WORKING PAPER

GREEN INVESTMENT SCHEME: CASE STUDY ON HUNGARY

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Abstract

Recently, the concept of a Green Investment Scheme (GIS) has been developing rapidly and gained pace in 2008 when Hungary and Latvia adopted the GIS legislature and at least three more European countries prepared to follow suit. Against this background, the paper examines the Hungarian case looking into its legal framework, possible GIS architectures and the country's actual choice regarding the modality of a Green Investmet Scheme. An overarching question is the allocation of revenues from sales of assigned amount units (AAUs). The primary focus of this paper is on the allocation of AAU revenues to the buildings sector since the latter represents one of the priority areas to be addressed in the context of climate change mitigation. On this basis, an overview of existing national and EU subsidy systems supporring energy efficiency in the Hungarian buildings sector is presented. The authors point to a complementary nature of Hungarian Green Investment Schemes which are supposed to address the projects weakly supported by other policies. In addition, the experiences of CEE countries in energy efficiency projects in buildings are reviewed to the extent which can be relevant for selecting appropriate GIS architecture modalities. Furthermore, the paper addresses the issue of similarity between JI (Track 1) and GIS projects and gives certain recommendations with regard to implementation of Green Investment Schemes in the buildings sector.

Abbreviations

AAU	Assigned Amount Unit
CDM	Clean Development Mechanism
CEE	Central and Eastern Europe
CO2e	Carbon dioxide equivalent
EE	Energy efficiency
EIT	Economy in transition
ERU	Emission reduction unit
ETS	Emission trading system
FM	Flexible mechanism
GHG	Greenhouse gas
GIS	Green Investment Scheme
IET	International emissions trading
JI	Joint Implementation
MOEW	Ministry of Environment and Water (Hungary)
MRV	Monitoring, reporting and verification
Mt	Million tons
NEEAP	National Energy Efficiency Action Plan (Hungary)
UNFCCC	United Nations Framework Convention on Climate Change

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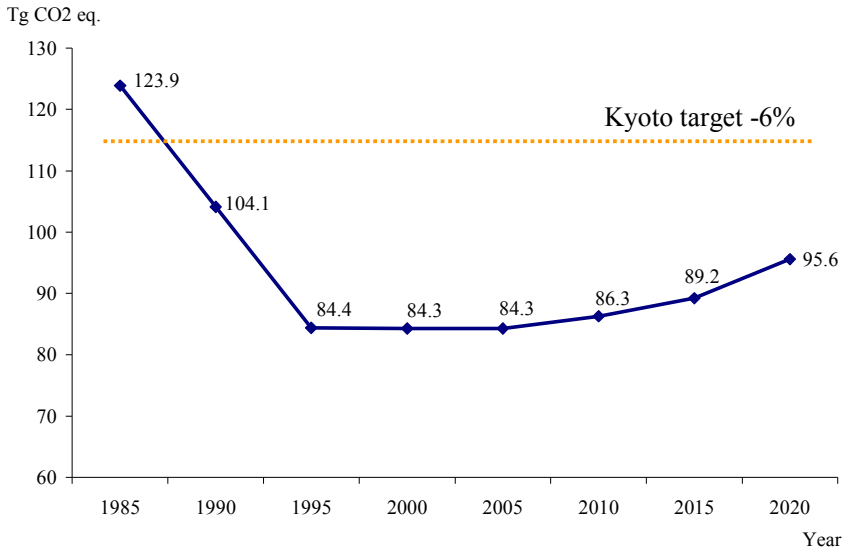
1 Background on Climate Policy and GIS in Hungary

1.1 Climate policy and emission trends in Hungary

In August 2000 Hungary ratified the Kyoto Protocol assuming an obligation to reduce its GHG emissions by 6% with the baseline being the average of 1985-87 (UNFCC 2004). In 2007, the government adopted National Climate Change Strategy for the period 2008-2025 which highlights the significance of further reductions in the emissions of greenhouse gases. Figure 1 illustrates the past trend and the projected emission scenarios in Hungary. It shows a sharp drop in emissions below the Kyoto target in the 1990s as well as a gradual increase in those as the Hungarian economy started recovering in the beginning of the decade. According to the projections illustrated by Figure 1, even a non-linear emission growth that is forecasted to take its rise in 2015 will not result in exceeding the Kyoto target by 2020.

Figure 1. Scenario of Hungary's greenhouse gas emissions



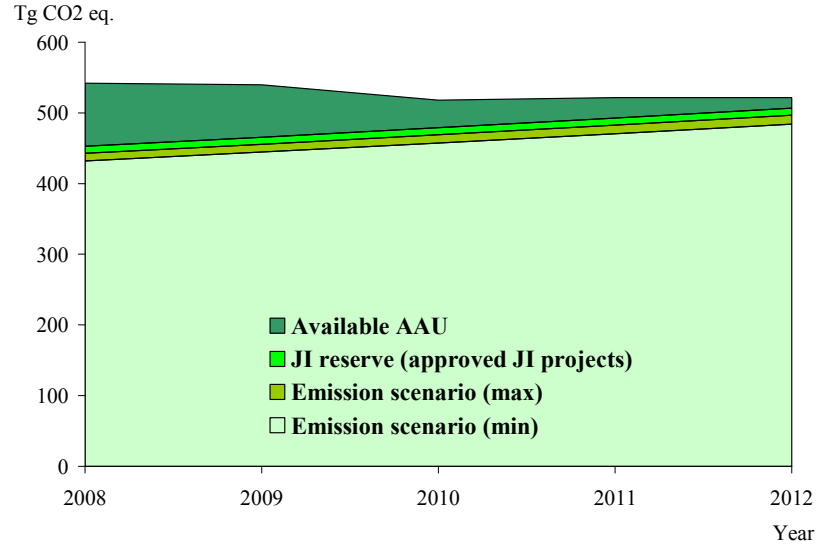
Source: Feiler 2007b

1.2 Hungary's Assigned Amount Unit Potential

Availability of AAUs for the use of flexible mechanisms is determined by the total quantity of AAUs available for the country, the size of the commitment period reserve, likely emission trends till the end of Kyoto commitment period and the amount of AAUs necessary to be set aside for the generation of ERUs for Joint Implementation projects (GIS in Hungary: Briefing 2007). Figure 2 shows the quantities of available AAUs as of April, 2008. Note that the figure was constructed taking into account the potential GIS transactions. Consequently the amount of AAUs available for selling is supposed to decrease by 2020. According to Feiler (2008), out of 89 million assigned amount units the Hungarian government assigned about 15 million units for the pilot transaction allocating 30-40 million AAUs for the second phase. These numbers were calculated after considering worst and best emission scenarios

according to which the country will emit 432 million and 443 million AAUs respectively. In addition, about 10 million units were reserved for Joint Implementation projects.

Figure 2. Available Assigned Amount Units in Hungary



Source: GIS in Hungary 2008; authors' calculations of GHG emissions trends

In September 2008, Hungary sold 2 million government carbon credits to Belgium. The price of AAUs was not disclosed, but the Hungarian representative argued that the current price of AAUs potentially available for sale was around €14-15. However, this price might apply specifically to Hungarian carbon credits as the government has earmarked the AAU revenues for cutting emissions setting up so called "hard greening" option (see Section 2.1), which renders Hungarian AAUs more expensive. The second deal took place in November 2008 with 6,6 million carbon credits being transferred to Spain. The price of an AAU was not disclosed, but, as a larger amount of AAUs was marketed, we might assume that it might be lower than during the first deal.

