Positive Energy District Replication - Case Study of the City of Trencin, Slovakia

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Abstract. Energy efficiency has been one of the key topics for urban planning for the past few years in relation to sustainable development, resilience as well as climate change. There are many technological approaches aiming at efficient use of energy, innovative technologies and renewable sources of energy, but what is often missing is its relation to spatial planning and planning system and documentation. Horizon 2020 project Making City is striving to promote Positive Energy District (PED) planning and methodology aiming at development of new integrated strategies to address the urban energy system transformation towards low carbon cities, with the PED approach as the core of the urban energy transition pathway. It is implemented on the level of cities and city districts, having two types of areas – two lighthouse cities and six follower cities. The city of Trencin (Slovakia) is one of the follower cities where multiple urban areas have been selected to replicate the PED concept developed by the project consortium. Trencin is the eight largest city in Slovakia with a rich manufacturing history in textile and arms industry. It is currently focusing on diversified its economic activities in the sectors of tourism, innovation, culture and industry. The PED replication will involve a broader city centre area including multiple municipal buildings (schools and sports infrastructures) and residential buildings (individual housing and apartments). The following paper describes the key notions from the PED concept providing a holistic approach on harmonizing energy and urban planning for energy. It evolved from single, unintegrated, simple “building” based interventions into PED concepts looking forward to reaching energy and climate targets which will lead to an integrated energy planning. The paper further explores this PED approach in the city of Trencin, including the challenges it had to overcome during the implementation, as well as perspectives for its future development. The aim of the project further on is to create a standardized concept ready to be the core of specific urban energy transitions planning processes.

1. Introduction
Decreasing the overall energy consumption in the EU had been on the political agenda for decades, in relation to the climate change struggle and beyond. In cities, right after the transportation, buildings consume the most energy and therefore there is particular focus of multiple national and international policies to increase the energy efficiency of buildings and districts. The object of energy efficiency policies is slowly shifting from individual buildings using renewable sources of energy to considering whole districts and neighbourhoods in order to better calibrate the solutions and enhance the potential of innovative energy solutions. The following paper is approach adopted by Horizon 2020 Making City project which is focusing on districts in selected European cities aiming at optimizing their energy
consumption and testing the positive energy district (PED) concept. The paper has three main parts. The initial part is reviewing the literature and current approaches to energy efficiency in cities. The second part discusses and presents the approach taken by Making City project, including brief description of the project. Third and final part explains the utilization of the concept on the city of Trencin, one of the so-called ‘follower cities’ within the project. As the project is in initial stage, this part is mostly focused on city analysis focusing on its governance, mobility and transport characteristics and the city strategies, including comparison of the city goals to the EU level energy consumption.

2. Positive energy districts – literature review
Buildings account for 40% of total energy consumption in the EU [1] and 35% of greenhouse gas emissions (GHG) derived from energy uses [2]. Increasing energy efficiency of buildings has been on the top priority list of the climate change adaptation and mitigation for the past two decades. The focus up until the past few years now mostly on individual buildings (concepts such as zero energy buildings), in particular publicly owned objects which were renovated using the public money. These solutions very often aim at streamlining the renewable energy solutions for individual buildings [3,4]. In the EU, more than 220 million buildings were built before 2001, with generally poor energy performance, and of which only 0.2% perform deep renovations every year. This means that there is a huge potential for reducing energy consumption in the building stock. Regulations and building codes have evolved and continue evolving towards more efficient or nearly zero energy buildings, with EU Directives 2010/31/EU and 2018/844/UE as clear examples of strong commitment to the improvement of the energy efficiency of the building stock [4]. Striving to improve the flexibility of decentralized energy generation, individual buildings and energy systems should be able to interact with each other and to reach this quality, the concept of positive energy district (PED) highlights the importance of active interaction between energy generation systems, energy consumers and energy storage within a district [3].

The literature on zero energy and energy positivity concepts and solutions on the level of a districts or neighborhoods is rather sparse as it is relatively new idea and it is mostly conceptual phase [3]. The roll-out of these concepts is, though, fostered by the European Clean Energy package which is calling for so-called ‘energy communities’ consisting of multiple small-scale energy consumers and providers, to share energy in local energy networks [5].

The advantage of PEDs in comparison to individual building focus include the ability to exploit more of the available energy generation and energy storage potential of the community, i.e., the district and that the focus being on speeding up the urban decarbonization, regarding mainly its scalability potential…. The key concept of PED is that of a district that produces more energy from renewables than what is needed to fulfil the district’s demand, being able to export this energy surplus to another part of the city [4].

