

# DEFINING A SUSTAINABLE PATHWAY FOR SLOVAKIA'S HEATING AND COOLING (H&C) SECTOR

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## EU landscape

Heating and cooling (H&C) is the EU's biggest end-use sector, comprising 50% of final energy consumption, 80% of which is used in building systems that rely on fossil fuels for 2/3 of energy demand (3/4 for heating alone), half of which are currently considered beyond their service lifetime.<sup>i ii</sup>

H&C is at the intersection of several longstanding EU strategies and instruments being revisited and updated to meet the more ambitious climate goals set under the European Green Deal, namely the EU strategy on H&C, the EU Renovation Wave, Energy Performance of Buildings (EPBD), Energy Efficiency Directive (EED), Renewable Energy Directive (RED II), Emissions Trading Scheme, (ETS II), and Industrial Emissions Directive (IED).

- **EU strategy on heating and cooling (H&C)** was issued as part of the sustainable energy security package adopted in February 2016, prioritizing sustainable and efficient H&C in buildings, energy efficiency in industry and better integrating H&C into the electricity system.<sup>iii</sup>
- **EU Renovation Wave** lays out three policy and financing priority areas; (i) energy efficiency in public buildings, (ii) tackling energy poverty, and (iii) accelerating the decarbonization of H&C.<sup>iv</sup> RED II, EED and the EU ETS aim to deliver faster and deeper renovation for better buildings which naturally contributes to the decarbonization of H&C. Under RED II and EED, member states are required to submit comprehensive assessments (CAs) for decarbonizing H&C systems to the Commission, citing the potential for efficiency, renewables and waste heat. Local authorities and utilities should have an important role in creating the necessary regulatory framework, market conditions and skills to prepare a robust pipeline of projects that will modernize H&C systems. Therein the Commission encourages public authorities to consider using energy and CO<sub>2</sub> taxation to promote the switch away from fossil fuels.
- **EED** identifies large potential of high-efficiency cogeneration and district heating and cooling to reduce primary energy demand. Efficient district heating and cooling means a system using at least 50% RES, 50% waste heat, 75% cogenerated heat or 50% of a combination of this energy and heat. Only these efficient systems or efficient individual H&C supply options should be taken into consideration in a CBA as an alternative to the baseline. Promoting high efficiency cogeneration and the use of heating and cooling from waste heat and renewable energy sources. Member states are to carry out a comprehensive assessment of the potential for high efficiency cogeneration and efficient district heating and cooling DH&C.<sup>v</sup> Like the EED, EPBD set minimum performance standards but do not require any acceleration of replacement rates nor choosing more efficient outcomes above the minimum.
- **RED II** is a cornerstone of the F55 package, raising the headline EU RES target to 40% by 2030, a significant increase from the 32% established by the Clean Energy Package Renewable Energy Directive (RED) before it. It includes:<sup>vi</sup>
  - Buildings – a new benchmark of 49% RES by 2030
  - Industry – a new benchmark of 1.1% annual increase in RES
  - H&C – existing indicative 1.1% annual increase becomes binding on member states
  - DH&C – indicative 2.1% annual increase in RES H&C
- The 2018 **EPBD** stipulated that member states should adopt measures ensuring the performance of installed, replaced, or upgraded technical building systems like space heating, air conditioning or water heating, is documented as part of certification and compliance checking. The EGD aligned revision is expected in Q4 2021.
- **ETS II** is the proposed extension of the current ETS to include the building and transport sectors. The social impact arising from higher CO<sub>2</sub> prices with the creation of a Social Climate Fund. This Fund should be used by member states to support their measures and investments to increase EE of buildings through renovation and decarbonize the H&C of buildings.<sup>vii</sup>
- **IED** applies to EU air quality policy since it is designed

to prevent air pollution at the source. However, its effectiveness could be easily undermined by exemptions granted to member states and relevant installations, for example setting less stringent emission limit values is BAT would lead to 'disproportionately higher costs' compared with the environmental benefits, or a special derogation until 2023 for district heating plants. According to the European Commission, from the 2014-2021 budget Member states allocated some EUR 2 billion to air quality projects, but for example in the case of Sofia none of the projects targeted emissions reductions from the domestic heating sector.<sup>viii</sup>

