ENERGY TRANSITION ROADMAP

Setting the foundation of sustainable energy systems with energy efficiency

Industrial legacy cities and districts in the Alliance have set ambitious climate targets that require drastic cuts in carbon emissions and announced plans for rapid expansion in renewable energy generation. However, the Alliance cities, conscious of their legacy challenges and equally focused on achieving equitable outcomes through their sustainability actions, also emphasize energy efficiency as one of the most crucial components of their sustainable transition strategies.

Energy efficient cities provide the strong foundation on which sustainable energy systems can be built. Renewed economic growth, increased digitalization and the shift towards the electrification of urban environments contribute to rapid energy demand growth. Hence, in order to meet future energy demand while transitioning to renewable sources, cities need to identify a course of action that reduces energy consumption and improves the city's overall energy performance.

By investing in energy efficiency upgrades and advocating for sustainable energy consumption at municipal, residential, commercial and industrial levels, local governments help to increase city's resilience and secure long-term prosperity. The role energy efficiency plays at the local level should not be underestimated. While often not flagship sustainability initiatives – they are one of the most robust and multi-faceted tools cities can utilize to cut carbon emissions.

Energy efficiency initiatives within the Alliance cities and districts have taken all shapes and forms, and most importantly have engaged large numbers of stakeholders. Examples on how cities apply and adapt energy efficiency programs within municipal buildings, citizens' homes and large-scale commercial and industrial infrastructures are illustrated in this solution roadmap. These diverse and collaborative initiatives showcase how energy efficiency programs and investments, no matter how large or small, help to reinforce the Alliance cities' commitment to improving their sustainability and building inclusive communities.

PATHWAYS



PIONEERING CITY-LED ACTION

Setting the example for energy efficiency by investing in cityowned infrastructure



EMPOWERING LOCAL COMMUNITIES

Bringing value to residents by increasing access to energy efficiency support programs



SUPPORTING PARTNERSHIPS THAT SCALE

Achieving scale and impact through multi-stakeholder energy efficiency initiatives



PIONEERING CITY-LED ACTION



Cities planning to use energy efficiency measures to reduce urban energy demand or energy-related GHG emissions can take the first step by addressing the energy consumption of municipal buildings. Publicly owned infrastructure provides an easily accessible start point to pilot energy efficiency initiatives, test new technologies and invest using public funds. The importance of municipal building efficiency as a core sustainable transition pathway lies in its ability to lead to quick CO₂ emission reductions. Building efficiency additionally has economic benefits for industrial legacy cities with constrained budgets, as upfront costs can be refinanced through public savings from reduced utility costs.

Within the Alliance – municipal building efficiency is often part of a bigger sustainability vision. This is why comprehensive strategies include not only infrastructure investment in energy efficiency projects, but also softer and creative initiatives. Actions include training city employees in sustainable energy consumption practices and developing energy efficient building management guidelines. Illustrated by Buffalo's experience, this multi-angle approach yields stronger results and also provides knowledge and data that can inform other energy efficiency initiatives at the city-level. Furthermore, by retrofitting and upgrading municipal facilities in line with ambitious energy efficiency policies, regulation and ordinances set at the local level, local governments are also able to demonstrate their commitment and set an example that businesses and residents can follow.

City of Buffalo: Strategic investment in municipal building efficiency



Energy demand in Buffalo is increasing spurred by renewed economic growth, but energy affordability is simultaneously a growing municipal challenge. Taking swift action, the City of Buffalo chose to lead by example with an energy efficiency push, setting a target to reduce municipal energy consumption by 20% by 2020. To date, Buffalo has spent \$6 million to upgrade 56 city-owned facilities. These investments have led to \$820,000 in annual cost savings and have a GHG emissions reduction potential of 865 metric tons of CO₂ equivalent per year.

Upgrading city-owned facilities to reduce municipal energy consumption in the City of Buffalo. © City of Buffalo



Buffalo's commitment to sustainable energy consumption is also supported by several other initiatives highlighted in Buffalo's 2015 Energy Master Plan. These include:

- The promotion of energy awareness through outreach and training;
- Updating the City's lease arrangements to promote energy conservation;
- Implementing energy conservation measures;
- Improving energy management through preventative maintenance and retro-commissioning;
- Optimizing use of space in municipal buildings; and
- Participating in a demand response program.

The size and impact of city-led energy investments may seem limited; Buffalo's combined public agencies' energy consumption amounts to only 6% of the city's total. However, city-led action is often the catalyzing first step that helps to provide the necessary example for energy saving practices that will lead to city-wide adoption and investment in energy efficiency. In particular, Buffalo's energy efficiency initiatives also include community-focused projects. This is an important approach as these investments tangibly demonstrate the city's commitment to energy efficiency to Buffalo residents. Examples include upgrading systems at Lafayette Ice Rink, implementing lighting improvements to Kleinhans Music Hall and illuminating historic buildings including the City Hall Dome with LED. These energy efficiency investments not only save energy and cut CO₂ emissions and operating costs, but also create community value by preserving and improving local facilities and landmarks that citizens love.

