



Planning is the Key in Helping to Create More Efficient Systems for Cities

By ENGIE

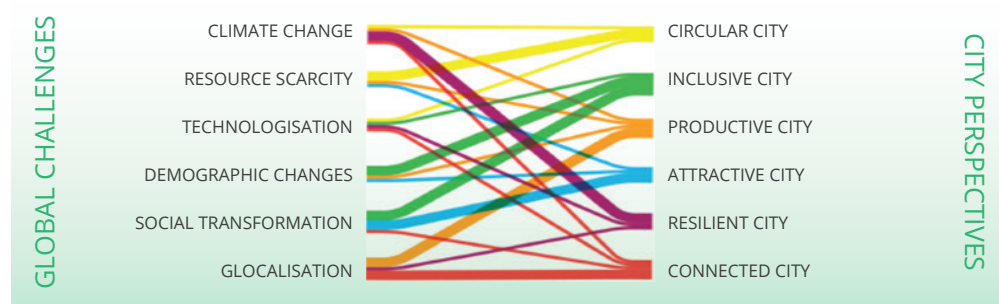
“

THE GOAL OF NET CARBON NEUTRALITY ENERGY GENERATION AND DISTRIBUTION CANNOT REALISTICALLY BE ACHIEVED OVERNIGHT BUT HAS TO BE PLANNED AS A LONG TERM STRATEGY.

”

The world is moving more and more towards urban areas where almost 50% of the CO₂ emissions are being produced to meets citizens' needs in terms of transportation, energy and services. Key energy issues impacting city resilience such as access to energy, security of supply, a sustainable energy production mix and new levels of energy efficiency helping to reduce emissions, needs to be constantly addressed.

Climate change related to extreme weather conditions has the potential to disrupt operations resilience and can have long-term effects on the performance of infrastructure (capacity and efficiency).



Considering urban population growth and the impact of climate change on systems, whether extreme heat or cold, energy demand will drastically increase in the coming decades. Energy production and consumption must be properly evaluated and considered as a whole in order to define solutions that would meet the local needs.

*This can be achieved thanks to a very powerful tool known as the “**energy master plan**” which is based on the principle of complementary synergies of systems and circular economy.*

What is at stake?:

1. The Importance of strategic urban planning by the public sector and its policy as a “chef d’orchestre” involving all stakeholders of the territorial development including the private sector.
2. The importance of combining multi energy schemes from local renewable energy generation to grid connection as a systemic approach.
3. The integration of **District heating and cooling systems** as the backbone of a sustainable dense city to supply and optimize green energy on a large scale.

The planned Roadmap to Carbon Neutrality



Figure: Feasibility study of a district heating network

The goal of net Carbon neutrality energy generation and distribution cannot realistically be achieved overnight but has to be planned as a long term strategy with various short-term enhancements during the lifetime of the urban infrastructure and building schemes.

This initial planning process led by the public sector jointly with developers, builders, real estate owners and operators will definitely help to mitigate the risks of a project and define the best solutions that could meet the project objectives taking into account the local constraints and resources that could apply to a district heating or cooling system.

The importance of a long-term strategy becomes evident here to implement essential infrastructures that will allow the systems to adapt to the latest technologies and examples of this are **district heating and cooling systems**, private wire microgrids and Smart technology networks, all of which should be planned as a completely integrated and decentralised infrastructure.

Increasingly thermal or electrical storage is becoming an essential component of these decentralised networks to not only reduce the peaks of heating, cooling and power demand by exploiting low energy tariffs from utilities providers but also as a **sector integration** enabler which could capture waste heat from local industrial processes as well as renewable energy which cannot be consumed as it is generated.

The success of installing a Carbon neutral, low operating cost city-scale project will also have a direct impact on developing the local economy and tackling energy poverty, one of the blights of the modern world, and this parameter should be one of the main KPIs in the planning of any new urban infrastructure project.

Power is nothing without control

Even with the best designed systems and the latest technologies, if energy generation, distribution and consumption is not being properly measured and logged, then those systems will become increasingly inefficient with the consequence that reductions in CO₂ will be diluted.

