PlanRadar Ebook

The Architecture of the Future

Findings from PlanRadar's research into Buildings of the Future

September 2022

Executive Summary

In June 2022, PlanRadar conducted a research project into future trends, priorities and strategies for architecture according to leading industry voices in 12 countries. In this eBook, we take a closer look some of the key trends.

As a construction software business with customers around the world, PlanRadar has a keen interest in the global trends affecting architecture. To understand how architects in the countries we work in are adapting to change and are planning for the future, we decided to conduct in-depth research to learn what experts predict architecture in their countries will look like in the coming decades.

In our globalised era, many of the materials used in buildings, and the trends affecting architecture, are increasingly universal. For example, buildings in practically every country today rely heavily on materials like steel and concrete, whereas in the past local materials like bamboo, stone or clay dominated. In the same way, architects everywhere are responding to universal challenges - particularly climate change and rising temperatures.

Yet differences between countries persist. Looking at climate change, its impacts will be felt differently in different places – and therefore affect architecture in unique, localised ways. Architects in the Arabian Gulf, for instance, will need to design for extreme heat, while those in northern Europe will need to build for the threat of intense storms and flash floods. While the pressures are global, the strategies and tactics that will be implemented will be local.

That being said, architects and urban planners are among the most forward-looking built environment professionals, working on projects years or even decades before ground is broken. Many of these tactics are not new. However, it takes time for architectural theory to make its way into real-world buildings. Too often, we see compromise on the basis of cost, convenience or profitability. But as the industry is facing pressure to meet challenging sustainability goals, it is becoming more likely that today's best practices become the norms of the future.

Here at PlanRadar, we're excited to collaborate with architects at the cutting edge of the profession and uncover the architecture of the future.

Methodology

In June 2022, PlanRadar's team researched 12 countries in which the company is active, across Europe, North America and the Middle East (specifically: the US, UK, Germany, Austria, France, Spain, Italy, Slovakia, Czechia, Hungary, Poland and the UAE). There is a Euro-centric bias in the countries selected, since this is where the team has the most resources in terms of languages.

Sources were selected based on the following criteria:

1. From a government-led or government-sponsored report, project, or legal requirements.

2. From a report made by the Association or Chamber of Architects within this country (e.g. RIBA in the UK). If there is a professional association of Urban Planners, Civil Engineers, Designers, Interior Designers or Furniture Makers, these were used as sources for certain relevant questions.

3. From articles published within a journal or magazine owned by the Association or Chamber or Architects (e.g. RIBA Journal for the UK). As in 2. above, for certain questions the magazines or journals of other professional bodies are also acceptable sources.

4. All sources were to be as recent as possible, but date from no earlier than June 2020, in order to exclude pre-pandemic predictions. Government regulations can pre-date the pandemic, but must still be current. Sources should specifically refer to an individual country, not to global trends.

5. Where no answers were available from relevant industry bodies or their publications, other reliable 3rd party sources were used. These occurrences have been clearly marked in the full list of sources.

Access the complete raw data here.

How do experts think architecture will change?

Our buildings have always protected us from the environment, and one thing that has emerged in the course of our research is that this needs to be truer now than ever.

The first key statistic to emerge from our research is that 100% of countries we reviewed saw sustainability as the key need within the built environment. It will drive different trends, but at the heart of this research is a group of professionals that strive to integrate sustainability into best practice, wherever they are located.

The changing climate is delivering higher temperatures and more unpredictable weather patterns. As a result, our buildings need to be resilient. While this is, of course, a global trend, the specific responses must reflect the local environments. In countries as large and geographically diverse as the United States, this potentially means even greater localisation of design.

