



Goals, Policies and Actions that will Affect Improved Outcomes in District Heating in Ukraine

Summary of Policy Vision for Transformation

May 2019

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I. Introduction

District heating in Ukraine is an essential need and its economic and social importance is great. District heating accounts for a significant share of Ukrainian total primary energy use, providing heat to over 50% of Ukrainian homes. District heating can make a substantial contribution to a sustainable energy future in Ukraine. It can save energy and boost energy security, but only if stronger policy measures to encourage wise management and investment are put in place.

Today, the sector faces many challenges in Ukraine, reflecting decades of accumulated problems. These challenges have created a viscous circle, leading to decline of the sector. Public authorities perceive it as a social rather than commercial sector where district heating companies are providers of public services, not qualified business players operating on a true market. The perception of district heating as a social service, as well as the current tariff policy, undermine this sector's sustainability. District heating systems are outdated and need urgent replacement and modernization. Customers are frustrated by the costs and poor reliability related to this underinvestment. Moreover, Ukrainian cities do not fully exploit the economic and environmental benefits of district heating: the actual use of cogeneration, waste heat and renewable energy sources is rather low. In the meantime, for many years, natural gas prices remained very low for residential consumers, encouraging many customers to switch to individual gas boilers, whether or not this was truly economic. The government understands the major challenges of the sector and has announced positive reforms such as increasing the share of renewables and cogeneration, introducing incentive tariffs and involving the private sector. However, the actual implementation of these reforms has been very slow, and much remains to be done.

This policy paper lays out a vision for reforming the Ukrainian district heating system. This includes goals, policy priorities and actions to achieve that vision. This vision describes the transformation of the sector in the long-term, with sequencing to achieve real results starting in the near term.

This vision foresees a future in which Ukrainian district heating is affordable, reliable, resilient and efficient, specifically, where:

- Affordable district heating meets the needs of local customers.
- Heat supply is reliable, with minimal service disruptions.
- Resilient systems that use renewable and highly-efficient sources of heat prevail.
- District heating becomes the most efficient option for heating Ukraine's cities.

In achieving this vision, the major goals of the policy reform recommendations this document lays out include:

- To adopt and implement cost-reflective tariffs that incentivize efficiency both within district heating systems and for customers.
- To reform regulations so that Ukraine achieves comprehensive metering, efficient interconnections with networks, and low-cost, efficient heat supply with fair third-party access.

- To improve governance of municipal district heating utilities so that they transparently focus on customers first.
- To implement policies that promote investment through rigorous network and investment planning, and realistic strategies to attract private sector investment and know-how.
- To create tariffs and policies that promote energy efficiency in district heating and the buildings they are connected to.
- To ensure that social support networks help needy families who cannot afford heat, while eliminating inefficient direct subsidies to district heating utilities.
- To develop a comprehensive and coordinated strategy that transforms district heating policy.

Based on the experience in the European Union, particularly in other transition economies, reform is not only possible, but essential, particularly as Ukraine grapples with the need to enhance its energy security.

Several countries in the European Union have policies that can serve as examples for Ukraine. This document focuses on countries that regulate their district heating markets through robust network and investment planning, such as Denmark and Lithuania. Taking the Danish example, several key themes emerge: municipalities are responsible for developing urban heat plans with optimal zoning of heat and gas supply. Only the most cost-effective heat supply options are allowed, and district heating utilities are required to ensure implementation of any least-cost investments in energy efficiency at consumers. All municipalities are municipally or communally owned, and by law, they must return profits to consumers. In Copenhagen, different heat supply sources (such as CHP waste-to-energy facilities) can access the network to supply heat, allowing for a variety of cost-effective supply options. Other countries like Poland and Lithuania have many similar laws, such as network planning, zoning and requirements to support energy efficiency in customer facilities. However, there are important differences, such as policies to attract needed private investment that would also be useful to consider in Ukraine. Likewise, the specific institutional roles vary somewhat in each country, with differing degrees of local autonomy versus centralized approval of investment plans and tariffs. In general, in Europe, there is more integration and coordination of policy functions at the national level than in Ukraine, where numerous ministries and government agencies play a role on different aspects of the heating agenda, often with insufficient coordination.

This vision section will provide a high-level overview of the key policy recommendations and how they are linked to one another. The later sections of this report will then provide more detailed descriptions of the need and options for addressing each of these priority recommendations.