1.3 Legal background on GIS in Hungary and procedural framework on "greening' the projects

There are a number of national and EU documents that serve as a background to the Green Investment Scheme. One of the major requirements to the newly designed mechanism is compliance to the mentioned documents and directives:

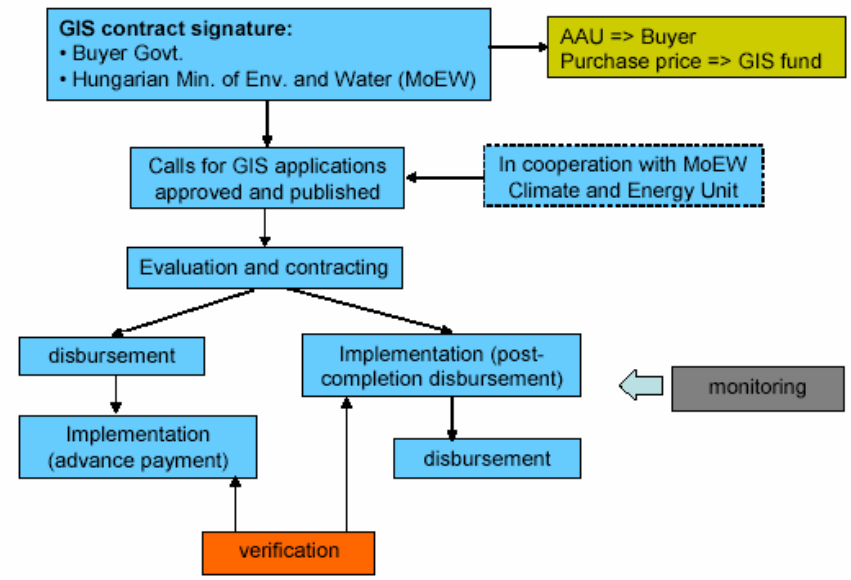
- 2002/91/EC Directive on the Energy Performance of Buildings (EPBD);
- Ministerial Decree 7/2006 (V.24.) adapting the 2002/91/EC Directive to the national circumstances;
- 2006/32/EC Directive on Energy End-Use Efficiency and Energy Services
- National Climate Change Strategy;
- National Energy Efficiency Action Plan of Hungary for the period between 2008 and 2016 (draft)

In June 2007, the Hungarian Parliament passed the Act LX of 2007 on the Implementation framework of the Kyoto Protocol, which grants JI and GIS legislative status (Hungary 2007a). In the same year, a secondary law, "Government Decree 323/2007. (XII. 11.) Korm. on the implementation of Act LX of 2007" was also approved by the Government. Decree 323/2007 further defined the key elements in

the GIS, such as the conditions for the sale of AAUs, conditions of the GIS; conditions for and decisions over applications of the sales revenue and monitoring and verification issues, as well as EU state aid rules in relation to GIS (Hungary 2007b). In addition, a draft version of Operational Manual on the implementation of the Green Investment Scheme in the buildings sector was finalized in August 2008.

The process of AAUs' selling and of the GIS implementation might be represented as a scheme (Figure 3). At the first stage the buyer government and Hungarian Ministry of Environment and Water (MoEW) sign the GIS contract where the amount and the price of AAUs are stated. GIS fund is to be deposited at a special account in the MoEW. After that MoEW invites tenders considering program and project type of utilisation of revenues. The projects are examined by Project Management Unit (outer experts). Monitoring is conducted during the whole process of the project implementation. After completing the project, the emission reduction and the cost-effectiveness are verified. National contact person informs the buyer regularly about the proceedings of the project implementation.

Figure 3. Procedural framework on "greening" the projects



Source: Feiler 2008

According to a governmental official (Feiler 2008), at the stage of tender the Ministry of Environment and Water applies the following criteria for selecting the projects:
- cost-efficiency;
- climate and legal additionality (see Section 2.7)
- first projects: low-hanging fruits (areas with biggest emission reduction potential and biggest recovery of the costs regarding the carbon efficiency);
- areas can be included where there are matching funds provided by the Hungarian state, but additionality can be secured.

1.4 Priority areas under Hungary's National Climate Change Strategy

Hungary has explicitly indicated that GIS will be applied to the projects not attracted by JI (Feiler, 2008). This fact determines the area which the Hungarian government visualizes to target by Green Investment Schemes at the first stage. Residential and public sectors are supposed to receive the first AAU revenues in order to encourage

energy efficient and climate mitigation activities in this field as, according to the IPCC (2007), it has the largest GHG reduction potential. In addition, Hungary's National Climate Change Strategy proposes the following sectors as key targets for GHG reduction:

- renewable energy for heating;
- biogas production for transportation purposes;
- activities for reductions of non-CO2 emissions (National Climate Change Strategy 2007; Feiler 2008; Lazi 2008).

2 Possible GIS Architectures

2.1 Type of Greening

Greening is the process that links the surplus AAU, which has limited climate and environmental merits, with activities that can result in environmental benefits (Tangen et al., 2002; Blyth and Baron 2003). The "greening" process can be of two types. Hard greening refers to activities in which the greening process can deliver measurable and quantifiable emission reduction units. However, if the activities associated have non-quantifiable and non-measurable emission reductions, it is soft greening (Blyth and Baron 2003; Andrei, Relicovschi, and Toza 2006). Hungary's Act LX of 2007 on the Implementation framework of the Kyoto Protocol bounds the government to greening, which is closely linked with stricter requirements to a greening ratio (see below).

2.2 Greening ratio

Greening ratio can be defined as the proportion of emission reductions accruing from greening activities to the amount of AAU transferred in exchange of the funds channeled to these activities. The notion of greening ratio mainly pertains to hard greening as the latter implies that AAU revenues are invested into projects with measurable and verifiable emission reduction. In Hungary, greening ratio is not employed as a standard to regulate greening activities, and the government has opted for the ex-post establishing of the greening ratio. To achieve one-to-one greening for certain measures in the housing sector, the crediting period might be extended beyond the first commitment period depending on the type of the project. In other sectors, which are similarly profitable regarding carbon saving but have smaller potential than in the building sector and where projects will give lower recovery, a subsidy (and not one-to-one scheme) is being planned.

2.3 Program / Project Based Approach

Program window starting late 2008 is designed to support a large number of small projects which have similar characteristics in order to reduce the transaction costs bundling them together and supporting them in a similar manner and a streamline way. Requirements to verification of emission reduction are standardized and should fall in line with the Hungarian energy audit methodology. The areas eligible for the program architecture modality include house insulation; public lighting modernization;

passive house construction; renewable energy, energy efficiency and energy saving projects primarily in the domestic and public sector; district heating.

Project window is likely to start with the second phase of the Hungarian GIS. This window is supposed to be open for the competitive sector, to support and stimulate new and innovative ideas for emission reduction. Most likely, the project window will resemble a Joint Implementation scheme (Track 1) but will be more streamlined and less burdensome. This modality will be applicable to outstanding large size or/and complex climate mitigation projects (Feiler 2008; Csoknyai pers. comm.).

2.4 Instruments of investment. Budgetary option of the fund

As of now, the Government Decree that entered into force on 1 January 2008 provides an option of using grant schemes for GIS financing. In this respect, there might be certain developments in the future, but one option is not considered at all: credit financing, for the following reasons. First of all, the government is unwilling to support commercial banks. In addition, there is an unsuccessful experience with the National Energy Efficiency Program (see Sections 3.2 and 3.6). Its recent variant is based on soft loans, and after this change was introduced the demand has decreased significantly (Csoknyai pers. comm.).

As to the budgetary option of the fund, there is a provision that the finds for GIS will be managed separately from the state budget. The revenue from the sales of AAU enters a special account at the Ministry of Environment and Water (MoEW). This system is strengthened by provisions in each year's Act on State Budget. The funds can be rolled over and over during several years (Csoknyai pers. comm.). As per the MoEW's decision GIS funding will not be used for **pre**-financing the projects. That would reduce the risks for the government. In case of failure of a project a full payment recovery will be claimed if the GIS funds have already been transferred (Feiler 2008).

2.5 Monitoring and verification (general issues)

The specific areas selected for the support schemes are expected to produce evident emission reduction impact. Verification is supposed to focus on the cost-effectiveness, extent and expected time-period of the emission reduction. The Hungarian GIS system distinguishes between two basic types of verification:
1. reporting by the beneficiary of the project with documentation and random verification by the GIS Management Office – for small projects where it is easy to establish emission reductions;
2. third party verification according to ISO 14064 standard – for large and/or complex projects (Feiler 2008).