Part of the planning of any urban utility network must therefore include a detailed execution plan for the centralised monitoring, recording and controlling of all essential parameters to record any values that exceed their thresholds and raise alarms to highlight any equipment failures.

This data should also be used by the intelligent central controllers, which are constantly learning and updating their algorithms (AI) to control the generation, storage and distribution of energy and achieve the optimum performance under different climatic and demand conditions.

Completing the Circle

Energy can no longer be considered in isolation and should be addressed along with **Water** and **Waste** management. As such, a true circular economy can only be achieved when the planning of the urban infrastructure coordinates and connects between energy, water and waste (solid and effluent).

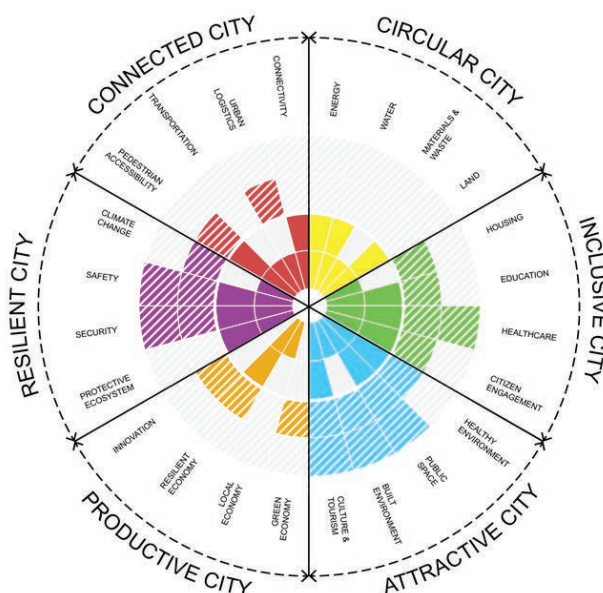
The district energy schemes (thermal or electric) allow us to connect energy from waste technologies such as incinerators and anaerobic digesters which drastically reduces the net output of waste and also provides low cost / Low Carbon power and clean water for recycling either on a campus, district or city scale.

From global challenges to city perspectives

360° CITY SCAN tool maps the performance of a city (infrastructure readiness and services efficiency) and thus potential growth areas from 6 different perspectives: circularity, inclusiveness, attractiveness, productiveness, resilience, and connectivity.

These aspects work together as a whole towards a balanced city and should be seen as different layers enclosing all the different aspects in the right ratio. When one aspect is underdeveloped, the city does not function properly and marginalizes citizens.

The aim is to introduce interventions in order to have a positive impact on all the aspects.



District Heating and Cooling (DHC) solutions help to develop a more balanced city, making it more resilient, more inclusive and more circular.

In the urban planning of tomorrow, digital is an essential lever to pre-model, to design and to operate. The expertise to simulate multiple energy scenarios taking into account energy needs (impacted by change drivers like energy efficiency actions, sector energy growth, population growth...) is key. Comparing these scenarios helps to establish a clear energy roadmap to meet the energy demand for the short, mid and long-term horizons considering:

- Energy efficiency actions by sector
- Mature and innovative solutions to reduce energy consumption: cogeneration, waste heat, geothermal, ...
- Solutions improving energy efficiency in transportation and using generating savings for cities
- Reduction of primary energy and water consumption as well as CO₂ emissions



"ENGIE Asia Pacific is a leading energy and services company focused on three core activities: low-carbon power generation, global networks and client solutions. With our regional headquarters in Singapore, we operate low-carbon power plants that focus on natural gas and renewable energy across Asia Pacific. Apart from our suite of renewable technologies including wind, solar, and hydro plants, our retail arm is based mainly in Singapore and Australia.

We are also growing our services business, largely in Singapore, Philippines, Malaysia and Australia. With the energy mix and fast-growing demand for power in Asia-Pacific providing significant opportunities for growth, we are striving towards our zero-carbon ambitions."



Promoting Sustainable Urban Energy in Asia Pacific

Asia Pacific Urban Energy Association (APUEA)

