National Building Deep Dive - Slovenia

General background:

- **Fossil gas consumption:** Slovenia heavily relies on fossil gas imports, with total consumption reaching 903 million Sm^3 in 2021[1]. The industrial sector accounts for 61% of consumption, followed by transformations (20.1%), households (14.4%), and other sectors (3.3%).
- **Household energy usage**: Fossil gas represents only 10% of final energy consumption in Slovenian households, trailing behind biomass (39%), electricity (28%), and heating oil (12%). District heating slightly lower than fossil gas at 7%.
- **Fossil gas in district heating:** In district heating systems, fossil gas contributes around one-third (31.48%) of primary energy for heat production. Coal holds the largest share at 47%, while renewables, mainly biomass, account for 17.5%. Waste-to-energy plants, industrial waste heat, and electricity have minimal contributions[2].
- **Distribution of fossil gas:** Distribution of fossil gas covers most urban areas in Slovenia, except for Primorska. In 2018, there were 13 distribution system operators serving 120,228 household customers, 249 customers in closed distribution systems, and 14,246 public utilities. The average household consumption is 9,615 kWh per year[3].

Energy savings:

- **Government measures for energy efficiency in public buildings:** The Slovenian government implemented soft measures to reduce energy consumption in public buildings by 10%. These include limiting cooling to 25°C with certain humidity conditions, adjusting dress codes, reducing building operation hours, and setting maximum heating temperatures. Building managers are responsible for implementing energy efficiency measures and investing in renewables, particularly for heating[4]. However, there might be an implementation deficit with regards to those measures due to the quality of facility management in public buildings.
- **Policy efforts for short-term energy savings:** The government has various efforts to achieve savings e.g. Slovenian Environmental Public Fund (Eco Fund) and regional offices of energy advisors[5]. BORZEN provides online portals and trainings for energy auditors. Additionally, NGOs, electricity suppliers, and web portals have launched campaigns to address the increase in energy prices[6].
- **Support for low-cost energy savings:** Several measures aim to support energy savings investments. The Eco Fund provides public support, tenders for co-financing energy renovations, and actions for targeting energy-poor households. The Eco Fund manages a network of energy advisors.
- **Targeting least efficient buildings and heating appliances:** Currently, no specific activities have been identified to target the least efficient buildings and heating appliances during the

[1] https://www.energetika-portal.si/fileadmin/dokumenti/publikacije/energetska_bilanca/ebrs_2021.pdf
[2] https://www.agen-rs.si/documents/10926/38704/Poro%C4%8Dilo-o-stanju-na-podro%C4%8Dju-energetike-%20v-Sloveniji-v-letu-2021/17048023-cfc5-4283-8e48-5fa078ad2ae6
[3] https://ec.europa.eu/info/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans_en#documents
[4] https://www.gov.si/zbirke/projekti-in-programi/ukrepi-za-omilitev-draginje/
[5] https://ekosklad.si/prebivalstvo/ensvet
[6] Examples: https://www.caszazemljo.si/, https://www.trajnostnaenergija.si//, https://www.energetika-portal.si/, https://eko-portal.si/home

energy crisis. However, there are existing building databases rating deep renovation opportunities[7]. Inspection systems focus on identifying heating appliances with high air pollution emissions rather than low energy performance.

- **Energy price interventions:** The government has implemented measures to address higher energy prices. This includes lowering excise duties on electricity and energy products. A one-off solidarity allowance of €150 was provided to vulnerable groups. Gas price caps were introduced for households, small commercial users, and social service providers, along with reduced VAT rates[8]. The current gas tariff does not incentivize the uptake of heat pumps or gas savings.

Recommendations: 

- **Energy audits and capacity building:** Define target groups and introduce quality control for energy auditors. Establish capacity building programmes for energy efficiency in local administrations targeted at renovating public and private buildings.
- **Price cap:** Reform the current price cap on gas and introduce a block tariff that gives greater incentive to save energy.
- **Subsidies:** Targeting subsides to specific areas where there is small uptake of certain measures or some specific are needed e.g. in air pollution areas. Implement long-term strategies to promote investments in the energy renovation of the building stock.
- **Monitoring:** Implementation of control systems and monitoring for the energy use (energy accounting) and actual achievement of planned savings and connection with other national databases (e.g. Public Payments Administration that has bills for all public buildings energy supply).