Fundamentally, the EED revision should strengthen capacities of public authorities to prepare, finance and implement comprehensive H&C planning and coordination with renovation projects. It sets the framework for H&C planning as far as identifying energy efficiency and renewable energy potential by member states, providing monitoring policies and measures to exploit this potential, which directly support the achievement of the RES target in H&C set out in Article 24 of RED. Planning measures for H&C under the EED are synchronized with the NECP timeline, which is meant to facilitate consistent assessments of the potential for renewable energy sources and use of waste heat under RED.<sup>x</sup>

While EED has helped increase the significance and awareness of H&C across member states, overall impact has been low mostly due to lack of follow up given to the findings from the comprehensive assessments (according to Article 14) and wide use of permitted exemptions. As such, Articles 23 and 24 of the revision lay down stricter planning and follow up of these assessments, including stronger promotion at local and regional levels. They also introduce minimum requirements for efficient DH&C systems, broader cost-benefit requirements and obligations on reuse of waste heat. Furthermore, the European Commission advises member states to set up national competence centres advising local or regional energy agencies on especially complex issues like DH&C. It also suggests member states promote the upgrading heating systems as part of deep renovations for 2050 carbon neutrality, a combination of heat demand reduction and covering remaining demand with a carbon free energy source.<sup>x</sup>

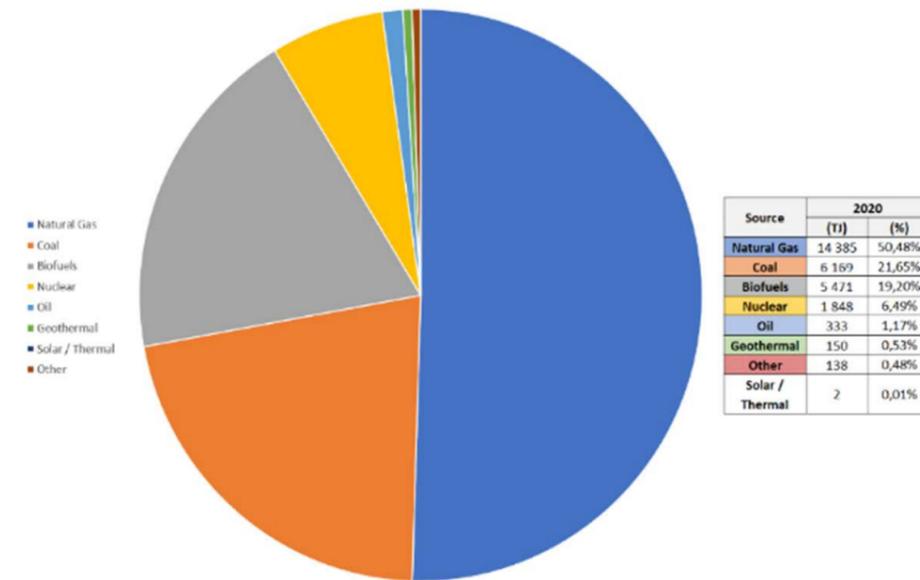
Moreover the 2018 JRC review recommended future member state CAs should include the drivers of future demand, e.g. effect of existing energy policies, changes in building stock, population change, changes in GDP and changes in industry demand. The European Commission should consider working in closer collaboration with member states to overcome core challenges, share best practices and provide a more detailed description of the scope of analysis and reporting standards.<sup>xi</sup>

