Summary of policy recommendations on introduction of energy audit data systematization method (NEAD platform) in Baltic Sea Region

April 2021

Contract No: EM 2020/31

Commissioned by: Ministry of Economics, Republic of Latvia

Contractors:

Dr.Sc.ing., Agris Kamenders

Dr.Sc.ing., Gatis Žogla

Dr.Sc.ing., Līga Žogla

Quality control: Dr.Sc.ing., Agris Kamenders

Approved by: Dr.Sc.ing., Marika Rošā

EKODOMA Ltd. is an engineering consultancy company in Riga, Latvia; it provides expert technical solutions in the energy industry with regards to any environmental and administration issues thereof. The company was established on November 15, 1991; Registration No. 40003041636, VAT Registration No. LV40003041636, the EU Central Consultancy Register PHARE/TACIS Registration No. LAT 20498.

Content

Introduction

In the CAMS project "Energy auditing in the Baltic Sea Region", Status Quo report has been mentioned that the collection of energy data in a uniform and standardized way can enable comparisons and generation of new knowledge for different public and private actors. Although, great untapped potential exists regarding common energy data collection and analysis, so far it is performed only on specific areas within country specific requirements. For instance, standardized energy audit data collection can contribute to forming relevant future policies and guidelines and can be used to evaluate current or historical energy patterns. Through existing real-life examples, it can be useful tool for energy auditors to carry out audits and also provide real evidence on potential savings for those implementing energy efficiency measures.[1]

Therefore, the objective of this document is to compile most relevant policy recommendations identified in each Climate Adaptation and Mitigation Synergies in Energy Efficiency Projects (CAMS) project partner country (Estonia, Latvia, Poland, Russian Federation, and Sweden) on introduction of Nordic Energy Audit Database (NEAD) platform in the Baltic Sea Region (BSR).

This report consists of three main parts. The first chapter gives a brief overview of the country-specific conditions regarding context of energy audit system and existing energy data systematization methods in each country. The next chapter is focused on the CAMS project country-specific situation and policy recommendation regarding the introduction of NEAD platform on national level.

The third and the final chapter summarizes the policy recommendations on BSR level. The summary of policy recommendations on BSR level has been based on the content analysis of the following CAMS platform project documents:

- Energy auditing in the Baltic Sea region. Status Quo report.
- NEAD platform testing results in each CAMS project partner country.
- Discussions with field experts and specific target groups regarding energy audit quality and data systematization methods per project partner country.
- Additional input from CAMS project partners.

All the collected country specific policy recommendations are categorized into four main groups: Political, Economic, Social and Technical. Based on this distribution, the summary of recommendations is drafted containing the recommendations that are applicable and similar for all CAMS platform project partner countries. Also, a simplified risk assessment analysis for the introduction of NEAD platform in BSR is made.

[1] CAMS project "Energy auditing in the Baltic Sea Region", Status Quo report, final, 2020.02.20.

1 Brief overview of the existing conditions

The Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC Text with EEA relevance (Energy Efficiency Directive) and Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (Energy Performance Building Directive) states the requirements for energy auditing and building energy certificate system development in Estonia, Latvia, Poland, and Sweden as the EU member states. Although, the requirements of the Directives are equal, the way how they have been introduced into national legislation differs between these countries. For Russian Federation, the requirement of energy auditing is defined in the federal law "On Energy Saving and on Improving Energy Efficiency and on Amending Certain Legislative Acts of the Russian Federation".

One of the issues that could affect the possibilities of introducing the energy audit data systematization method and NEAD platform in BSR, is the perception of differences between the term "energy audit" among CAMS project partners in accordance with information that is provided in the different energy audit reports. For instance, in Latvia in order to have an Energy Performance Certificate (EPC) for a building – a comprehensive energy audit is made or a simpler one that is based on the measured data (if the purpose of the audit is only to ascertain the consumption of the building without any analysis on energy efficiency improvement measures). In Poland and Estonia for issuing building EPC a simple energy audit is made, but more comprehensive is needed for buildings applying for the renovation programs. In addition, in Latvia and Poland, there is also separate legislation acts on calculation methodology how to perform an energy audit for large enterprises, which in some cases does not include the calculation methodology for energy audits of buildings but have a different methodology.

This is somewhat different in Sweden and major differences can be found in Russian Federation. In Sweden to have a building EPC it is enough with a simplified energy audit, but for large companies it requires to do a comprehensive energy audit. Also, in Sweden requirements for carrying out energy audits are set for small and medium sized enterprises (SMEs). There is also a requirement in Latvia to do energy audits in SMEs using more than 500 MWh and the Energy Efficiency Directive says all member states shall promote energy audits for SME. In Russian Federation three level energy audit system is implemented: energy declaration (document with simple information), energy certificate or energy passport (simple energy audit for buildings), report on the energy audit (general energy audit) which is voluntary for all organizations.

According to the differences in each country, also energy audit data systematization platforms as well as energy data input and storage platforms have been developed and used, which are similar to the NEAD platform presented in the CAMS project (see Table 1).