When there is a relatively low investment level per project and emission reductions can easily be established, it is not necessary to have full-fledged third party verification by ISO 14064 standard – as the uncertainty level is rather limited. In such case the first type verification is to be realized in addition to the normal procedures of reporting required in other similar governmental support schemes (GIS in Hungary: Briefing 2007; Feiler 2008).

Buyers will be involved in selection if the priority areas for GHG emission reductions, providing access to data regarding the management of GHG funds, as well as data on emission reductions resulting from the supported activities (GIS in Hungary: Briefing 2007). Monitoring will be provided by an internationally renowned auditing firm that will audit investments and use of the revenues. Auditors will prepare annual reports and final report. Buyers will be presented the reports and will have full and unrestricted access to all relevant data, information and documentation (Feiler 2008). The reports will be also made publicly available (GIS in Hungary: Briefing 2007). See Section 3.5 for a detailed description of MRV activities applied to energy efficiency in buildings as a priority area for Hungarian GIS

2.6 Crediting period and GIS timeframe

A crediting period is defined as the time span during which a project generates carbon credits and which cannot exceed the project's lifecycle period (Point Carbon, 2008). Hungary has opted for the crediting period until 2020 in case of buildings related projects, which requires ax-ante approach to crediting, and until the end of 2012 in other cases. The Hungarian AAU deals with Belgium and Spain are likely to set the stage for further transactions with comparatively long crediting periods. The latter are justified only in cases where emission reduction will certainly and predictably occur as result of the investment and as long as the given measure is additional (that is, the same level of efficiency is not required by law). For the Belgian-Hungarian and Spanish-Hungarian deals this is ensured because the greening is focusing on buildings carbon-efficiency where intervention measures are having long-lasting effects.

Timeframe is a period during which the GIS transactions and AAU sales, as well as the disbursement of the funds can take place. Hungarian government is planning to limit its GIS timeframe by the first commitment period. However, it might be advisable to allow for post-2012 disbursement of the funds as this would ensure that there is enough time to channel all AAUs revenues to projects in the most optimal way.

2.7 Additionality requirements

The Hungarian GIS ensures additionality, which is defined by Hungary as climate additionality and legal additionality. Climate additionality means that all GIS activities should result in quantified emission reductions, which are verifiable. Soft greening is excluded from the greening option. This decision grants Hungary a better position when negotiating with the buyers on the price of AAUs. Legal additionality is defined as the greening activities not covered by measures mandated by legislation in force (Feiler 2008) and is reflected in the development of operational procedures for GIS. The Hungarian GIS scheme allows for support not only in a stand-alone manner, but also in the areas where other state or EU funding is available as well, but there is a need in all cases for producing additional emission reduction over what is mandated by requirements for other support. The possible combination of various support schemes is designed to reinforce each other and to reduce overall transaction costs.

2.8 Summary of key GIS modalities in Hungary

A summary of the key architectural decisions on Hungary's GIS is represented in Table 1.

Table 1. Key Green Investment Scheme architectures as applied to Hungary

Modality	Hungary's design option
Greening option	Hard greening
Programmatic/project	Project and programmatic approach
Budgetary option of the fund	Money goes directly to the special account in MoEW
Additionality requirements	Climate additionality: all GIS activities will result in quantified emission reductions, which are verifiable. Legal additionality: support in the areas where there is either no financing or other state or EU funding is available, but there is a need for producing additional emission reduction over what is mandated by requirements for other support
Baseline	Programmatic windows: sectoral baseline[1] Project window: TBD
Verification	Small project: a) carbon efficiency calculation and desk review; b) a random check; c)after the project realization check on performance of the applicant. Large project, ISO 14064 standard is employed
Monitoring	Financial audit; Reported by the MOEW in the format of a report according to ISO 14064 standard; an advisory board monitoring of GIS overall
Crediting period	Until 2020 in case of buildings related projects and end of 2012 in other cases
Timeframe	First commitment period
Fund allocation	Grants, non-refundable subsidy
Beneficiary	Private companies; non-profit companies; central and local authorities; physical persons
Project selection	Tender by the government
Greening ratio	Not predetermined – will be established ex-post, but studies show efficiency and potential of measures

Source: based on Stoyanova 2006; Qiao 2008; Feiler 2008;

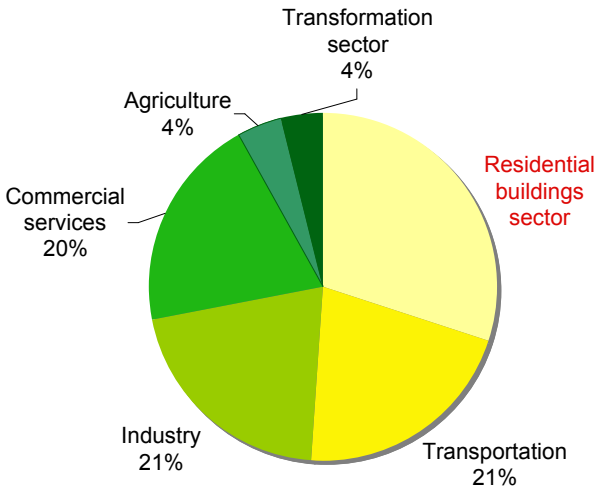
[1] Sectoral approach to a baseline calculation is grounded on shifting the focus of monitoring and verification "from a project-by-project level to a sector-wide level" in which case GHG emissions are be considered to originate from "a range of sources defined as a sector" (Baron and Ellis 2006).

3 EE in Hungary's Buildings Sector: Link with GIS

3.1 Overview of Hungary's buildings sector

Buildings sector is one of the prioritized areas for the implementation of Hungary's GIS. Residential sector in Hungary represents about 1/3 of the total national CO2 emissions (see Figure 4). Energy-efficiency improvements in buildings supply the largest cost-effective and low-cost CO2 mitigation potential (IPCC 2007).
The Hungarian government is planning to focus on the residential area and public buildings sector in order to have a long-term, good quality greening, in the sectors where the infrastructure of the existence is the longest.

Figure 4. CO2 emissions by final energy end-users in Hungary, 2004



Source: ODYSSEE NMS 2007

3.2 Overview of Hungary's energy efficiency policies

Hungary's National Energy Efficiency Plan (NEEAP) was approved by the Government on 13 February 2008. The Action Plan is an important instrument for Hungary to reduce energy use by 20% by 2020 in accordance with EU obligations. In order to achieve this objective, the following major areas and sub-areas of intervention were identified:

- residential/household sector buildings,
- institutional/public sector buildings,
- energy conversion,
- traffic, transportation,
- construction (newly constructed buildings),
- energy-consuming goods which, being in an operational or stand-by mode, can substantially change the demand for energy (NEEAP 2008).

The Action Plan stipulates energy efficiency measures as applied to the Hungary's situation. The NEEAP (2008) considers such areas as residential sector; tertiary sector; industrial sector; transportation sector; cross-sectoral approach.

A short outline of measures planned in the residential and tertiary sectors is given in the tabulated form (see Table 2 and Table 3). Table 2 shows that energy efficient modernization of panel buildings is accountable for the highest planned savings, namely 1,125 GWh per year by 2016. It means that the program supporting the renovation of panel apartments is supposed to trigger the highest potential energy savings. This policy is closely followed by "For a Successful Hungary" program that aims at 750-1,000 GWh/year savings by 2016. According to the calculations, creation of the basis for an energy-conscious conduct is one of the least efficient measures for energy efficiency. By 2016 it is supposed to be bringing from 25 to 125 GWh annually. However, in the long-term perspective this measure might be one of the most crucial ones as it would lead to the conscious implementation of all other measures.