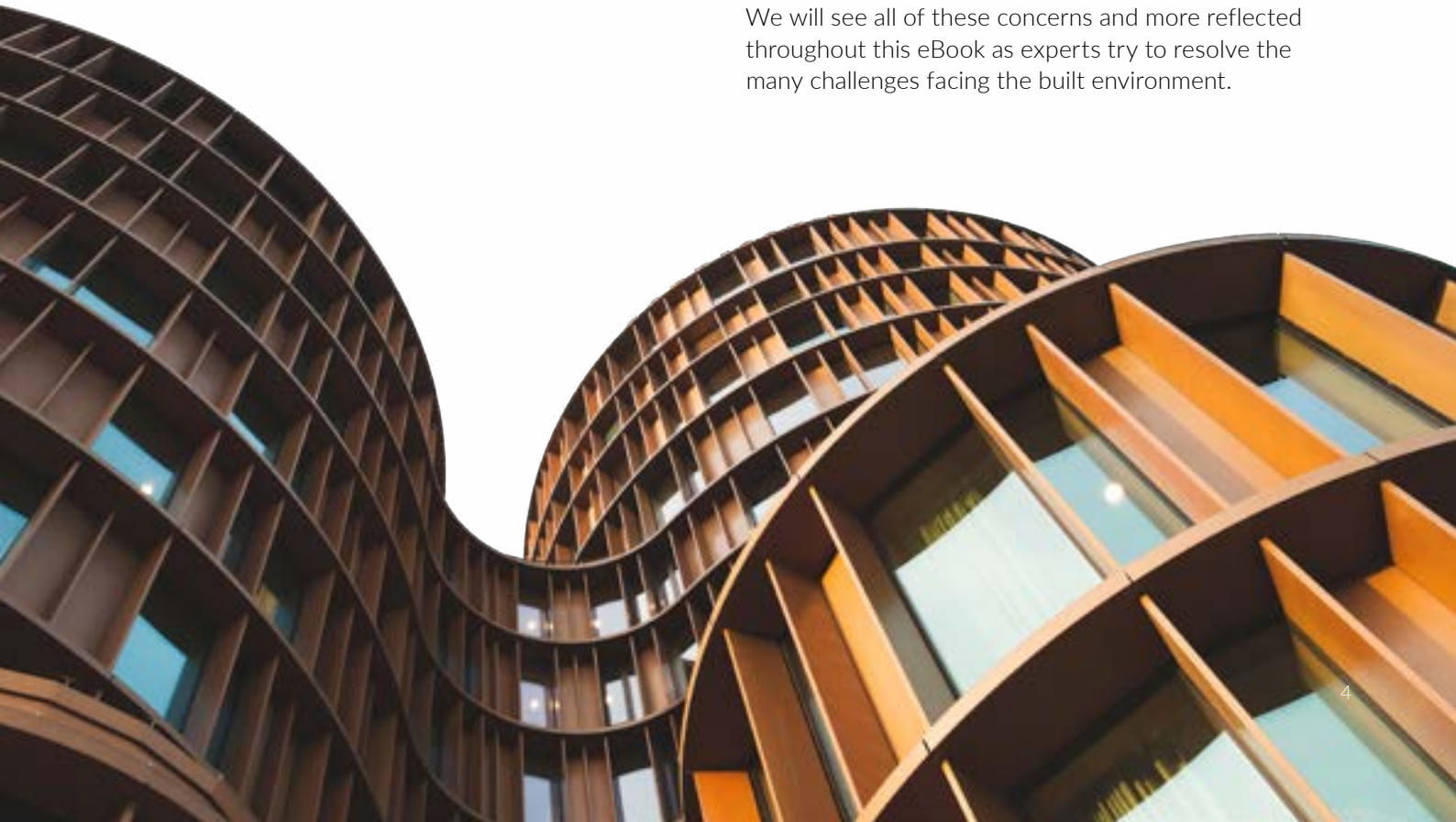
Meanwhile, architects worldwide have a solid grasp on the impact new construction has on the environment. Now, not only do we require our buildings to shelter us from the environment outside, but our buildings must themselves become part of the strategy to slow climate change.

This eBook does not aim to describe well-established changes that have been documented in great depth elsewhere. Instead, our goal is to compare and contrast what national governments and experts in architecture and urban development foresee for the future of architecture in their countries. This report explores how government bodies and industry experts in 12 countries think the course of architecture and urban development in their nations will evolve in the coming decade.

One question that this research does not answer is whether architects and urban planners have the support they need to make their predicted trends a reality. Questions of cost-effectiveness, profitability and availability of materials drive developers and contractors to make less sustainable choices. And, after all, climate change isn't the only challenge that built environment professionals are struggling to resolve.

For example, the COVID-19 pandemic readjusted expectations for home and office life. In many countries we also see discussion of the high cost of living for many members of society, and the question of affordable housing and the growth of urban populations is an ongoing challenge for several of the countries reviewed here.

We will see all of these concerns and more reflected throughout this eBook as experts try to resolve the many challenges facing the built environment.



Key findings at a glance

100% of countries consider sustainability as being the biggest trend influencing architecture

9 out of 12 countries reviewed favour people-first streets

66% of countries will focus on water conservation

Downsizing The Czech Republic is predicting smaller homes for households

2/3 believe that hemp has great potential as a building material

33% plan to implement more green spaces

Simple, not smart Germany expresses reservations about smart cities for the sake of smart cities

50% want to reduce urban sprawl and build denser cities

7/12 countries are pro-biophilic design

Overarching trends in architecture

The first question posed was “What will be the main trends in architecture in the coming decades?”

The responses blended views on individual building trends with broader themes of urban development. For example, liveability and human-centric design is a broad theme that can apply to the city as a whole as much as it can apply to individual structures.

Meanwhile, some responses included very specific tactics: biophilic design, smart buildings, 3D printed construction, etc. In total, there were 18 different answers. In this section, we will examine the five most common responses in greater depth.

What will be the main trends in architecture in the coming decades?

Sustainability	12
Net zero	10
Livability/human-centric design	7
Buildings designed as part of the environment	6
Resilience against extreme weather conditions	5
Building re-use/repurpose	5
Increased local urban development	4
Biophilic design	3
Smart buildings/networked buildings	3
Recycled materials/circular economy	3
Courtyards and more public spaces to blend private/public space	3
3D printed construction	2
High urban density	2
Modular buildings	2
Modern construction technology / BIM	2
Smaller homes	1
Affordability	1
Accessibility/inclusivity	1
Transitional housing	1

Sustainability

As mentioned in the introduction, all of the nations reviewed in the research recognise that environmental change is a reality. They also recognise that the built environment is currently a large contributor to global emissions.

Sustainability is therefore predicted to be the number one trend in architectural design in the coming decades. Every country, no matter its location or the precise manner in which it will be impacted by climate change, recognises a responsibility to reduce emissions.

For many of the nations assessed here, the push towards sustainability comes as part of the EU's 2050 long-term strategy, in which the bloc aspires to be climate-neutral by 2050[1].

The goals laid out in the European Commission's vision, which was published in 2018, are in line with the Paris Agreement, signed in 2015[2].

The Paris Agreement has been signed by 194 countries, plus the EU. While the United States withdrew from the Paris Agreement in November 2020, it then rejoined in January 2021 under the new administration. All countries represented in this study have therefore ratified the Paris Agreement. While the agreement does not place specific requirements on individual nations, it is not surprising that there is a high level of awareness and concern in the relevant built environment professions.

