Green Public Procurement in Poland – criteria for Thermal Insulation products

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Summary

The article is focused on the important issue of most suitable selection of procurement regarding Green Public Procurement (GPP) on the example of the thermal insulation products. Increasing demand on ecological goods, service or work causes that 'green' market is growing stronger especially in construction sector. Environmental friendly technology is becoming important element of everyday life and now it starts to exceed from single households to public authorities, which are major consumers. Their need of purchasing sustainable goods or services caused formation of GPP, a voluntary instrument which has a key role to become more resource-efficient. Due to this growing demand Building Research Institute (ITB) in cooperation with Thermal Insulation Producers Association and Ministry of Economy developed the ecological criteria for thermal insulation products. Document partly took into account GPP Thermal Insulation Technical Background Report prepared by AEA Group for European Commission (Harwell, June 2010), but is mainly based on national law and requirements. Elaborated criteria for thermal insulation products, depending on their application and material that are made from, are focused on the key environmental impacts, including: energy consumption in manufacturing and transportation, pollution of air, water and soil due to the use of hazardous substances (e.g. blowing agents, fire retardants) and promotion of easily recycled materials. What is important for GPP approach the national ecological criteria take into consideration Life Cycle Assessment (LCA). The document consists of main criteria, which need to be fulfilled and secondary criteria – additional issues, which are regarded as an advantage. This document will help local and public authorities to purchase the most environmentally friendly thermal insulation products.
Keywords: GPP, thermal insulation, sustainable goods, Life Cycle Assessment, public authority.

1. Introduction

Green Public Procurement (GPP) draws policy that sets standards for public authorities in selection of procured goods or service, which minimize their negative impact on environment and which take into account Life Cycle Cost and Life Cycle Assessment. On that basis GPP is influencing development of innovative, ecological and pro-environmental technologies.
In 2004 two directives aiming to clarify, simplify and modernize existing public procurement European legislation were adopted. First - 2004/18/EC Directive that covers public works contracts, public supply contracts and public service contracts and second - 2004/17/EC, which covers the procurement procedures of entities operating in the water, energy, transport and postal services sectors. The Directives set the possibility of including environmental considerations in the contract award process, what allows the authorities to contribute to the protection of the environment and the promotion of sustainable development, whilst ensuring the possibility of obtaining the best value for money for their contracts.
The European Commission activity aiming to estimate common GPP criteria resulted in 2008

issuing first set of environmental criteria. The 10 products and service groups covered, including construction materials, have been identified as priority groups that are most suitable for “greening” using GPP. Key, selected features, which are significant for GPP approach in construction materials, are:

- organic and natural origin,
- energetic performance,
- indoor air quality,
- low embodied energy,
- ability of reuse,
- recycled content,
- dangerous substances reduction,
- waste reduction,
- rainfall water use,
- renewable energy source,
- effective water use,
- water recycling and reuse.

Second set of GPP criteria was released in July 2010. The package included environmental criteria for: windows, glazed doors and skylights, wall panels, hard-floor coverings, combine heat and power, road construction and traffic signs, street lightning and traffic signals, mobile phones and thermal insulation.

Thermal Insulation is a product group, that was taken first into consideration to prepare environmental criteria for Green Public Procurement in Poland. Ministry of Economy of Poland in cooperation with Public Procurement Office, industry represented by Thermal Insulation Producers Association and research institutes - Building Research Institute (ITB), on the basis of criteria developed by the European Commission, developed national criteria for “green procurement” for thermal insulation materials. ITB plays fundamental role in these works. On the basis of background information [1] developed by European Commission and European GPP, Building Research Institute had to estimate national criteria in reference with polish regulation acts and in compliance with Essential Requirements of Directive 89/106/EC. Draft of these polish criteria was consulted with Thermal Insulation Producers Association and know it will be sent for public verification.

Estimated criteria for thermal insulation procurement process include the most important environmental factors such as: energy consumption in the building as a result of less efficient insulation, energy consumption, especially in manufacturing and transportation, pollution of air, land and water due to the use of hazardous materials e.g. blowing agents or, carbon dioxide emission, use / extraction of raw materials, production of hazardous waste, generation of waste material, including hazardous wastes and packaging and its disposal. In accordance to these environmental limitations GPP criteria promote insulation products, which meet those requirements and are:

- most energy efficient,
- appropriate for a situation to ensure maximum benefit,
- restricted with the use of hazardous materials,
- easily dismantled and recycled,
- effectively maintained to extend its useful life,
- produced with its end of life management,
- made of recycled materials and its packaging consists or is fully made from recycled materials.
- friendly to environment and have documented environmental features such as: Eco labels, environmental declarations or environmental management systems.