Table 2. Measures planned to encourage energy efficiency in the residential sector

No.	Measure	Action by end customers triggered by the measure	Duration	Planned savings by 2016 [GWh/year]
1	Support for energy-efficient modernisation of residential buildings built by industrialised technologies	energy-related modernisation of panel apartments	(2001-) 2008 - 2016	1,125
2	"For a Successful Hungary" residential energy savings assistance and credit programme (NEP assistance application system)	energy-related modernisation of traditionally built apartments	2008 - 2016	750-1,000
3	Application of individual measurement, miniature heat centres in distance heat supply	reduction of distance head demand	2008 - 2016	375
4	Development of the operation of an energy efficiency consultant network	promotion of energy-related modernisation	2008 - 2016	375
5	Energy-related certification of buildings	encouragement of energy-related modernisation	2008 - 2016	125-375
6	Periodic inspection of household boilers	encouragement of replacement and renewal of boilers	2008 - 2016	125-250
7	Energy efficiency labelling of household boilers	replacement of boilers and purchase of better efficiency boilers	2008 - 2016	75-125
8	Energy efficiency labelling of household electric and gas boilers	replacement of household machine, purchase of better efficiency machines	2008 - 2016	75-125
9	Provision of assistance for purchasing household cooling machines of special energy efficiency with an "A" label and household refrigerating machines of special energy efficiency with an	replacement of household machines, purchase of better efficiency machines	2008 - 2016	125-200

No.	Measure	Action by end customers triggered by the measure	Duration	Planned savings by 2016 [GWh/year]
	"A" label and other household machines, by replacement of old appliances			
10	Improvement of the propagation of energy-efficient lighting equipment (compact light tubes)	replacement of light fixtures	2008 - 2016	175-350
11	Working out energy efficiency-related training materials for application in primary and secondary education	creation of the basis for an energy-conscious conduct	2008 - 2016	25-125
	Total			**3,350- 4,425**

Source: Hungary's NEEAP 2008

According to Table 3, third party financing is the most effective measure in the tertiary sector. It is potentially capable of bringing 1,750 GWh/year by 2016. Second most effective policy is elaboration and implementation of energy efficiency Directives related to public procurements encouraging the use of more efficient equipment. Estimated annual savings total 1,250 GWh by 2016. Total predicted savings can reach as high as 4,300 GWh per year by 2016.

Table 3. Measures planned to encourage energy efficiency in the tertiary sector

No.	Measure	Action by end users triggered by the measure	Duration	Planned savings by 2016 [GWh/year]
1	Local municipality training, awareness building, consulting on the basis of experiences of the UNDP/GEF municipal energy efficiency program	sensible investments related to energy rationalisation	2008 - 2016	250
2	Third party financing	more dynamic energy efficiency activity	2008 - 2016	1,750
3	Encouragement of reduction of energy use in the Regional Operative Programs	taking into account energy savings in the course of town rehabilitation	2008 - 2016	125-175
4	Promotion of ESCO-type investment projects	more dynamic energy efficiency activity	2008 - 2016	125-625
5	Elaboration and implementation of energy efficiency Directives related to public procurements	application of equipment with better energy efficiency	2008 - 2016	1,250
6	Elaboration of minimum energy efficiency requirements for office equipment	reduction of energy use by institutions	2008 - 2016	250
	Total			**3,750 -4,300**

Source: Hungary's NEEAP 2008

Some of the energy efficiency measures might be paid special attention to. In the household sector there are two main programs:

- Energy efficient modernization of residential buildings built with industrialized technology LKFT 2006-LA-2, so called “panel program”, and
- „For A Successful Hungary” – Household Energy Conservation Subsidy and Credit Program, so called “NEP”.

“Panel program” supports buildings made with industrialised technology fucusing on individual measures. The government can subsidise 1/3 of the renovation costs up to 400,000 HUF. The rest should be financed by the applicant. The bodies eligible for the loan include local governments, building societies and communities of owners in block of flats. The amount of the loan can reach as high as 2/3 of the refurbishment expenditures. However the maximum size of the loan cannot exceed 800,000 HUF per apartment. The Hungarian Development Bank can provide the applicant with the preferential interest loan. Between 2001 and 2005 the renovation of 124,769 apartments was subsidized in the framework of the programmes through the provision of loans worth HUF 20.9 billion (Elek 2007).

NEP is a program supporting mainly masonry constructions built with traditional technologies before 1994, oriented on individual applicants and focusing on individual measures. The government offers non-refundable grants and/or preferential interest loans to fund the energy efficient retrofit of residential buildings. The intensity of support is comparatively low: 15, 18 and 20% of the refurbishment’ costs depending on the measures implemented. Renewable energy systems can get the support up to 25% which is the only program targeting new constructions. The modest funding might be the primary reason for low demand from applicants’ side and for the development of black market for energy efficiency services (Csoknyai 2008; Csoknyai pers. comm.; Elek 2007). Thus, until the grant support exceeds the 20% VAT in Hungary, the construction sector will consider the black labor market more advantageous and money-saving.

Energy efficiency in the tertiary sector is also supported by specially designed programs:

- „The Apple of Our Eye” Program;
- UNDP/GEF municipal energy efficiency projects.

„The Apple of Our Eye” stipulates that public procurement will be used for selecting a commercial organization which will finance the Programme and ensure the continuously outstanding level of heating and lighting during the entire term of the Programme. Managers of public (educational) institutions can enter into a contract with this commercial organization. Feasibility studies have confirmed that The Apple of Our Eye Program can be launched without state funding. For an energy efficiency project to be supported by this program the costs should reach HUF 10 million with a maximum support of HUF 500 million.

UNDP/GEF municipal energy efficiency projects aim at reducing greenhouse gas emissions in Hungary by improving the energy efficiency level of municipalities. Legal entities which entered into a contract with local municipalities can also apply for the subsidy (for example, ESCOs). The conditions of the participation as as follows:

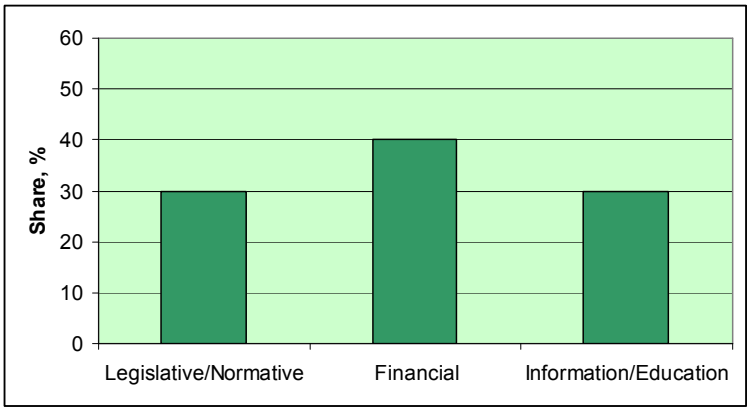
- In the case of audits to reveal energy losses the disbursed subsidy is a non-refundable loan amounting to HUF 2 million at the maximum (but the loan cannot exceed 40 % of the costs and 10 % of the annual energy costs of the institution(s) to be audited).

- In the case of feasibility studies the disbursed subsidy is a non-refundable loan amounting to 40 % of the costs or HUF 5 million or 8 % of the costs of the project at the maximum. The subsidy is subsequently given (Elek 2007).

Passive houses have not been supported by any program so far.

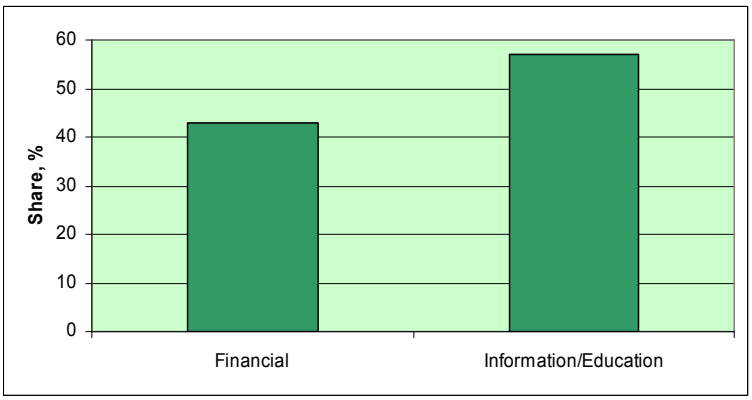
In general, energy efficiency measures in Hungary's household and tertiary sectors can be represented on the graphs (see Figure 5 and Figure 6). Figure 6 shows that the household sector is mainly dominated by the financial measures. However it should be noted that building codes and the residential energy consulting network are not included into the graph, which might distort the overall picture. As to the tertiary sector, the dominating position of financial measures is similar to the situation in the household sector. In addition, education, information campaigns and training are of great importance for the sector of institutionary buildings. The Green Investment Scheme is planned to supplement the existing energy efficiency programs covering, to some extent, their gaps and making the projects more attractive financially.