As the built environment is a significant contributor to carbon emissions, both during the construction phase and during the operation and occupation of a building, it is also clear that governments will be pushing the construction industry to take action.

We can and should read many of the other answers to this question through the lens of sustainability.

[1] https://ec.europa.eu/clima/eu-action/climate-strategies-targets/2050-long-term-strategy_en
[2] https://ec.europa.eu/clima/eu-action/international-action-climate-change/climate-negotiations/paris-agreement_en

Czech Rep.	**14%**	Hungary	**7%**
Germany	**38%**	Austria	**36%**
Spain	**26%**	Poland	**7%**
France	**37%**	Slovakia	**12%**
Italy	**33%**		

Net Zero

Net Zero is a state which can be reached via a number of tactics. In the built environment, this means developing buildings that cost very little carbon to build and operate. Energy use at all stages should be reduced and buildings should work as efficiently as possible. With the use of innovative materials and the implementation of biophilia, it might even be possible that a completed building can capture carbon.

There is no one, single, fool proof way to build Net Zero buildings. However, architects, engineers and materials scientists constantly drive for improvements.

A core tenet of modern thinking on sustainability, Net Zero is a common strategy for achieving measurable progress towards environmentally-friendly building. This, too, comes from the framework of the Paris Agreement, which calls on countries to significantly reduce their greenhouse gas emissions.

For many nations, Net Zero is a relatively long-term goal. However, the EU has legally committed to attaining specific reductions in emissions by 2030[3]. For the countries included in our research, these percentage reductions are as follows:

The 10 countries in the research that cite Net Zero as a key trend in architecture reflect many of the countries with legal pressure to deliver improvements in this area. Hungary's absence from these 10 countries may reflect that it has only pledged to reduce its emissions by 7% by 2030. However, Poland has also only pledged a 7% reduction in this timeframe, but still cite Net Zero as a major concern The UAE has set a goal to reach Net Zero by 2050, but as this goal was only announced in October 2021, we would expect it to be reflected in any future strategy documents.

[3] https://unfccc.int/sites/default/files/NDC/2022-06/EU_NDC_Submission_December%202020.pdf

Liveability and human-centric design

Taking a step back from the topic of sustainability, the third key trend for the architecture of the future is liveability and human-centric design.

There are many facets and strategies that come into the creation of a liveable building and community. Fundamentally, liveable architecture is that which supports a user's physical and mental wellbeing, that puts the human at the centre of design. Rather than designing to meet an aesthetic alone, or to deliver the most cost-effective use of space, the goal is to create a building that is fit for purpose while enhancing the experience of the user.

While liveability places the human being at the centre of plans, the common features of a liveable building and community also contribute to sustainability goals:

- Walkability reduces the need for long, polluting commutes
- High-density mixed-use developments offer opportunities for more effective use of space and resources
- Integration of public transport opportunities
- Effective heating and cooling solutions can be depending on the local climate

Countries that state that increasing liveability is a key goal include the UK, Germany, Austria, Spain, Czech Republic, UAE and Poland.

Buildings as part of the environment

Architects have long understood that buildings are rarely constructed in isolation – their design is of course dependent on local terrain and infrastructure.

However, there is a push for designers to think beyond what is feasible within a given plot of land. Instead, the environment of a building can be harnessed, influencing the design of heating and cooling systems, the addition of shade where necessary and whether the building can access any local natural amenities – water, wind, sunlight, or geothermal energy.

To fully design a building as a part of the environment, however, the designer must also be aware of the potential damage that construction can do to the surrounding area. The American Institute of Architects goes in depth on this subject in their Framework for Design Excellence. In "Design for Ecosystems", the AIA states that "Good design mutually benefits human and nonhuman inhabitants."[4]

To this end, they suggest a number of best practices for design, including incorporating plant life that attracts pollinators, adding bird collision deterrent design strategies and avoiding the creation of excess light pollution.

This is a two-way street. The environment can be harnessed by the designer to create a pleasant and sustainable environment for humans. But buildings can also be adapted to have a net positive impact on their natural surroundings.

Again, this sub-topic is not entirely divorced from the theme of sustainability but suggests a set of distinct strategies that many architects and urban planners are encouraged to use.

Countries that state they are interested in designing buildings in harmony with the environment include the US, Germany, France, Slovakia, Italy and Poland.

[4] https://www.aia.org/showcases/6082454-design-for-ecosystems

Resilience

The concept of resilient buildings straddles two trends that were identified earlier: that of sustainability and that of liveability.

A trend towards resilient buildings recognises that changing local climates pose a challenge to residents. For example, areas of Western and Central Europe are suffering from more frequent flooding, while Southern Europe struggles with an increased risk of forest fires. Meanwhile, the US faces longer and more intense heat waves, leading to wildfires in areas of the country that were previously considered safe from this kind of catastrophe such as the Pacific Northwest, as well as more intense hurricanes, particularly along the East Coast. A so-called "megadrought" has also been unfolding in the Southwest since 2000[5].

While the UAE may at times be considered to be relatively secure from climate change, considering its desert climate, the government's own website states that "The UAE is classified among the categories of countries with highest rate of vulnerability to the potential impacts of climate change in the world." They predict that this will increase already high temperatures and reduce precipitation further, causing droughts, while simultaneously sea levels will rise and there will be a higher frequency of storms.

Given this background, it is surprising that only 5 out of 12 countries reviewed cited resilience as a key trend for the coming decades. Austria, Spain, the Czech Republic, Slovakia, Hungary, the UAE and Poland were all missing. It will be interesting to monitor whether resilience becomes a greater priority for these nations in the future.

