Beyond cables and pipelines : A brighter state of the Energy Union

The Energy Union should be an opportunity to accelerate the energy transition and define a new set of roles, rights and responsibilities for the new players who are at the forefront of it. Energy Cities provides an alternative picture of how the energy transition has progressed at local level across the five pillars of the Energy Union: **#1 decarbonisation, # 2 energy security, #3 the internal market, # 4 energy efficiency and #5 research and innovation**. For each of these pillars, the paper points to recommendations on how European competition and energy legislation could be improved to sustain the momentum.

Back in 1996, the city of **Växjö**, southern Sweden, the municipal council took the unanimous decision to break free from fossil fuels and is well on track to reach that goal by 2030.

In **Geneva**, Switzerland, the city relies on the wealth of its local resources to improve energy security, using for example the water of the Leman lake as an energy source to heat and cool down buildings.

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#1 / Decarbonisation of the economy

A real exit strategy for fissile and fossil-based industries

At the local level, decarbonisation efforts have kept progressing at a furious pace year on year with 2016 being no exception. As the lead protagonists of a new energy system based on decentralised infrastructures and technologies, local authorities have continued to seize the climate challenge as an opportunity to enact ambitious policies. They have understood that in order to be successful, the energy transition ought to be more than a technical exercise. It should rely on a new economic and societal model with a clear break from the past. While cities are successfully withdrawing investments from carbon-based energy, national governments still struggle to put forward a proper exit strategy for fissile and fossil-based industries.

Quick snapshot of success so far

Cities as lead actors of the post-carbon system

As early as 1996, the municipal council of the Swedish city of **Växjö** took the unanimous decision to break free from fossil fuels, and is well on track to reach that goal by 2030.

In Poland, a country which stands out for its climate sceptic positions, 50 cities including the capital **Warsaw** have committed to reducing their own CO_2 emissions by a minimum of 20% by 2020 by stepping up energy efficiency investments and renewable energy production. **Kaunas**, Lithuania's second largest city, is already half-way through its objective of 100% clean energy production.

In Germany, while the government still hasn't floated an official date for its coal exit strategy, the capital city of **Berlin** made the official commitment to go completely coal-free by 2030.

The Divest Movement

Norway and Ireland aside, the number of national governments that have committed to divest assets from fossil fuel investments is close to zero. At city level however, the trend is gathering pace, with hundreds of local governments having voted favourably on the decision, from small and medium-sized cities such as **Oxford** (UK), or **La Rochelle** in France to big capitals like **Berlin** and **Copenhagen**. In **Stuttgart**, capital of the federal state of Baden-Württemberg in Southern Germany, local elected representatives voted a divest motion in July 2016 to withdraw investments from companies engaged in coal, oil and unconventional gas or fracking — including EnBW, E.ON, RWE, BASF and Bayer. The new guidelines also cover additional ethical investment criteria of environmental and social aspects as well as good governance.

Across all these cities, the funding streams divested from fossil fuel holdings are then re-invested in activities that are not only low-carbon, but also support the local socio-economic fabric.

The Community energy drive

According to a 2016 study from CE Delft, energy-producing citizens could make up half of Europe's electricity by 2050. But for this carbon-free potential to be tapped, community energy projects need to be supported at all levels. At the city scale, local authorities are already doing a lot. In the French city of **Lorient** for example, the local authority recently reported a partnership with a citizen-led project of "shared energy", leasing its public roofs (town hall, school, etc.) for the installation of a PV power plant.

Modernising for real

Revenues from the EU Emissions Trading System (ETS) are meant to provide opportunities to invest in the modernisation of the energy system. In some Member States, this still means putting coal on life support via supposedly "cleaner" technology. At local level, when competences allow, innovative ways of putting these funds to good use have been tested. In Brussels Capital Region for example, ETS revenues are used to finance the deployment of renewable energy. This included allocating direct subsidies to households, purchasing solar panels for public buildings and creating a regional energy service company.