II. Tariff and Regulatory Reforms

Tariff and regulatory reforms are essential to the economic sustainability of district heating. Fully-cost reflective tariffs define the health of the district heating sector. Tariffs should also incentivize investment, efficiency and reliability. The good news is that many of these elements already exist in Ukrainian legislation, but implementation has not been perfect. Ukraine has also made significant progress in metering, but about 20% of buildings remain unmetered. Finally, Ukraine has an opportunity to attract efficient, resilient heat supply by allowing third-party heat access.

Cost-reflective Tariffs

It is worth breaking these key points down into concrete priorities for action. At a minimum, district heating tariffs should allow utilities to recover reasonable and efficient costs. Today, a large share of the cost of district heating is not covered by the tariffs, which ultimately leads to system inefficiency and, ironically, higher costs. Systematically denying long-term investment costs in district heating has made systems unreliable and expensive to operate. A large share of the energy put into the system is simply lost to inefficiency: in Kyiv, for example, heat distribution systems can lose up to 26% of the heat they transport, a level virtually unheard of internationally.

The Heat Supply Law states that tariffs should cover reasonable costs, but in regulations and practice, there are many ways that costs are rejected. Among the more important of these are decisions to exclude investment costs, particularly those for medium and long-term investments. Likewise, when fuel costs change, it can take months (or even years) for the district heating tariffs to catch up. For example, in Odesa, the tariff has not changed for five years, despite dramatic increases in the price of natural gas. Another large area of losses is the way that tariffs are calculated based on normative demand, rather than actual sales. In setting the tariff, the costs are divided by the anticipated sales; when these are based on inflated norms, rather than actual sales, the actual revenue that comes in is substantially less in expected revenue compared to cost. In Kyiv, this practice resulted in almost a 19% difference in revenue compared to actual costs in 2018. Moreover, this practice allows district heating companies to underestimate network losses and instead effectively attribute them to generation, which makes it harder to assess investment needs and options. (These normative consumption levels would also lead to overinvestment in capacity). Another category of costs not allowed in district heating tariffs includes working capital financing; labor costs are kept at levels so low that district heating companies can have difficulty attracting competent staff, and the list goes on. Addressing these cost gaps is truly urgent, and when cities address them in a piecemeal way by providing direct subsidies when the financial situation becomes dire, the result can be poor strategic choices and growing costs.

Incentivizing Investment, Efficiency and Reliability

Tariffs that incentivize investment, efficiency and reliable performance are also important to bringing down the cost of district heating and providing better service. The regulatory-asset base (RAB) model has been well-tested in Europe and elsewhere; it provides stable revenue for investments which are critical needed in Ukraine's district heating sector. This model can also incorporate incentives based on benchmarking, which encourage companies to improve performance. NEURC also maintains a benchmarking database to encourage district heating companies to minimize cost. USAID initially developed this database for NEURC. USAID is also developing a RAB tariff model for Ukraine and has prepared draft regulations on a RAB tariff for heat transportation. Implementing RAB and incentive tariffs requires first allowing for all reasonable costs, and then systematically building the regulatory base and capacity for these regulations. Because NEURC only regulates the heat tariffs in the largest cities, local officials also need capacity and tools for these regulations. Independent, evidence-based regulation is important in ensuring that tariffs are not politically driven, which has led to low tariffs in the past.

Metering

Ukraine is also still working to increase the share of buildings that are metered. Metering allows for billing based on actual consumption. Consumption-based billing simultaneously ensures that building owners and occupants have an incentive to save energy, which is important to lowering their energy costs. Currently, only about 80% of buildings in Ukraine are metered, which represents significant progress from 10 years ago. Still the rate at which new meters are installed has slowed since 2016 as utilities are no longer allowed to recover the cost of installing meters.

Third-Party Heat Supply

District heating is a localized product, not a market commodity like oil or electricity; this is an important difference for successful policy. In the district heating sector, it is not feasible to have open competition between heat suppliers because of the transmission losses which render distant heat sources uneconomic. However, it is possible to allow third-party heat suppliers a chance to access the network, depending on the specific demands and costs. This is an important option in introducing new, low-cost and resilient heat sources such as industrial waste heat recovery, renewable heat supply and modular cogeneration. USAID has developed a legislative package for third-party access that, if adopted, can pave the way for introducing these lower cost heat supply options.