Figure 5. Energy efficiency measures in the household sector



Source: based on MURE Measure Database Online

Figure 6. Energy efficiency measures in the tertiary sector



Source: based on MURE Measure Database Online

3.3 General characteristics of GIS in Hungarian buildings sector

The GIS subsidy in Hungary is supposed to support two kinds of projects:

- Complex projects aimed at reaching a certain category in the labeling system. In this case the target rating should be attained for the whole building. The

area of a construction defines the structure of GIS support with the border of 1,000 m^2.

- Individual measures not supported by any national or EU programs (for instance, glazing of loggias, heat recovery ventilation, summer heat protection).

The structure of the subsidy is different for refurbishments of buildings under and above 1000m^2 and for new constructions.

The Green Investment Scheme in Hungary is to be promoted and popularized through the Demonstration activities which will get additional support from the Hungarian government. These activities include billboards with the information about the project, open days, on-line information, which will contribute to awareness-raising. The Demonstration activities are supposed to be undertaken on a voluntary basis. This part of the Green Investment System (as it is often referred in Hungary) might be considered as yielding a point to soft greening. Demonstrative aspect of a GIS is also indirectly supported by the government's preference to complex investments and combinations of energy efficiency measures which prove to be more spectacular. These measures require the highest capital investment and have the longest payback period. However, in the long run, these are politically and environmentally justified, which is the primary reason for attracting the attention of Hungarian policy makers with respect to GIS. Other energy efficiency measures incur lower costs and have low to medium CO2 mitigation potential (see Table 4).

Table 4. Aspects of efficiency of different energy efficiency measures and the availablility of governmental support

Measures	Investment costs	CO_2 saving potential	Supported by GIS in Hungary
• energy saving lighting; • low energy consumption household appliances; • controllable heating	Low	Low	No
• window replacement; • thermal insulation; • boiler replacement; • heat recovery ventilation; • construction of sunspaces	Medium / High	Medium	Yes
renewable sources of energy which can be used at the scale of buildings: • solar collectors; • biomass (pellet and wood gasifying); • boilers; • heat pumps; • photovoltaic systems	High	Medium in the short term. High in the long term	Yes

Source: adopted from Csoknyai and Szalay, 2008

3.4 Project selection/approval

The GIS grant application should contain a technical part, which assesses the carbon efficiency of the planned measures, by providing detailed technical information. The method for providing such information is based on the methodology mandated by the EU's Energy Performance of Buildings Directive (EPBD). For new buildings there is one exception, the passive house category, where the calculations should be submitted using the methodology of the German Passive House Institute. For improvements in existing buildings two calculations should be submitted, one on the current state of the building and one on the planned state after the application of planned measures.

The submitted GIS grant applications are to be scrutinized by the authorized agency. The evaluation consists of two stages. To begin with, a formal check of the application's completeness and validity of the submitted documents should be undertaken. A successful formal evaluation is followed by a technical scrutiny, so called "energy-environmental evaluation". This stage requires involvement of specialists – technical experts. They perform the assessment according to the following criteria:
- compliance of the planned refurbishment with requirements that do not appertain to energetics (for example, fabric protection);
- feasibility of the planned renovation and appropriate demonstration of the feasibility in the application;
- relevant and adequate financial assessment of the planned measures;
- compliance of CO2 reduction and energy saving calculation with relevant guidelines (namely, with 7/2006 (V.24.) decree – following the EPBD).

The Hungarian GIS scheme as a basic option allows for emission reduction calculation for the 1st Kyoto commitment period. However, in case of new buildings and complex building refurbishment, the lifetime of certain measures is predictably 20-30 years, in case of new buildings the general life span is 80-100 years. For such cases the emission reductions are to be calculated till 2020, as it is likely that these measures will lose their additionality by then (strengthening building energy standards might require such measures by law by then). In case of the planned project window yearly assessment of emission reductions is envisioned according to the ISO 14064 standard.

3.5 Monitoring and verification, baseline calculation for GIS in buildings sector

For programmatic window in the buildings sector, the projects are usually small in scale, disperse and large in number. In this case, the greening activities involve calculation of emission reduction by potential beneficiaries. A technical protocol is provided by the government, regarding energy consumption of the building by its physical properties. The beneficiaries use the technical protocol provided by the government to calculate the emission reduction and report it in the form provided by the government when applying for the fund. Then if the beneficiary complies with all the conditions of becoming eligible for funding, they get a notification regarding the grant from the GIS operating entity. After the retrofitting/building project is done, a new calculation is to be made as verification and there will be a random check on whether the activities have taken place. Following verification the grant is disbursed

to the owner of the project. In short, the verification for the programmatic window is done by a) reporting by the beneficiary of the project with documentation; b) random verification by the GIS Management Office.

According to the National Energy Efficiency Plan, continuous monitoring of individual programs on behalf of Energy Centre Kht – a body in charge of monitoring performance of and coordination of various measures – is beneficial in order to facilitate the potentially necessary transformation or fine-tuning of individual measures. Energy Centre Kht. will prepare annual monitoring reports about the results of the respective measures, which will be approved by Ministry of Economy and Transport and submitted to the Government by the same Ministry for information purposes (Hungary's National Energy Efficiency Action Plan 2008).

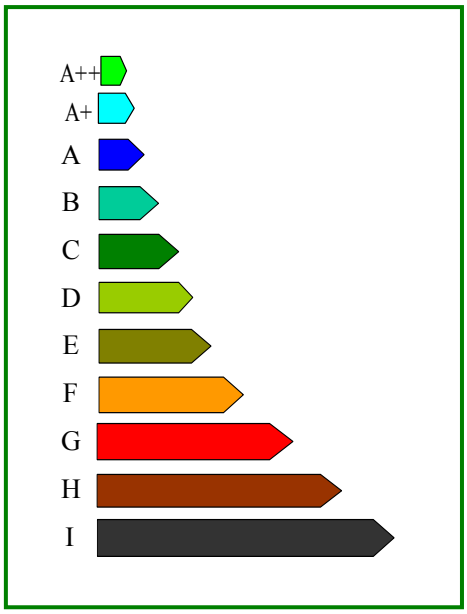
GIS projects in buildings sector will follow the standard monitoring and verification procedures stated by the Government Decree on GIS depending on the size and complexity of the project. According to the technical protocol, the emission reductions could be calculated by using the standardized factor or formula directly. The controlling process will include a check of the documentation as well as a random technical check by experts listed by Hungarian Engineering Chamber (Csoknyai pers. comm.). That will guarantee the technical quality on the applicant side. Other independent energy experts will monitor the technical quality on the evaluation side. The rules of the calculation are fixed in the 7/2006 (V.24) Ministerial Decree. In addition, it will be necessary to keep energy bills for three years after the project was finalized, for occasional control as well as for statistical purposes. As to the passive construcions, the monitoring and verification rules are determined at the international level (Csoknyai 2008; Csoknyai pers. comm.). These standards and certification are promoted and controlled by Passivhaus-Institut in Darmstadt, Germany.

A technical factsheet will go along with the documents to provide more efficient control procedures. This technical section will include:
1. Guidelines for applicants about frequent individual measures with an Appendix for experts which would include:
- Side effects
- Recommended combinations with other measures
- Risks and solutions
- Technical requirements
- Recommendations, privileged solutions
2. Guidelines for the evaluators in case of questionable applications (Csoknyai 2008).

Efficient control procedure will be maintained be means of energy efficiency labeling system. Since 2006, according to 2002/91/EC Directive, Hangary's buildings should be given certification categories according to the energy performance: from I to A+, where I is a building with large energy consumption, A+ with very low energy consumption, C is a current national standard. The adaptation of the EPBD to the national circumstances the category A++ was introduced to account for more advanced levels of energy efficiency measures. The rating categories are based on the ratio of the actual and the prescribed reference values of the specific primary energy consumption (Zöld 2008). The baselines for complex retrofit and for new constructions have certain differences. Baseline for complex renovations is the original condition of the building. Target energy labels in this sector are C, B, A, A++.