Table 1

Differences between project CAMS platform partner countries

CAMS project partner country	Existing databases/platforms for energy audit registration, storage, and analysis[2]
Estonia	A public Building Register, state e-registry administered by the Ministry of Economy and Communication. The registry covers the energy consumption data of existing buildings, which supports automatic energy labelling and energy certification. Currently, the Building Register is being upgraded and the module of data input for obtaining an energy certificate will be launched early in 2021. There is no database for registration of large company/enterprise energy audits.
Latvia	A centralized collection of data from energy audits in buildings and large companies (enterprises) are carried out through the building information system (BIS). The system does not offer statistics, data sorting, data filters and other tools necessary for benchmarking. BIS ensures detailed information exchange among the persons participating in the relevant construction process. In addition, BIS includes register of EPCs, register of energy auditors, and register of energy auditors of enterprises (from year 2020) and register of energy reports of enterprises (from year 2020). The purpose of the registers regarding buildings is to inform the society about the energy efficiency of buildings, as well as independent experts who are certified to issue EPC's. The access is open to third persons regarding to all the registers, with an exception that for example, EPC are publicly available without their detailed information included in annexes (this information is available only to the independent expert who has issued the EPC and to the owner of the building).
Russian Federation	From 2019, energy certificates and energy audit reports (as a paper document) must be stored for five years in the Self-Regulatory Energy Audit Organization. At official website of the Ministry of Energy, the analytical portal is available (currently under construction) for energy declarations and energy passports for buildings with the following abilities: ○ Viewing pre-configured reports on the main characteristics of the energy efficiency of the budget sector in the context of

[2] Information collected from CAMS project documents "GoA 2.3 Homework" and "Questions for clarifications" completed by the respective project partner.

	federal districts, constituent entities of the Russian Federation, municipal districts. o Formation of arbitrary analytical reports with parameters selected by users with the ability to automatically draw graphs based on them. o Search and viewing of energy declarations of individual institutions with the ability to view the characteristics of buildings.
Poland	The central database for public building EPC's exists and is accessible as far the anonymized data sets for specific categories of buildings. Simple data benchmarking is available. A database or platform for collecting storage and analysis of data from energy audits for large enterprises/companies is not available. It is planned to develop a national database/system where all data from EPCs and energy audits for all kind of buildings will be registered.
Sweden	A national system for register of building EPCs (only for the whole certificates, not extracted data from the certificates) and audits financed with state grants is available. The system is not transparent and accessible for others. Energy audits for large companies are reported into one register, with limited data extraction and no open access.

Although, in each country an existing system for energy audit registration is available, in most cases it does not provide any analysis of the stored data nor benchmarking possibilities, nor it is open access which at BSR level as a cross-country benchmarking tool could be done via NEAD platform and SPEED – methodology "Sector-specific process for Excellent Energy Efficiency Data handling".

2 Country specific recommendations

Within the CAMS project, in each country the data from at least five energy audits were used to test the NEAD platform. All energy audits were done by energy efficiency experts or certified energy auditors. The results were discussed among the field experts and different target group representatives. Based on the discussions, the specific policy recommendations for introduction of the NEAD platform at a country level, was drafted and summarized specific for each CAMS project country.

All the collected policy recommendations are categorized into the following main groups regarding the introduction of the NEAD platform:

- Political – recommendations that have an impact to the national legislation regarding the process of carrying out energy audits and the calculation methodology.

- Economic – recommendations on financial capacity and other economic issues that could influence the quality of energy audits.
- Social – recommendation regarding sector specific aspects to improve the knowledge and skills of experts in energy efficiency field.
- Technical – recommendation on technical issues regarding adaptation, introduction, and maintenance of the NEAD platform.

Also, the main conclusions and possible recommendations for the improvements of NEAD platform are described.

2.1 Estonia

For the testing of NEAD platform comprehensive energy audits from two public buildings that have been renovated and data from building EPC and EPC calculation tool for one multi-apartment building was used. The selection criteria were the post-renovation housing stock and ad hoc availability in the auditing pool of public premises to be renovated. The energy audits and EPC have been conducted by certified energy auditors, which also tested the data in NEAD platform and presented the results to the project partner organization.

Based on the testing results and discussions among project partner's core team, energy auditor and representatives from Stockholm Environment Institute (SEI) Tallinn, the following main conclusions divided into four categories can be drafted:

- Political:
  - NEAD Platform is recommended tool to support auditing, and a single platform can only work if a regulation or measure requires it.
  - The NEAD platform could serve as a guidance material/reference database.
  - State agencies and local governments must be required to carry out monitoring of energy use of their buildings and, if necessary, energy audits.
  - One should consider the building register is in the developing process. Consulting both processes can capitalise the best uses and functions. There is also information about the EPCs from the energy audits. Thus, even a cross-Baltic database will not work, because it would require additional data entry.
  - It should be taken into account that the need to perform energy audits on public buildings is mainly related to the requirement to receive support and grant. Grant audits are slightly more complex and include the dynamic simulation modelling in the audit. This requirement also ensures that audits provide high transparency on the technical activities that will make a building more energy efficient. A high-quality energy audit compiling all the necessary information is highly effective. It is not necessary to establish strict standard and form of international audit.
- Economic:
  - Based on the previous experience there is no interest from energy auditors or state in paying for the database service and no public interest in paying for professional information. Therefore, as energy auditors cannot support updating NEAD Platform, the costs for maintaining and updating has to be budgeted by relevant public entity.
  - Energy audit and design costs are supported by energy efficiency measures. Therefore, it is difficult to comment on whether and what problem a NEAD platform on BSR level would help to solve it.