Positive Energy Districts will raise the quality of life in European cities, contribute to reaching the COP21 targets and enhancing European capacities and knowledge to become a global role model [6]. PEDs and Positive Energy Neighborhoods (PENs) are now seen as strategic keys for decarbonizing the built environment in Europe [7].

There is no single universally accepted definition of PEDs. The Horizon 2020 Making City project, which is focusing on promoting the PED approach, defines PEDs as an urban area with clear boundaries, consisting on buildings of different typologies that actively manage the energy flow between them and the larger energy system to reach an annual positive energy balance [8].

3. Making City approach to Positive Energy Districts
The MAKING-CITY is a large-scale H2020 Smart Cities project funded by the European Union, that aims to address the city energy transformation, developing of new integrated strategies towards low
carbon cities. The focus of the project is the development and implementation of Positive Energy Districts (PED) – districts that produce more energy than they consume, as the core approach for the urban energy transition pathway. The solutions proposed in the projects include positive energy buildings, renewable energy systems, energy sharing, electric mobility and smart IT, as well as non-technical solutions such as effective policy innovation, business models, regulations and standards as well as citizen engagement and increasing of the overall energy awareness of the public. The project consortium consists of 34 European partners: 9 city councils, 5 universities, 4 research centers, 4 clusters and foundations, 4 rental housing administrators, 4 SMEs, 3 energy companies, 1 construction firm [9]. The scope of the project, number of involved countries, actors and stakeholders points out the importance of the interdisciplinary approach with aim of collaboration and knowledge transfer regarding the mitigation of climate change. Spectra Centre of Excellence at the Slovak University of Technology operates as a supporting institution for the City of Trencin, that is involved in the project as a follower city. The MAKING-CITY project is based on the results of many research projects as well as the experience of realised "best practice" projects and aims at a new combination of proved (sectoral) solutions supplemented by developing new solutions to design sustainable spatial development patterns and its improvement with direct participation of all relevant actors.

The technical guidelines for PED as a part of Making City project provide a standardized concept valid to be the core of specific urban energy transitions planning processes and are being created taking into account the constraints of the fellow cities underlining main needs in terms of energy and land use planning in principle. The objective is to empower replicability, scalability, and sustainability of PEDs, taking into account the city needs and priorities, on-site resource availability, Making City PED solutions (demand side solutions as low consumption in buildings, improving energy efficiency by energy management in buildings and districts, supply side solutions as alternative energy resources and integrated infrastructures as large storage, heat pumps, district heating, etc.) and their business models through a decision-making journey emphasizing citizen engagement [8].

PED Methodology focuses on the procedure considering the identification process of the PED concept boundary and selection of proper PED solutions specific and appropriate to the cities. It is composed of the phases encompassing a decision-making route that underlines citizen engagement throughout this process. The procedure aims to understand what the city is looking for, described as state of play in cities for figuring out the priorities, objectives and needs of the cities. Therefore, the main goal is the creation of a specific plan/design/guideline for each city that may reach, understand and try to follow the phases of the methodology and find out its needs, vision and objectives [10].

4. Case study of the city of Trencin

4.1. General overview of the city
Trencin is a city in western Slovakia lying in the valley of the river Vah about 120 kilometres north of the Slovak capital city Bratislava. Trencin is an old historical city with a population about 54,916 (31-12-2018). Trencin is an administrative and business centre of The Self-Governing Region of Trencin.

The city of Trencin is now one of the most important towns of Slovakia with varied cultural and social life and university. Among the events that attract visitors to Trencin is the summer pop-music festival Pohoda and various international exhibitions.

Trencin with 81.99 km2 and a density of 669 inhabitants/km2 could be characterized as the city with middle level of urban density because of large areas of greenery (forest park Brezina, River Vah banks), historical monument (area of the castle) located in the city centre and rural character of some parts of the city.
Trencin belongs together with Nitra and Bratislava, the three oldest cities in Slovakia, which chronicles mentioned already in the 11th XXI century. Its key strategic location near three Carpathian Mountain passes at the crossroads of trade routes it always did a significant foothold and administrative centre.

