

The Potential of Subsidy Schemes to the Support of Wooden Houses Construction in the Context of the Green Economy

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Abstract—The purpose of this paper is to analyze prepared frameworks of grant schemes that could help to increase the market share of the timber sector in Slovakia in the context of the requirements of sustainable development and the green economy. This paper analyzes and compares the three available grant schemes with the analytical procedure. At the same time, this paper presents partial results of the survey of conditions of fulfillment and interest for state subsidy from the perspective of producers of wooden houses in Slovakia. The results show that public interest in subsidy is considerable, but with certain risk factors for its successful implementation.

Keywords—subsidy, wooden houses, energy performance of building, renewable energy source

I. INTRODUCTION

In the context of achieving economic growth, the company is aware of the importance of protecting the environment and global resources. Based on the knowledge that uncontrollable growth in a resource environment is unsustainable, in 1987, in the document "Our Common Future", the concept of sustainable development was formally defined for the first time. According to the Environmental Act no. 17/1992 defines sustainable development in the conditions of the Slovak Republic as a development enabling present and future generations to preserve the possibility of satisfying basic living needs while preserving the diversity of nature and natural functions of ecosystems [1]. Recognizing the interdependence between economic growth, the living standard of the population and the quality of the environment and the lack of resources of natural resources, was to reason of the emergence a new green economy concept. According to United Nations Organization definition the green economy is an economy that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. It can be seen as a means to achieve a resilient economy that provides a better quality of life for all within the ecological limits of the planet [2]. If the Slovak Republic wants to become a modern and "green" society, it must also set goals that will enable it to reduce energy consumption, reduce greenhouse gas production and increase the share of energy from renewable sources. The forestry-wood sector is the strategic area that has the prerequisites for achieving these goals. At present time, this sector is facing many problems. One of them is the low demand for wood products. A step towards increasing

demand could be indirect government support, favoring the use of wood over other materials. The National Program for Utilizing the Wood Potential of the Slovak Republic in 2013 presented the goal of improving domestic demand for wood products in line with the principles of the green economy. One of the ways to achieve this goal was to support the construction of the green buildings. Buildings that are effective in using energy, natural and social resources and environmentally friendly throughout their life cycle [3], [4].

If we want to talk about "green buildings", the efficient use of energy is just one of the assumptions. A basic prerequisite is the choice of used construction materials. Preferred and supported should be those materials that meet the requirements of environmental, renewable and sustainability. Wood as a material has a high potential to become a material of the future. The reason for the support of wood is its almost wasteless processing and relatively simple disposal due to its natural character. After the end of its life, wood and its products can be recycled and reused. Timber, as one of few building materials, has a positive CO₂ score, meaning that during the growth phase, wood absorbs more CO₂ than is released during its preparation and use in actual building processes. Due to this fact, wood as a renewable resource will play an extremely important role in the business sector. This issue has been addressed in the studies of Pásztor et al. [5] and Gustavsson et al. [6]. This fact should also be taken into account in the construction of family houses. At present at the conditions of the Slovak Republic, the construction of a wood-based houses is only approx. 10% share of total construction. Compared to the options available to the Slovak Republic, this share is still very low.

The aim of this paper is to assess the framework of prepared subsidy schemes that could help to increase the market share of the wooden houses sector in Slovakia in the context of the requirements of sustainable development and the green economy. The secondary objective of this paper is to present partial results of the survey of conditions of fulfillment and interest in the state subsidy.

II. MATERIALS AND METHODS

One of the motivational tools that can support the energy-saving and ecological construction of family houses in Slovakia is a form of state support. Under the conditions

of the Slovak Republic, the following 3 grant programs were considered for the analysis of available options:

- a) The first grant program was prepared by the Ministry of Transport and Construction of the Slovak Republic. This is a draft amendment to the Act on the Energy Performance of Buildings no. 555/2005 through which the ministry wants to support the construction of houses with almost zero energy consumption. The draft amendment was approved by the Government of the Slovak Republic 9.1. 2019. The effectiveness of the amendment should gain since May 2019. For the purpose of the subsidy in 2019 under the subprogram Construction and Restoration of the Residential Fund, it was earmarked 40 million € [7].
- b) The second grant program was prepared by the Ministry of Agriculture and Rural Development of the Slovak Republic still in 2017. This is a draft decree on providing support for the development of forestry and the recovery of raw wood in the Slovak Republic, which should support the construction of low energy-consumption wooden houses. The draft decree is currently in the process of approval. Total has been earmarked to the support 1 million € [8].
- c) The third grant program was prepared by the Ministry of Environment of the Slovak Republic within the Operational Program Quality of the Environment. This is a national project called Green Households, which can provide subsidies for the use of small renewable energy sources. The pilot program was launched in the period 2015-2018. For the period 2019-2023 was approved by its sequel. Overall 420 million € is allocated to the Green House project until 2023 [9].