## Slovakia landscape

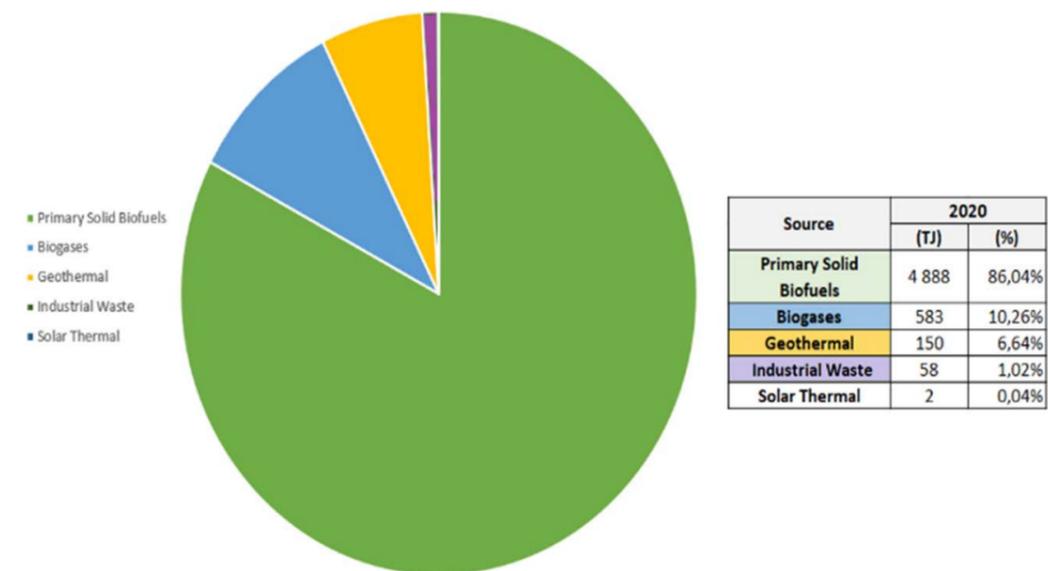
Slovakia is the second most gasified country in the EU behind only the Netherlands, with about 90% of the population having access to natural gas. Of the two coal power plants in operation, Novaky will continue to be a primary heat source for the Upper Nitra region after its

transformation away from solid fossil fuels in accordance with the Action Plan for the Transformation of Upper Nitra detailed in Slovakia's NECP. Slovakia's current heat and RES technology mix are illustrated below.

### Slovakia's heat mix, 2019



### Slovakia's RES mix, 2019

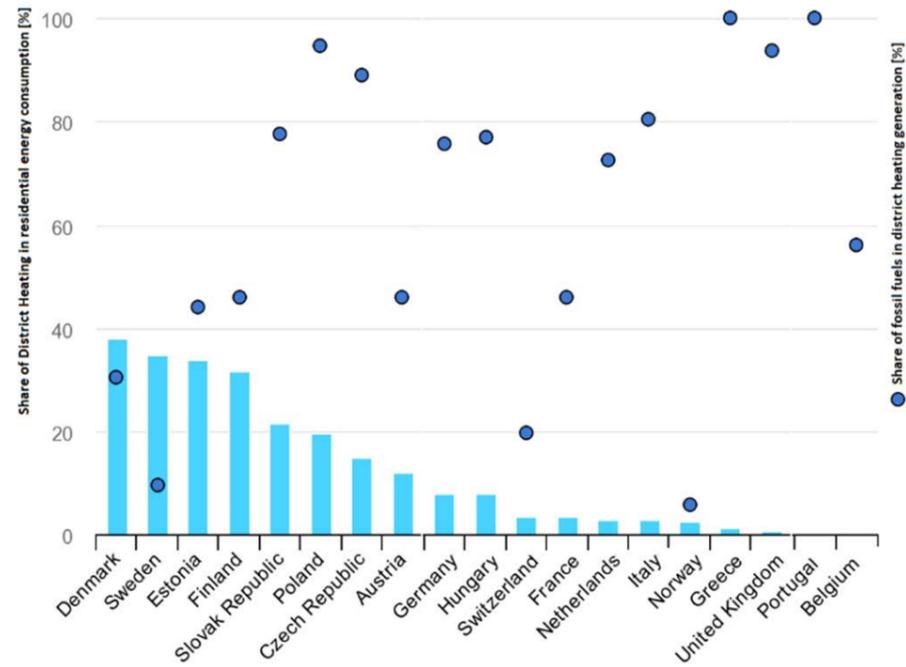


Source: IEA<sup>xii</sup>

By virtue of the high share of natural gas and low, declining share of coal in heating, the sector is fossil dominated yet relatively low carbon, which can be somewhat of a limiting factor for increasing the use of renewables in H&C in compliance with EU legislation. The high degree of centralization within DH systems provides favourable technical preconditions for the use of biomass, biomethane

and geothermal energy, but considering the former's negative impact on air quality, Slovakia's preferred strategy targets the development of biomethane and hydrogen to utilize existing gas infrastructure while also leaning into the geothermal potential which is fully recognized. The below graph shows Slovakia's relatively high share of DH in residential heating and fossil fuels in DH.

