5th March 2024, Alfa Laval Headquarters, Lund, Sweden

Sustainable Cities: It is time to implement at scale!

Collaborative actions to reach net zero on time

Recommendation paper

Energy efficiency in cities is paramount when it comes to overcoming global climate and energy challenges. According to the COP28 agreement, our energy efficiency efforts must double by 2030 if we are going to meet the Paris Agreement. Action and implementation at scale are necessary if this state of awareness is going to become a reality. That is where Sustainable Cities come in.

With cities accounting for two-thirds of global energy consumption and more than 70% of annual global carbon emissions, improving energy efficiency in heating and cooling systems, integrating sector coupling, and creating partnerships across the value chain can have a significant impact on reaching net zero.

We know the solutions are available today. But how do we implement at scale? That is why we have brought seven key players to the table with perspectives from across the value chain, including Euroheat & Power, Engie, E.ON, Kraftringen, Ramboll, Aurubis, and Alfa Laval. Together we identified ten recommendations for cities, industry peers, and policy makers on how to accelerate the energy transition with cities as change arenas for a more sustainable future.

Effective policies that accelerate the implementation of these sustainable solutions need to be passed if we are to meet the ambitious targets. This, alongside urban energy planning and scaling up the collaboration across the value chain between industry, energy companies, cities, governments, and academia is what will count long term.

This Recommendation paper is our collective first step. We want to continue this process by meeting and sharing, turning knowledge into action as we all race to reach net zero on time. Everyone who has signed this document is available to be contacted and open for discussions.

That is where you come in. Join us at the table to help the scale up of sustainable cities all over the world.

Aurubis kraftringen Euroheat & Power RAMBØLL

ALFA LAVAL e·on ENGIE

Awareness to Action – reaching net zero on time

1. We need to consider both electricity AND heat to reach net zero

Electrification is crucial for decarbonization. However, heat networks and heat storage will also play a key role, and faster action in these areas is paramount. By utilising heat in energy systems via heat networks and district heating systems, we can reduce peak electricity demands, decrease the overall carbon footprint, speed up the transition to net zero, and reduce costs. District heating systems also facilitate the utilisation of waste heat, enable large-scale energy storage, and make it possible to integrate more renewable energy into the system.

For example, a recent study shows that waste heat in the EU accounts for over 2,000 TWh per year. This covers most of the EU's heat demand for buildings and hot water. Reusing waste heat also provides greater headroom for the electrical grid to support the more difficult-to-decarbonize sectors, such as transportation and heavy industry.

Action

- Affordable, flexible, and resilient energy solutions are pivotal. Due to the world's continued dependence on fossil fuels, we need to fully make use of all the available solutions, shifting towards more 'disruptive' policies that scale up the energy transformation.
- We must take a holistic view when it comes to energy and consider heating and cooling as much as electricity in all decisions, policy making, legislation, and when creating financial instruments.
- Drive the capture and utilisation of waste heat as an important part of the green transition.
- Incentivise and reward thermal-based energy solutions to encourage integration between electricity and thermal infrastructures.
- Share experiences across cities, regions, and nations on how to implement at scale.

2. We need to consider district cooling as a way to reduce electricity demand

Today, cooling demands continue to increase, putting pressure on the stand-alone cooling solutions that rely on electricity. District cooling is an efficient way to cut carbon emissions and energy consumption across the entire sector. District cooling offers several important benefits for cities and real estate owners in terms of energy efficiency, reduced environmental impact, and cost savings.

Centralized cooling plants can achieve economies of scale and utilise advanced technologies that optimize energy usage, resulting in lower overall energy consumption. District cooling systems can negate the 'heat island effect', leveraging more efficient and cleaner energy solutions that utilise renewable energy sources like free cooling with sea water. Furthermore, district cooling can enable thermal energy storage to balance peak demands.

Action

- Develop national and area-based cooling action plans that minimize electrical consumption and carbon emissions. This includes making plans for an HFC phase-down.
- Evaluate the symbiosis of heating and cooling. For example, we can utilise the return temperature from cooling as heating and/or for domestic hot water, making cooling a possible source of heat. Furthermore, evaluate absorption cooling machines when it comes to producing cooling out of waste heat.
- We must take a holistic view when addressing energy and consider energy as electricity as well as heat and cooling in all decisions, policy making, legislation and when creating financial instruments.
- Showcase business models, investment models, and strategies to highlight the financial and environmental benefits of district cooling.
- Share experiences on how to implement at scale across cities, regions, and nations.