- Professional:
  - The certification of auditors and quality control of audits is to be given to Professional Chamber.
  - It is especially important to maintain the auditor's independence, competence and professionalism. Training is also needed to harmonize the overall quality standards of auditors.
  - The NEAD platform can be one part of the training program for energy auditors. Providing training and using one standardised framework. To combine with Taltech training modules.
  - National professional auditing code and system is already developed.
  - The open data of the platform can be useful and relevant professionally, in particular for collaborative projects.
  - There is no need to translate the NEAD platform in national language because all auditors can understand and work in English. Though the original working documentation should remain in Estonian.
  - Training for energy auditors could be more frequently in order to harmonize the level of auditors and improve their knowledge. During the profession development, the work and knowledge of the auditors is controlled and 'audited', though there is an additional need for comprehensive training. If this platform could provide training framework and cases relevant to local needs, it can work well and serve the auditing community.
  - Training could certainly be provided on the database. It can provide new knowledge and information on comparisons of energy audits in other Baltic Sea countries.
- Technical:
  - Issuing building EPC is automated in the building register, no one is pleased to enter data several times.
  - Few years after the renovation, renewal the EPC on the basis of the specified consumption data can be/should implemented assisted by CAMS platform.
  - It is not clear how to add more detailed dynamic simulation data to the platform and reporting. One might get some insights and details on the minimum requirements and building EPCs.
  - In complex buildings, an audit is complex and should cover much more detailed information. Thus, it is important to understand the platform development and improvement opportunities (compared to the existing ones).
  - It is possible to add a benchmarking in more complex European R&D projects in case if special measurements are performed.
  - The database does not contain indoor climate data, it has been becoming increasingly important, and should be coherent with energy data.
  - Include life cycle and life cycle assessment and materials energy issues (LCA database topic).
  - Include climate change adaptation issues (checklist, synergies, trade-offs)
  - Technically, the NEAD platform is operational. No copy-paste simple audits are performed today. The owner of the building, the business owner has a definite interest and desire to solve the energy problem and find solutions that are rather specific to this building (except for apartment buildings where it is

possible to copy). In a public building, there is less reproduction and replicability as the building systems are more complex.

- The ministry and KredEx grant agency or other relevant institutions should explore the possibility of interlinking the existing auditing database using the platform approach.

As a conclusion the existing NEAD platform can be used as an auditing database for benchmarking and database of energy efficiency measures if more exploratory cases are available. However, it is not much seen as a platform of a social communication point for energy auditors, because it is rather small community (30 active auditors) who use mainly bilateral oral communication. In addition, the NEAD platform as a single database is not relevant. Although all auditors would use the same database of measures and input information. Here, all the buildings are different, and the one-to-one measure do not apply.

2.2 Latvia

In total eight energy audits for multi-apartment buildings were carried out in four cities of Latvia. Six of the buildings are typical 318 series buildings with 55 apartments, which built in the 1960s, but two buildings are a 103-series with 41 apartments. The calculation methodology for energy audits have been performed in accordance with the Cabinet Regulation No. 348 Adopted 25 June 2013 "Methodology for Calculating the Energy Performance of a Building". The use of SPEED methodology "Sector-specific process for Excellent Energy Efficiency Data handling" was considered for conducting the energy audits. However, based on the revision of SPEED methodology by the local energy efficiency experts (certified energy auditors) it was concluded that it does not provide the calculation methodology for energy audits, but describes the necessary energy data inputs from the energy audit. Therefore, the energy audits were carried out according to the national legislation. The energy audits of the multi-apartment buildings and the data from the audits were inserted in the NEAD platform by a certified energy auditor. A general opinion was that the NEAD platform is a tool that can be used to enter the results of an energy audit, but it does not perform calculations that would facilitate the energy audit development process. In addition, it is primarily designed as a platform for collecting energy audit data for enterprises and it is not customized for the data regarding energy efficiency of buildings. Consequently, it contains specific sections and input fields that are required for the collection of energy audit data for enterprises, which do not apply to energy audits for buildings. The NEAD platform does not separate data on buildings, but the building can be defined as a separate enterprise for which energy consumption and its distribution is indicated.

Based on the testing results the following main conclusions can be made categorized by the following groups:

- Political: To take over the NEAD platform in Latvia, the existing Cabinet of Ministers regulations that determine the usage of BIS should be amended to provide the use of the NEAD platform as a mandatory platform for energy performance certificate registration of buildings. However, it will not give an additional input or innovation for Latvian data systematization data base (BIS), since BIS fully provides the functionality of needed data collection for Latvia on energy efficiency via not manual data input but through the automatic data generation from the energy

certificate (which is generated in BIS system in online regime). Moreover, by making the changes in the existing legislation, it would significantly affect the capability of independent experts (energy auditors) for the adaptation and usage of the new NEAD platform since no clear target and usage of NEAD platform data is determined during the CAMS project.