### Share of residential DH and fossil fuels in DH, 2019



Source: IEA<sup>xiii</sup>

Slovakia's NECP set an overall 2030 RES target of 19.2%, of which the RES in H&C contributes 19%, up from the current 13%.

### Slovakia's 2030 RES targets

	2021	2030
RES – H&C (%)	13	19
RES – ELECTRICITY GENERATION (%)	22,4	27,3
RES – TRANSPORT, INCLUDING MULTIPLICATION (%)	8,9	14
OVERALL RES SHARE (%)	14	19,2

Source: Slovakia NECP, December 2019<sup>xiv</sup>

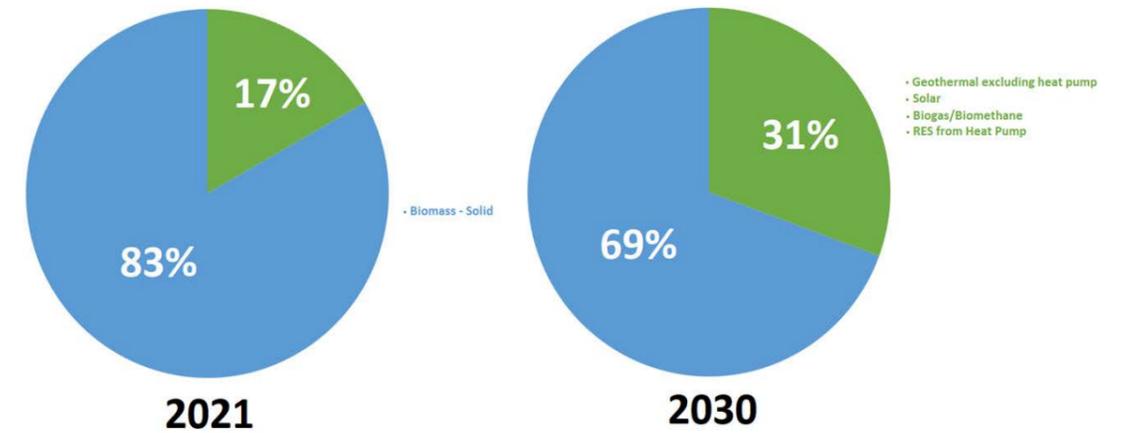
Among RES technologies, geothermal energy for DH has the lowest current share and will see the highest growth, while the dominant technology, biomass, will exhibit the lowest growth. Overall, RES increases by a cumulative 30% over this decade.

The 937 ktoe of RES would make up approximately 35% of heat demand in 2030, up from about 20% currently (721 ktoe). Considering the H&C sector 2030 target of 19%, this implies that cooling will comprise a much lower RES share than heat.

### Slovakia RES in heat by technology

SOURCE	2021	2030	INCREASE
	(KTOE)		
GEOTHERMAL EXCLUDING HEAT PUMP	7	50	614%
SOLAR	14	43	207%
BIOGAS/BIOMETHANE	65	100	54%
RENEWABLE ENERGY FROM HEAT PUMP	35	94	169%
BIOMASS - SOLID	600	650	8%
TOTAL	721	937	30%

