiness index**

- **Participants**: 81% Spend more than 30 hours in the office
- **Aged 31 to 50 years old**: 71%

**Air Quality**
- Reduced stuffiness and odor: 54%
- Reduced humidity: 65%
- Air movement: 65%

**Workspace**
- with amount of workspace despite reduced floor space: 79%
  - **satisfied or very satisfied**

Data is based on a survey taken in 2019 from 298 employees in comparison to the old Schneider Electric Building in 2017.
Buildings of the future across the life cycle

Leveraging the all-digital, all-electric world for new or existing buildings

- Sustainable
- Resilient
- Hyper-efficient
- People-centric

Design → Build → Operate → Maintain