- Economic: Any implementation and maintenance of such platform involves a need for funding. During this study, the required investments for the takeover and maintenance of the NEAD platform in Latvia were not determined. The cost depends directly on the amount of improvements of the platform, as well as the regular platforms maintenance costs and willingness of the existing owners of the platform to transfer the platform to other users.
- Social: If the NEAD platform were determined as mandatory, it should be translated to Latvian language and trainings for energy auditors on the use of the NEAD platform must be provided.
- Technical: The NEAD platform currently has several major flaws:
    - Benchmarks are created to determine the energy efficiency level of an existing facility / company / building, as well as to compare different facilities / companies / buildings. In the case of buildings, the existing benchmarks of the NEAD platform provide false information on the level of energy performance of buildings.
    - It does not make climate correction (normalization) to building energy consumption data. Consequently, the benchmarks included in the NEAD platform provide incorrect information about buildings. For example, if the NEAD platform were to compare the heating energy consumption of a building in Latvia and a building in Spain, then a building in Spain would have a lower heating energy consumption. The lower consumption of a building in Spain is not because it is more energy efficient, but because Spain has fewer heating degree days than Latvia.
    - Even by using the platform during the conduction of energy audits, it does not improve the quality of it, because the platform does not provide the calculation methodology on the input data nor calculations of the data itself. Moreover, the manual data input without providing the guidance, i.e., the calculation methodology how to reach the required data constitutes and additional burden for energy auditors.

In addition, during the Baltic Environmental Forum Latvia initiated interviews with stakeholders from Energy Agencies to evaluate their interest in potentially using an open-access platform for benchmarking purpose similar to NEAD platform. Another viewpoint next to the above mentioned was:

- If the platform had a variety (and more) of different examples from BSR countries, it could potentially be used for training purposes. Students could learn about the costs and benefits of different energy efficiency measures, their payback time, maybe discover innovative measures not yet popular in their country, etc.
- It would be important to indicate the rationale for implementing the specific measures in each example. Such database must be "live" and regularly updated, as information on costs is rapidly becoming obsolete. Also, another important issues to consider is the input data verification.

- The use of such platform would be highly recommended if a large set of data would be available for comparison. It would be interesting to see what kind of energy efficiency measures have been implemented and why they have been chosen as recommendatory. Also, it should be open-access.

It can be concluded that the NEAD platform in Latvia should be used only as a voluntary platform for the data benchmarking purposes on the BSR level. The NEAD platform for voluntary use in Latvia should be implemented only when this platform is adapted to Latvian conditions (especially building certification). The NEAD platform could potentially already function as energy efficiency measure database on the BSR level but would need to be adapted to building certification data (as it is in other BSR countries) and provide correct benchmarking functionality, as well as a better user interface for new users to be able to easily access, filter relevant information. As well as this filter must be based on benchmarking functional possibilities, i.e., to be able to select measures according to exact criteria. In addition, on the BSR level the platform on a voluntary basis can be seen as an exchange of experience and best practices. However, in the national context considering that the existing register of building EPCs is already fully used in Latvia, it would be desirable to consider the possibility to supplement the functionality of this register with data analysis of the data already entered in the register rather than adapting a new platform.

2.3 Russian Federation

For the testing of NEAD platform in total data from five different types of energy audits were used:

- One energy declaration for organization (SPbPU).
- Two energy declarations for separate buildings.
- Two reports on energy audits.

The all-above-mentioned declarations were prepared by SPbPU experts, and the reports on energy audits by Center of Energy Efficiency of Saint-Petersburg which is a member of the Self-Regulatory Energy Audit Organization in Russia. Based on the testing results, the following main conclusions divided into four categories can be drafted:

- Political: The Self-Regulatory Energy Audit Organizations have developed internal standards which define details of auditing procedures and requirements to their outputs which are not compatible with the NEAD platform requirements.
- Social: It is necessary to develop a system of training, retraining and advanced training of employees of regional and municipal authorities, professional auditors, and specialists of industrial enterprises responsible for energy efficiency and energy savings.
- Technical: The existing energy audit calculation method in Russia of presenting data differs significantly from NEAD platform:
    - The categories “Supplied energy” are suitable for energy declaration, energy certificate, and report on energy audit for both buildings and companies/industry.
    - The categories “Energy end-use” are suitable for energy certificates and reports on the energy audits for companies/industry only, but do not fit for buildings (not tested).
    - The manually upload of data from energy audit in the NEAD platform was seen as major disadvantage. Although, for a Russian energy

declaration, the task of converting an Excel form (current data collection method) into NEAD platform data input requirements are not seen too difficult.

Meantime, the NEAD platform can be used on voluntary bases for benchmarking purposes, finding suggestions for energy efficiency measures to use in energy audits, or platform as a social communication point for energy auditors. In addition, in future the interface for some level between NEAD platform and existing portal in Russia could be developed for benchmarking, but it could be in addition to "usual" entrance in NEAD platform. The advantage of using NEAD platform is the large amount of comparable data for benchmarking and use of proven methods at the national level. As a burden of NEAD platform introduction on national level, all kind of data about Russian Federations' organisations, people etc. must be stored at servers located in Russia. Thus, this probably, will apply also for data usage of energy audits.

2.4 Poland

In total six pilot energy audits were selected for testing the NEAD platform. Five energy audits correspond to buildings which have applied for the state renovation program, thus, having a comprehensive energy audit (level II). In order to make the data comparison two of the selected buildings were public services and three multi-apartment buildings. Moreover, five of the selected buildings were built in the 1980s and one multi-apartment building just recently built in 2020. For this building, a preliminary EPC was made not only for the whole building, but also for each flat separately. The data were based on the planned design without actual energy consumption data. All the data were used to test the NEAD platform.