At the turn of our era, the Celts pushed Germanic tribes arriving in the territory of Western Slovakia in the north and west. The most famous of them were Quadi, who along with Marcomanni, inhabit the neighbouring southern Moravia, often led the fight against legions of the Roman Empire. The most significant clash of two opponents at the time was called Marcomanni wars when the victorious II. Auxiliary legion was given up in Trencin, wherein the turn of 179-80 wintered. Symbol of this era is the text written to the castle rock celebrating the victory of the Roman soldiers.

The main highlight of the city and surrounding region is Trencin Castle, a dominant feature of the city of Trencin and the entire region of Považie. Together with Spiš Castle and Devin Castle, Trencin Castle belongs to the most extensive castles in Europe.

Since ancient times, the castle has guarded trade routes connecting the region of Northern Ugria and mining towns of Central Slovakia with Bohemia, Moravia, Silesia and Poland. History of the castle dates back to the 11th XXI century when it consisted of residential tower and rotunda, remains of which can be seen in the upper courtyard.

Greenery and nature-based surrounding of the city is one of the main features of genius loci of the city. In the city centre, there is one of the biggest forest parks in central Europe called Forest park Brezina. Now, the forest park has an area of 212.68 hectares. Tree species composition consists of beech, hornbeam, maple, elm, spruce, pine and larch. Forest complex in close proximity to the town centre is rare, in particular by providing the people of the city ideal conditions for mental and physical relaxation.

Significant highlight forming the structure of the city is River Váh streaming directly through the central part of the city. River Váh is the longest river in the country and is important not only for quality of the life in the city but the system of dams with hydropower plans is crucial infrastructure for production clear electricity for the water. One of these hydropower plans is located in the city.

Trencin is not only administrative and business centre of the region but also the centre of music, because Pohoda takes place in Trencin during the summer. The Pohoda fest is one of the most famous open-air fest in Central Europe and in TOP 10 fest in Europe, with more than 30,000 visitors/per day. Pohoda is a music and arts festival with international acclaim, where alternative, indie, electronica, world music & punk meet classical; alongside literature, dance, visual art, film and theatre.

Area of the city is located at level 204-210 meters above sea. Trencin is located in the western part of Slovakia. Trenčianska plane basin, which bends down along the river Váh, concluded in the east mountain ranges Považský Inovec and Strážovské hills to the west foothills of the White Carpathians.

4.2 Energy & Environment characterization

Energy characteristic of the city is strongly affected by the lack of data at local and also regional level. There is no validated source of information about energy consumption in the city, the energy sources, GHC emissions etc. The city of Trencin hasn’t got any official data sets providing this kind of information.

Only relevant and validated source of data is data sets from state agency the Slovak innovation and energy agency covering only national level. So, we are not able to catch local specifics and setups via exact data about energy. Final energy consumption per capita in Trencin can be only derived from
national data. The last update of data was made in 2016, so we applied annual increase of consumption in average ratio 2% per year. So, based on this approach final energy consumption per capita in the city in the year 2018 is 19.25 MWh with respective division according to the sources in next Figure 62.

According to the national regulation, local energy sources provided energy only for specific territory are not installed. Also, the indented local energy GRID does not exist, so all sources of energy (without small solar and heating systems providing energy for specific building) are connected to the main distribution system.

Heating of private houses in the city are mainly provided by heating systems using natural gas, renewable sources (biomass, heat pumps) are using in were low scale. In the 2 main housing neighbourhoods in Trencin (Sihot' and Juh) the central heating system is used using natural gas or biomass as primary sources of the energy. But there is a trend of disconnecting separate flats or whole buildings from the central heating system and installation own heating system in flats or for wholeentire buildings.

Waste management in the city is focused on increasing of recycling rate in the city. The trend from last 3 years is positive and the recycling rate was 40% from whole amount of solid waste in the year of 2018. But there is a big gap and also potential in using the waste as a commodity for heating systems. The capacity of the city using waste energy source is limited by finance but mainly by state regulation. There is no appropriate legislation and supporting mechanism to increase using the waste of commodity for energy production.

The ambitions of the city of Trencin in energy field are framed by the ambitions and implementation of respective strategies at the state level. In this context, no building will be newly introduced into the use without fulfilling the parameters of energy passive house (A0) by 2030.

The city of Trencin has got only indirect goals related to the energy transition, right now. Also, there is a lack of strategic planning documents dealing with the topic of energy/energy consumption.