For the new buildings: baseline is Category C. Target energy labels are B, A, A++, passive house. Figure 7 and Table 5 illustrate energy labeling system.

Figure 7. Energy labeling of buildings



Source: the 176/2008 (VI.30) Decree in Csoknyai and Szalay 2008; Zöld 2008

Table 5. Energy consumption of buildings in different performance catergories

Category	Energy consumption, kWh/m^2/yr.	Characteristic
A++	<45	Ultra-low energy consumption
A+	<55	Low energy consumption
A	56-75	Energy efficient
B	76 – 95	Exceeds requirements
C	96-100	Meets requirements
D	101-120	Close to requirements
E	121-150	Better than average
F	151-190	Average
G	191-250	Close to average
H	251-340	Poor
I	341 <	Bad

Source: the 176/2008 (VI.30) Decree in Csoknyai and Szalay 2008

The energy label will be assigned to a building only by a qualified expert after the calculation based on the 7/2006 (V.24.) decree. Labeling based on keeping track of the energy bills (operational method) is not considered for the Green Investment Scheme due to the need to make the process as accurate as possible and to avoid profit-making. By “a qualified expert” the Hungarian government understands “a

professional who has fulfilled the requirements of the Ministry of Environment and Water and successfully passed the exam for the Green Investment Scheme“ (Csoknyai and Szalay 2008).

Upon the project completion the fact that the funds have been spent as per their intended purpose should be proven. The following documents are to be submitted:

- photographic documentation;
- for individual measures: invoices from a construction company and for the materials used (note: for the complex renovations and / or new constructions the submission of invoices is not a must. They, however, should be kept for three years.);
- a validated copy of the NEP or Panel Program grant certificate if GIS is a supplement to one of them.

After submission of the listed documents randomly chosen projects are to be inspected on-site. If the post-project inspection uncovers that the project's documents are not convincing or were falsified then the provided subsidy is to be re-funded (Csoknyai and Szalay 2008).

3.6 EE in buildings: experience of CEE countries

A number of interviews with energy efficiency experts were conducted during the course of the research. The major purpose of this survey was to find out whether the issues of energy efficiency in building sector vary significantly in different countries. The experiences of CEE countries with energy efficiency projects in buildings have been reviewed to the extent which can be relevant for selecting appropriate GIS architecture modalities. The results are summarized in Table 6. As the table shows there are considerable differences in several areas; among them: baseline setting, requirements to monitoring and verification, CO_2 reduction calculation. On the other hand, numerous similarities in the experts' answers suggest that recommendations aimed at energy efficiency improvements might be given on the general basis.

Table 6. A survey summary of experts' opinions on EE in buildings sector (cross-country)*

		Hungary	Latvia	Poland	Bulgaria	Croatia
Key success factors for energy efficiency projects in buildings	**for retrofit projects**	Understanding among policy-makers. Raising awareness of the general public. Detailed database**. Government incentives. Labeling system enforced. Collateral-free approach; financial products based not on perceived risks but on real risks.	Motivation; public awareness.	Maintaining the existing financing scheme.	Awareness; financing.	Subsidy schemes development.
	for new constructions	Enforcement of buildings codes and stronger control. Government incentives, supporting extra efforts from builders.	Legislation; lack of educated (in energy issues) architects and building engineers.	Implementation of EPBD to introduce incentives for new buildings projects.	Legislation.	Regulation and standards.
	for small scale projects	Grouping. Financial schemes, grants. Awareness raising. Social businesses aiming at small marginal profit. Demonstration of energy savings.	Motivation; public awareness.	Dissemination of the best practices.	Awareness; initiative.	Subsidy schemes development.

		Hungary	Latvia	Poland	Bulgaria	Croatia
	for complex projects or/and large scale projects	Competent project management. Government incentives. Energy control and distribution; installation of small-scale CHPs (Combined Heat and Power).	Legislation and motivation; political support and educated developers.	Implementation of EPBD; carbon funds (white certificates).	National / Regional / Municipal programs.	Subsidy schemes development.
Deficiencies of the main energy efficiency programs		Complicated process; bureaucracy, "paper work". NEP: decreased governmental support (less than VAT). Targets only middle-income market needs, but not low-income.	n/a	Lack of coordination of environmental, economy policies with housing policies and financing schemes.	Financing.	n/a
Selection process for the projects is used for energy efficiency projects in buildings		Top-down.	Bottom-up or mixture of top-down and bottom-up approaches.	Top-down.	Top-down.	Mixture of top-down and bottom-up approaches.
Best options for financing energy efficiency programs in buildings		Grant schemes; tax rebates, subsidies and other fiscal incentives. New buildings: equity financing.	Debt financing (soft loans); grant schemes; carbon funds.	Debt financing (soft loans); grant schemes. Carbon funds (to be developed).	Debt financing (soft loans); grant schemes.	Grant schemes; tax rebates, subsidies and other fiscal incentives.
Financial schemes which are likely to fail (or have already failed) in the sector of energy efficiency in buildings		Soft loans (e.g., NEP). No success with revolving funds in small projects. Also, failure if the grants are too small. EU structural funds can be used only by small and medium-sized companies.	Revolving funds have failed.	Direct subsidy has failed.	Self-financing.	Debt financing was not very successful.
Requirements to Monitoring & Verification	**for retrofit projects**	***	Comparing with reference building, but there is no state-approved M&V system yet.	No.	Audits.	No.
	for new constructions	***	n/a	No.	Building standard.	No.
	for small scale projects	***	n/a	No.	Audits.	No.
	for complex projects or/and large scale projects	***	n/a	Building energy management systems, light management systems.	Audits.	No.
Fund distribution used for the implementation energy efficiency projects in buildings		With governmental support (e.g., 15% support in NEP).	With governmental support: State Investment Program; state grants.	25% grant to the *h/writing* for up to 80% of refurbishment cost, based on energy audit.	With governmental support: subsidizing.	With governmental support: fund for environmental protection and energy efficiency.
The baseline setting and monitoring process is based on …		n/a	Negotiated baseline.	Normative seasonal heat demand calculated for each building separately.	Sectoral baseline / standard.	No baseline.
Is CO_2 reduction calculated after completing the energy efficiency project in buildings?		Only for the projects financed by EU structural funds.	Not in every project.	Yes.	Yes.	No.

		Hungary	Latvia	Poland	Bulgaria	Croatia
Methodology of CO2 reduction calculation.		Efforts to harmonize EPBD labeling system with the national system of CO2 reduction calculation (Csoknyai pers. comm.).	Calculation methodology worked out during the WB research.	Based on specific Polish norm, which will be changed in order to comply with European norms.	n/a	n/a
Is it planned to harmonize energy efficiency programs with GIS?		Yes. GIS legislation in place. Details of dealing with future projects are being elaborated.	Yes. Legislation is ready. First EE projects in buildings sector start in 2009.	Yes. The works on it are initiated by the Ministry of Economy.	No.	Not at the moment.

Notes:
* All questions and answers are with respect to a certain country.
** A suggestion from one of the EE experts: to make a publicly available (Internet) database created on m^2 flat consumption level (of buildings with more than one flat) (at low cost and in a short period of time – from gas / electricity service provider and land registry and meteorological (temperature) + district heating data) that can be used for benchmarking (Solymosi 2006; Solymosi pers. comm.).
*** There is no strict M&V for national programs. Basic method: desk review. The major reason: lack of capacity, of manpower. The situation is stricter with the projects supported by EU structural funds. M&V is conducted according to EU regulation (periodical site reviews, auditing).
Source: interviews with energy efficiency experts in the buildings sector, 2008

4 Financial Assessment

4.1 Average marginal cost of CO_2 mitigation, including project costs, in the selected target area

Costs of the project aimed at improving EE in the buildings sector, as well at its payback period, depend on various factors:
- retrofitting or new building construction;
- size of the object;
- scope of retrofitting or “greening” the building;
- scope of monitoring and verification.