[7] See Geodetic Administration of the Republic of Slovenia (GURS): Energy Performance Certificates database
[8] https://www.total-slovenia-news.com/business/10321-gas-prices-capped-from-1-september

Gas boilers:

- **Ban on some fossil fuel boilers**: The Act on the Promotion of the Use of Renewable Energy Sources prohibits the design and installation of new heating oil, mazut, and coal boilers starting in 2023[9]. However, there is no current plan to ban the installation of new fossil gas boilers.
- **Minimum energy performance standards permit gas boilers**: Minimum energy performance standards for new buildings still treat the installation of condensing boilers as reference optinion for heating. This means gas can still be used in new constructions as long as they meet efficiency criteria. By contrast, direct electric heating is prohibited in new constructions, except for specific cases related to renewable energy production and hot sanitary water.
- **Investment support for gas boilers**: The Eco Fund still provides subsidies and incentives, including investment support, for condensing gas boilers in multi-family buildings[10]. However, support for individual houses is no longer available.
- **Absence of price-based measures to reduce fossil gas consumption**: While Slovenia has implemented a pollution tax on heating oil, currently, there are no price-based measures such as energy taxation, carbon taxation, or network charges in place to specifically target the reduction of fossil gas consumption in Slovenia. The focus has been on other energy sources.
- **Government regulations on fossil gas prices**: The Government of Slovenia issued a regulation on determining the maximum permitted retail price of fossil gas for household customers and basic social services[11]. The set price is €0.073/kWh for fossil gas in households and common household customers, and €0.079/kWh for small business customers. This regulation was introduced to address the high prices of oil and electricity and bring stability to the fossil gas market.

Recommendations:

- **National ban on new gas boilers:** Introduce a national ban on the installation of new stand-alone gas boilers in all new buildings from 1st of January 2024 and in all existing buildings before 2030.
- **Inventories:** Introduce and integrate inventories of older heating devices in households with poor efficiency and emissions (e.g. everything below 90%) used to target specific measures.
- **Phase-out strategy:** Develop a strategy for the transition or replacement of fossil gas heating devices to renewable energy sources, district heating or other sustainable sources. Particular attention should be paid to the transition period, when households will switch from one technology to another, when distribution will strongly increase prices of energy products due to infrastructure maintenance and fixed costs.
- **Support local phase-out of gas:** Support for municipalities that are getting gas systems from concessions so they can operationalise a phase-out. Otherwise, some municipalities might end up renewing long-term contracts with gas companies creating a potential carbon-lock in for the coming decades.

[9] http://www.pisrs.si/Pis.web/pregledPredpisa?id=ZAKO8236

[10] See Ekosklad - Gas condensing boilers

[11] http://www.pisrs.si/Pis.web/pregledPredpisa?id=URED8623 valid until August 31st 2023

Building renovations:

- **Building stock overview:** Slovenia's building stock consists of 87.3 million m², with 76% built before 1990. Single-family homes represent over half of the stock (53%), followed by multi-family homes (19%), private service-sector buildings (16%), and public buildings (11%).
- **Rural-urban dynamics:** Slovenia has a highly distributed settlement pattern and a significant rural population. Urban dwellers have also been moving to rural areas due to factors like the impact of COVID-19 and rising real estate prices in cities.
- **Oversized and underutilized rural buildings:** Many rural homes in Slovenia are large, originally designed for multi-generational living. However, these homes are often oversized and underutilized, leading to high heating costs. Individual biomass furnaces are commonly used to heat only specific rooms.
- **Renovation industry:** Slovenia's building stock has limited potential for industrialisation of renovation, as there is a lack of standardized floor plans and building technologies, leading to challenges in implementing prefabricated elements for energy-efficient measures.
- **Energy efficiency challenges and energy poverty:** Only a small percentage of renovations in Slovenia achieve medium or deep energy savings[12], indicating a need for more ambitious renovation efforts. A significant portion of single-family homes (45.8%) and multi-family homes (7.6%) falls into lower energy efficiency classes, putting households at risk of energy poverty.
- **Slow progress in energy renovations for public buildings:** The annual renovation target for central government public buildings was not achieved by 2021. Despite an increase in energy renovations, only 32% of the cumulative target for the period 2014-2021 were implemented by the target date. Although having a renovation programme for the public sector, the construction industry is facing problems when renovating them due to other obstacles such as historical protection or the lack of seismic resistance.
- **Energy efficiency standards for new buildings:** Slovenia's current energy efficiency standards for new builds slightly deviate from Commission benchmarks[13]. They are less ambitious for single-family houses and more ambitious for office buildings. NZEB standards also include a minimum renewable energy share of 50% for all building types.