The Foundation of Energy Saving in Gdańsk has initialized a continuing dialogue regarding the NEAD platform testing results and how to improve the energy audit system in Poland in general with actors representing the following policy stakeholders:

- Ministry of Development, Labour and Technology, Dep. of Low-Emissions Economy (responsible for the Long-term Renovation Strategy)
- Marshal Office of Pomeranian Region, Energy Planning Dept.,
- Regional Fund for the Protection of Environment and Water Management – Energy Advisors national team
- Association of Energy Auditors (ZAE),
- Association of Energy Conservation Agencies (SAPE),
- Polish Ecological Club active at the national and transnational level within the Climate Coalition in cooperation with 25 other NGO's.

Also, discussions as far the role and effectiveness of Energy Audits, with the bodies contracting the energy efficiency projects in the building sector the responsible for the building's structures covered by the six pilot audits being prepared to test the CAMS methodology:

- The two municipalities of Sopot and Władysławowo.
- The Housing cooperative MSM Szkuner I.
- The Real Estate managing company in Gdansk.

Based on the testing results and discussion among above-mentioned different target group representatives, the following main conclusions divided by categories can be drafted:

- Political: As the activities of national institution for EPC are regulated strictly by law, there is only a chance to locate NEAD platform in the framework of professional NGO sector.
- Social:
    - For NEAD platform uptake on national level the information in the platform is necessary to be Polish language, as well as training courses for the users of the platform will have to be organized in long-term.
    - Making these database resources available for specific users and – also open for application of standardized information allowing transnational comparisons (e.g., between the BSR countries) can be considered.
- Technical:
    - The existing NEAD platform fully cannot be used neither for buildings nor large company energy audit data analysis. Thus, separate platforms for building energy audits and audits for enterprises could be created.
    - It is possible using the NEAD (or BEAD platform) as tested for the audits being made with the complexes of buildings with different neighbourhood settings and RES components.
    - It may be useful to use the NEAD platform application (upgraded however in this matter) for calculating multiple – in the sustainability terms of economic, social, and ecological effects – for assessment, the complex (total concept) renovation of buildings from the so called "affordable housing" sector, e.g., identified in the study for Pomeranian Region.
    - It would be valuable to collect and present in the NEAD platform the data from the audits implemented in the BSR countries, so to prove the advantageous use of monitoring devices for assessment of the energy performance of buildings and auditing other results (e.g., quality of measures tested with dynamic simulation models using the precise data base from monitoring).
    - One could propose that the CAMS concept of auditing could be used for further development of more intelligent facilities /digital tools for energy auditing, benchmarking, and monitoring. As recommended by Long-term Renovation Strategy, such task could be developed with support of the National Smart Specialization program (the digitalisation and automation of the process of energy performance auditing – including software and database tools, which is already enlisted in this facility in Poland).

It would be very profitable for speedier and more effective implementation of "Renovation Wave" in the BSR, if something like Baltic Energy Audit Platform (NEAD platform) was established and maintained not as much as database only, but for broadly conceived communication and cooperation of auditors and other stakeholders of energy performance improvement process. Such platform/database and communication facility could be conceived as administered within the EU Strategy for the Baltic Sea Region (EUSBSR) by Coordinator of Policy Area Energy or Council of the Baltic Sea States (CBSS).

However, the approach to the energy auditing issues prefers the sectorial evaluations and programming, with much use of the market data aggregation and other data processing techniques (like cross sectoral benchmarking, a trendy approach to innovation search and

transfer) it is not clear whether it is relevant for the individual buildings auditing process and preparing the buildings for renovation. The building structures and physics strongly differentiated use and changing behavioural patterns of users, the environmental features etc. are more prone to be tackled with the use of dynamic simulation modelling, social interaction models etc. than statistical data processing, if only such big data are available.

2.5 Sweden

The SPEEED-methodology, "Sector-specific process for Excellent Energy Efficiency Data handling", has been tested, including the NEAD platform for auditing and handling of data. All pilot energy audits for testing were performed for real estate company's SBB properties:

- Horndals Bruk 2:23 and Horndals Bruk 2:24, which consist of five dwellings with the total heated area 7 346 m^2.
- 10 dwellings in Horndal un Fors with the total area of 10 273 m^2.
- Falun 9:19, includes health centre, office building and vehicle repair shop.
- Swan 17 in Falun. The audit was performed for the real estate energy balance with three electricity subscriptions and one local heating system.
- Three real estates in Borlänge:
    - Klövervallen 1 – include seven multi-apartment buildings (three storage) with total heated area 13 285 m^2 and built in 1950s.
    - Ärtskidan 1 (Veteaxet 1) – include six multi apartment buildings (three storage) with total heated area 6 108 m^2 and built in 1950s.
    - Lisselhagen 4 – include three multi-apartment buildings (seven storage). Built in 2013 with total heated area of 7 554 m^2.

The conclusions from the pilot energy audits have been overall positive. The possible way on implementing the platform for further use in Sweden was discussed among relevant public authorities:

- National Board of Housing, Building, and Planning (Boverket).
- Swedish Energy Agency (Energimyndigheten).
- Swedish Environmental Protection Agency (Naturvårdsverket).
- 21 County Administrative Boards of Sweden (Länsstyrelser).
- Regional Energy Agency (Energikontoret Dalarna).
- Energy Auditors (Energikartläggare).