In topics related to the energy the strongest attention is taking on climate change adaption of the city through activities dealing with development and quality increasing of green and blue infrastructure in urban area. A new strategy for climate change adaptation at the local level is in the process of development. The final draft of strategy will be finalized in October 2019. In November 2019 will be strategy reviewed by municipal Committee of environmental affairs, transportation, investments and spatial planning. The strategy will be related to local specifics of city of Trencin and also will be linked to the national strategy: Strategy of climate change adaptation of Slovak republic (last update 2018).

4.3. Mobility characterization
Mobility in the city of Trencin could be reflected through the following specifics:
• The compact urban structure of the city providing an advantage for sustainable forms of mobility: walk, bicycle.
• Competence fragmentation in the development and maintenance of transport infrastructure (state/regional municipality/city).
• Absence of sectoral planning documents/strategies dealing with mobility in the city except for cyclo-mobility.

Mobility is an important aspect of the city in the planning of future development. All relevant forms of mobility are available within the area of the city and relevant infrastructure is well established including the infrastructure of TEN-T network. There is highway (D1) passing through cadaster of the city, the first-class road is cutting the city through the city centre together with highspeed railway
corridor. This is on one side a high potential of the city (good connection to high-speed transport infrastructure in the city centre) on another side, the localization of transport infrastructure is the important limit for further development in the central part of the city.

The civil airport is also available in the city but without regular connections and operator for the public transport services. The river Vah is potentially corridor for water transportation but in the current situation is used only for sport and leisure activities.

The city of Trenčín concentrate activities in the field of mobility in the last years to the following:
- Parking policy in the city
- Cyclo-infrastructure development
- Sectoral planning documents/strategies

Parking policy – regulation of parking in the whole area of the city. The City of Trenčín prepared and implementing new parking policy in the city. The main focus of the policy is on regulation of the cars amount passing and parking in the centre of the city and the residential neighbourhoods, on support of the change of mobility behaviour of inhabitants but also visitors of the city. The motivation tools for electromobility should be implemented as a part of the regulation. New parking regulation policy has been implemented in central parts of the city (downtown, historical centre, and some neighbourhood areas) in the year 2019. Next year, the regulation policy will be spreading to other neighbourhood areas to cover areas were majority of inhabitants are living.

Cyclo-infrastructure development – Supporting activities leading to change in community behaviour – using bicycles instead of cars. Plan for cyclo mobility development (cyklo generel) was created in 2016, where main cycle routes were defined. Based on this, city started building the main cycle routes within the core area of the city and interconnections to areas with the highest density of inhabitants. Currently, there are more than 30km of cyclo-routes newly built or marked on existing route network within the city.

Sectoral planning documents/strategies - New plan of sustainable mobility. The city is preparing crucial mobility strategy document – new plan of sustainable mobility covering the whole aspect of mobility within the city. Currently, we are in the process of elaboration and expected time of finalisation is year 2021.

Because of the absence of sectoral planning documents there a lack of validated data about transport flows and shares of different forms of transportation in the city.

4.4. Governance characterization
The city of Trenčín is a regional centre covering business, culture, sport and services. Region of the Trenčín is one of the most developed regions in Slovakia, close to the average of the EU. The previous industry activities in the city are continuously changed by services and industry with high added value. The economic growth of the region and especially of the city is reflected in the rate of unemployment that is one of the lowest in SR. Currently, rate is approx. 2%. But this situation is jeopardised by the structure of job position which are in high risks because of sensibility on automatization/robotization in industry activities. The regions lying in the Western part of Slovakia (including Trenčín) are the riskiest regions in whole EU potentially affected by continuous robotization especially in automotive industry.

Governance of the city could be characterized as open and participative. The city of Trenčín has got an existing vision of the city development up to 2040: “City of Trenčín the leader in the region and the most attractive regional centre based on the quality of life, knowledge-based economy, housing, tourism and opportunities for young and seniors”. The main quality of the vision is included in the integrative cross-sectoral character of development processes as well as activities of different stakeholders not only
public sector. The vision of the city of Trenčin should be lighthouse for the whole region and should be a clear vision not only for the city but also for stakeholders which are an important part in development processes.

Integrative participative planning approach is a crucial aspect leading to reach the vision of the city and is one of the Smart City principles which are implemented in the city governance. The city of Trenčin is one of the lighthouse cities in Slovakia covering smart city not only as the implementation of the newest technologies but also through smart, participative planning approach to the development of the city. Currently, 22 external experts preparing Smart Concept for the city as a base for an upgrade of the main socio-economic strategy of the city. The concept covering 10 main areas of interest:

• Area 1 - Smart city and Smart region
• Area 2 - Smart Innovative Management
• Area 3 - Smart Economy
• Area 4 - Smart health and social services
• Area 5 - Smart energy and smart buildings
• Area 6 - Smart Public Infrastructure and Transport
• Area 7 - Smart solutions in the area of population supply, circular economy and environmental infrastructure
• Area 8 - Smart education
• Area 9 - Data availability and use for smart decision-making and management
• Area 10 - Smart financing concepts.