[5] https://www.nature.com/articles/s41558-022-01290-z.epdf

Building reuse and repurposing

Adaptive reuse is another strategy that derives from sustainability goals. In general, it is more sustainable to renovate, reuse or repurpose an existing structure than it is to demolish a structure and build a new one in its place. It is faster, more cost-effective and uses fewer materials. Reuse also enables owners and developers to preserve heritage buildings that may be protected by local laws.

However, reuse is not always a straightforward process. For example, older buildings can become structurally unsound, and rectifying this in a cost and labour efficient manner can be extremely challenging. Some buildings have also been designed for uses so specific that it would take an extensive amount of work to turn them into multipurpose structures.

Despite these challenges, 41% of countries we surveyed foresee that there will be a greater amount of building reuse and repurposing in the coming decades.

Countries that express a strategic interest in building reuse include the US, the UK, Austria, France and Spain. When we consider that the UK ranks 50th in global population density while the US ranks 177th, it's clear that none of these countries are driven to this strategy by a lack of land to build on.

However, the UK has had a policy of classifying undeveloped land around cities as "Green Belt" land since 1955. Austria protected Vienna's own green belt all the way back in 1905. The US's first green belt was legislated in Kentucky in 1958 and many other states and cities followed its example. In Spain, meanwhile, Madrid was long surrounded by a natural green belt until the city's rapid expansion eradicated a portion of it. Now, there is an ongoing project to renew the green belt and restore the forests[6].

While the concept of a green belt is not so popular in France, Paris was enclosed in a number of city walls that restricted the city's expansion throughout history. Its last city wall was demolished in 1931, allowing the city to grow into the metropolis it is today. Green belts to prevent urban sprawl are now again under discussion in France, with a trial taking place in Rennes.

These urban green belt projects have placed pressure on the existing developed space. For the population to continue to grow, all space used inside the green belt must be maximised. Meanwhile, it is easier to meet sustainability targets by retrofitting existing buildings. Building reuse and repurpose makes it possible to achieve population growth without resorting to urban sprawl.

[6] https://www.decadeonrestoration.org/stories/five-centuries-later-madrids-green-belt-makes-comeback

Best practices in urban development

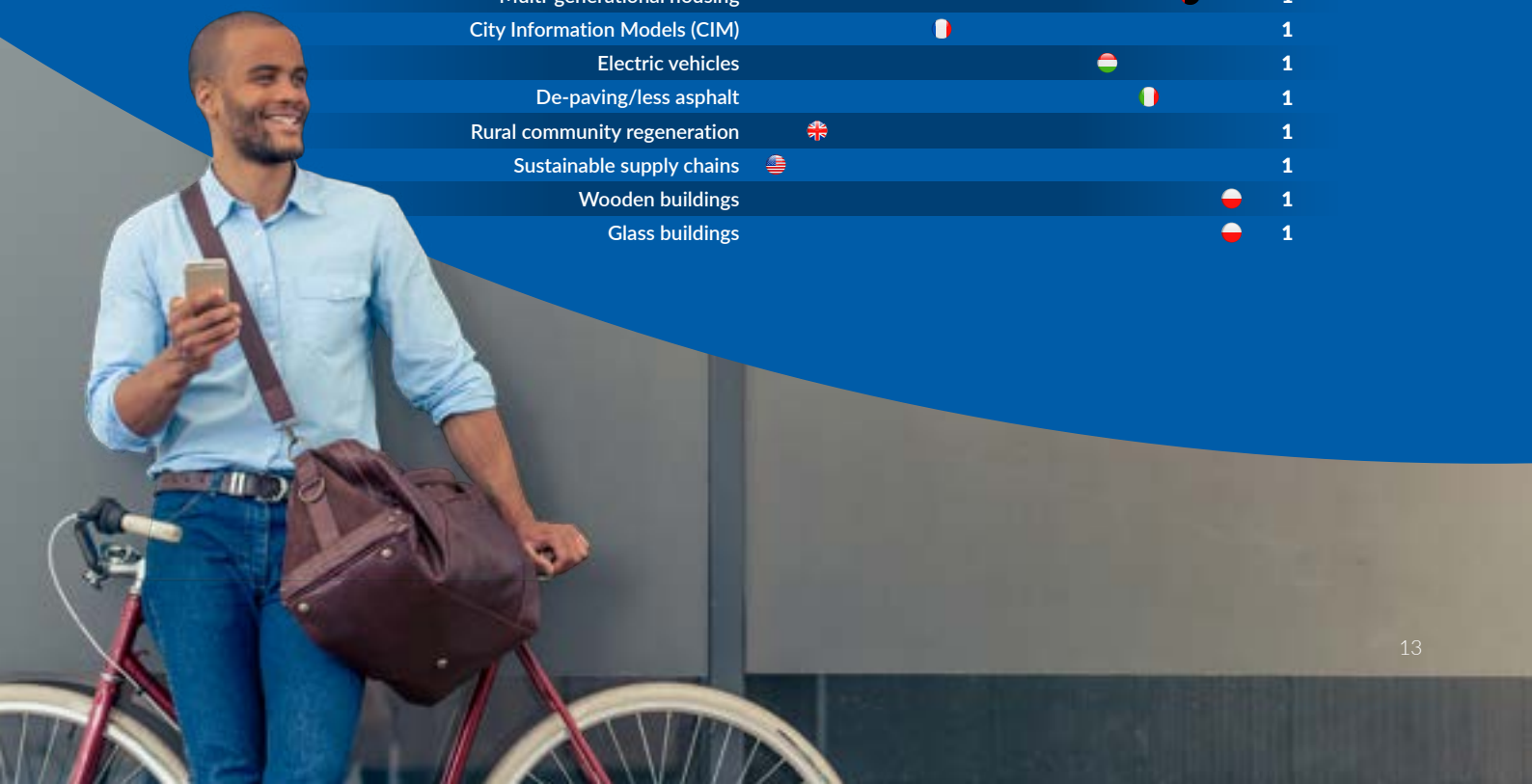
The second question posed was “What are the urban design trends that will shape the future of cities?”