Still, more work lies ahead for the city. The city is already half way to achieving its energy consumption reduction goal of 20% and at present plans to accelerate the conversion of streetlights to LED. Municipal energy efficiency initiatives are also being integrated with multi-level energy initiatives. Knowledge and good practices developed through city-level energy efficiency improvements can be used to help guide new initiatives, including the multi-stakeholder Renewable Energy Purchase Agreement, and enhance the support of community energy efficiency initiatives such as those of PUSH Buffalo.



EMPOWERING LOCAL COMMUNITIES

Local governments should not fail to recognize citizens' contribution to reducing energy consumption and CO₂ emissions through small-andmedium-scale energy efficiency investments. All Alliance cities and districts demonstrate good practices for providing vital support that enables citizen participation in energy efficiency programs. A diverse range of local policies and incentive schemes has encouraged citizens to become more conscious of their energy consumption. Action examples include: Self-monitoring energy use, applying energy saving techniques and investing in technological solutions that enhance the energy performance of residential buildings.

Alliance cities also value the interconnection between energy efficiency and health benefits. The renovation of residential and community buildings improves insulation, thereby decreasing the need for heating/cooling homes. This in turn creates better living environments that promotes wellbeing and reduces health risks that stem from poorly insulated homes. Citizen-led energy efficiency investments also yield direct economic benefits through reduced utility costs and monthly savings, helping to strengthen economic wellbeing at the local level. This is a vital tool for cities in the Alliance that have placed importance on tackling energy poverty. By increasing low-income households' access to energy efficiency opportunities, local governments are able to empower communities to play a bigger role in the city's energy transition. Support programs such as the Green and Healthy Homes initiative in Buffalo, the Greater Cincinnati Energy Alliance and Katowice's recent Municipal Energy Center demonstrate how much value community-driven approaches to energy efficiency have.

City of Katowice: Municipal Energy Center – An access hub for energy efficiency

Energy efficiency improvement in Katowice has enormous potential to tackle carbon emissions and improve air quality and urban health in the city. However, the implementation of energy saving initiatives within residential pockets of the city has been limited due to a lack of knowledge and information on support programs amongst local constituents. To spread awareness and empower local communities to take action within their own homes, Katowice's Department of Energy Management and Municipal Office Environmental Management set up The Municipal Energy Center (MCE).

The MCE was launched during 4th Katowice Energy Days on 22 September 2018 by the Mayor of Katowice and with substantial local media attention. The initiative, the first of its kind in Poland, is an information point and knowledge hub that residents can visit to learn more about: energy saving; installing renewable energy; replacing heating systems and overall sustainability education. The center also provides information to residents about available support schemes. Located in the city center next to the City Hall of Katowice, the MCE allows citizens to meet directly with experienced energy consultants that can provide expert advice tailored to individual needs and context.



One of the largest programs is a subsidy available to residents to replace old heating systems. The program is worth over 250 million PLN (approx. \$65 million), and will last up to 2027. Another initiative is focused on the renovation and modernization of heating systems in public buildings. This program, which runs until 2021, will fully retrofit 44 public buildings including schools, preschools, and nurseries.

The center also creates a physical space in the city where events, exhibitions and workshops that are relevant for Katowice's sustainable energy initiatives can take place. At present there is a small exhibition created by artists The Municipal Energy Centre that opened in 2018 is located nearby Katowice's City Hall. © The Municipal Energy Center – The City of Katowice





in cooperation with city hall staff. Regular community meet-ups are also organized twice a month. Information and updates about these meetings are communicated through multiple channels including: social media, the city hall newspaper, and engaged local government councilors.



Katowice citizens engaging in conversation on energy savings in the MCE. © The Municipal Energy Center – The City of Katowice



SUPPORTING PARTNERSHIPS THAT SCALE

In order to scale energy efficiency investments beyond public buildings, local governments have focused on building and supporting partnerships that encourage the private sector to play a leading role on accelerating energy efficiency. Diverse collaboration initiatives with business stakeholders enable cities to take giant strides forward when it comes to expanding investment and achieving citywide energy savings.

For most cities, commercial buildings have the highest electricity demand and produce the most CO_2 emissions. However, stimulating the market uptake of energy efficiency continues to be a challenge for municipalities. Cities and districts in the Alliance have made an effort to work hand-in-hand with the private sector and service providers to find ways to stimulate energy efficiency investment through multiple tools such as setting fair regulation, offering tax abatements or providing other incentive schemes.

Cities have emphasized that identifying the right partners and investing in growing collaborative relationships with multiple stakeholders has resulted in successful projects that have a long-term future. The Chinese districts in the Alliance have chosen to especially prioritize partnerships that foster green industrial development. Due to their regional context and transition needs, shifting the industrial sector towards greener and energy efficient practices has been earmarked as the key to unlocking scalable energy saving investments and vast CO₂ emission reductions.