III. Governance and Customer-oriented Corporate Management

Improving governance in the district heating sector is essential to improving performance and rebuilding public trust. Healthy business practices are a core issue for the long-term sustainability of district heating in Ukraine. However, current business practices are not driven by customers and their preferences, which is a major weakness of the industry. Production and system operations, not customers, are often the main focus of district heating managers in Ukraine. At one level, this occurs because of the poor management skills at companies that do not place customers first, something that would bankrupt most companies in any sector over the long term. Stepping back, it is also clear that the production focus is very much a result of policies that reward the production orientation and give little incentive to improve customer service. For example, a regulatory approach that bases tariffs on costs plus profit with little external review will encourage companies to increase costs and production. Likewise, most district heating companies in Ukraine are owned by municipalities today. As such, municipalities can and should determine what kind of governance the utilities should have. Politicized or fragmented governance can dilute the ability of cities to guide healthy business practices. An alternative approach that some cities, like Zhytomyr, have adopted is to create a supervisory board. Ideally, such supervisory boards will have a majority of independent members with competency in key areas needed to build a customer-focused business strategy. In Western Europe and the United States, it is also common to have representatives of customer groups, like real estate associations, on these oversight boards or related advisory boards.

Other transition economies have shown that it is possible to move from debt-ridden, inefficient district heating toward clean, customer-focused heat services. For example, Riga Siltums, the Riga district heating company, has transformed from a loss-making enterprise to one with well-established customer service. The city created a Supervisory Council in 2002; this council approves 3-year strategies and annual budgets, and it oversees the Management Board. Through this process, the company has made prioritized investments, starting with individual heating substations; it has also reduced network losses from 24 to 12%, and increased the share of renewable heat supply to 30%. Not surprisingly, its customer base has stabilized and even begun to grow.

The benefits of prioritizing customers include improving trust and customer satisfaction, building new customers and sales, reducing non-payments, and creating a space where reforms can thrive. As customer satisfaction grows, experience from Central Europe shows that the willingness to pay and transform district heating companies also increases. Given these benefits, improving governance and moving toward customer-focused business models should be a priority in transforming Ukraine's district heating sector.

IV. Policies to Attract Investment: Improving Efficiency, Reliability and Customer Satisfaction

Policy is fundamental to attracting investment. As mentioned, regulatory practices in Ukraine today exclude most investments from the tariff. This effectively curtails virtually all but urgent investments and repairs. This severe underinvestment has continued for several decades, meaning that the systems have reached a critical point. Their costs have gone up dramatically while reliability has gone down. In Kyiv, as in other cities, there are regular explosive leaks from the system; the companies pay tremendous amounts for patching leaks, rather than pursuing systematic modernization in a sequenced fashion. Policy can play a positive role here too through tariff reform, network development policies, which link to investment plans. Attracting private capital can also help in transforming the sector, both through the strategic and management reforms this will bring, and through the investment that can flourish when policies and business strategies align.

Network Development

Ukraine urgently needs to develop and invest in its district heating networks, but it is also important to ensure that these investments are well-planned to meet the needs of the future. The basic framework that many EU countries use involves three elements: network development plans, least-cost investment plans, and tariffs that then support those investments. Ukraine has begun to pursue such an approach. There is a draft new heat supply scheme methodology, which represents an improvement, although it is important that, once this document is adopted, that there is strong support for implementation. The network development plans describe who is zoned for connection to district heating, based on cost-effectiveness; they also describe project heat demand and future heat supply volumes, as well as network needs. One major challenge is assessing what future demand may be: currently, most Ukrainian district heating systems are significantly over capacity, which reduces efficiency and increases costs. As Ukrainian buildings become more efficient, heat demand will likely drop, based on the experience in other transition economies. (It is interesting to note that while Ukraine emphasizes heat supply in its planning, in Denmark and other Western European countries, the emphasis is on holistic planning, looking at both supply and demand). Thus, network development needs to take a system-wide approach to ensure that revitalization is efficient, effective and useful. Likewise, developing the capacity at the local level to use network planning software will require substantial efforts and some time, but it is a necessary endeavor. Based on these heat plans or heat supply schemes, district heating utilities develop investment plans which cities, and in some cases, regulators, need to approve. These plans then form the basis for approving investment costs in the tariff, though in Ukraine, in general, capital expenditures are not included in the tariff, as mentioned earlier. Thus, there are critical links in developing heat networks that are missing in Ukraine, from the adoption of network development and investment planning methodologies, to capacity for doing this planning at the local level, to supporting investment through the tariffs.