Based on the outcomes of the testing results and discussions among energy auditors, public authorise, and individual organizations, the following main conclusions divided into four categories can be drafted:

- Political:
    - The platform should be established at national level. The main ownership should be by the 21 County Administrative Boards.
    - Such platform will lead to higher quality of energy audits and make benchmarking possible, at the same time as it will generate new knowledge to be used for design of policy and energy efficiency programs (intermediates supporting energy auditing, for example energy agencies). Energimyndigheten should provide data from previous energy audits and use it as the reporting channel for large companies reporting Energy Efficiency Directive data.

    - The platform for energy audits would be valuable to support inspectors with reference data for assessing companies' performance (public authorities responsible for environmental inspections). Naturvårdsverket should use it as a main tool for energy inspections
- Economic: The platform should be publicly owned, since authorities are among key interested stakeholders but the management/service for quality control, digital solutions and support can be outsourced. The cost for maintaining and trainings of the platform should be divided among authorities.
- Social:
    - The platform needs to have different levels of data access. Authorities can have full access, while energy auditors and companies only will have access to anonymized data.
    - The platform should be based on principles above for higher quality of energy audits, including using standardization of data categories, key performance indicator data and control of the data that are uploaded.
- Technical:
    - Platform support benchmarking and economic estimations. It can also function as an inspiration for finding more possible measures (energy auditors).
    - Platform will support visualization, analyses and benchmarking (enterprises).
    - Data from previous energy audits should be uploaded the platform to as large extend as possible.
    - The platform should meet the need for environmental inspection reports, energy audit programs as well as Energy Efficiency Directive. Data from energy audits should be uploaded to the portal and each authority should be able extract the information needed for each need.
    - The platform should be designed for a further step to also include energy performance certificates.

Based on experience and evaluation of the NEAD platform in the CAMS project, a digital platform for handling data in energy audits is highly recommended to be established as a long-term management model.

3 Results of questionnaire

In the report “Energy auditing in the Baltic Sea Region. Status quo report” several points for improvements of data collection from energy audits were indicated as needed on BSR level. Based on these suggestions a simple questionnaire for CAMS project partners were developed regarding the necessity of several improvements’ introduction in each country and their applicability and compatibility with the NEAD platform options for use. It was necessary to understand to what extent the identified improvements (the statements below) for data collection in the CAMS project “Energy auditing in the Baltic Sea Region. Status quo report” are important in each CAMS project partner country and whether the NEAD platform could be seen as a solution for it.

All CAMS project partners ‘agree’ or ‘strongly agree’ that a systematic way of data collecting for further energy data analysis is needed. Moreover, it could be done by using

NEAD platform if few adjustments to the existing NEAD platform version based on the partner NEAD platform testing results would be made (see figure 1).

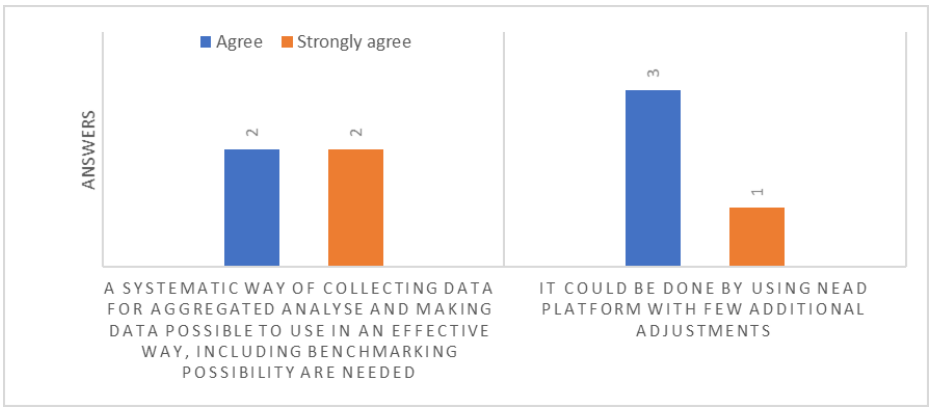

Figure 1: Energy data collection and systematization. NEAD platform usage opportunities.

Although, all partners 'agree' or 'strongly agree' that it is necessary to develop a standardized data collection methodology for data collection and development of national database for benchmarking, there is no common opinion expressed regarding the NEAD platform usage opportunities for this purpose (see Figure 2). Most partners (except one partner) are uncertain whether it could be done via NEAD platform but 'agree' that it would be possible if the platform could be improved.

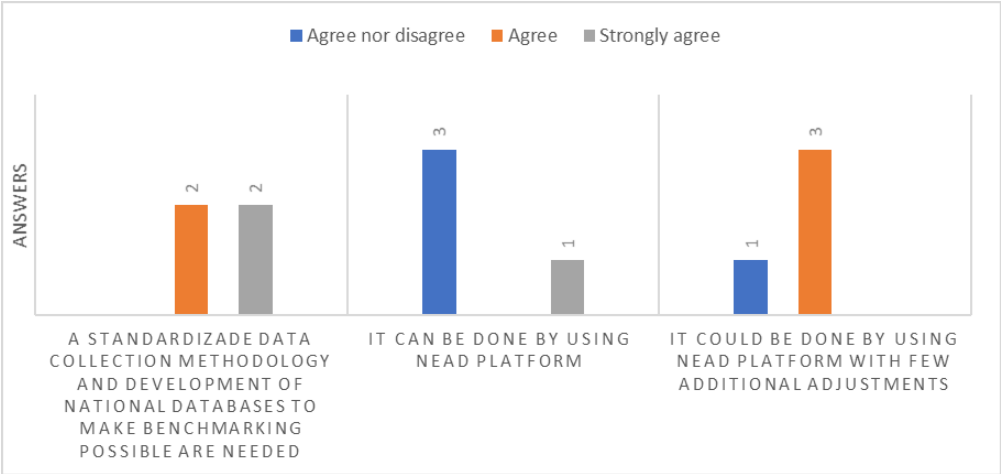

Figure 2: Standardized data collection methodology and national database for benchmarking. NEAD platform usage opportunities.