According to Elek (pers. comm.), an approximate payback period for retrofit projects amounts up to 30 years, for new construction – 12-15 years, for small scale projects – 20-25 years, for complex and/or large-scale projects – 20-30 years. However, the payback period of investments into the buildings sector depends immensely on a building’s type, technologies used for renovation/construction, energy prices. For example, with regard to panel buildings, the lag between refurbishments investment and its payback is shorter than for other types of constructions. In addition, the fact that heat envelope improvements extend the lifetime of buildings should be taken into account as well, especially in the case of panel buildings. It should be noted, however, that real estate owners conventionally judge about the projects’ attractiveness by the costs they have to bear rather than by duration of payback periods. In this respect, motivation for investment might be driven by the intensity of governmental support (e.g., national energy efficiency programs as well as GIS).

To estimate costs per m^2 (or per flat) that different kinds of projects incur is not within the scope of this study for two major reasons. First, the information is not easily accessible. Second, as different projects consist of various combinations of measures the expenses are defined on a case-by-case basis. One of the popular

examples is the SOLANOVA project under which a panel building underwent a comprehensive retrofit and now almost corresponds to the passive house standards. The investment costs are estimated as 16,800 EUR/flat (excluding VAT) (Hermelink pers. comm. in Novikova 2008). However, this figure does not take into account the fact that some of these costs would have occurred anyway for unavoidable repair works in the near future. In addition, as it was a demo project the green roof and the solar system have been installed to make the results more demonstrative (see Table 7 for detailed description of the options and a breakdown of associated costs). These measures are not typical for rank-and-file projects.

Table 7. Elements and cost allocation of retrofit options in the SOLANOVA-building

Element	Option	Cost allocation
Ventilation	Decentral ventilation units with 82% real heat recovery	19%
Solar thermal	App. 75 m^2 solar thermal area	8%
Heating	Easy heating system solution with radiators	13%
Cellar insulation	10 cm insulation of cellar ceiling	1%
Roof insulation	Green roof of 30-40 cm	13%
Wall insulation	16 cm polystyrene	22%
Window/door exchange	Polyvinyl chloride (PVC) windows: three-glazing on the South and the West, two-glazing on the North and the East	24%

Source: Hermelink 2005; Hermelink per. comm. in Novikova 2008

The following example illustrates a striking difference between investment costs of demo projects and mainstream ones. Renovation of typical panel-building apartments including windows exchange as well as insulation of walls, roof and basement amounts to:
- 1,154 Euro for a 37 m^2 flat;
- 1,631 Euro for a 55 m^2 flat;
- 2,216 Euro for a 73 m^2 flat (Dobi-Rózsa pers. comm.).

It should be noted, however, that comparison of project costs of different buildings is usually an approximation due to the factors mentioned above.

There is an opinion that after the renovation the households benefit not only in terms of saved energy but also in terms of the increased value of flats (Novikova 2008). But this increase might not be that visible taking into account the refurbishment costs. It might serve as a discouraging factor during the process of making a decision on retrofitting. As to investment costs of new buildings' construction, the cost sheets of implemented projects appear to be a commercial secret in the Hungarian business environment.

4.2 Possible coverage of the project costs by AAU revenues

The budget for GIS subsidy is assumed to be HUF 10 billion covering only residential buildings. 50 per cent of the subsidized project is supposed to be new constructions and the rest are refurbishments. The average subsidy for refurbishments is HUF 1 million per dwelling unit (Csoknyai pers. comm.). Originally, it was supposed that AAU revenues will cover 100% of the project costs. However, at the present moment GIS funding is supplementary taking the form of, so called, bonus or co-financing. It

is already decided that the share of financing will be fixed as a certain amount in monetary terms. Originally, the following scheme of financing was proposed (also see Section 3.5 on Hungary's labeling system):
20% of the project financing is covered by GIS if level C is reached;
25% if B;
30% if A;
35% if A+.
However this method of GIS financing was abandoned in favor of the one supporting projects in monetary terms for the following reasons:

- to simplify the scheme;
- to prevent supporting of extremely expensive measures;
- to make the process independent of the bills.

Based on interviews and background materials, Hungarian experts have developed a potential GIS support scheme in the buildings sector, which is represented in Table 8 and Table 9. This format would be similar for retrofit and for new constructions. It should be noted that the incentives to move to a higher level should be proportionately higher (Csoknyai pers. comm.). The extent of the support for both new constructions and renovations is to be limited to funding 100 sq. m of the housing area per living unit. That would naturally eliminate the projects which might be too costly for the state budget.

Table 8. Potential amount of GIS funding based on the labeling system (retrofit), HUF/m^2

	Renovated State				
Original State	**Category C (1000 m^2 or less)**	**Category B**	**Category A**	**Category A+**	**Category A++**
I	2,000*	4,000	6,000	9,000	12,000
H	1,500	3,500	5,500	7,500	10,500
G	1,000	3,000	5,000	7,000	9,500
F	Not supported	Not supported	4,000	6,000	8,000
E	Not supported	Not supported	3,000	5,000	7,500
D	Not supported	Not supported	3,000	4,500	7,000

Note: *1 HUF (Hungarian Forint) equals ca 270 Euro
Source: Csoknyai and Szalay 2008; Csoknyai pers. comm.

Table 9. Potential amount of GIS funding based on the labeling system (new construction)

Level reached after the construction				
	A	A+	A++	Passive house
HUF/sq. m	10,000*	13,000	16,000	20,000
Maximum sum of funding, HUF	1 million	1.3 million	1.6 million	2 million

Note: *1 HUF (Hungarian Forint) equals ca 270 Euro
Source: Csoknyai and Szalay 2008; Csoknyai pers. comm.

The costs of implementing the GIS depend on several factors and can be assessed only with a high degree of approximaion. These factors might include, *inter alia*, the price of an AAU, the amount of AAU sold, the condition and size of living units participating in the Scheme, etc. The budget of the GIS is approximately HUG 47.5 billion. It is likely that 75% of the supported projects will be renovations and 25% new constructions. The structure of Hungarian building stock suggests that half of the buildings participating in the Scheme will be multi-dwelling and the other half – single-family. Table 10 shows the results of calculations based on the assumptions made above.

Table 10. The average calculated costs of implementing the Scheme and the potential number of participating projects

	Renovation	New constructions	
		Single-family house	Apartment
Average GIS grant, million HUF/living unit	0.4	1.5	1.2
Average investment, million HUF/living unit	1.5	28	22
Calculated number of GIS projects	58,882	9,313	9,313

Source: adopted from Csoknyai and Szalay 2008

5 Options for GIS to address existing barriers under JI

The CO_2 reduction potential of the buildings sector is being captured at a very slow pace. One of the reasons is that Joint Implementation activities were not very successful in this area. As of December 1, 2008, there are 179 Joint Implementation projects in the JI pipeline: either registered or at the determination phase (Fenhann 2008). None of them address energy efficiency improvements either in household sector or in public and private service.
The limited number of JI (as well as CDM: mere 22 out of 4,151) projects in buildings is due to certain barriers specific to this sector. According to Novikova et al. (2006), they include:

- High transaction costs of small scale of buildings projects;
- Bundling of small scale building projects;
- Implementation risks;

- Complying with the additionality criteria;
- Setting of a multiple-type baseline;
- Post-Kyoto uncertainty;
- Lack of awareness and expertise.

To these we can add that project-based Flexible Mechanisms (FM) necessitate rigorous validation and verification procedures. As projects in the buildings sector involve a combination of *many* measures, these procedures might turn out to be a painstaking job. In addition, some measures are difficult to verify with methodologies provided by FM. Svenningsen (2008) identifies one more barrier referring to CDM, but we consider it applicable to JI as well. According to him, it is quite difficult to specify comparative buildings for setting a baseline since buildings may outlast several technology generations due to the long life span.