Once again, we see a balance of concerns, first for the human experience and second for strategies that mitigate the impact of climate change. These two areas of concern are fundamentally linked.
By improving the walkability of a location, it is possible to reduce the emissions formerly spent on commuting. And by reducing the number of cars and the amount of air pollution, we create an environment where people are able to comfortably walk.

Let’s take a look at the top five responses in more depth.

What are the urban design trends that will shape the future of cities?

People-first streets (not car-first)/walkable neighbourhoods	9
Cooling elements (plantlife and water features)	6
Regeneration/renovation to use already built-on spaces	6
Multifunctional districts (places to work, relax and live)	5
Biophilic design to reduce air pollution	4
Repurposed buildings	4
More public transport/traffic regulation	4
More communal public spaces	4
Resilience to climate change	4
More green spaces	4
Compact development, less urban sprawl	4
"Wellbeing landscapes" - connection to nature	3
Better connected affordable housing	3
Accessibility	2
Protected sensitive landscapes	2
Smart Cities	2
Multi-generational housing	1
City Information Models (CIM)	1
Electric vehicles	1
De-paving/less asphalt	1
Rural community regeneration	1
Sustainable supply chains	1
Wooden buildings	1
Glass buildings	1



People-first streets (walkable neighbourhoods)

As mentioned in the first section of this eBook, human-centric design ensures that the urban environment is navigable on foot. It implies that neighbourhoods contain all the essential things that a person needs to thrive: accommodation, workplaces, amenities like supermarkets or post offices, and even public buildings.

Walkable cities reduce reliance on cars, which in turn cuts emissions and improves air quality.

Reduced commute times also have an impact on wellbeing, with additional time spent commuting by driving or via public transport decreasing job and leisure time satisfaction. Meanwhile, commuting via walking has been shown to increase job satisfaction.[7]

Walkability is therefore a strategy that balances a human-first approach with sustainability goals. It is unsurprising that 9 out of 12 countries reviewed view it as an important trend.

Cooling elements

We have already discussed the importance of resilience to natural disasters when it comes to building design in the future. However, a natural disaster isn't necessarily one single catastrophe. In recent years, particularly in Southern Europe and the Southwestern US, lengthy heat waves have had all kinds of adverse effects on populations, both human and nonhuman.

There have been several studies proposing methods of reducing the urban heat island effect, but the individual cooling solutions will vary from city to city and country to country.[8] For example, introducing tree coverage can increase shade and reduce the amount of energy needed for cooling.

Water features, vertical greening and green roofs also assist by collecting rainwater and allowing for its evaporation, rather than letting all rainwater run into underwater storm drains.

Limiting the amount of asphalt used and considering the colour of pavements and buildings can also help. In some regions of the world, buildings have historically been white to reflect light and reduce heat absorption; this may be a tactic that is on the increase in other regions.

Countries currently interested in reducing the urban heat island effect include Germany, Austria, France, Slovakia, Italy and the UAE.

[7] https://travelbehaviour.files.wordpress.com/2017/10/caw-summaryreport-onlineedition.pdf
[8] https://www.researchgate.net/publication/268424536_Reducing_urban_heat_island_effects_A_systematic_review_to_achieve_energy_consumption_balance

Urban regeneration

Urban regeneration refers to the practice of renewing and improving urban neighbourhoods that have fallen into various kinds of disrepair. Areas that are targeted for urban regeneration often have run-down buildings and amenities. They are also frequently socio-economically deprived, and businesses in these areas may struggle to thrive.

The goal of urban regeneration is to breathe new life into these neighbourhoods – stimulating an improved quality of life for residents and economic growth for local businesses. Alternatively, urban regeneration may be called for when an area was used for an industrial purpose, such as docklands and warehouses, but those industries are no longer present in the area. These brownfield sites are often ideal areas for redevelopment.