The governance structure of the City of Trencin includes the self-governmental structure and city administration. The self-governmental structure is more integrative the mayor, the city parliament have got the decision-making power and is focused more on strategic decisions. The self-governmental mechanism consists of a mayor and 25 council members. All of them are voted directly by citizens. The current election term is November 2018 - November 2022. The city council has 7 committees – financial, mobility zoning and environment, schools, youth and sports, social and public safety, cultural and tourism. The self-governing body has the most important role of voting over the budget, voting on local laws and zoning core, buying and selling of land and buildings. Moreover, it has oversight power over the executive branch which consists of the mayor and the city hall administration. Since the council people are politicians they take on political stands in long term decisions and leadership.

4.5. Society & Citizens characterization

Society characterization is strongly affected through main socio-demographic trends in the city which are:

• The total number of inhabitants is continuously decreasing to current number: 54 916 and this trend without intensive intervention should continuous.
• The main reason for decreasing of inhabitants is strong process of suburbanisation in the city, where inhabitants moving to surround villages but still using the services in the city. This negatively affects the economy of the city and it’s one of the most urgent threats.
• The average age of the population is around 41,5 year and the trend is negative.
• Inhabitants of the city are well identified with genius loci of the city and participation of inhabitants on development planning is higher than in the surrounding region.

Citizens of the city are very sensitive on topics dealing with green infrastructure, natural environment in the city, quality of the greenery and topics of environmental protection.

The city of Trencin is a pioneer in using a broad participatory approach in all strategic or conceptual documents development processes. It’s something like standard that wide range of relevant stakeholders are involved in specific phases of strategy preparation and also in the implementation of relevant actions
related to the strategy of concept. Also, participation processes are secured through strategic environmental assessment or environmental impact assessment (later SEA, EIA) which is binding according to the law.

The city of Trencin was a leader in the biggest and longest participatory project in Slovakia - Trencin is you. The main objective of the initiative was active involvement of the public for the final shape design of the embankment in Trencin and initiating the dialogue with the public through opened communication. A first significant stage of transformation and development of the embankment was a planned ideological urbanistic competition in 2014, whose goal was to show possible forms and ideas of central city zone development in connection with historic city zone. The initiative was aimed at this step with clear objective to create competition assignment which would reflect public requirements on this space. The initial discussion on impact of the railway on connection of the city centre and the embankment took place in January 2012 counting about 200 citizens involved. The whole effort culminated in May 2014 by evaluation of international idealistic urbanistic competition -- Trencin city on the river and following presentation of the results in October 2014. The results of the completion are the background for creation of new zonal land use plan for riverside area, which can be now defined as brownfield area.

4.6. Society & Citizens characterization
Within this section, the main information of the existing plans that the city of Trencin has identified is included (Table 1-3).

**Table 1.** Trencin Short Term plans

| Plan | Scope | Description | Topics covered |
|------|-------|-------------|----------------|
| Programme of Social and Economic development of the city of Trencin (with a vision to 2040) | Local | The plan is the main strategic socio-economic development plan of the city. It covered a wide portfolio of the topics related to urban development in the city. The program provides framework for further implementation action plans in respective sectors (transportation, energy, social services etc.). | Mobility Social Energy |
| Programme of Social and Economic development of the Self-Governing Region of Trencin | Regional | The plan is the main strategic socio-economic development plan of the region. It covered a wide portfolio of the topics related to urban development in the region with special focus on competencies related to the region (secondary education, healthcare, social insurance, mobility (roads of 2nd and 3rd class). | Energy Social Mobility |
| Sustainable Energy Action Plan (SEAP) – The Self-Governing Region of Trencin | Regional | SEAP is the key document defining the energy policies of the self-governing region for the next 7 years in order to increase energy efficiency in properties owned by the region (high schools, social services, self-governing region offices, health services, hospitals, etc.). The Sustainable Energy Action Plan (SEAP) developed in 2013 and updated in 2015, is the key document defining the energy policies of the self-governing region for the next 7 years in order to reduce CO₂ emissions. This plan includes a number of measures in the short aimed to increase the energy efficiency of public buildings and rational use and management of energy. | Energy |
The Energy Policy of the Slovak Republic (Energy Policy) is the strategic document defining the energy sector's primary objectives and priorities to 2035 with a view to 2050. The Energy Policy is a component of Slovakia's national economic strategy given that ensuring sustainable economic growth is conditioned by the reliable supply of affordable energy. The Ministry of Economy of the Slovak Republic (Ministry of Economy) is responsible for completing the Energy Policy for a minimum period of 20 years and updating it on a five-year cycle. The Policy defines more principles and possible approaches to the topic than specific actions.