The fragmented nature of buildings-related projects usually leads to a lower level of CO_2 reduction per project which results in higher marginal costs of cutting the emissions. Since stand-alone JI projects are quite difficult to implement in this sector there might be a solution provided by programmatic GIS approach reducing the transaction costs. The programmatic modality option could also address the fact that it is difficult to bundle JI projects in the housing area. To get a sufficiently large reduction of CO_2 would require covering a large number of buildings. However, it might be hard to achieve the same reduction targets at the same time for, say, the whole district (Novikova et al. 2006). In addition, strict monitoring and verification in this case may be problematic as well.

Differentiation of MRV methods according to a project's size and/or complexity would ensure against creating a JI-like scheme. Regarding the implementation risks, the buyers of AAUs might be less concerned about those than the buyers of ERUs. JI involves purchasing credits before they are issued with the exception of some government programs such as ERUPT which pays some amount of money upfront. The issuance of the credits depends on the performance of a project as well as on the successful verification by the JI board. In case of GIS, transfer of the money from a buyer's side and AAUs from a seller's side is supposed to take place before the implementation of a project (GIS in Hungary 2008). According to Pruze (2008), AAUs are safer with respect to implementation and delivery risks with the two main reasons behind it: first, AAUs are guaranteed by the government; second, the risk is spread among several projects (particularly, due to a programmatic approach in Hungary and Latvia).

As the first commitment period comes to an end in 2012 there is a high degree of uncertainty about a future international agreement on the issue. This fact prevents realization of potential FM projects with long crediting periods. Since large-scale, short-term projects are rare in the buildings sector project participants are discouraged from this area. However GIS might be less risky in this respect. As it was mentioned above, the exchange of AAUs and money between the seller and the buyer would take place at an early stage of the GIS project or even before the project starts. Therefore, the participants are likely to be more secure than in case of FM implementation.

As the barriers under Joint Implementation might be addressed by Green Investment Schemes there is some concern about GIS competing with JI Track 1 (Korpoo and Gassan-zade 2008). However these fears may have little ground when it comes to

the buildings sector. Hungary has unambiguously specified that GIS will be applied to the projects not eligible under JI, though it has developed rather strict requirements to the environmental integrity of future projects. Thus instead of moving from JI to GIS implementation as new Member States used to plan (Chmelik 2005), Green Investment Schemes could target smaller projects not qualified for JI and not supported by any other financial schemes.

6 Conclusions

Hungary can be considered as a top-runner in GIS development, especially considering the fact that first official moves in the direction of designing a GIS took place already in 2006. There is a legal system in force, institution system in place as well as verification and monitoring framework. This GIS legal framework is supposed to guide the country between 2008 and 2025 regarding emission reduction and adaptation. The funds for GIS are earmarked and will be managed separately from the state budgetary flows. This option might be recommended to other AAU-selling countries due to weak financial discipline and other institutional imperfections that prevail in most of them. Nevertheless, to increase and retain buyers' confidence, a governmental agency should be a part of GIS operational activities as is the case in Hungary where Ministry of Environment and Water is in charge of GIS management.

The projects to be supported by Hungarian GIS will be selected according to certain criteria, namely cost-efficiency; complementary nature of the funds; climate and legal additionality. Climate additionality indicates that all GIS activities should result in quantified emission reductions, which are verifiable. Legal additionality necessitates the greening activities not to be covered by measures mandated by legislation in force (Feiler 2008) and is reflected in the development of operational procedures for GIS. The Hungarian GIS allows for support not only in a stand-alone manner, but in the areas where other state or EU funding is available as well, but there is a need in additional emission reduction over what is mandated by requirements imposed by other financial support schemes.

The selection criteria are complemented by a hard-greening option specified in the Hungarian law on GIS, indicating that the greening process should deliver measurable and quantifiable emission reductions. At the same time, the modality option of soft greening should not be left out. It would be crucial to pay special attention to the publicity campaign regarding the implemented pilot projects. The Hungarian government is planning to make a provision for certian demonstrative activities such as billboards with the information about the project, open days, on-line information, which will contribute to awareness-raising from other sources than GIS.

The modality of hard greening is closely related to a notion of a strict, one-to-one, greening ratio. However, to obtain 1:1 greening for certain measures in the housing sector, a crediting period might be extended beyond the first commitment period depending on the type of the project. Accordingly, Hungary has opted for the crediting period until 2020 in case of buildings related projects, which requires ax-ante approach to crediting, and until the end of 2012 in other cases. Along similar lines, the timeframe during which the GIS transactions and disbursement of the funds takes place might require a longer period than until 2012. Although Hungarian government is planning to limit its GIS timeframe by the first commitment period, it

might be advisable to allow for post-2012 disbursement of the funds as this would ensure that there is enough time to channel all AAUs revenues to projects in the most optimal way.

Emission balance of the country has defined the priority areas to be supported by green investment schemes. Key areas targeted for GHG reduction include residential and public sectors; renewable energy use for smaller to larger heating systems; other measures of energy conservation, energy efficiency and promotion of the use of renewable energy. The funds received from the first AAU deals are supposed to be channeled to the housing sector. As the residential sector is responsible for 30% of emissions, this potential might be captured by means of GIS. Energy efficiency measures in the residential as well as tertiary sectors are backed up by a number of national and EU subsidy systems. The GIS is planned to build upon these programs taking the form of so called bonus or co-financing. This complementary nature of Hungarian green investment schemes may be well used to address the projects weakly supported by other policies. However, the GIS funding in Hungary will not cover 100% of the project costs. It is already decided that the share of financing will be fixed as a certain amount in monetary terms to avoid supporting too expensive measures which might happen in case of a percentage share. Thus the Hungarian structure of the GIS subsidy stimulates more efficient investments, and this modality choice might be heeded by other countries. Such modality option as subsidy scheme was predetermined by the experience in Hungarian buildings sector: other financial schemes did not prove very successful.

Other GIS modalities are partly elaborated in the Government Decree effective 01.01.2008 and partly are still work in progress. According to the above-mentioned Decree, the approach to greening activities will be program-based for the first AAU deal (targeting residential and public sectors) and will be complemented by the project window afterwards. The program window will support small projects in a streamline way bundling them together. This appears to be an agreeable approach to capturing mitigation potential in the buildings sector. It might be recommended not to overburden this architecture modality with JI-like monitoring and verification procedures. As to the project window, it is supposed to stimulate innovation and new ideas giving incentives to the competitive sector. This modality option is planned to be similar to JI projects but less burdensome.

One of the main barriers of joint implementation projects is a cumbersome validation and verification of energy efficiency measures. Since a typical project in energy efficiency in buildings uses a combination of many measures it is a formidable task to observe all the requirements. In addition, some measures are difficult to verify with methodologies provided by JI procedures. In this respect, green investment schemes might fill in the niche without replacing JI altogether. Thus, instead of moving from JI to GIS implementation as new Member States used to plan (Chmelik 2005), green investment schemes could target smaller projects ineligible for JI and not supported by any other financial schemes. This is the primary reason for the Hungarian GIS system to distinguish between two basic types of verification: desk review and random verification by the GIS Management Office – for small projects and third party ISO-verification – for large / complex ones. Such differentiation within the modality choice might facilitate and streamline the implementation of the unheeded projects. However monitoring will need a third party intervention for both types of projects.

Risks and challenges related to GIS mechanism represent one of the major concerns about the implementation of green investment schemes. Among the most cited obstacles are high time pressure, absence of international regulation on GIS, lack of previous experience in this area. However, almost every challenge in this field might be matched with a corresponding opportunity. Moreover, these may stimulate energy efficiency improvement in the area that is very hard to reach by policies or market-based efficiency investments, but that is a major contributor to GHG emissions – residential sector. For instance, high time pressure could serve as a driver for significant efforts and cooperation in elaborating the scheme itself as well as for capturing energy efficiency potential in the housing sector. The absence of established international regulations and legal framework indicates voluntariness and high flexibility of the scheme that can be applied, in principle, to any GHG mitigation activity. Lack of previous experience and research may be compensated by the lessons from JI and CDM. In addition, ESCOs and existing financing instruments might help to determine the most effective designs and modality options (Ürge-Vorsatz 2007a). The future of a green investment scheme depends on how fast the nations and governments will be in matching the challenges with corresponding opportunities and appropriate solutions.

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