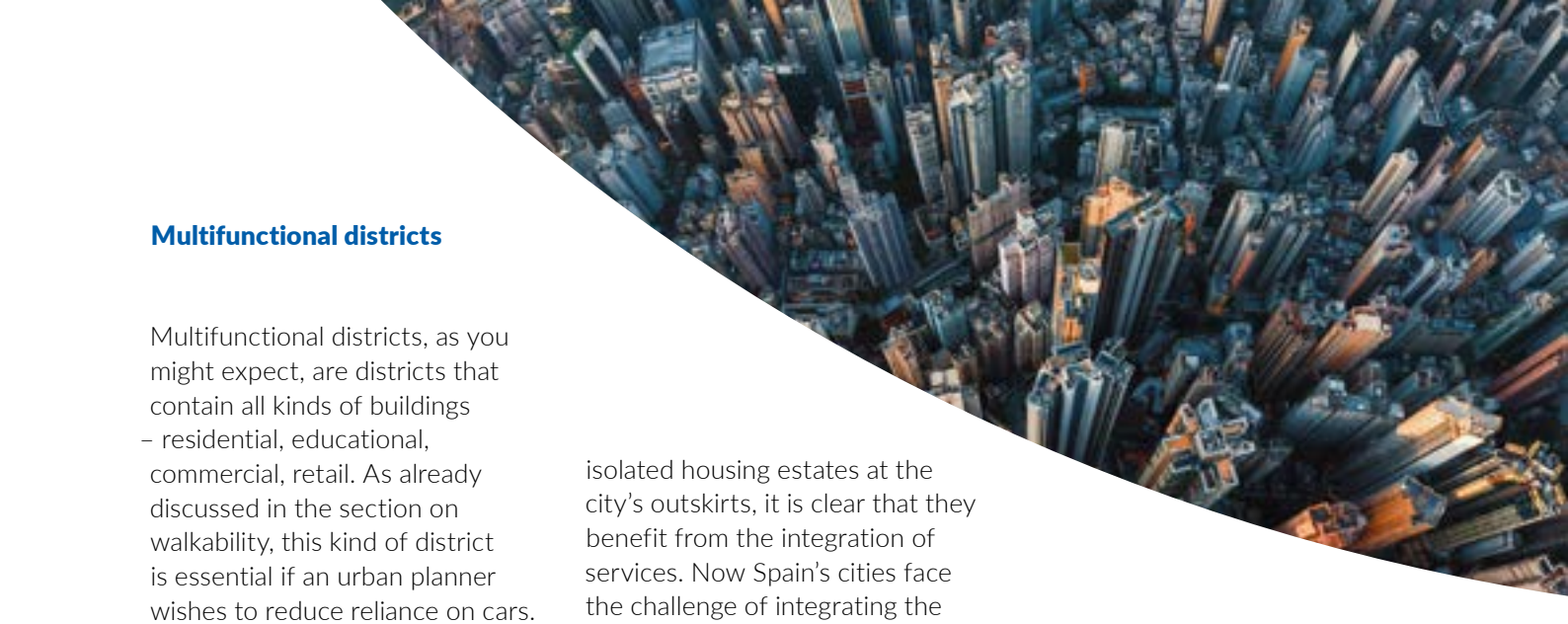
Urban regeneration has often been criticised for causing gentrification and displacing existing residents who are priced out of their neighbourhoods.

Urban regeneration strategies can include:

- Financing brownfield regeneration
- Investing in transport infrastructure
- Fund repairs and improved upkeep to local amenities such as parks, libraries and youth services
- Provide incentives to developers to increase housing stock or to renovate existing properties
- Investment in tourism industry and development of facilities that will draw visitors[9]

Six countries reviewed in the research are committed to regeneration or renovation of the existing built environment: the UK, Germany, Austria, France, Spain and the Czech Republic.

[9] https://www.reading.ac.uk/PeBBu/state_of_art/actions.htm



Multifunctional districts

Multifunctional districts, as you might expect, are districts that contain all kinds of buildings – residential, educational, commercial, retail. As already discussed in the section on walkability, this kind of district is essential if an urban planner wishes to reduce reliance on cars.

Multifunctional districts also allow urban planners to keep population density relatively high. Rather than spreading amenities around in different districts, each district can be used for housing. Urban sprawl is recognized as a harmful process due to the increase in CO_2 emissions, increase of artificial soil and the additional time and energy it requires to move from district to district.

Multifunctional districts can aid compactness and reduce the environmental impact of the urban area, while having positive impacts on the local community by enabling increased walkability[10].

5 of the 12 countries reviewed consider multifunctional districts to be a key trend in urban planning in the next decade. They include Germany, Spain, the Czech Republic, the UAE and Poland.

In Germany, multifunctional districts have been a deliberate planning choice since the 1970s, with living areas, education and employment opportunities and recreational opportunities being deliberately integrated.[11]

Meanwhile, in Spain, the majority of city residents live in flats.[12] When comparing their standards of living with those in suburbs or isolated housing estates at the city's outskirts, it is clear that they benefit from the integration of services. Now Spain's cities face the challenge of integrating the suburbs and new urban satellites.

There is potentially a similar need in the Czech Republic, where much of the housing stock was built under the socialist government. These large residential blocks attempted to create egalitarian housing, but they were often badly connected with other amenities. Immediately post-Communism, the government devolved urban planning responsibility to municipalities and the majority of homes were privatised, leading to a pause in urban development and the closer integration of districts.

Poland saw similar issues to the Czech Republic. With both industrialisation and urbanisation happening at a tremendous rate in the mid-20th Century, builders prioritised huge residential developments.[13] Shops, restaurants, schools and other amenities were planned to be built later, meaning that huge populations were often underserved. While older cities that were less damaged during World War II retained much of their character and diversity, smaller or more industrial cities were almost entirely reshaped.

While the other nations taking this approach often have existing problems to fix, the UAE is a country that only began urban development in the 1950s, with the largest boom happening in the last 25 years. Its cities are diverse and their strategies have changed considerably over the years. For example, Dubai has explicitly planned its city to attract tourism and investment from around the world, rather than focusing on a relatively small pool of residents. However, the city is growing rapidly – from under 1 million residents in 2000 to over 3.4 million in 2022, with the population projected to reach 6.5 million by 2040[14]. With so many people coming to the UAE and Dubai specifically, it is possible that the specific goal of developing multifunctional districts will help to make the new arrivals feel at home.

In future research, it may also be interesting to consider the countries that do not have this stated in their strategy. Perhaps their existing zoning laws already encourage (or don't discourage) multifunctional districts and so they don't currently feel it necessary to include it as an active strategy.

[10] https://hal.archives-ouvertes.fr/hal-02914038/document
[11] https://www.burohappold.com/wp-content/uploads/2019/08/GIZ-Keystone-Paper-5-Urban-Renewal.pdf
[12] https://especiales.eldiario.es/spain-lives-in-flats/
[13] https://rcin.org.pl/Content/62816/WA51_81767_151633-r2016_Urban-Development-in.pdf
[14] https://www.thenationalnews.com/uae/2022/01/23/dubai-population-to-surge-to-nearly-6m-in-20-years-amid-urban-transformation/

Materials of the future

Another question posed by our researchers was “Which construction materials will be used in the future?”