Sequencing is also extremely important in network development. Sequencing limits the risk of investing in over-sized capacity, which become stranded assets. Investing first in investments closer to buildings, like the individual heat substations that can efficiently connect buildings to the network, can allow planners to better understand future demand before making comprehensive investments in new supply. Likewise, investments in the network reduce losses that impact the supply capacity needed. The second reason that sequencing is important is that investments need to be carefully planned to avoid increasing tariffs rapidly before service improvements appear. Sequencing can also target the most important cost and energy saving opportunities in the system, which can help bring down costs, making it easier to finance future investments. Policy needs to take such sequencing needs into account.

Attracting Private Capital

Financing will be critical for improving district heating infrastructure in Ukraine. While most district heating companies in Ukraine today would not be attractive to private capital because of the tariff and management challenges, as tariffs become more supportive of investment, private investment can play a major role. Private management can also bring new know-how and business skills to the sector that can improve operations and customer focus.

There are several policy considerations here. First, what form should the investment take? There are a wide range of options for involving the private sector, from management contracts to leases and concession agreements, to full or partial privatization. Management contracts can help prepare companies for investment by improving business systems and decision making. Leases and concession agreement give the private participant control for a fixed term; these agreements can also require or incentivize investment, particularly if they are long enough in nature. Privatization likewise can attract significant capital and know-how. Second, how can cities best prepare companies for private investment? Steps to prepare the company can ensure a reasonable deal for the city and its citizens. This means establishing good management practices, which often requires setting up a supervisory board to streamline and professionalize oversight of the company. If a company has substantial losses, it may be important to turn these around with a clear plan before launching an effort to attract private capital. Third, tariff policies have significant impact on how attractive the district heating sector is, as described above under tariffs. A supervisory board can also be beneficial if the approach involves anything less than full privatization: private companies will want stability, clarity and transparency in their oversight, which a well-functioning, independent supervisory board can provide.

V. Improving System Efficiency and Planning for Changes in Demand

Improving the efficiency of district heating is vital to its long-term health and viability, as well as bringing costs down to meet customer needs. Specific issues under this include the need to incentivize investments that improve system efficiency, which also requires better understanding

system losses. Planning for changing demand is also very important to efficiency, since oversized systems tend to have high losses; this also means it is important to sequence investments for best results. Finally, in most EU countries with large district heating sectors, district heating companies have obligations to consider investments in energy efficiency at end consumers, particularly when that is more cost-effective than building new supply (this falls under the Energy Efficiency Directive).

Incentivizing System Efficiency

Regulatory practices and governance policies should incentivize efficiency, as described above. Currently, the policies incentivize waste by providing profit based on cost: the higher the cost, the higher the regulatory profit. Likewise, governance policies and city oversight of district heating focuses on production more than customers. District heating companies with high losses may actually be eligible for more municipal subsidies than those with low losses.

Layered onto these incentives for inefficiency are the large challenges getting approval for capital investments that could help bring down costs. Many cost saving investments are not allowed under the tariff. For example, generally the most cost-effective measure for improving efficiency in district heating is to install modern heat substations with heat exchangers and controls. In many countries, the district heating company can install this equipment and get reimbursed through the tariff. In Ukraine, installing individual heat substations requires that 50% of the residents in a building approve of the installation and agree to finance it. Not surprisingly, outside of municipal buildings, this measure is rare, even though can reduce system-wide heat losses by up to 25%. In Latvia, on the other hand, they changed the laws to allow the district heating company to own and install individual heat substations. This combined with an incentive tariff then provides a strong financial stimulus for district heating companies to prioritize this investment. Other investments such as waste heat utilization, network pipe insulation, and generation controls likewise are also not allowed through the tariff as it is implemented today. Finally, it is important to consider that in Western Europe, the share of heat-only boilers has dropped substantially: virtually all new investments in district heating supply involve cogeneration, waste heat recovery of various types and/or renewable energy. For example, Stockholm is on track to provide 100% of its district heat from waste heat recovery or renewable energy sources by 2022, investments which are commercially competitive and helping district heating gain market share.