Policy changes needed to sustain the momentum

Market design and renewables:

- In light of the above-mentioned potential of "energy citizens" to support the 2050 decarbonisation targets, the much floated need for a "level playing field" must not only be considered across different technology options but also across market players
- Exemptions to the foreseen phase out of priority dispatch and more generally support schemes for renewable energy projects should not be granted based on size only but rather in light of regional integration of projects: i.e., the added value they bring to the communities
- Scotland has achieved its 500MW target for community energy in 2015, 5 years ahead of schedule. The European Commission should heed the Scottish model and promote community energy targets at EU level, setting a long-term trajectory to boost investors' confidence
- The European Commission should entice Member States to impose a legal obligation to renewable energy investors to open the capital and governance of their projects to citizens and local authorities' participation. This specific requirement already exists in other Member State like France and Denmark, where, in the latter, developers of new wind turbines are required to offer at least 20% of the ownership to local citizens. Experience has shown people are less likely to adopt a "not in my backyard" attitude when they are involved in the decision making and ownership of new projects.

Governance of the Energy Union:

- When drafting their National Energy and Climate Plans, Member States should be encouraged to take account of and build on the local Sustainable Energy Action Plans adopted by over 5,000 cities across Europe

Legislation on ETS:

- Revenues from ETS auctioning should be directed to actual decarbonisation of the energy system, based on making the most of local renewable and energy efficiency potential while ensuring a fair transition for regions most vulnerable to system change-related job losses

EU financing reform

- The EU itself should heed the cities examples and strive to make its funding politics fissile and fossil fuel-free. Fiscal and financing rules adopted by European institutions should be reformed under a sound divest strategy

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#2/ Energy security, solidarity and trust

Don't put all your eggs in one basket:
Cities act cross-sector and partner

Merely switching energy suppliers to address geopolitical shocks is not the most viable way of addressing security of supply. Relying excessively on capacity reserves from centralised power stations - an option still favoured by numerous EU Member States - also very much reads like an outdated solution in an energy system underpinned by technologies that are increasingly flexible, distributed and decentralised. At local level, cities are putting real diversification into action, not only changing providers but also working across sectors and networks: using heat as an energy source or storage medium, and more generally optimising the various flows that cross their territories. In 2014, the European Commission Joint Research Centre estimated that by implementing the cities' local action plans in the countries most vulnerable to system stress, the equivalent of 58% of gas consumption could be saved!

Quick snapshot of success so far

Reducing import needs through local heat

It is estimated that half of Europe's entire heat supply could be covered via district heating. By harnessing surplus heat from industrial processes, power plants and waste incineration – or by relying on CHP, heat pumps, geothermal or solar thermal energy, cities contribute to a great deal of Europe's energy security.

By way of example, the metropolitan area of Paris recently decided to heat yet another of its neighbourhoods through geothermal energy, heating around 10,000 households and communal buildings in the municipalities of Grigny and Viry-Châtillon. In Eastern Europe, the Latvian capital **Riga** stepped up efforts and cooperation with the department of economical affairs to accelerate the integration of renewables within its DH system.

The city of **Aberdeen** established an energy service company to manage the sale of heat and power from a CHP plant fuelled by non-recyclable waste from households and businesses in the area. The newly established body will also deal with the development of the associated DH network, as part of its efforts to cut carbon emissions by 50% by 2030.
In The Netherlands, city officials estimate that using waste heat from the **Rotterdam** port could save about 12% of gas consumption nationwide!

Urban-rural solidarity

A great deal of energy self-sufficiency, and indeed solidarity and social cohesion, can be achieved through enhanced cooperation between urban and rural areas. While rural areas have space and resources, urban settings often present greater levels of energy demand, as well as economic power: a win-win cooperation. In **Frankfurt-am-Main**, Germany, the city is partnering with the surrounding territory to achieve its 100% renewables target notably via biomass and wind investments. This would – through an equally strong energy efficiency push - allow the metropolitan area to cover 184% of electricity demand through renewable energy by 2050.

To achieve its energy and climate plan objective of 160MW wood energy installations, the metropolitan area of **Lyon**, France, adopted a similar strategy. A territorial forestry project has thus been set up with the various relevant stakeholders, to detail how the local forest will be exploited over the 60 to 80 following years, in order to power a biomass heating plan that will be connected to the local district heating network in 2020.

Policy changes needed to sustain the momentum

Market design

- The Market Design provisions on generation adequacy and system stability should put greater emphasis on district heating and CHP from renewable or recovered energy sources as alternative options to improve energy security before considering the implementation of capacity mechanisms.