Table 2. Trencin Medium Term plans

| Plan | Scope       | Description                                                                                                                                                                                                 |
|------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Strategy for climate change adaption (in progress) | Local | The city is preparing crucial climate change adaptation strategy – Strategy for Climate Change Adaptation at the local level defining approaches, measures and tools using for facing of challenges resulting from climate change in the city of Trencin. Currently, we are in the process of elaboration and expected time of finalisation is next year (2020). |

Table 3. Trencin targets aligned with the European ones

| EU target | Plan in which is included | Is the target achieved? | Is there a more ambitious one? |
|-----------|---------------------------|------------------------|--------------------------------|
| 75% population aged 20-64 employed | Programme of Social and Economic development of the city of Trencin | YES | |
| 3% of GDP invested in R&D sector | Programme of Social and Economic development of the city of Trencin | NO | |
| Reduction 20% of GHG emissions | Programme of Social and Economic development of the city of Trencin | NO | |
| Increasing 20% of share of RES | Programme of Social and Economic development of the city of Trencin | NO | |
| Improved 20% energy efficiency | Programme of Social and Economic development of the city of Trencin | NO | |
| Early school leavers’ share reduced under 10% | Programme of Social and Economic development of the city of Trencin | YES | |
| 40% of 30-40 years old with tertiary education | Programme of Social and Economic development of the city of Trencin | YES | |

The main targets for future development of the city are formulated in the main socio-economic strategy “Program of social and economic development of the city of Trencin for years 2016-2022 with a vision to 2040”. The vision of the city is defined as: City of Trencin the leader in the region. The main goal going through all sectors of urban development is increasing number of inhabitants from approx.
55,000 to 80,000 in the year of 2040. The crucial quality following by the implementation of the strategy is quality of life of inhabitants of the city.

The strategy and the targets included are linked to main strategic planning documents related to the socio-economic development at the regional and national level. Thank to this linkage, the most of the EU targets defined at European level are covered by the “Programme of Social and Economic development of the city of Trencin for years 2016 - 2022 with a vision to 2040”. Through the implementation of the strategy, Trencin is supporting (more indirect) the fulfilling of the EU targets.

Sub-targets defined in the ‘Programme of Social and Economic development of the city of Trencin for years 2016 - 2022 with a vision to 2040’ can be cumulated to the following main targets:
- Increasing the number of inhabitants.
- Sustainable mobility transition: Sustainable mobility transition plan in the city of Trencin is focused on changing the mobility flows within the city via increasing of cycle mobility instead of individual car mobility. Sustainable mobility should support decreasing of CO2 emissions from transport, decreasing of other emissions (main focus is on PM emissions), decreasing of fossil fuel use for mobility purpose.
- Climate change adaptation: The city is aware of challenges resulting from climate change, so quantitative and qualitative developments of green and blue infrastructure in the organism of the city are important tasks for the development of the city. It’s crucial for reaching a higher quality of life, but also for fulfilling goals under energy transition of the city. Green infrastructure represents an important element in puzzle of energy transition path. But based on prepared project and action we could define also another target, which is not included in current version of the strategy.
- Smart energy: Trencin has got a strong motivation to change their own energy consumption mix following the goals to increase the use of local renewable energy sources, starting with CO2 emissions decline to CO2 positive solutions in the city. Currently, city focuses activities to the real estate owned by the city. Activities covering this approach are energy audit of buildings owned by the city, refurbishment of building through GES (guarantee energy services), smart energy metering and management.

5. Conclusions
This paper was discussing the innovative approach to increasing energy efficiency in cities focusing on the whole districts as opposed to individual building in accordance with the Horizon 2020 Making City project. The project in its next phase will create specific strategy for Trencin as the ‘follower city’ of the project where the innovative solutions will be tested and this way the concept of PED will be tested and refined to become ready to be deployed on global scale.

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