2. Definitions and Background

For the purpose of Green Public Procurement thermal insulation materials criteria are defined as material used to keep buildings cooler in summer and warmer in winter by reducing the flow of heat through the exterior surfaces of the building[2]. Choose of proper insulation has to apply to its application and its amount depends on a climate zone and

geographical position, where the building is raised.
There are different insulation products, polish criteria were set for six types depending on an application site, which included cavity wall insulation, solid wall insulation, loft insulation, floor insulation, roof insulation and insulation for pipe work and ducts. Apart from application type thermal insulation can differ by the material it's made of. There is insulation with inorganic mineral fiber origin (e.g. mineral wool, stone wool, and glass wool), organic oil/coal origin (e.g. polyurethane foam, phenolic foam, expanded or extruded polystyrene), organic plant/animal origin (e.g. cellulose, cork, wood fiber or cotton insulation) and other (e.g. aerated glass, foamed glass or foil products).

2.1 Key environmental impacts

2.1.1 Dangerous substances

Main threats for environment in insulation product life cycle come from components, which the product consists of. Few of them can be classified as dangerous for human or environment. Dangerous substances have a negative impact on air quality, water, even human health, with many of the substances identified as carcinogenic, teratogenic or mutagenic. One of examples are the blowing agents used for preparation and application of foam insulation. In recent years blowing agents were based on chlorofluorocarbons (CFCs), permanent substances, which do not affect negatively on human health, but as it turned out they contribute to ozone layer depletion. Substitute for CFCs was hydro chlorofluorocarbon (HCFC), which had smaller ozone layer depletion potential, but still it had negative impact on ozone layer. In accordance to Montreal Protocol the use of both substances is forbidden. As an alternative are common and said to be less hazardous to environment – carbon dioxide and pentane.

2.1.2 Embodied energy and thermal performance

Subsequent impact, embodied energy, has an indirect effect on environment during the life cycle of a product. Product life cycle is defined in norm PN-EN ISO 14040:2009 Environmental management – Life cycle assessment – Principles and framework and in case of construction product – in prEN 15804 Sustainability of construction works — Environmental product declarations — Product category rules[3]. Significant energy consumption is observed in production phase and transport and it also depends on thickness and weight of thermal insulation product, necessary for proper thermal performance. Embodied energy is shown in an example of different kinds of insulation depending on an embodied energy on a roof with the same thermal resistance.

Table 1. Prime embodied energy in thermal insulation on example of 100m2 roof with thermal conductivity 3,33m2k/W

Material	Thermal conductivity	Thickness [mm]	Weight [kg]	Embodied energy [GJ]
Cork	0.040	133	1733.33	12.2
EPS	0.035	117	291.60	28.9
PUR/PIR	0.024	80	264.00	33.3
Rock wool	0.038	127	1520.00	33.6
Glass wool	0.037	123	1295.00	44.8
XPS	0.036	120	420.00	46.2
Wood fiber	0.050	167	4000.00	68.0

The use of thermal insulation with high level of thermal resistance, in terms of environmental protection, is very important and should be considered as a main criterion in choosing products. Such insulation allows reducing energy consumption, what affects on environment in reduction of energy production. It is highly recommended to reduce the embodied energy

in production phase. Values of embodied energy should be taken from IIIrd type Environmental Declaration (prEN 15804) and can be used in GPP for choosing “greener” insulation product with same technical features e.g. thermal resistance
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2.1.3 Recycling

Most of insulation products can be processed in recycling process. It is important for cost-effective measures in terms of economy and environmental protection in reference to storage in a landfill. If the product has to be recycled, there need to be a recycling facility to enable its recycling. What is crucial, after that process the product operational, quality and durability performance need to be sustained.

3. Criteria and Regulations

Developed environmental criteria are divided into core and comprehensive criteria.
Core criteria, which are significant element in GPP process, relate to main environmental impacts of a given product. They are made with minimum additional verification or cost increases. Comprehensive criteria give an advantage in overall score for products, which have documented environmental certificates.

3.1 Core criteria

3.1.1 Thermal transmittance.

Thermal transmittance of insulation should not exceed 0.04 W/mK, to sustain proper thermal resistance of dividing wall. Producer declares transmittance factor, 90% of given product needs to have better transmittance than declared value. Producer needs to present product declaration, CE marking. The basis of this criterion is EPBD Directive 2010/31/EU.

3.1.2 Greenhouse gasses

Most of fluorinated greenhouse gasses have significant Global Warming Potential (GWP). In this category hydrofluorocarbons (HFCs), perfluorocompounds (PFCs) and sulfur hexafluoride (SF6) can found. Also gasses, like chlorofluorocarbon CFC-11, which have negative impact on ozone layer (ODP – Ozone Depletion Potential) are listed as dangerous. Criterion does not allow any of these substances to be released from product. The bidder is obliged to provide appropriate proof that criterion is met. It is regulated by Regulation (EC) No 842/2006 of 17 May 2006 on certain fluorinated greenhouse gases.