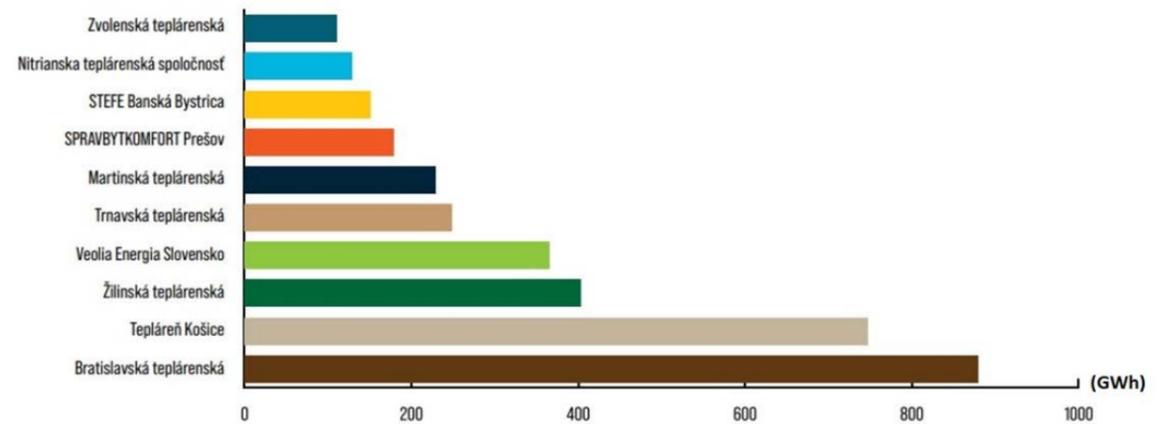
Source: Slovakia NECP, December 2019



Source: Slovakia NECP, December 2019<sup>xv</sup>

The below chart shows that out of the ten largest heat producers in Slovakia by output, those serving Bratislava and Kosice are far and away the largest.

### Top 10 Slovak heat suppliers, GWh, 2020

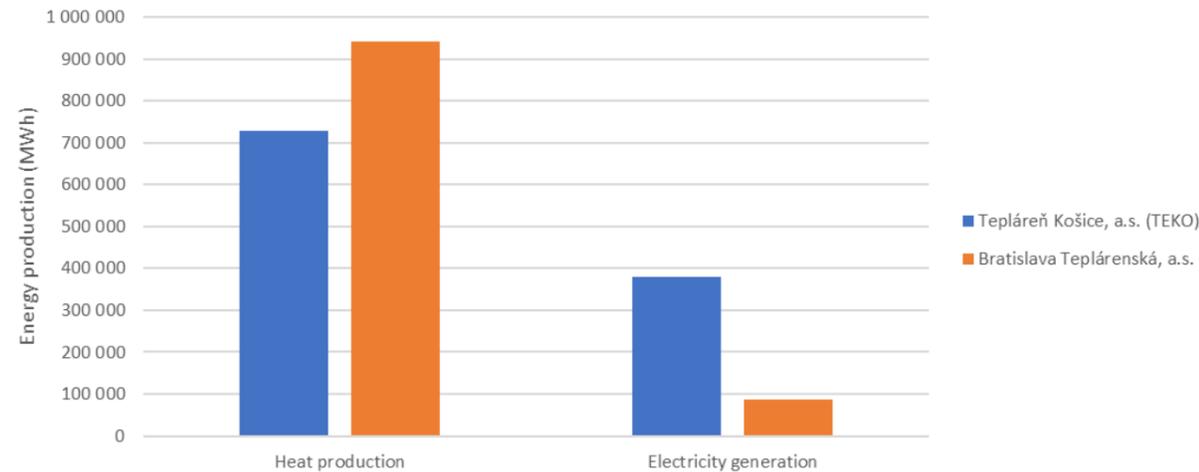


Source: Úrad pre reguláciu sieťových odvetví<sup>xvi</sup>

While Tepláreň Košice produces slightly less heat than Bratislava Teplárenská, its cogeneration electricity output is almost 400 GWh following a large increase from 2019 to 2020, compared to less than 100 GWh for Bratislava

Teplárenská. It is also worth noting that Bratislava produces about twice the municipal waste as Kosice with energy recovery of 50% compared to 60%.<sup>xvii</sup>

## Energy output of Slovakia's two largest heat suppliers, MWh, 2020



Source: Bratislava Teplárenská<sup>xviii</sup> and Tepláreň Košice TEKO<sup>xix</sup>

Slovakia's NECP cites the following measures to achieve its 2030 targets:

- Binding levels of RES in DH systems** – At least 1% annual average for the entire DH sector allowing individual operators to change their own fuel base by connecting RES heat suppliers or self-consumers and RES-producing communities through a mandatory heat offtake mechanism based on non-discriminatory criteria and reasonable charges, ensuring that a reasonable proportion of fixed network costs are collected by the operator to meet heat demand when RES is insufficient.
- Mandatory RES connection to efficient DH** – New and existing buildings undergoing major renovation will be required to connect to efficient DH systems using RES only in the cases that this leads to higher building energy performance compared to the operation of individual equipment for RES self-consumption.
- Information obligation** – Suppliers must provide regular updates (at least once a year) of the RES share in heat supply and DH systems and whether it is meeting efficiency conditions or in the process of transition.
- Supporting individual RES** – Self consumers and renewable energy communities are subject to non-discriminatory fees ensuring a reasonable payment towards fixed costs allowing the operator to meet heat demand when self-consumption is insufficient.