Understanding Losses

Knowing where the largest losses are is an important first step in designing effective investment plans. Financial unbundling can help in identifying the largest losses. Today, financial unbundling is not a strict regulatory requirement, particularly for cities that set their own tariffs. Even in cities that have tried to financially unbundle their tariffs, calculating the tariff based on normative consumption makes it much easier to hide losses as unsold consumption. Tariff policies and governance practices should require district heating companies to clearly separate

costs and losses by system segment, including in how these policies are implemented. This will then help cities and district heating companies design network development and investment plans that address the underlying cost inefficiencies.

Planning for Changing Demand

District heating systems in transition economies were almost universally designed with excess capacity. As the systems have reformed, they have also seen demand drop, particularly as some customers have switched to other forms of heating, and both buildings and networks have improved in efficiency. In Ukraine, buildings in general are quite inefficient, and investments in retrofits are growing. Likewise, improvements in network connections and pipes will further reduce losses.

Predicting future demand in a given city is challenging: network planning software provides no insights into demand trends, rather, it looks strictly at supply. The best practice in other transition economies is to invest in stages, and to prioritize investments in networks and individual heat substations before renovating supply. Such an approach also gives cities a chance to develop network development plans that clearly indicate what kind of supply is needed, and how existing supply can be consolidated before making investments.

It is helpful here to mention two cities: Warsaw and Riga. Warsaw began renovating its district heating system in the early 1990s by replacing coal boilers and cogeneration plants with more efficient gas ones. However, in a few years' time, it was obvious that demand had dropped, and these new plants were not operating efficiently because they were overcapacity. Thus, these relatively new plants became stranded assets, and Warsaw ended up installing new, smaller capacity plants in the 2000s, which of course resulted in higher heat prices than was necessary. Riga also has seen significant drops in demand. However, after restructuring their district heating company, Rigas Siltums, in the early 2000s, the company focused its initial investments in efficiency improvements, starting with individual heat substations. Its customer base is now growing, although as buildings become more efficient, sales are still declining slowly.

Policies to Promote End-Use Efficiency

Based on requirements in the EU Energy Efficiency Directive, most EU countries have set up an energy efficiency scheme that requires utilities to achieve annual, end-use energy savings equal to 1.5% of sales annually. The Directive also allows countries to use alternative policy measures to achieve these targets. Denmark, Poland, Lithuania and other countries with large district heating sectors include district heating in their energy efficiency schemes. The practical effect of this is continuous investment in end-use efficiency, which is actually reducing system-wide costs because end-use efficiency is typically less expensive than new supply. Through the energy efficiency obligations, EU legislation also provides a financial mechanism for utilities to make these investments, and have the costs recovered through the tariff. In Denmark, the energy efficiency scheme pre-dates the 2012 Energy Efficiency Directive, and companies participate

through a voluntary agreement and an Executive Order that establishes the framework. Ukraine can also consider establishing an energy efficiency scheme, which would likely save consumers considerable costs in total, based on the experience in other European countries.

VI. Social Support for Improving Energy Security and Reducing Non-Payments

Reforming district heating is important to ensure that systems become efficient, reliable and customer oriented. At the same time, it is crucial to ensure that the neediest in society have support, given the central role of heating in meeting human needs in Ukraine. Meeting basic human needs is also essential for ensuring enduring support for reforms. The current low-income family support for utility bills began in 1995 in Ukraine, targeting households who pay at least 15% of their income in communal services, including heat. This program remains the main mechanism of social protection of households at times of rising prices and tariffs for heat and other communal services. The number of households who receive utility subsidies varies from month to month, reaching its peak in spring. In April 2018, about 6.7 million households, or 45% of all households in Ukraine, received utility subsidies.

It is also important to recognize that Ukraine's social support network relies heavily on utility-bill focused social support, which is quite different from most OECD countries. OECD countries typically have three kinds of support for families that can help with energy bills: general, need-based welfare support (which doesn't target specific expenses), short-term assistance with utility bills, typically in emergency situations, and assistance to low-income households with energy efficiency retrofits to reduce their energy bills in the long-run. In general, the first and third categories involve the largest budgets, while in Ukraine, most of the assistance is aimed at helping families long-term with bills, but without a clear and connected plan on helping them to lower those bills, or to more holistically meet their needs. This then sets up a situation in which families may not be helped as comprehensively as they need, yet they feel they have a right to subsidized energy. It is important to note that Ukraine does have welfare support, particularly for the disabled and elderly; it also now has programs to support energy-efficiency retrofits, though these programs are less comprehensive than those in most OECD countries. Ukraine spent 2.2% of GDP on utility programs in 2018.

