2050 – A SMART CITY ODYSSEY


In 2050, the skyline is unlikely to be filled with flying taxis but in 31 years, how will our cities have changed?
Digital technology

The data collected by buildings, infrastructure, and phones are changing the way the city works. Apparently, all this information is making our fridges smart, our homes more efficient, and soon it will even help our buildings talk to each other. To get a better idea, think about the smart home. When you leave, the heating turns itself off. When you’re on your way home, it turns back on again. Like a dog waiting for its walk every morning, smart homes get to know their owners.

“They’re very quickly machine-learning your habits and creating a programme that works around you – and they’re pretty good at predicting when you need energy and when you don’t,” explains Mike Pitts, deputy challenge director at Transforming Construction at the innovation agency Innovate UK, who’s bringing the information together to be able to manage systems across a large urban area.

And what about the Grid, the way we heat and light our homes will evolve. To some extent, we can expect power from solar and wind.

“In a decentralised way,” says Fry, director of Regeneror and consultant, “those who have surplus energy, can sell it.”
Harnessing waste heat

Modern society is a bit like Ebenezer Scrooge in Charles Dickens’ A Christmas Carol. We have spent many years being awful that now – after being visited by the ghosts of climate change future – we are compelled to repent.

However, Scrooge did have one big advantage over us: he wasn’t half as wasteful. All around us, the waste heat from industry billows away unused; our draughty homes are hard to heat; and, according to Pitts, London spends more money on energy to cool itself than it fritters away on heat. The cities of 2050 will be kinder to the environment, thanks in part to the expansion of district heating networks.

Fry notes that district heating provides about 2% of the UK’s heating needs at present, but that there is enough evidence to indicate that it could satisfy about 20% of heat demand. In time, more and more waste heat from industrial processes and other sources will be captured and recirculated on a much larger scale to heat and cool our urban centres.

“There was a study from the Greater London Authority which said that, even with the existing technology and economic assumptions, London could provide 60-70% of its heat from waste heat sources and unused sources of heat,” he says, “and if new technology came through, maybe that could be 100%.”

Right now, we’re at a tricky point in time. We need to decarbonise our housing but don’t have the necessary infrastructure in place to do so. Within the next three decades, a swathe of heat networks will be put in place to mine our waste heat and reduce the reliance on gas.

“I think there’s enough waste industrial heat across the UK to provide our heat needs,” adds Pitts. “Heat networks are tough to do, but as we move to retrofitting their homes in the future, using more heat pumps, then district heat networks make a lot of sense. And the potential is there to mine those lines for proofing it’s a good energy source.”

Recent ISMMA predictions suggest 2050 will see a 40% reduction in UK CO2 emissions with a 95% reduction by 2060.
Energy-efficient homes

Most of the houses we see today will still be here in 2050. Indeed, according to the Future City Catapult, 90% will still be standing in three decades’ time. Apart from energy-efficient cladding and solar roofs, chances are our homes won’t look that different. So, if you’re a timber housing evangelist, you may have to wait a lot longer for your log cabin London.

“but what we must remember is that when you improve the quality of your home, it’s not just the energy efficiency gain. The homes are quieter and comfort levels are greater because they don’t cool down as quickly or warm up very fast. They stay cooler in the summer, which I think is something that is often overlooked.”

The move towards passive housing in the next few decades promises to be slow are off the Grid, they’re producing more energy than they use, and actually dump their excess energy into a fleet of electric vehicles."

Between the capturing of waste heat, in-built solar roofs, active façades, ground source heat pumps, better insulation and air tightness, the buildings of the future won’t be as needy energy-wise. And then there is the falling cost...
Materials

Every other day, we read about novel ways of using our waste to create more responsible, less energy-intensive building materials. If you feel like it, you could build a house today using bricks made with cigarette butts, straw, or even your own faeces. You could insulate your walls with cardboard and grape stalks and panel your walls with cocoa husks and coffee grounds; but if you're dreaming about the widespread change in the way we use construction materials, you will probably be disappointed for now.