In the context of the second grant scheme, a targeted questionnaire survey was conducted in 2018 (April-May). The object of the survey and target group was producers of wooden houses in the Slovak Republic. The research object was the potential of state support for financing of wooden houses. The questionnaire survey was aimed at identifying and analyzing the interest in using the state subsidy for the construction of low-energy family house. The partial objective of the survey was to assess the possibility of fulfilling the specific criteria of the required grant conditions with risk areas.

Through the questionnaire, a total of 117 companies in the Slovak Republic dealing with the construction of wooden houses were addressed. The data available is a total of more than 90% of the producers providing services in Slovakia. The questionnaire was distributed by e-mail in April-May 2018. Total of 43 companies were involved in our survey, representing 36.75% of all addressed companies. We consider this sample to be sufficient. Because we have been able to get answers from representatives of companies that, based on previous survey results, account for up to 80% of the market share in this segment.

III. RESULTS AND DISCUSSION

In order to assess the framework of subsidy schemes that could help to increase the market share of wooden houses constructions in the Slovak Republic, we used the method of analyzing defined conditions based on their publication by supporting web portals. The first requirement for applying for a state subsidy supporting the construction of a family house is the fulfillment of the basic requirements presented in Table 1.

TABLE I. BASIC REQUIREMENT FOR SUBSIDY

	Draft amendment to the Act No 555/2005 on Energy Performance of Buildings	Draft regulation to the provide support for development of forestry and the recovery of raw wood in Slovakia
Construction type	without specification	wooden house
Energy class	A0	A0 – A1
Total floor space	≤ 200 m ²	≥ 75 m ²
Number of living rooms	without specification	min. 3
Procurement price	without specification	≥ 65 000 €
	including VAT	without VAT
Finalization type	without specification	complete house
Approval	≥ 31.12. 2014	≥ 1.10. 2017

Source: Authors

Amount of the subsidy provided in the context of reviewing the documents is quite different. According to the draft amendment No. 555/2005 may provide a subsidy of 40% of eligible costs and paid a maximum amount of 8,000 €. The amount of the subsidy granted will depend on the achieved value of the coefficient of heat transfer of the building structures and on the achieved value of heat demand for the heating of the family house within the energy class A0 - according to the global indicator, primary energy; $A0 \leq 54 \text{ kWh} / (\text{m}^2\text{a})$ [10]. According to the draft Decree on the granting of support for the development of forestry and the recovery of raw wood in the Slovak Republic, the parameters that influence the development of forestry as well as the development of the less developed regions of Slovakia. The basis of the subsidy is the amount dependent on the inclusion of the construction into the energy class A0 or A1 and the location of the new building due to the distance of the capital city of Slovakia. The maximum base amount of the grant is 6,000 €. This amount can be increased by € 2,000 in three cases (I-III). The individual types of increase are specified in Table 2.

As of January 1, 2021, all buildings will have to meet a nearly zero energy requirement according to the forthcoming legislation. Achieving this standard is not possible without a renewable energy source. Under the Green House Project, applicants may apply for a maximum grant of € 3,700 depending on the energy source (Table 3). It should be noted that this form of aid is not in contradiction with other valid subsidy schemes and can be considered as an additional subsidy for the construction of a family house. Terms of support for the selected renewable energy source (RES) – photovoltaic panels, solar collectors, heat pumps, biomass boilers and wind turbines presents a Table 3.

TABLE II. AMOUNT OF THE PROVIDED SUPPORT FOR THE SUPPLICANT

		Draft regulation to the provide support for development of forestry and the recovery of raw wood in Slovakia	Draft amendment to the Act No 555/2005 on Energy Performance of Buildings
Energy class A0	a	6 000 €	≤ 8 000 €
	b	4 000 €	
Energy class A1	a	5 000 €	not apply
	b	3 000 €	
Increase I		2 000 €	not apply
Increase II		2 000 €	not apply
Increase III		2 000 €	not apply
Highest subsidy		12 000 €	8 000 €
a – house build outside the capital city of the Slovak Republic b – house build on the territory of the capital city of the Slovak Republic I – if the house is in the village in less developed district II – at least 70% of the wooden construction products from which the house is made is made of wood that comes from sustainably managed forests for which a PEFC or FSC certificate has been issued III - at least 50% of the wooden construction products from which the house is constructed are made of wood coming from forests of the Slovak Republic			