Another especially important question is regarding the benchmarking necessity on BSR level and the use of NEAD platform for it. As it can be seen from the Figure 3, the partners opinions differ. The majority 'agree' or 'strongly agree' that benchmarking possibilities on BSR level would be an additional motivation to increase the quality of energy audits, but meantime, they are uncertain whether it can be done by using the NEAD platform. Except one partner who sees the NEAD platform as a benchmarking tool on BSR.

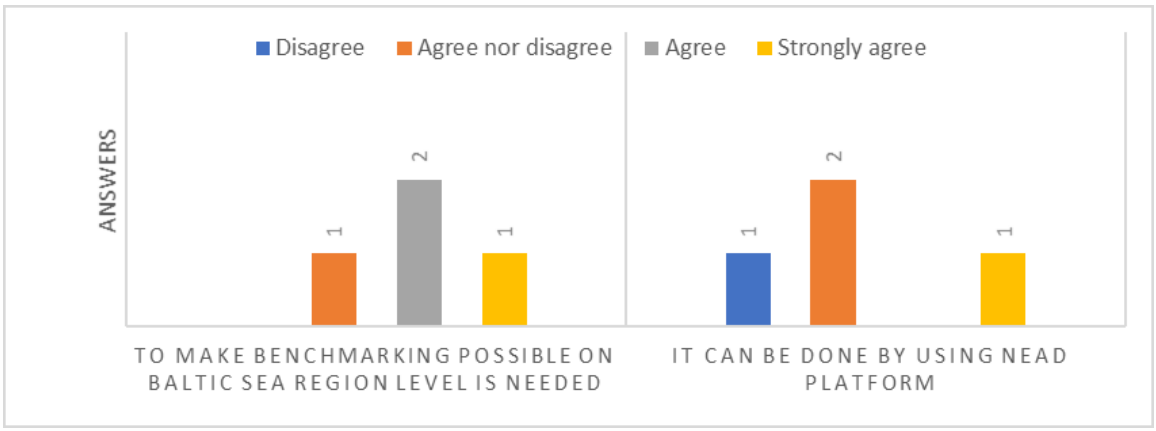

Figure 3 Benchmarking on BSR and NEAD platform usage opportunities

In addition, another two improvements regarding benchmarking opportunities were identified (Figure 4):

- Development of key performance indicators (KPI) for different sectors.
- Benchmarking opportunities across different sectors.

Like previous, the partners 'agree' or 'strongly agree' that the development of sectoral common KPIs are needed for sectoral benchmarking and would help to improve the benchmarking and the analysis of the results. However, one of the partners is not certain whether benchmarking across different sectors is needed.

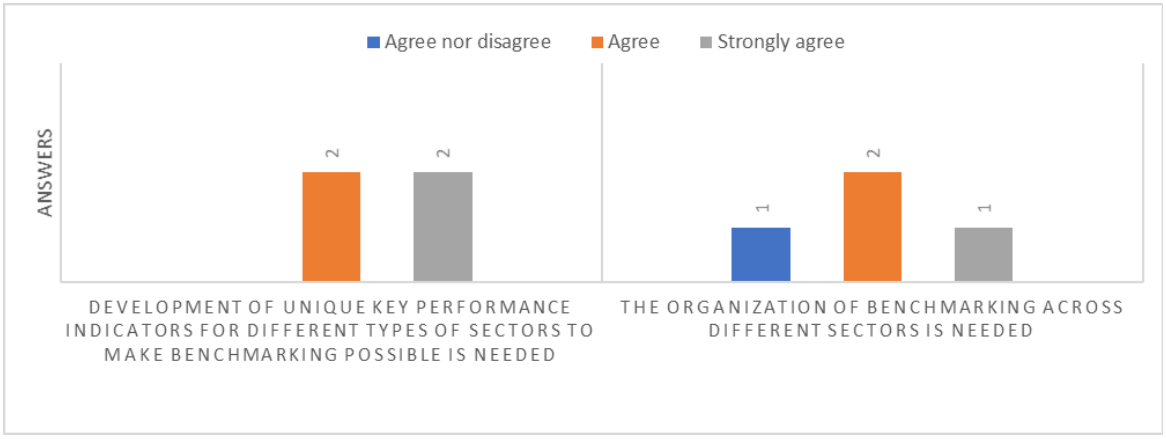

Figure 4 Sectoral benchmarking

Moreover, there is no consensus on the use of NEAD platform for sectoral benchmarking (see Figure5). All partners have different opinion regarding the use of NEAD platform for benchmarking purposes of energy audits for large companies/enterprises and building energy performance certificates (EPCs). More unanimous opinion is regarding benchmarking of data from SMEs energy audits by using NEAD platform. It is more likely that the differences between partner's opinions is due to the type of energy audit and data from energy audits that have been used for the testing of NEAD platform.