Concrete is king and won't be overthrown for a while yet. Fry notes that cement production is responsible for 8% of global carbon emissions. "According to analysis by Carbon Brief, if that were a country, it would have the highest carbon emissions apart from the US and China," he says. "The carbon intensity of cement has fallen by 19% over the past 30 years but not all of those best practices and technologies for producing it are that widely adopted, and demand has tripled, driven from urbanisation; so, there is a conundrum around cement and concrete. There are alternatives but they're not that widely used and understood yet."

Even still, alternatives are emerging. The continuing emergence of wood products such as cross laminated timber has meant that wood is being trusted more and more - a material that provides an environmentally friendly alternative in construction. All over the world, timber skyscrapers are popping up and the world's largest cross laminated timber building, in Dalston, East London (a structure engineered by Ramboll) Government may have plans to ban combustible materials from walls of buildings once the Grenfell fire tragedy. Advanced manufacturers of fire-retardant timber engineers say it is ready and will speed up the pace of change.
Transport

Visit Paris today and you’ll see people zooming around on shared electric scooters. Just flash your bank card and away you go. Even in London’s sleepy suburbs, shared electric bikes lean next to garden walls, ready for anyone to use if they’re willing to part with a couple of pounds.

The transport mix has been disrupted and much of it is down to the choice of the next generation. “There’s a big generational shift coming in now,” Pitts said. “I think for older people – my generation and above – a car represents freedom, but for the younger generation it’s not. Accessibility and mobility are much more important. If it’s one type of vehicle that just does one type of job and you have to find somewhere to store it and keep it running, why would you do that when the world’s becoming much easier to get around in?”

Pitts foresees a future of easily hailed taxis and autonomous pods – a rise that could slowly sound the death knell of the humble bus. He foresees autonomous pods driving optimised routes, knowing exactly where to pick people up and drop them off. “You could have people living on the edge of the city getting in very easily rather than having people go to that one bus stop and wait for an hour. It makes it easier for everyone to get around... and if they’re autonomously controlled, they are safer.”

Chris Fry also believes that through mobility as a service, people’s relationships with vehicles will change to such a point that car ownership will become low in urban areas and replaced in part by autonomous, on-demand electric vehicles and intelligent systems that optimise journeys – whether that be zooming the whole way by car or hopping out walking for parts of the trip.

Christian Bocci, senior partner, architecture and urban design, Weston Williamson + Partners, said: “Our traffic fabric – in which cars, bikes, and servicing vehicles share the same roads – will evolve into individual user-centric systems. We have flexible systems that anybody and everybody can use. Unstructured transport broken down into many small systems. You will start to get a layering of the Grid, I believe. We will start to separate that and there will be some double-decker or below ground routes that work in parallel. These systems will break out rather than being the single open road structure that anyone can use.”

If this comes to pass, electric cars may have their silent say on how we are delivered. We’ve all electric cars and trains are quiet as death. When coupled by self-driving, dedicated services it is more likely that many of our journeys at night-time or sleeping hours may be taken by city transit. Of course, there is another important part of why the Grid will change, our urban spaces and places. We need to get people off the road and into the realm of the pedestrian and the commuter. If we don’t, we will have a city we can’t get around easily.”

Netherlands 2015
Green and blue spaces

Rightly or wrongly, I always felt that politicians saw green campaigners as children talking among adults – tolerated, but not taken seriously. Now, as we count the costs of climate change, these children are being taken seriously. Turns out the greening of cities, through green roofs, sustainable drainage systems, air quality measures, and carbon-gobbling plants, actually saves money in the long run.

“There’s a necessity to make our cities more resilient and, in so doing, a good way of doing that is to combine blue green infrastructure, make streetscapes a little bit greener, and use parks in times of flood as flood areas,” notes Fry.

Our cities are becoming hot houses every summer, but we can reduce this urban heat island effect with the help of greening. By planting more trees, creating roof gardens, and building new parks, our updated cities will defuse the build-up of heat in concrete-dominated cities and improve air quality. Similarly, the creation of sustainable urban drainage systems will reduce the impact of surface water flooding which, if you recall the spate of flash floods last summer, has been a growing threat.