Impact assessments and energy security strategy

- Considering the documented larger socio-economic benefits of locally-anchored energy projects, the European Commission should consider the opportunity of introducing an impact assessment mechanism encouraging Member States to plan energy infrastructure from the bottom-up: carrying out a mapping exercise of how much energy demand can be covered by more inclusive, sustainable solutions at local level and only covering the remaining needs via centralised infrastructure. This approach is in line with and complementary to the "energy efficiency first" principle.

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#3/ A fully integrated internal energy market

New market realities call for reshuffling responsibilities

Moving to a "fully integrated" energy system should have a broader meaning than making renewable sources compatible with the market. Beyond adapting to new technologies, genuine integration also calls for consolidating the position of new entrants such as local utilities and cooperatives.
Leaving the centralised energy paradigm behind means adapting the control model and redistributing competences and responsibilities. At present, traditional market players continue to have a disproportionate role in the EU's proposed market architecture.

Quick snapshot of success so far

From market concentration to...

Local optimisation

Creating an integrated energy market should be more than a story of endless electricity cables and gas pipelines. Systems where energy is distributed at the mezzo and micro levels, built closer to demand, present numerous opportunities. Not only do they generally present ownership structures that deliver greater benefits to the local community, they also bring a balancing advantage to the overall system, reducing peak loads through local management and preventing grid losses.

The European Commission market design proposals should help bridge the important gap which has contributed to completely disconnect territories from the energy sources they use, year after year since the emergence of the industrial revolution. Thankfully cities have "relearned" to harness the resources of their territories, such as **Geneva** which uses the Leman Lake as an energy source to heat and cool down buildings. It is also this renewed connection which has allowed the city of **Växjö** to bet on becoming a 100% fossil fuel free territory by 2030, tapping into its rich biomass potential.

Actor diversification

The liberalisation of energy market and related spur in competition is still viewed as the unique way to deliver a "fair deal to consumers", as the European Commission puts it. In many countries however, this liberalisation has not delivered the promised better deals and the mistrust against energy suppliers is growing. In the UK, where there is increasing defiance against the "Big Six" traditional energy suppliers, some frontrunner cities have managed to address both the trust and affordability issue by creating their own energy companies. Indeed, these non-traditional energy players are increasingly entering the market in countries where they didn't have a historic monopoly. "Robin Hood Energy", launched by the city of **Nottingham**, now supplies the whole East Midlands, with yearly household tariffs about €100 cheaper than in the rest of the country, which has moved the region from 7th to 1st place in terms of price competitiveness in the country!

Democratisation

Over the course of 2016, the municipality of **Pamplona** in Spain also started exploring opportunities to create a municipal energy company, tasked not only with providing renewable electricity for its own facilities but also for citizens and companies. In addition to this, the local utility's missions include a strong focus on energy democracy, notably by:

- Facilitating the production of green energy by citizens and other local actors (energy assistance)
- Fostering networking between new producers, e.g. by encouraging the creation of a cooperative of small producers under the city's auspices
- Reinvesting parts of the profits into programmes addressing energy poverty

"Mini energy union"

In **Haren**, Germany, 147% of the local power demand is covered by renewables, mostly wind and solar. In the border town of **Emmen**, the figure only reaches 3%. If direct energy flows were allowed between the two cities at distribution level, this would allow Emmen to tap some 79.000 MWh of excess electricity from its neighbouring German city, enough to power the annual consumption of an average 24.000 households. The two local authorities have started looking at opportunities for Horizon 2020 funding to bring this project to fruition. Cross-border cooperation between Distribution System Operators has however never happened before and the cities hope to operate in living lab conditions to experiment this new solution.

Policy changes needed to sustain the momentum

Legislation on market design:

- The proposed creation of an official body to represent Distribution System Operators should include safeguards against a reinforcement of the role of market incumbents – leaving room for external scrutiny but also smaller players involvement such as municipal energy utilities
- The internal market objective of better integrating variable renewable energy sources should be coupled with more tangible policy instruments to consolidate the role of new entrants into the market
- New market design mechanisms need to be put in place in order to support the interconnection of various resource flows including heat, energy, waste, water, ICT, etc.
- Despite the EU's recently adopted heat strategy, the proposed market design remains narrowly electricity-focused. More policy and market instruments need to be put in place to support the deployment of renewable heat and make the EU a leader in the field. At global scale, the IEA/IRENA policy database shows that a lot more needs to be done indeed, listing 582 policy instruments in force for renewable electricity compared to only 158 for heating and cooling across the analysed 75 countries.