Source: Authors

TABLE III. GREEN FOR HOUSEHOLDS – SUPPORT FOR FAMILY HOUSES

Source of energy	Type	Amount of subsidy per 1 kW of installed power	Highest amount of granted subsidy
Photovoltaic solar panel	(≤ 1 kW)	1 000 € + bonus for the accumulation of electricity (180 €/kW)	1 000 € 900 €
	(> 1 kW)	1 000 € (≤ 1 kW) + 900 € (> 1 kW) + bonus for the accumulation of electricity (180 €/kW)	2 450 € 900 €
Solar panel	-	500 €/kW	1 750 €
Heat pump	-	370 €/kW	3 700 €
Biomass boilers	-	100 €/kW	1 500 €
Wind turbine	(≤ 1 kW)	1 500 € + bonus for the accumulation of electricity (180 €/kW)	1 500 € 1 575 €
	(> 1 kW)	1 500 € (≤ 1 kW) + 1 000 € (> 1 kW) + bonus for the accumulation of electricity (180 €/kW)	3 000 € 1 575 €

Source: Authors

Basic information about the survey, producers of wooden houses presents Table 4. It is clear from the results that the public interest in subsidy is considerable. However, the whole process of legislative preparation and commenting on documents is very tedious. The whole process has lasted for more than a year under ever-changing circumstances.

As a risk factor for the provision of the subsidy is shown especially the share of realization complete house (44.19%), which eliminates more than 50% of potential applicants for subsidy. Also, the risk factor of the availability of subsidies is too low the proportion of preferred construction systems of state subsidy conditions (solid wood construction, combined construction, traditional log construction), compared to the most used system in practice (timber frame and panel system construction). This is a relatively

significant risk factor of the practical applicability of this grant scheme.

TABLE IV. GENERAL INFORMATION OF THE SURVEY OF PRODUCERS WOODEN HOUSES

	The number of surveyed companies	Responded	Not responded
	117	43 (36.75%)	74 (63.25%)
Interest in state subsidy		Lack of interest in state subsidy	Without opinion
	42	0	1
<i>Preferred type of construction of wooden house</i>			
Timber frame construction	24 (55.81%)		
Panel system construction	16 (37.21%)		
Solid wood construction	1 (2.33%)		
Combined construction	1 (2.33%)		
Traditional log construction	5 (11.63%)		
<i>The most common type of finalization of the contract</i>			
House with walls and roof construction	4 (9.52%)		
House without fixture	19 (44.19%)		
Complete house	19 (44.19%)		

Source: [11]

Other risk factors appear to the subsidy conditions that could increase the subsidy:

- Support will increase by € 2 000, if the applicant proves by the declaration of the contractor that at least 50% of the wooden construction products from which the house is constructed are made of wood coming from forests of the Slovak Republic.
- Support will increase by € 2 000, if the applicant proves by a declaration of the contractor that at least 70% of the wooden construction products from which the house is made is made of wood that comes from sustainably managed forests for which a PEFC or FSC certificate has been issued.

Survey results show, that only 14.63% of enterprises declare that the share of those producers who, in more than 50% of cases, of the wooden construction products from which the house is constructed are made of wood coming from forests of the Slovak Republic (Fig. 1.).

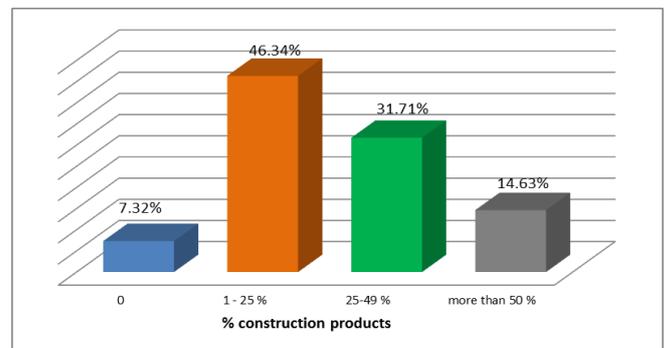


Fig. 1. Share of wooden construction products made from wood of Slovak forests. (source: authors)

Here is the fact that Slovak companies import most of the components for the construction of a wooden house from abroad and there is no use and appreciation of domestic wood raw material. We state our opinion as a problematic point in the forthcoming decree. Also, the required proportion of more than 70% of the wooden construction products from which the house is made is made of wood that comes from sustainably managed forests, is only about 27% of respondents (Fig. 2.).