Perhaps the proposed Great Thames Park, as part of growth plans for the Thames Estuary, could become the mould for future flood resilience by urban waterways. Following a recommendation by the Thames Estuary Growth Commission, Fry says the Government has agreed to investigate the idea further.

“That’s exciting because it’s looking at a green park in an area that definitely has a flood-resilient element (the estuary environment) and weaves that into the way the new infrastructure and new industry could be developed. It could be a model for how to do that on the macro scale.”

Sooner or later, we’ll be forced to become more economical in our use of resources. In new homes, that might mean exploiting passive heating during the day; or using tree canopies to provide passive cooling in cities. As cities evolve, the temperature-regulating capability of underground spaces will also be harnessed.

Bocci explains that the subsurface, a much more stable temperature, can help provide more mid-rise spaces. “I’m fairly certain underground will play a major part in the temperature,” he says. “One network that could have done this already had to have been used as beer storage sinks... We’re looking into a network that straddles the Thames link into London.”
In recent times, climate change protesters brought the busiest street in London to a standstill and Jeremy Corbyn hopped off the fence for long enough to declare a climate emergency; so, if it weren’t clear already, it is increasingly apparent that the need to act for our excesses will make our cities look, sound, and even smell different.

Some are almost there already. Oslo, Copenhagen, Essen, and Nijmegen are four European cities to have made significant strides towards a low-carbon future. But how have they done it? Connolly is well placed to comment, with RPS involved in the European Green Capital Award - a European Commission initiative that rewards cities for environmental achievements and commitment to sustainability. “Strong governance and leadership are paramount,” she says, “with sustainability and accountability built into policies, long-term vision and strategies, meaningful citizen engagement, working with business and industry, and an integrated approach as different environmental areas are all connected, ultimately viewing the city as an ecosystem.”

She also emphasises the importance of a more nebulous, yet no less important, concept: community. “Advanced cities have been working with citizens, raising awareness and cultivating a sense of community for years,” she adds. “They are now leading public thought and behaviour change, and this will continue.”

Needless to say, the four experts have varying visions of the future - as any four people with different specialisms would. For Connolly, the city of 2050 will be a more compact, efficient place. “The mode of the compact city will be key - while cities grow up instead of out and public transport, and brownfield instead of greenfield, with high connectivity, allowing for diverse modes of mobility (walking, cycling, public transport, and the like) efficiencies savings in energy, waste, and so on. [with]...
Conclusion

When we think of the future, it’s worthwhile looking at the past. If we cast our minds back 31 years, back to 1988, it’s amazing how much has changed. There was no internet to speak of back then, pretty much no one had mobile phones, and we had fireplaces upstairs.

Some of what came to pass three decades later, we could have predicted. Other aspects of 2019 would have seemed otherworldly to us – magical even (a phone, TV, radio, library, VCR, sound system, camcorder, and camera all in that tiny box!). With the ever-increasing interconnectedness of people, the real-time sharing of knowledge, computing getting closer and closer to human intelligence, and the acceleration of technological change, many aspects of life in 2050 will be unrecognisable. Let’s hope most of these changes are positive – that we live in greener, cleaner, more efficient cities. Oh, and hopefully we all have hair.

Look out for...

HORIZONTAL LIFTS – Christian Bocci sees elevators moving to the horizontal plane – an innovation that could connect neighbouring buildings. “We’ve seen Dyson with the multi lifts,” he says. “These can go horizontally as well as vertically, so you’re going up a lift that can go to the top of a building, below ground, sideways 50m, and go into another building. This technology could start to transform the way we build buildings above and the underground.”

REACTIVE STREET LIGHTING – street lighting is evolving to use less energy and is even tackling anti-social behaviour. The more footfall there is, the larger gatherings of people, the more energy is used. Reduced and perception of reduced cycling or walking feels safer and also gives fewer people a different perspective.