The answers to this question may reflect both how engaged local designers may be with innovative materials in development, or how much potential they perceive these materials to have in their local market. Many may be aware of smart materials but consider them to be too expensive for their market, or for there to be limited demand for a particular material’s properties. Once again, this research doesn’t reveal a lack of knowledge, but it may reveal local priorities.

One trend firmly established is a return to organic, easily grown or manufactured, materials. Straw, wood, clay, bamboo – all of these have been traditional building materials for hundreds if not thousands of years. Now, with some additional tweaks by materials scientists and product manufacturers, these traditional materials are returning. They also have the added benefit of being more sustainable to produce than steel or glass.

Hemp

Hemp is predominantly used in construction in one of two formats: bricks and blocks or in planks. It can also be used within “hempcrete” which consists of hemp ‘shiv’, the woody core of the hemp plant broken up into something resembling fine wood chips. This is then mixed with a lime-based binder and water. The combination sets hard and is an excellent insulator for walls, floors, or roofs.

In all of its forms, hemp is a sustainable material. Unlike most trees, hemp can grow up to four metres high in three months without the use of pesticides and herbicides. We are also seeing increased hemp production worldwide.[15] Within Europe alone, hemp production has increased 75% from 2015 to 2019, with the largest producers in the EU being France, the Netherlands and Austria.[16]

While we didn’t review data from the Netherlands, it is no surprise that France and Austria are on the list of 8 countries that consider hemp to be a key building material of the future.

Wood

Wood is, of course, not a new construction material. It is one of the oldest and most popular materials used in the industry. However, with growing pressure to reduce the construction industry’s carbon emissions, wood is becoming more and more popular.

For example, the number of multi-storey mass-timber buildings being built in the U.S. rose 50% between July 2020 and December 2021, according to the wood trade group WoodWorks.[17]

In addition to being a sustainable material, provided that sustainable forestry practices are applied, wood is surprisingly fire-resistant – something that may be key when considering the increasing numbers of wildfires across Europe. It is also often a cost-effective option. Wood also lends itself well to modular and prefabricated construction, which can reduce waste and increase the efficiency of construction.

However, there are some drawbacks. Particularly for multi-storey wooden buildings, it is advised to have traditional foundations to ensure resilience against flooding, using concrete. When not properly treated, wood is also prone to rotting. Some building codes and regulations around the world also have different limitations on wooden buildings.

That being said, the benefits of wooden construction are such that 8 out of 12 countries reviewed consider it a key material of the future, placing it in joint first place.

[15] https://www.grandviewresearch.com/industry-analysis/industrial-hemp-market
[16] https://agriculture.ec.europa.eu/farming/crop-productions-and-plant-based-products/hemp_en
[17] https://www.wsj.com/articles/wooden-skyscrapers-are-on-the-rise-11649693924

Recyclability

To quote documentation from the European Parliament, "The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended. In practice, it implies reducing waste to a minimum."[18] The circular economy falls seventh on our list, but one key element of it – recycled materials – is on the radar of 7 of our 12 countries.

In the construction industry, the main focus is on reducing reliance on materials that are difficult to reuse, such as concrete, cement and steel. Materials experts are also researching methods of reusing these materials, as recycling a material like steel by re-smelting it requires a large amount of energy consumption.

Other prominent recycled materials in construction include wood, bricks, plastics, textiles, plasterboard and glass. Of course, some of these materials are more fragile than others, so contractors carrying out renovation work or demolition need to be aware of the value of saving these materials for recycling.

Clay

Clay is a common construction material around the world and is also one of the oldest known building materials. It is most commonly used to create bricks or roof tiles. It is often considered sustainable because it takes relatively little energy to extract it and refine it to be suitable for building.

Clay can also be combined with other materials to form composites such as plaster, ceramics, rammed earth and more. Clay structures have potential lifespans of a century or more, thanks in part to the material's durability and fire-resistance. It can also be moulded into almost any shape prior to firing.

The drawbacks to clay is that clay brick structures can be extremely heavy, placing limits on the heights you can build (or the scale of the foundations you need). The extraction of clay at the industrial scale may also be less sustainable than first thought.

The five countries that foresee an increase in the amount of clay materials used in construction include Germany, Austria, France, the Czech Republic, and Slovakia.

Straw

The uses of straw in construction are surprisingly diverse. For example, you can build entire homes out of straw bales – a method that was already in use in Nebraska in the late 1800s.[19] Despite this innovation being over a century old, the structural limits to straw bale-based buildings mean that they are often only a single storey tall, limiting their uses. Straw has more commonly been used as insulation within walls.

One more modern use of straw is as a part of manufactured panels. There are a variety of techniques already on the market. These panels can replace chipboard or plasterboard.

There have been questions about whether straw is sufficiently fireproof or moisture-proof to be used in buildings. While the fireproof nature of straw bales and compressed straw has been proven, concerns about moisture and rot remain, at least when it comes to straw bale construction. As a result, many countries with high rainfall may not consider straw to be a viable building material.

However, that has not stopped 5 countries, including the US, France, Czech Republic, Slovakia and Italy, from listing straw as an exciting construction material for the future.

[18] https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits
[19] https://www.buildinggreen.com/feature/straw-next-great-building-material

Global concerns, local tactics

Our research into experts' assessments of the future of architecture reveal that countries from difference regions all share a single prime concern: sustainability and climate change. This is further reflected in the nations' interests in increasing resilience against extreme weather and integrating cooling strategies in urban design.