Recommendations:

- **Empty buildings policy:** Address the issue of empty buildings especially outside of urban areas as part of taxing, social and equal development policies for example by transforming single-family houses into multi-family buildings.
- **Multi-family buildings:** Facilitate the renovation in buildings with multiple owners by engaging “local heroes” via building managers.
- **Explaining energy contracting and stimulating comfort as a service:** The model of energy contracting in multi-apartment buildings should be well communicated and understandable to flat owners. Otherwise, there will be major obstacles due to a lack of trust in the energy company and also the building managers. Also, in relation to energy poverty, but mostly B2B, comfort as a service approach should be stimulated (instead of fuel subsidies for the poor).
- **Simplify reporting requirements:** Reporting requirements, such as achieved savings, CO_2

[12] https://op.europa.eu/en/publication-detail/-/publication/97d6a4ca-5847-11ea-8b81-01aa75ed71a1/language-en/format-PDF/source-119528141

[13] https://www.bpie.eu/wp-content/uploads/2021/06/Nearly-zero_EU-Member-State-Review-062021_Final.pdf

emissions savings, primary energy savings, must be simplified compared to energy contracting for the public sector.

- **Strengthen the network of energy advisors:** Introduce new training programmes and new competences for energy advisors to stimulate the retrofitting market for single family homes.

Heat pumps:

- **Heat pump market and support schemes:** Slovenia is not a member of the European Heat Pump Association, but it is estimated that between 6,000 and 8,000 heat pumps are sold or installed annually. The Eco Fund provides co-financing for heat pumps[14], with 25,690 units co-financed from 2011 to 2017.
- **Heat pump stock:** In 2019, approximately 50,000 heat pumps were installed in Slovenia[15]. Heat pumps accounted for a significant portion of renewable heating and cooling but represented only 2.6% of gross final energy consumption for heating and cooling in the country.
- **Air-to-water heat pumps:** Air-to-water heat pumps are the most successful heat pump technology in Slovenia, particularly for domestic hot water applications.
- **Investment support and financing:** Investment support for heat pumps is primarily distributed through the Eco Fund, offering subsidies and green loans. However, some of the support programs have been closed, and it is uncertain when they will reopen. A few municipalities also provide investment support for heat pumps.
- **Challenges for heat pump uptake:** Heat pumps face competition from biomass due to its wide availability, and in urban areas, efforts have been made to prevent heat pump installations to protect existing district heating and gas infrastructure. Outdoor noise regulations for heat pumps are also not yet in place, hindering their deployment in densely populated areas due to an uncertain legal environment with ongoing lawsuits against noise coming from the outdoor units of air-sourced heat pumps.
- **Electricity to gas price ratio:** Between the fourth quarter of 2021 and July 2022, the electricity to gas price ratio improved significantly for households (July 2022: 1,3 vs. 2,7 in Q4 2021). Next to the general increase in gas prices, this was also the result of price caps for electricity and gas being introduced in July 2022 by the government. As the price caps will remain in place until the end of the year, the ratio will at stay at 1,3 at least until the end of 2023[16].

Recommendations:

- **Improve data availability:** Provide more detailed data on heat pump sales differentiating between the different types of heat pumps. This would be particularly interesting regarding air-to-air heat pumps as they might be installed to replace fossil fuel boilers even if district heating is available. Furthermore, data on post installation parameters would allow to control the actual energy savings due to installing heat pumps.
- **Noise regulation**: Introduce noise regulation to avoid heat pump installations being a problem. This is relevant in densely populated areas where buildings are close together. The problem can be temporarily solved with sound barriers.