- Right to disconnect** – For H&C systems that are not efficient by 31 December 2025 end-users are entitled to switch to RES self-consumer.
- Financial support** – A tendering procedure will provide financial support for the construction of new RES in electricity and heat plants while biomass has a legal requirement for cogeneration.

Slovakia's NECP defines and distinguishes financial support for RES technologies accordingly:

- RES in heat** – Traditionally RES support has been associated with electricity generation while the heating sector only had access through cogeneration technologies: biomass and biogas. With new RES targets, separate operating aid will need to support RES in heat from biomass, biomethane, geothermal, solar, and heat pumps. This could take the form of a surcharge or green bonus on an annual basis until the full depreciation of the investment. Aid will be limited to operators who have built new DH systems or approved a plan to switch to efficient DH supply that will then met the conditions for efficient DH supply. Auctioned emissions allowances will also contribute to this operating aid.
- High efficiency RES cogeneration** – Currently electricity generation in new cogeneration plants qualifies for financial support irrespective of use of RES as long as 60% of heat produced is supplied to a DH system with primary energy savings of at least 10% qualifies. This now needs to be modified to increase

RES heat incentives for new cogeneration plants. The aid should be provided in the form of a guaranteed feed in tariff to operators of newly or transitional efficient DH systems.

- CHP and biomass** – Operating aid for cogeneration plants to offset differences in operating costs and market electricity and heat prices will be provided through a feed in tariff over a three year period which can be extended under certain conditions.
- Waste heat** – Will support integration of RES through biomethane facilities derived from plant and animal waste, biodegradable municipal, kitchen and restaurant waste and waste treatment as well as CHP waste heat, especially waste heat generated as industrial and energy sector by-product.

The Slovak government supports intelligent system solutions leveraging DH&C to supply buildings collectively rather than individually. DH already plays an important role in delivering environmentally friendly heat to cities and 4<sup>th</sup> generation DH systems are singled out as an indispensable, cost-effective building block for future smart cities. These systems provide connectivity and flexibility to match production with consumption and especially to utilize waste heat from industrial processes or the tertiary sector (e.g. data centres and hospitals). Combined heat and power (CHP) plants are common in DH systems, using 20% less fuel than producing the same amount of electricity or heat alone and enables storage of energy in the form of heat. Furthermore, individual heating is dependent on biomass which is detrimental to air quality and exposes the population to serious health risks.

An important pillar of the energy efficiency improvement policy is reducing the energy intensity of heat distribution. Where projects for the construction of new DH&C systems, especially in areas with poor air quality, are combined with new RES heat installations, possibly in conjunction with high efficiency cogeneration, a combination of investment aid and operating aid from listed programmes will be made possible.

The main financial sources identified in Slovakia's NECP are EU funds, the Modernisation Fund (MF), and the Environmental Fund. At least 35% of Environment Fund revenues will be used for energy projects with support for efficient and sustainable DH, cogeneration and RES. The aim is to support DH&C operators switching to efficient systems through new or upgrade of existing CHP plants using RES. Currently the *Green for Households II* subsidy

programme supports household RES installations for up to 50% of the cost, including solar panels, biomass boilers and heat pumps. In addition to concurrent investment and operating aid (which will meet the proportionality condition for state aid by deducting the aid from total investment based on levelized cost of energy (LCOE)), fiscal measures such as reducing the VAT rate RES H&C might also be introduced. If this does not incentivize H&C market participants to pursue adequate RES capacities, the competent authority will proceed to launch a call for tenders.

The NECP concludes that in order to meet RES targets the 2021-2027 programming period will prioritize:

- Increasing RES share in DH including efficiency of generation and distribution;
- Supporting plants using RES, energy distribution and storage facilities including smart management systems to increase efficiency of existing installations and installation of new RES plants for businesses and public and household sectors;
- Exploiting geothermal and supporting development of local heat supply systems.

## Endnotes

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