Cities of Pittsburgh and Cincinnati: Scaling energy efficiency through 2030 Districts

Both Pittsburgh and Cincinnati regularly collaborate with private sector-led initiatives to broaden and speed-up local energy transition strategies. In particular, both cities are part of the 2030 Districts Network. 2030 Districts are a part of a North American initiative that creates a network of property owners who collectively commit to advancing the sustainability of a densely-occupied commercial area within a city. Each district aims to reduce energy and water consumption, as well as transport-related carbon emissions by 50% by 2030. To achieve these goals, the stakeholder group works together to leverage finance and shared resources in order to renovate and retrofit existing building stock, foster efficient facilities management and integrate sustainability principles in new construction projects.

Pittsburgh's 2030 District launched in 2012 and is currently the largest in the network with over 508 commercial buildings participating. Within six years, the district has already achieved a 12% decrease in energy and 14.5% in water consumption. Dedication and commitment to the 2030 District goals also saved building owners \$85.4 million in utility costs. Energy efficiency innovation is a particularly strong point of the district and the city as a whole. However, much of the innovation being explored in Pittsburgh isn't only high-tech, but also practical and simple civic-minded solutions that can be easily replicated. Collective energy savings at such scale have helped the city as a whole to make progress on its larger sustainability goals. Following the success of Pittsburgh's 2030 District, the city government has also developed a Building Benchmarking Ordinance that will encourage even more private building owners to play an active role in curbing energy consumption at the local level.



Cincinnati, on the other hand, recently launched their 2030 District in 2018 becoming the 21st District in the network. Pittsburgh's successful example provided the case study that helped Cincinnati to develop its own 2030 District vision. A key driver for Cincinnati to launch their own 2030 District was to improve the competitiveness of the city, and to attract and retain professionals by offering a sustainable and healthy working environment. Cincinnati's 2030 District has rapidly grown to 158 buildings comprising over 20 million square feet, including the Cincinnati City Hall, and is actively planning progressive initiatives for 2019. Energy efficiency is set to be a core aspect of upcoming projects.



Pittsburgh's 2030 District is currently the largest in the network with over 508 commercial buildings participating. © Pittsburgh 2030 District Cincinnati's 2030 District has rapidly grown to 158 buildings comprising over 20 million square feet. © Cincinnati 2030 District



To spur the market for energy efficient design, Cincinnati has implemented a policy that offers up to 15 years property tax abatement for buildings that achieve Leadership in Energy and Environmental Design (LEED) certification. This incentive has helped lead to over 400 LEED certified projects, improving the performance of Cincinnati's building stock.

The individual experiences of both cities partnering on such initiatives, and the strong ties developed through the Urban Transitions Alliance have enabled both Pittsburgh and Cincinnati to share good practices and support one another to take strides towards a more resilient and inclusive energy future.

E-Town, City of Beijing: Expanding energy efficiency principles through green industrial building guidelines



Still experiencing growth in its industrial sector and growing energy demand, E-Town recognizes the critical role of energy efficiency not only for residential, but also industrial buildings. Over the past few years, E-Town has initiated

Facility of BOE Technology Group, a certified green industrial building in E-Town. © E-Town Construction and Development Bureau several pilot projects focusing on green residential buildings, green industrial buildings, passive housing, and energy efficiency retrofitting. Through pilot experimentation, greening industrial buildings and infrastructure is viewed as the most effective and scalable solution.

However, to further enhance the district's overall energy efficiency standard, transforming a handful of certified buildings is not enough. It requires a district-level approach, implemented through partnership and collaboration with relevant stakeholders to scale-up the impact. To achieve this, E-Town has invested substantial time and resources, working together with the private sector to conduct a careful analysis of the current energy efficiency levels in industrial buildings. These efforts provided a clear understanding of: 1) the transition barriers; 2) the existing government regulation, policies and practices in the construction sphere; 3) the essential incentives to support the best practices; 4) the required standard-setting activities for advancing energy efficiency in the E-Town context.

After years of preparation, E-Town recently released its own Green Industrial Building Guidelines to accelerate its green and efficient industrial transition. Starting from 2019, the guidelines require all new constructions to achieve a 2-star rating, and all factory expansions to achieve 1-star. By 2025, all new construction projects need to achieve 3-stars and an additional 3-star green operation certification. This level of public-private cooperation on green industrial development is well ahead of the national mandate, which only requires half of all new buildings to be certified by 2020.

E-Town's guidelines will also provide comprehensive multi-phase management support to private actors, including financial incentives through an incremental subsidy to encourage industrial adaptation. With its progressive purpose and vision, E-Town is highly likely to become the front runner of green development throughout China and showcase the potential of using a district level approach to upscale energy efficiency and sustainability goals.



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