

Vienna's Vision for a Sustainable Energy Future: Heating, Cooling, and a Path to Net-Zero by 2040

In recent years, the city of Vienna has significantly elevated the role of energy planning within its urban development agenda, establishing a dedicated municipal department to tackle the complex and interlinked challenges of energy and sustainability. This move reflects the growing recognition that energy planning must be seamlessly integrated into broader urban strategies, particularly as cities around the world confront the dual pressures of climate change and population growth.

Vienna's energy strategy is not short-term in scope. It is designed with an eye toward the long arc of the city's development, with ambitious goals set for 2030, 2040, and even 2050. These strategies span multiple legislative periods, ensuring continuity beyond individual political terms and allowing for the kind of sustained, coordinated action required to transform an urban energy system. Central to this transformation is a reliance on robust, data-driven insights, particularly regarding the building stock and energy infrastructure of the city. Pilot projects are actively used to trial innovative solutions and inform city-wide rollouts, ensuring that policies are grounded in practical realities and technical feasibility.

Vienna's population of around two million includes a substantial segment—about 25%—living in municipal social housing. This presents a unique opportunity, but also a profound responsibility. Social housing buildings can serve as testing grounds and exemplars for the city's energy transition goals, helping to drive equitable sustainability initiatives that reach all segments of society.

Traditionally, the focus of urban energy transformation has been on heating, but this is now changing. With the climate crisis leading to higher average temperatures, sustainable cooling has become equally important. Vienna is addressing this shift with an integrated approach that acknowledges the growing need for cooling solutions in residential and public buildings.

One of the most pressing issues is the city's dependency on fossil fuels, especially in the building sector, which is responsible for approximately 45% of Vienna's CO₂ emissions. These emissions largely stem from heating systems powered by oil and gas. Thus, targeting the building sector is essential to meet the city's broader climate goals. Vienna is actively working to diversify its energy sources, aiming for a drastic reduction in fossil fuel use by 2040. This transition is underpinned by investments in renewables like solar and wind energy, although the use of hydropower is naturally limited due to the region's geography.

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The city's dense urban fabric offers certain advantages when it comes to implementing new heating and cooling systems, particularly those that rely on district infrastructure or shared resources. Mobility also plays a key role in Vienna's sustainability strategy, with efforts underway to reduce the reliance on private vehicles as part of a more comprehensive approach to carbon neutrality.

Vienna's political leadership remains steadfast in its commitment to achieving net-zero emissions by 2040. This continuity is supported by stable governance and is further reinforced by the city's active participation in global sustainability initiatives. A recent meeting highlighted this alignment, with a mention of the World Summit currently taking place in Vienna, endorsed by none other than Arnold Schwarzenegger. During the session, the speaker invited participants to request additional information and presentation materials, offering a pathway for deeper engagement.

Given that 2040 is just 15 years away, Vienna faces a tight timeline to eliminate its reliance on fossil fuels like gas, oil, and coal. But the city is not only seeking to reduce total energy consumption—it is committed to ensuring that the energy it does use is sustainable, climate-friendly, and renewable. Vienna is emerging as a pilot city for solar energy, with annual solar installations consistently exceeding targets, particularly on privately owned structures such as rooftops and parking lots.

A significant component of the energy transition involves the widespread adoption of heat pumps—both air-source and geothermal. These systems require an expanded supply of electricity, which reinforces the city's need to ensure that its electrical grid is powered by renewable sources. District heating is another cornerstone of Vienna's approach. Unlike many other cities, Vienna's district heating system is municipally owned and operated. This allows the system to be strategically aligned with the city's sustainability goals, rather than dictated by private market forces.

The goal for the district heating network is to phase out fossil fuels entirely by 2040, transitioning instead to sources like biomass, geothermal energy, and electrically powered heat pumps. While some fossil fuels are still used today, mainly due to industrial demand and fuel imports, clear plans are in place to phase them out. Vienna's industrial sector does still rely on gas, but buildings remain the dominant source of emissions and thus the primary focus of intervention.

One of the more groundbreaking initiatives involves deep geothermal energy. In eastern Vienna, drilling has reached depths of 3.5 kilometers to access underground heat. This project, led by a consortium, is expected to provide heating for about 200,000 people—roughly one-eighth of the city's population. While the city is also exploring the potential of "green gas," or renewable methane, it acknowledges that this resource is too scarce and costly to be used for broad-scale building heating. Instead, it will be reserved for specific

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industrial processes that cannot yet be electrified or transitioned to alternative fuels.

A major part of the heating and cooling strategy includes scaling up geothermal energy for municipal heating. Vienna is applying geothermal techniques similar to those used in individual homes but at a much larger scale—enough to serve complexes of up to 25,000 households. This approach offers a pathway to decarbonize municipal buildings without requiring extensive expansion of the existing district heating grid.

The city has also introduced a comprehensive “Vienna Heating Plan 2040,” which maps the entire city into zones based on their optimal heating solutions. In red zones, the district heating network will be expanded, while other zones will rely on alternative or decentralized systems. Many areas, particularly those on either side of the Danube, will implement localized heating strategies. Historically, the district heating network has grown in a fragmented way, leaving some areas disconnected. The new plan aims to rectify this by prioritizing densification and expansion where it makes the most sense economically and technically.

District heating is particularly well-suited to densely built areas where individual heat pumps may be impractical due to space or noise limitations. However, it is not feasible to cover all of Vienna’s two million residents through this system. Therefore, new collective heating networks—often referred to as “purple areas” in planning maps—are being developed. These networks involve small groups of buildings sharing resources for heating, cooling, and even solar energy generation.

To demonstrate feasibility and build momentum, Vienna has launched the “Phasing Out Gas” program, which aims to convert at least 100 building projects away from gas heating by 2025. Multi-storey residential buildings are prioritized due to their higher impact and the ability to showcase success stories with real residents and property owners. These cases serve as powerful proof-of-concept examples that help build trust and buy-in.

Cooling presents an additional layer of complexity. Unlike heating, which can often be centralized, cooling tends to require decentralized, electricity-based systems like air conditioners or heat pumps. While district cooling is used in some specialized buildings such as hospitals, it is not yet viable at a city-wide scale. Nonetheless, geothermal heat pumps, which offer both heating and cooling capabilities, are being increasingly promoted as an optimal solution. A technical study commissioned by the city explored various cooling options, but as of now, there is no one-size-fits-all approach for integrating cooling into the broader district energy framework.

Through a combination of strategic planning, municipal ownership, and technological innovation, Vienna is crafting a bold and detailed roadmap to



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achieve its 2040 net-zero target. By focusing on both heating and cooling, reducing fossil fuel reliance, and empowering local solutions, the city is not only adapting to the challenges of climate change—it is actively leading the way toward a more sustainable urban future.