3. We need to focus on geographical, area-based programs

Every city and geographical area will need to have its own custom solution for energy efficiency. There is no "one size fits all". By establishing area-based programs, including district energy networks, we can conceptualise methods for accelerating the green transition. This safeguards each area's energy security, and affordability, while also making it accessible to all. However, for its success, collaboration is necessary to clearly define roles and responsibilities. Providing incentives for participation is key in this area.

Action

- Create incentives for cities, energy companies, real estate owners, and industries to collaborate around district heating and cooling.
- Thermal energy transfer between cities should be encouraged.
- City planners need to create energy master plans for set areas based on heat availability maps. These can be used to highlight available waste energy and future energy sources, such as planned data center locations.
- Identify the availability and temperature of energy, alongside industry and building demands, to facilitate informed decision making.
- Showcase successful projects, business models, and investment models.
- Establish collaboration models between industry, energy companies, real estate owners, and cities.

4. We need to promote and enable waste heat recovery and sector coupling

Facilitating waste heat recovery and sector coupling requires the alignment of industry goals and regulatory support. Identifying suitable collaboration partners, incentivising cooperations, and establishing a clear decision-making framework is essential. Regulations must support investments at industrial sites as well as in energy networks, to facilitate the transfer of energy to a district heating network.

Action

- The reuse of waste heat can be governmentally incentivised to accelerate the uptake of waste heat utilisation.
- We can conceptualise methods for sector coupling with, for example, the standardisation of performance contract, business models, and investment models.
- Showcase existing business models and consider standard contracts for waste heat supply and utilization between waste heat producers and district energy supply companies.
- Remove any obstacles for sector coupling. For example, the Carbon Border Adjustment Mechanism (CBAM) can be used as a tool for fair pricing of the carbon emitted during the production of carbon intensive goods when importing to a certain area. However, for global competitiveness, CBAM can be a hindrance to exporting companies. This is why it is so important that governments evaluate environmental adjustment mechanisms that support global competitiveness.

5. We need to enable public and private risk sharing

Due to the long pay-off time of energy investments, it is important that governments and cities' policies are practical, long-term, and stable. We must de-risk and manage upfront capital costs for clean heat projects, which are CAPEX intensive in nature.

Risk sharing between the public and private sectors is crucial. This is particularly true for projects involving waste heat recovery from industrial and tertiary buildings, as there is an inherent risk for these activities to close or relocate, or for geothermal projects which face higher uncertainty in the initial, exploration phase.

Action

- Develop and showcase models for risk sharing between the public and private sectors. In the district heating and district cooling sectors, energy companies often carry all the risk.
- Develop a toolkit for cities to identify opportunities, methods, and incentives that benefit all stakeholders.
- Derisk collaboration with long-term business models and strategies aimed at driving the energy transition.
- Governments needs to develop policies that protect individuals and end customers, as well as the energy supply value chain, such as energy companies and industries investing in waste heat reusage technology.
- Evaluate the energy pricing structure for district energy supplies. Pricing should reflect the environmental benefits of district energy to drive demand for stakeholder connection.

6. We need standardisation to accelerate the energy transition

Standardised practices within district energy systems will improve efficiency and interoperability, as it speeds up and derisks project completion. By consistently adhering to standards, cities can optimise energy networks, increase energy efficiency, reduce waste heat, enhance overall performance, and increase reliability. International standards will also come with safer operations, reduced costs, and better cross-border collaboration. In other words, cities that align themselves with global norms will be positioning themselves for long-term success.

Standardisation plays a crucial role in collaborative business and investment models, enabling improved communication strategies among cities, energy companies, industries, and other stakeholders. This would establish consistent and lasting rules of engagement. Furthermore, industry and energy providers would benefit from standardised methods of engagement and performance contracts. By prioritising some key parameters in these standardised approaches, decision-making will also become more efficient, cost-effective, and timely.

Standardisation would also drive product and system design, emphasizing modular solutions for faster deployment.

Action

- Standardising feasibility studies can accelerate the identification of key development areas for district energy networks. However, these standardisation models must allow for local adaptation for them to be relevant.
- Develop and share standards in collaboration, business, and investment models.
- Emphasise the importance of developing modularised, plug-and-play solutions for plant room designs, substations, and more.
- New and retrofitted buildings should be equipped with water-based heating systems so that they will be compatible with various low-temperature heat sources and solutions such as district heating, cooling, and heat pumps.

7. We need to increase efficiency in the district energy sector through digitalization

Digitalization is essential on the road to net zero and plays a key role in creating sustainable cities. In fact, data-driven solutions such as AI can help identify new opportunities for energy efficiency. They can also help create comprehensive databases for heat sources and develop improved practices for informed decision-making.