Legislation on State Aids

- The auctioning system for new renewable energy capacity should ensure a diversity of market participants by:
  - Excluding local value– driven project developers from auctioning and allowing support schemes to be maintained for these actors
  - Alternatively, reserving a share of auctioning capacity specifically to these projects
- In addition, tendering mechanisms should also support the Treaty objectives of territorial and social cohesion through a decentralisation of tenders which should also be carried out on a regional basis. This would ensure a greater diversification of the energy system, more in tune with geographical specificities, reducing the cost of transport losses and fostering an evenly shared energy generation in the whole country instead of in certain focus areas.

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#4/ Energy efficiency

From silo mentality to systemic logic

Increasing energy efficiency is about much more than reducing end user consumption. It supposes planning intelligently the development of a neighbourhood, district, city or larger area. It means discarding one-size-fits-all solutions and understanding energy efficiency as a context-dependent objective that can be based on a lot of different approaches and solutions.
In some cities, energy efficiency gains have been achieved by reducing primary energy demand through collective solutions based on sustainable district heating, while in others the focus has been more oriented towards individual household units through smart technologies and appliances. On some occasions, net-zero energy buildings have been favoured while in others a combination of sustainable heat and demand management have sufficed. Whatever the choices they make, cities are heading full steam towards energy efficiency. However, their efforts are still hampered by silo approaches and contradicting priorities from EU programmes and policies as well as dissuading national legislation.

Quick snapshot of success so far

The 2050 shades of energy efficiency

"Energy efficiency first" is a motto that cities have embraced for a long time now, as a crucial step on the road to 100% renewable energy or indeed climate neutrality by 2050.

The Danish city of **Sonderborg** for example, has launched the "ProjectZero" which commits it – with the involvement of citizens and companies alike – to become climate neutral by 2029 already. When asked how to achieve this strategy the answer from the city officials is straightforward: "Our number one priority is to be energy efficient, because the energy we do not use is the most sustainable". To reach this goal, the city translated its strategy into various instruments including the ZEROFamily learning programme and the ZEROhome project focused on helping some 18,600 home owners to retrofit their houses, which on average are over 65 years old.

Energy efficiency is also the number one priority of the city of **Frankfurt-am-Main**, Germany, in order to achieve its objective of relying 100% on renewable energy by 2050. Indeed, this target is only feasible, the city explains, via a 50% increase in energy efficiency, with the remaining demand to be covered with 25% energy generated in the city and 25% outside.

Tackling fuel poverty

Strong political commitment to address energy efficiency across European cities is often driven by a desire to address the rampant issue of fuel poverty, affecting one out of six Europeans. In the Portuguese city of **Porto**, which launched a deep building renovation programme as part of its Covenant of Mayors commitment, residents of the targeted neighbourhood have observed a 70% decrease in their energy costs.

Planning locally also saves energy

Beyond reducing heat and electricity consumption or using smart technologies, energy efficiency should be synonym of intelligent resource planning. This means a country's infrastructure and energy mix choices should be the sum of informed decisions taken at local level based on urban metabolisms and territorial specificities. Cities are ecosystems made of flows of heat, waste, water, food and geographically dependent energy sources. This represents enormous opportunities to reduce the need for distant infrastructures, more vulnerable to external shocks and prone to energy losses and waste. In Ireland, this approach has been well understood. The Sustainable Energy Authority encourages local optimisation of resource and demand-driven energy planning, helping cities such as **Dublin**, Ireland, to make use of "resources atlases" showing the availability of local energy options and supporting them in the development of their Covenant of Mayors Sustainable Energy Action Plans.

Policy changes needed to sustain the momentum

Tensions between conflicting EU objectives:

- Competition legislation and principles of individual consumer choices are sometimes at odds with the broader EU Treaty objective of social and territorial cohesion. New energy efficiency provisions that for example impose the generalisation of smart meters risk favouring a free rider logic and deterring system effectiveness in dwellings relying on collective heating solutions
- Similarly, article 24 of the proposed new directive on the promotion of renewable sources grants customers the right to disconnect from district heating systems provided that they find an alternative solution with a better energy performance. Again, such a provision, considering the effect it might have on reducing economies of scale from district heating investments, expenses and maintenance costs, runs the risk of negatively affecting the broader community