We can also hypothesise that the COVID-19 pandemic has led to a greater interest in liveable buildings and cities. We see this reflected in plans for increased walkability, multipurpose districts and greater resistance to urban sprawl.

There is massive diversity when it comes to the tactics employed by different nations. The range of answers supplied is such that many ideas only had one country as an advocate. And when one considers the different impacts of climate change and the different historical strategies of each nation, this diversity is unsurprising.

Being sensitive to these different and varying needs will allow designers to meet requirements and support different markets successfully, designing cities that are future ready, yet also appropriate to different cultural settings.

Finally, while it is heartening to see 12 nations presenting a broad range of strategies for sustainability, it must be remembered that the institutions questioned were largely architects, urban planners and designers. Their plans will be approved by governments and delivered by a range of other construction professionals, each facing competing pressures. As a result, it may be some time before we see these concepts realised.

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About PlanRadar

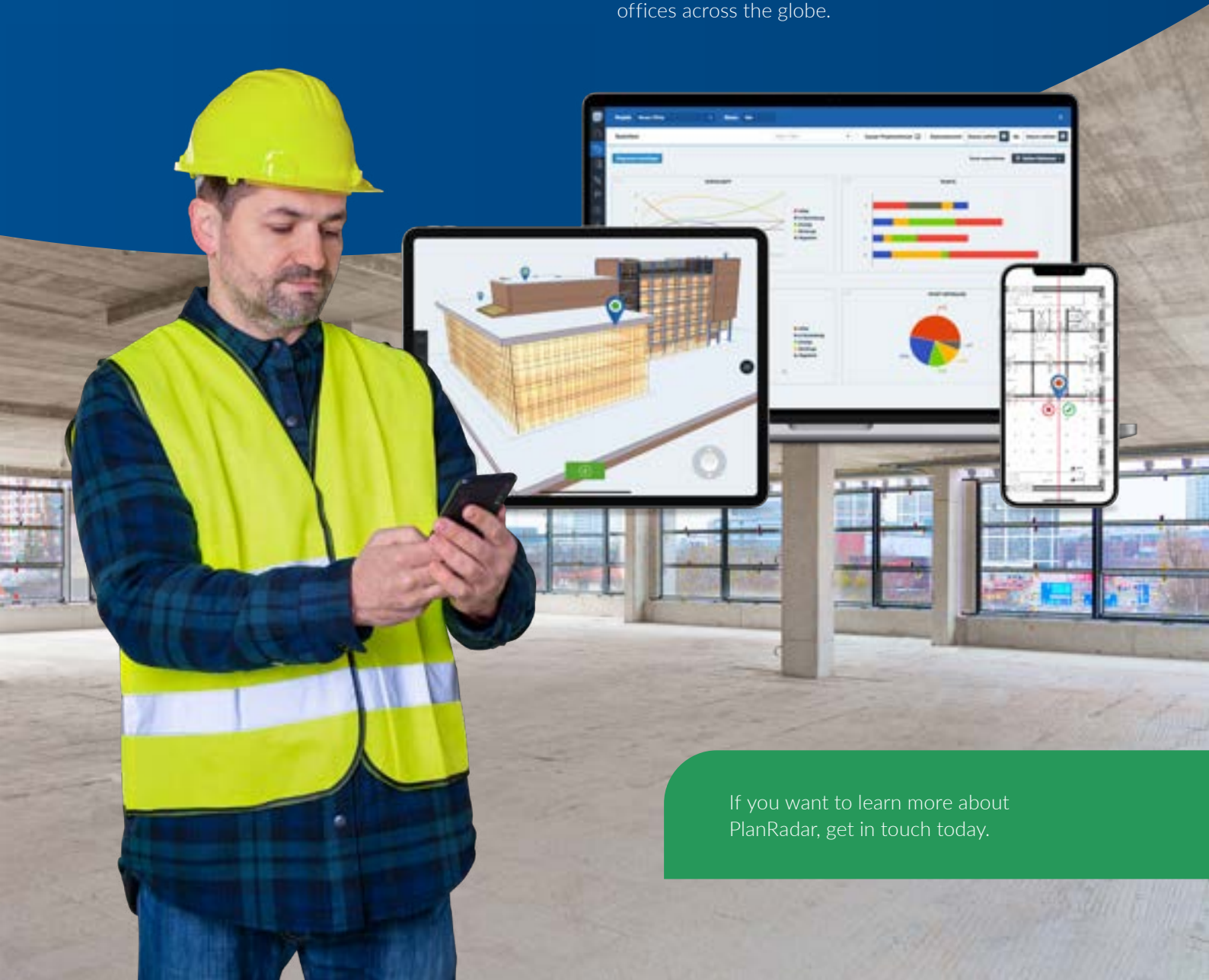
PlanRadar is an award-winning, digital SaaS field management platform for documentation, task management and communication in construction and real estate projects. We operate in over 60 markets around the world.

PlanRadar digitises all daily processes and communication across real estate and construction. The platform connects all project stakeholders and provides real-time access to valuable project data, enabling teams to increase quality, cut costs and realise work faster.

The easy-to- use platform adds value to every person involved in a building's lifecycle, from contractors and engineers to property managers and owners, with flexible capabilities for all company sizes and processes.

Today, over 100,000 professionals are using PlanRadar to track, connect and solve issues on- and off-site. PlanRadar is currently available in 19 languages, and can be used across all IOS, Windows and Android devices.

Headquartered in Vienna, Austria, PlanRadar has offices across the globe.



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