Action

- Utilise energy meters and sensors to obtain crucial operating parameters.
- Utilise data mining and AI to optimize energy efficiency, reduce cost, and decrease carbon emissions. AI can automatically favour lower carbon sources based on availability and for example predicting peak demands based on weather data.
- Develop tools for risk mitigation and standards for data sharing across the district energy value chain.
- Use data-driven solutions to create a comprehensive database of heat sources.
- Develop digital and continuously updated energy master plans for informed decision-making.
- Develop the workforces' digital skills and encourage lifelong learning in digital solutions.

8. We need to highlight district energy as an accelerator for economic growth

District energy systems not only provide efficient cooling and heating, but they can also fuel a green job revolution. By investing in these sustainable solutions, cities can create employment opportunities while advancing environmental goals.

Building and maintaining district energy networks require a workforce for infrastructure development, energy efficiency improvement and refurbishment of existing buildings for network connections. Engineers, technicians, and construction professionals will be required to create, maintain, and manage these systems. The growth of district energy projects directly contributes to local economies and employment.

Action

- Promote district energy on a local, national, and international level as a method for large scale carbon reduction and energy efficiency.
- Explore and highlight the socioeconomic impact of district energy on cities, regions, and nations.
- Implement a plan to continually follow up on employment rate and the sectors contribution to GDP.

9. We need academia to provide future skills and explore future solutions

Collaborating with the relevant fields of academia is vital if we are going to advance district energy systems. This is because academic institutions drive research and innovation, which leads to more efficient and sustainable technologies. They also facilitate the transfer of knowledge, workforce development, and provide resources for testing and validating new solutions. On top of that, academia also plays a role in informing policy development and could support the adoption of district energy systems on a wider scale.

Equally important is meeting the growing demand of skilled professionals. At the predicted and required growth rate of district energy, there will be a labour shortage in the sector. Collaboration with academia is essential to identify, recruit, and develop future talent. This will need support from manufacturers, who can contribute with product and application training while national qualifications are put in place. It is imperative that a ready, proficient workforce is in place to meet the demands of the energy transition.

Action

- Continuously foster a dialogue between academia, cities, energy companies, and industries to create a mutual understanding of future needs and meet new skill demands.
- Engage in recruitment drives and trainings to promote careers in the district energy arena.
- Highlight the role of heat, heat networks, and their benefit in society in public debates.
- Invest in and incentivise research and development based on sustainable energy solutions.
- Create and continuously update academic qualifications in subjects relating to district energy, sustainability, and decarbonisation.

10. We need district heating and cooling to be a recognized sector

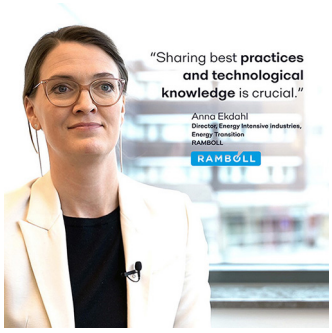
Having district heating and cooling as a recognised sector with a unified narrative is essential to promote awareness and address the blind spots in policy making, as well as in city planning. It would also make it easier to address the overall acceptance of district heating and cooling.

Establishing a recognised sector would mean that governments and city policy makers treat district energy as a prioritised area when developing policies, regulations, and financial instruments to meet the sectors' specific needs. Time frame is one essential factor to consider in this process. Policies and regulations should be long-term if we are going to stabilise the sector and safeguard continual, long-term investment.

Action

- Identify district heating and cooling as a sector for tailor-made policy making, city planning, talent attraction, and socioeconomic analyses, etc.
- Ensure that the policies are created in collaboration with industry experts.
- Develop long-term district energy policies and regulations to create security, derisk financial investment, and safeguard growth.

Olivier Racle
Head of the Business Platform DHC
Engie



Anna Ekdahl
Director, Energy Intensive Industries, Energy Transition
Rambøll

Julien Gennetier
Vice-President Energy Division
Alfa Laval

Sezgin Kadir
Group CEO
Kraftringen

Anna Hall
Head of Public Affairs, Energy Division
Alfa Laval

Phil McDermott
City Energy Transformation Lead
E.on

Ulf Gehrckens
Executive VP, Corporate Energy & Climate Affairs
Aurubis

Aurélie Beauvais
Managing Director
Euroheat & Power

Malgorzata Moczynska
President, Brazed and Fusion-bonded Heat Exchangers
Alfa Laval

Neil Parry
Global Head of District Energy
Alfa Laval