Funding programmes

- More funding should be channelled towards projects aimed at overcoming the split incentive barrier in the building sector between tenants and landlords, considering the number of cities facing a situation where most of the buildings are tenants-occupied
- European guarantee mechanisms and seed funding provided through investment programmes such as the European Fund for Strategic Investment should further target locally-anchored projects that support 2050 objectives, notably via a greater representativeness of cities in the governance of such instruments

Eurostat Accounting rules

- Local authorities should be exempted from accounting energy efficiency investments as debt in their balance sheets

Governance of the Energy Union

- The National Energy and Climate Plans process should encourage Member States to take full account of the local potential for energy savings and local resources when planning long-term energy mix and infrastructure

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#5/ Research, Innovation and Competitiveness

2050 starts today: Transition toolkit needed

A new energy system is in the making but the innovations that underpin this revolution are not only enabled by new technologies. In many ways, they are often the result of new social practices and governance methods. The decentralised energy system relies on a whole new set of players, and the collective intelligence of local communities is a fertile ground for the emergence of new solutions.
In light of this, Research & Innovation efforts across Europe should help cities test innovative transition kits, putting more emphasis on social innovation and experiencing with new practices. More focus needs to be put on testing emerging trends such as neighbours trading excess energy through blockchain grids, cities developing innovative financing tools to finance measures from their sustainable energy action plans, districts developing "treasure maps" of their local energy potential through participative processes, etc.

Quick snapshot of success so far

Social innovation

Because the new energy system no longer relies on a handful of vertically-integrated industries, new dialogue and exchange formats need to be established between all the protagonists of the energy transition. The city of **Almada** in Portugal has started to go down that road by setting up in 2016 a local climate platform with an innovative governance model – including members, advisors and ambassadors – to join efforts in reaching the city's objective of reducing its CO_2 emissions by 80% by 2050.

Micro-grids

The Belgian City of **Ghent** is developing a sustainable neighbourhood project in a low-income district in order to increase the penetration of renewable energy in the city, reduce the burden on the larger network and tackle poverty. The neighbourhood autonomy is achieved via a massive deployment of solar PV (750kW), balanced by CHP, high energy efficiency and demand management. Whether or not they have a suitable roof or the initial investment, all the households of the neighbourhood participate in the scheme via a cooperative. The latter handles the grid balancing through demand management and group purchase of energy efficiency equipment.

New system, new funding means

Through the EU project INFINITE Solutions, cities are learning from one another on how to think outside the box when it comes to securing funding for their sustainable energy projects.

The Danish city of **Frederikshavn** for example is partnering with local banks (even looking into setting up a competition) to encourage them to offer low or zero interest rates on energy renovation loans. So far, branch offices of eight national banks have already signed a cooperation agreement with the municipalities. There is no shortage of such innovative financing schemes as illustrated in this leaflet.

Policy changes needed to sustain the momentum

More targeted funding to test new solutions and scale up promising ones

- Beyond the roll-out of specific technologies, 2050 energy foresight exercises require more research and innovation support. The Horizon 2020 programme should include a stronger focus on transition management at local level to help cities better manage their long-term transition, set up priorities and build local coalitions
- While microgrids are fast penetrating across the Atlantic and in less developed countries, Europe lags behind. Research and innovation efforts across Europe should help mainstreaming such innovative practices while reducing overall system costs
- European funding must continue to support the testing out of innovative financing schemes at local level, where voluntary commitments continue to be made every day as part of the Covenant of Mayors, and where the solutions are being implemented
- Research efforts should aim at helping cities to develop innovative approaches towards developing urban-rural resource sharing and knowledge partnerships, including cross-border

Enabling cities to function as laboratories to test new ideas

- In many cases, inflexible national regulations often pose hurdles to cities' capacity to innovate. A "space for innovation" as required by many local authorities across Europe, must enable them to circumvent such obstacles by allowing them to operate in an environment free of legal constraints to test innovative practices

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The Belgian City of **Ghent** is developing a sustainable neighbourhood project in a low-income district in order to increase the penetration of renewable energy in the city, reduce the burden on the larger network and tackle poverty.

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In **Heidelberg**, Germany, the world's biggest passive house neighbourhood has reached completion. It created 7,000 jobs in the process and hosts some 12,000 households.

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Sustainable energy is one of the main development priorities for the Czech city of **Litoměřice**. Last year, the city inaugurated its first solar bench offering free internet access and charging stations for mobile phones. The bench also monitors energy production and consumption as well as air quality.

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