Ukraine has recently moved from providing these social support subsidies for utility bills directly to the district heating companies to monetization of these subsidies, such that the families themselves receive the funding. This is an important change that can encourage efficiency. What it means is that if a family can reduce its energy use through efficiency, it will not lose its subsidy eligibility, but rather, will be able to pocket the difference. Moreover, families that do not pay their heating bills will lose their subsidy, meaning that they have a strong incentive in paying their bills on time. This can help mitigate non-payments, at least those from the residential sector.

As part of this process, it is important as well to move away from other direct subsidies to district heating companies. Specifically, most cities in Ukraine today recognize that the tariff does not

cover the operating and capital costs of running a district heating network. Rather than raising tariffs, they provide direct payments to companies to partially fill the gap. The notion is, again, that residential consumers need support. However, this practice has actually *increased* costs and tariffs as systematic rejections of long-term investment have driven up system losses and outages.

When customers do not pay, this effectively creates another type of subsidy with very damaging impacts on the system. City officials are loath to disconnect customers, given the dire health impacts of that, but the additional hole in company budgets leads to further pressure to subsidize the companies. What is more, allowing non-payments to continue has a particularly negative impact on district heating utilities because they are not allowed to include in their tariff proposals the costs of financing working capital, in other words, their costs of waiting for customers to pay. Thus, district heating companies often are late in paying their suppliers, which results in additional fines. Today in Ukraine, residential customers make up the largest share of non-payments to district heating companies. Payment levels had improved substantially from 2016 to 2018, but in late 2018, after the natural gas prices rose, payment levels dropped precipitously.

VII. Developing a Coordinated District Heating Strategy

Transforming district heating requires a coordinated, strategic approach. Lack of coordination and strategic focus on district heating have led to many of the problems with the current system and created confusion at the local level about whether cities should better abandon district heating.

Continuing on today's path will have several important consequences:

- Systems will lose more money, becoming a greater drain on state budgets;
- Some systems will simply close due to poor performance and customer disconnections;
- Poor families will be left without another means of heating, creating additional drains on the budget and the economy;
- The opportunities for low-cost, flexible and resilient district heating will begin to disappear.

Developing a coordinated district heating strategy is both possible and essential in Ukraine, just as it has been across Europe. The strategy needs to take into account all aspects of the issue, including tariffs, investment and planning, governance, social subsidies, and coordination with other parts of the energy sector. In other words, it needs to be comprehensive to achieve true change. This requires close coordination across a range of government bodies and stakeholders, both at the national and local levels. The international community can also play a key role by sharing examples of success, supporting reforms, and working with cities on financing for reenvisioned district heating systems.

Based on experience in Central Europe, sequencing reforms within the strategy is also important. For example, district heating companies need to be able to fully recover reasonable costs through

tariffs before they can become self-sustaining enterprises. Tariff reform, is thus, is a particularly urgent priority. That includes ensuring that the tariffs stimulate efficient and reliable operations. Attracting investment is also a large priority, and the private sector can provide an important source of funds, but only once district heating companies become attractive businesses through tariff and governance reform. Large-scale investment should also rely on clearly thought out plans, meaning that cities need network development plans to design transformative investments. Such transformative investments should also consider efficiency in supply, delivery and end-use to ensure that they are cost-effective. Investing needs to consider the future of both demand and supply, recognizing that demand may drop because of efficiency before it grows as new buildings connect, and that district heating technologies have changed substantially in recent decades. Reforms need to provide for the neediest families, but not by holding the entire sector back through underinvestment and subsidies. Rather, social support should be targeted to meet families' overall needs and help them improve their homes' efficiency to save money. In Europe today, district heating is growing because it is efficient and customer friendly. Ukraine can also revitalize its district heating sector with strategic planning.

A new district heating strategy for Ukraine should clearly tell Ukrainian citizens how the sector is doing. This means tracking key indicators of success, such as cost, losses, reliability, and customer satisfaction.

In summary, policy priorities for a transformation strategy include tariff and regulatory reforms, improved governance for customer-oriented management, policies to promote needed investment and network development, policies that encourage and take consideration of options to improve efficiency, and social support for low-income families. These policy priorities can help in developing a coordinated district heating strategy. Coordination, in fact, is critical given the complex nature of district heating and the number of government and local stakeholders involved. Likewise, it is important to strategically sequence the reforms, building on successes, ensuring that costs remain affordable, and recognizing that demand will change as the sector develops.



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