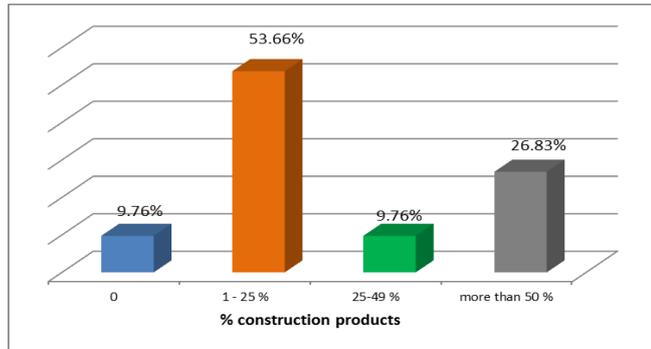


Fig. 2. Share of wooden constructions products made from wood with certificate marks PEFC/FSC. (source: authors)

IV. CONCLUSION

The demand and social need for environmental protection is currently a challenge that is associated with many areas of life. In the field of construction industry, one of them is also the future energy consumption for the operation of buildings, but also the energy needed to produce the structural elements. In accordance with the principles of green economy comes to the fore the concept of green buildings. These are buildings that use environmentally friendly and less energy-efficient building materials in their construction. At the same time, they provide the required energy standard with the use of a certain type of renewable energy source. Such an approach by the state requires targeted support and coordination within the grant schemes (Fig. 3.).

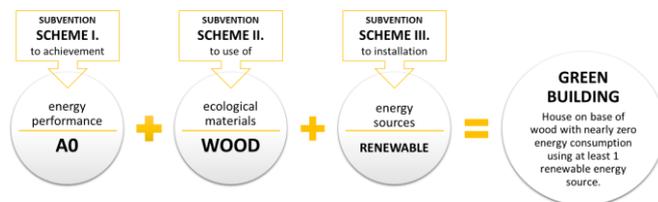


Fig. 3. Subsidies concept with aim to support green buildings on base of wood. (source: authors)

This concept, supported by the required energy standard, the use of renewable and environmentally friendly wood-based materials and also available renewable energy sources is the right solution in our conditions to meet the requirements of sustainable development and the principles of the green economy.

The Ministry of Agriculture and Rural Development of the Slovak Republic presented in 2017 a draft decree aimed

at supporting the construction of wooden family houses meeting the requirement of a high standard of sustainability in the use of resources. This decree is still in the process of approval, and at this point it is not clear whether it will be approved. A possible reason is the wrong setting conditions, which revealed the results of our survey.

The Government of the Slovak Republic has recently approved (January 2019) draft amendment to the Act No. 555/2005 Z. z., which will allow to apply for a subsidy for the construction of a new family house [7]. The only condition is to achieve energy class A0 with almost zero energy consumption. As of January 1, 2021, all new buildings will have to meet this energy standard [12]. As the study of the European Union has shown *Study on the Energy Savings Potentials in EU Member States, Candidate Countries and EEA Countries* [13], the construction of new passive houses can make a significant contribution to reducing energy consumption. To make energy more efficient, households can also contribute to the use of renewable energy source. Within the framework of the Operational Program Quality of the Environment, in 2019, under the conditions of Slovakia, the project Green Households was launched. Through this project, households may apply for a subsidy for the installation of small equipment for the use of renewable energy.

Our recommendation may be presented as a clear support for subsidies schemes for the energy performance of buildings and renewable energy sources, but with the modification of the conditions for the support of wooden houses construction. However, this support requires an increase in the amount of financial resources allocated to support, but also the setting of the conditions that are most used in practice. In particular conditions the most common type of finalization of the contract, prioritize to the most preferred construction systems as well as systematically addressing the support and use of domestic timber inputs. Increase market share and production of wooden buildings will have certainly a positive impact on the environment. The given issue may be learned in studies Asdrubali et al. [14], Pajchrowskin et al. [15] and Wang et al. [16]. An important prerequisite for utilizing the potential of the wooden houses construction sector is also the increase in the share of the use of the domestic raw material base, which can become an additional criterion for increasing the subsidy schemes. The raw material base in Slovakia has its structure and price development. This issue is addressed in the studies of Gejdoš and Danihelová [17] and Suchomel et al. [18].

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