

Public transport is evolving – fast!

Overview

As discussed in previous issues, emission goals set in Paris in 2015 created opportunities for investment in cleaner technologies and are proving a catalyst for remarkable advances worldwide.

Currently, the production and use of energy accounts for around two-thirds of global emissions. The *Union Internationale des Transports Publics* (UITP), an international network designed to bring together all public transport stakeholders and all sustainable transport modes, predicts that demand for energy will grow by 20 to 35% over the next 15 years alone.

In general, sources of electricity remain beyond the control of transport entities. However, the sector is beginning to realise that, if demand is to be met in a sustainable way, major effort is required *now* – not later.

‘Sustainable’ transport enhances the social, environmental and economic viability of every region or neighbourhood it serves, not just by promoting mobility but also by limiting the impact of the infrastructure required to accommodate it. To be sustainable, the entire lifecycle of a mode of transport must be measurably effective, efficient and amenable to ongoing optimisation. What’s more, the source energy for it should be capable of being supplied indefinitely.

Countries and communities that improve the sustainability of their transport networks create cleaner, more vibrant and liveable towns and cities. What’s more, they’re contributing to a revolution in renewable energy and methods of storing and harnessing it.

“A developed country is not a place where the poor have cars ... it’s where the rich use public transport.”

Gustavo Petro, mayor of Bogota, Columbia

No-one owns or taxes the sun ... yet

Based in Paris, the International Energy Agency (IEA) comprises 29 member countries and has four main areas of focus: “energy security, economic development, environmental awareness and engagement worldwide.”

The IEA spruiks solar as affordable, inexhaustible and clean, an energy source that can be harnessed globally, not just in sunnier climes. Given that the costs of solar energy and its storage have virtually halved since 2010, solar photovoltaic electricity represents an increasingly viable alternative to new coal-fired power plants.

Solar power, says the agency:

... already helps power real-time passenger information at bus stops in London and ticket machines in New York [and] is used extensively on rail networks: Phoenix Valley Metro

recently unveiled a solar plant that is helping to power its depot and, in Japan, JR East has launched its first large-scale solar power generation facility to help power trains, reducing CO₂ emissions by around 500 tonnes a year.

In Australia, with its coal-dominated electricity grids, the federal government is dragging its feet with regard to renewables, but not so the states.

Earlier this year, for example, the Victorian government announced plans for a new, 75-megawatt solar farm, much of the energy from which will power the state’s entire tram network (the world’s biggest) by the end of 2018. The project forms part of Victoria’s commitment to achieving zero net emissions there by 2050 (which is, perhaps, optimistic, given the increase in emissions statewide in recent years).



Digital impression of a tram that runs on solar energy. [Photo courtesy of Australian Solar Group.]

Riding the winds of change

Wind power too makes real economic sense, with onshore wind the cheapest form of new energy generation in Europe today. According to [Wind Europe](#), energy from the wind is reducing costs so rapidly that it will play a central role in that continent's power mix going forward.

Right now, in a European country that's harnessed wind energy since the Middle Ages, about 600,000 train passengers a day travel courtesy of new-generation windmills located offshore and country-wide.



Nederlandse Spoorwegen (NS), The Netherlands' national railway company, runs all its electric trains on wind power, making it the first company of its type in the world to do so using renewable energy alone.

The 1.2 billion kilowatt hours of wind energy required is supplied by energy company Eneco, drawing from wind farms in The Netherlands, Belgium and Scandinavia. Eneco even built projects exclusively for the trains, ensuring low prices for Dutch commuters.

At present, a Dutch a wind turbine takes an hour to generate the power needed to run a train for 120 miles (~193 kilometres), but NS hopes to reduce energy consumption by 35% before 2020, so the trains will go further on less.

But how do trains like this work? In an article for [Forbes.com](#), Laurie Winkless explains. Rather than using conventional engines, electric trains:

... act like a component in an electric circuit. Rail networks source electricity from the grid [or, in this case, elsewhere], transmitted via high-voltage lines. Once it's in the network, [the] three main options for getting the electricity to the trains themselves [are] on-board

energy storage systems such as batteries, an overhead wire that the train connects to, or an extra 'live' rail that has direct current flowing through it at all times ... How ever the electricity is delivered to the train, once there it's used to power lights and air-conditioning, as well as the traction motors [that] turn the train's wheels. Electric trains also use regenerative braking, similar to what's found in hybrid and electric cars. [It's used] on underground trains in Los Angeles, Auckland and Buenos Aires, among others.

Regenerative braking is a method by which energy is extracted from the parts being braked (in this case, the train's wheels) to be stored and re-used, or used elsewhere.

Trains in the US city of Philadelphia, for example, utilise regenerative braking, and any excess power produced is directed to a centralised bank of lithium-ion batteries and then on-sold to the main electricity grid. So simple; so clever!

Back in Oz, as part of its push to lower emissions, the Victorian state government also recently green-lighted more wind farms – a step in the right direction for a country whose investment in large-scale renewables fell sharply last year.

And finally ...

SpaceX hypes the Hyperloop

In 2013, Elon Musk, founder of Tesla and SpaceX, envisaged a fast (1,200 kilometres an hour), efficient and cost-effective way of transporting commuters and cargo between moderately distant locations (San Francisco and Los Angeles, say, or Melbourne and Sydney) with minimal environmental impact.

This alternative mass-transit option, the Hyperloop, is a futuristic sub-sonic train comprising two massive, low-pressure tubes mounted on pylons, along which pods are propelled by magnetic accelerators. Musk described it as "a cross between a Concorde, a railgun and an air-hockey table," which would, by virtue of solar panels on the roof, be environmentally clean *and* self-powering.

SpaceX sponsors [Hyperloop competitions](#) to encourage the development of prototypes. Meanwhile, various companies and governments are exploring the concept of what, effectively, could be seen as "broadband for transportation."*



Artist's impression of VicHyper's Hyperloop, an Australian finalist in the SpaceX Hyperloop Pod completion held in January 2017.

Opines [Digital Trend's Will Nicol](#):

It remains unclear whether commercial Hyperloop systems will ever be widely adopted. As the global population swells and the environment declines, however, better mass transit systems will become essential. Leonard Bernstein once claimed that great endeavors require two things: 'a plan, and not quite enough time'. The plan for the Hyperloop is there, but how much time do we have?

Timing aside, one thing is sure: sustainable public transport will not be pedestrian.

* <https://hyperloop-one.com>

Which [Perth-based company](#) is on board with the notion of sustainability?

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