3.1.3 Substances classified as dangerous

In this category there are substances which are said to be carcinogenic (R40, R45, R49), harmful to reproductive system (R60, R61, R62, R63), mutagenic (R46, R68), toxic (R23, R24, R25, R26, R27, R28, R51), allergic (R42), cause heritable genetic damage (R46), danger of serious damage to health by prolonged exposure (R48), possible risks of irreversible effects (R68). Substances mentioned cannot be released in amounts exceeding acceptable concentration limits, which are shown in table 2
The bidder is obliged to provide appropriate proof that criterion is met. It is regulated by Ministry of Health Regulation (Dz. U. 2003 nr. 171 poz. 1666 with following changes) and by REACH Regulation – EC/1907/2006

Table 2. Indoor acceptable concentration limits and its categories A and B[4]

Substance	Indoor acceptable concentration limits [µg/m^3]	
	Category A	Category B
Ammonia	300	300
Phenol	20	50
Formaldehyde	50	100
Dibutyl phtalate	100	150
Styrene	20	30

3.1.4 Technical Environmental Information

The bidder must provide following information:

- Manufacturer and date of manufacture/ batch no,
- Energy amount and materials used for production,
- Weight and thickness
- Percentage value of recycled content
- Recycling information
- Maximum storage or install-by date
- Transport and installation instruction
- Storage instruction

These features are verified when bidder provides suitable documents.

3.2 Comprehensive criteria

Comprehensive criteria for GPP purposes in Poland are still under development, but there a scheme of what it should contain, how it should be verified and under what regulations. As it was previously mentioned comprehensive criteria promote products with specific, above standard documented features.

3.2.1 Recycled content in thermal insulation

Additional points would be given for recycled content in offered product. Limits proposed differ depending on a kind of insulation material e.g. Glass wool>55%, cellulose fiber>80%. This criterion will be regulated by novelized Construction Products Directive (89/106/EEC).

3.2.2 Environmental Management Systems EMAS and PN-EN ISO 14001

Other additional points would be given if producer can prove implementation of Environmental Management System (EMAS) or have introduced regulations given by PN-EN ISO 14001, which determines environmental aims, obliges the producer to implement pro-environmental policy, which needs to be controlled and certified by accredited body.

3.2.3 Environmental Declarations

Terms and conditions of environmental declarations are regulated by PN-EN ISO 14024, PN-EN ISO 14021 and prEN 15084. These norms set standards for type 1,2 and 3 ecolabel or EPD type, which are regarded as an advantage in procurement process. Bidder should demonstrate compliance with this criterion and provide declaration made by qualified institutions.

3.2.4 Origin of Wooden material

Other considered comprehensive criteria relate to origin of wooden material. Wood for the purpose of production of thermal insulation need to be certified by Forest Stewardship Council (CFC), Programme for the Endorsement of Forest Certification (PEFC) or other equivalent documents prepared by certified bodies.

3.2.5 Values of GWP and ODP for blowing agents

Additional points would be given for products which have blowing agents with lower ODP and GWP levels in reference with other blowing agents with the same thermal effectivity in product life cycle. It is assumed that in case of PIR, PUR and EPS production ODP emission equivalent of blowing agents is zero. It is regulated by Regulation (EC) No 842/2006 of 17 May 2006 on certain fluorinated greenhouse gases, what bidder is obliged to prove.

Table 4. Blowing agents in termo plastic insulation materials and their ODP and GWP

Product used	**Chemic name**	**ODP**	**GWP**
Urethane foam	CFC-11	1	4000
	HCFC-141b	0.11	630
Urethane foam modified with isocyanate derivatives	HFC-134a	0	1300
	HFC-245fa	0	560
	cyclopentane C5H10	0	3
styrene-olefine foam	CFC-12	1	8500
	HCFC-142b	0.065	2000
	HFC-134a	0	1300
Phenolic foam	CFC-113	0.8	5000
	Dichloromethane CH2Cl2	0	

3.2.6 Warranty

Last comprehensive criterion is warranty, which for the products installed should be minimum 20 years. If GPP chooses also to install the product, then the installation service needs to declare also 20 years of warranty for their service. The bidder needs to declare compliance with this criterion.

4. Conclusions

Developed by Building Research Institute polish environmental criteria for Thermal Insulation will simplify public procurement process and allow “greener” producers to compete on the market. Green Public Procurement sets standards for pro-environmental service in public sector, what will affect or give less negative impact for the environment especially in energy consumption, air quality or waste disposal. Public procurement with environmental aspects is one of the instruments of sustainable development and realization of 3x20 guidelines in 2020. Although criteria are almost developed, they need to be verified and accepted by public authorities and then implemented.

Reference

[1] Harwell *"Green Public Procurement – Thermal Insulation Technical Background Report"*, AEA, June 2010
[2] Allen, E. (1999) Fundamentals of Building Construction Materials and Methods. 3rd ed. John Wiley & Sons
[3] Norm is in preparation by Technical Committee CEN TC 350, in Poland by Technical Committee PKN KT 307 – Sustainable Development.
[4] Ministry of Health Regulation (Monitor Polski nr 19 z 1996 r., poz. 231)