[14] https://www.ekosklad.si/prebivalstvo/pridobite-spodbudo/seznam-spodbud/toplotne-crpalke
[15] https://replace-project.eu/wp-content/uploads/2021/12/D3.2-Statistical-Inventory-Report-%2020211122_revised.pdf
[16] https://www.euractiv.com/section/politics/news/slovenia-extends-natural-gas-electricity-price-regulations-until-years-end/

- **Regular operational check should be implemented**: Introduce requirements for producers to offer monitoring services such as apps to ensure energy efficiency as well as quality of the installation such as the size of the heat pump.
- **Grid flexibility: On the DSO level**, heat pumps should be included into flexibility services combined with home PV and batteries.

District heating:

- **District heating overview:** District heating plays a crucial role in the heat supply of Slovenia, particularly in densely populated urban areas. In 2021, heat distributors supplied 2,448.4 GWh of heat, serving household consumers (39%), non-residential consumers (30%), and industrial consumers (16%) with 15% being heat losses[17].
- **Heat sources:** Fossil fuels accounted for the majority (79.7%) of heat supply in 2021, with coal being the primary source (47%), followed by fossil gas (31.5%) and oil and petroleum products (1.2%). Renewable energy and waste heat sources made up a smaller share (20.3%), with woody biomass being the largest contributor (17.3%)[18].
- **Challenges and modernization:** There has been a decrease in the share of coal and an increase in fossil gas in heat production from 2017 to 2020. However, in 2021, due to high fossil gas prices, there was a slight reversal of this trend[19]. Efforts are underway to modernize production resources. For example, in Ljubljana, coal-fired units are replaced with gas-steam units to decrease coal usage by over 70%[20].
- **Distribution systems:** In 2021, heat was supplied through 112 distribution systems, with the largest networks located in Ljubljana, Velenje, and Maribor[21]. Warm-water and hot-water systems accounted for the majority of distribution systems, while steam distribution and district cooling systems represented smaller shares.

Recommendations:

- **Energy efficiency and pricing:** Energy efficiency is a priority, with some distribution systems meeting the criterion of at least 50% of distributed heat being produced from renewable energy sources. However, no system met the 50% criterion for waste heat[22]. End-user prices vary among municipalities, with an average monthly retail price of €95.8/MWh for household consumers in 2021[23]. The energy regulator provides price analyses for transparency and comparison purposes.
- **Promote heat pumps in district heating:** Develop a heat pump strategy for district heating identifying the potential to use ambient heat from rivers, sea or geothermal energy combined with solar thermal, among others, to heat district heat networks, and the necessary policies to support the technology.

[17] https://www.ceer.eu/documents/104400/7517827/C22_Slovenia_EN/70e75cb8-0f4b-8b71-8663-0c3decbf1545
[18] https://www.ceer.eu/documents/104400/7517827/C22_Slovenia_EN/70e75cb8-0f4b-8b71-8663-0c3decbf1545
[19] https://www.ceer.eu/documents/104400/7517827/C22_Slovenia_EN/70e75cb8-0f4b-8b71-8663-0c3decbf1545
[20] https://www.delo.si/lokalno/ljubljana-in-okolica/plin-cistejsi-od-najboljsega-premoga/
[21] https://www.agen-rs.si/web/emonitor/delovanje/daljinska-toplota
[22] https://www.ceer.eu/documents/104400/7517827/C22_Slovenia_EN/70e75cb8-0f4b-8b71-8663-0c3decbf1545
[23] https://www.ceer.eu/documents/104400/7517827/C22_Slovenia_EN/70e75cb8-0f4b-8b71-8663-0c3decbf1545

- **Institute mandatory local heat planning:** Establish binding national regulations for comprehensive and consistent municipal heat planning across all municipalities in line with requirements in the Energy Efficiency Directive Institute to identify key areas for the development, expansion and densification of district heat networks. Furthermore, lawmakers should aim to evolve these local heat plans into local energy distribution strategies, facilitating the synchronized planning of electricity, gas, hydrogen, and heat networks.
- **Subsidy schemes:** Introduce schemes to support the quick uptake of renewable energy in district heating. For contracting periods between 10 and 15 years, the grant should vary between 15% and 35% of the investment costs.