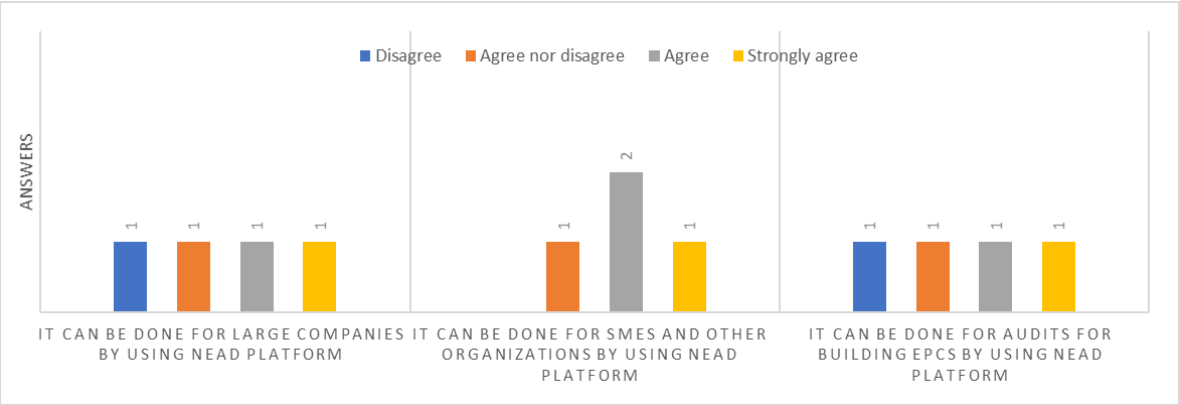

Figure 5 Use of NEAD platform for sectoral benchmarking

Also, the partners from Sweden, do agree that there are large differences in the content and set-up for energy audits in the BSR and it was not foreseen at the beginning of CAMS project. Therefore, NEAD platform is seen more as national platforms. Moreover, the use of the platform can largely benefit if it was based on few common basic principles, including standardized categories of data. It would then enable benchmarking and generation of valuable data for also on EU level.

4 Summary of recommendation in case of NEAD platform introduction in BSR

Based on the input from CAMS project partners regarding the policy recommendations on introduction of NEAD platform in Baltic Sea Region, the main policy recommendations are summarized in Table 2. As CAMS project partners represent different levels of governance and have different historical backgrounds on development of energy auditing practice, a unified approach for BSR level was not obtained. Therefore, in the table below the common opinions or most CAMS partner opinions have been summarized.

Table 2

Summary of the main common opinions for Political, Economic, Social and Technical recommendations

Political	Large differences between information and data that is included in the energy audit reports exists among BSR countries. Although specific requirements for performing energy audits to test the NEAD platform were set, not in all cases they were available. Therefore, in order to use the NEAD platform to its full potential, it is necessary to identify additional common energy data input requirements and set as mandatory that could be included in the energy audit reports equally from all BSR countries. If the use of the NEAD platform is needed to be set as mandatory then the use of it must be determined in the national legislation. Otherwise, the current national legislation is binding for the energy auditors and the NEAD platform will be used only on voluntary basis. However, since most of the CAMS project partner countries have already using an energy audit database or similar platforms to NEAD, the option of introduction of NEAD platform as mandatory is incredibly low. Thus, according to the majority of CAMS project partners opinion (see Chapter 2) it can currently only be seen as a voluntary tool. The introduction of NEAD platform as a nationally used tool for energy auditing in Sweden has been considered. In addition, a political agreement has to be reached between the BSR countries about the financing and management of the platform in order to have NEAD platform operational and useful on BSR level.
Economic	For the maintenance of the NEAD platform on BSR level an long-term financial support must be found either from country contributions or from EU Territorial Cooperation funds like INTERREG BSR. For most of the CAMS project partners it is not clear if and how the NEAD platform would support and facilitate the preparation of energy

	audit reports thus lowering the energy audit costs. Since the NEAD platform is not providing the energy audit calculations but rather requires the data input from already prepared energy audits. Therefore, the provided energy data analysis in the platform depends on the energy audit data quantity and quality and not the other way round. However, in case of Sweden the strong correlation between benchmarking data, calculated energy measure availability within NEAD platform and the energy audit cost reduction has been seen.
Social	The specific cultural characteristics of potential users of each CAMS project country for the use of NEAD platform should be considered, including the language barrier. This would be especially important, if this platform would become as a social communication point for energy auditors and other market relevant actors. The development of training courses (e.g., e-learning) for the potential NEAD platform users on BSR level needs to be considered, also in case if the platform would be used on voluntary basis.
Technical	The suggestions (at least some) for NEAD platform improvements from CAMS project partners should be incorporated and tested again with the pilot energy audits. The possibility to choose the type of building or type of energy audit before performing the data analyses in the NEAD platform must be considered. However, it is closely related to the aim of the NEAD platform and the purpose for its use in each CAMS project partner countries. In order to have a qualitative benchmarking analyses among BSR, the development and definition of specific correction factors (e.g., climate, building usage etc.) have to be considered.

Annex 1: Simple risk assessment

A simple assessment for the introduction of NEAD platform in BSR is made. By the introduction of the platform is understood the situation where it is used on a daily basis by the energy auditors or other relevant experts from all CAMS project partner countries to conduct and prepare an energy audit. As mentioned previously in this report it could be done if the platform would become mandatory nationally and energy auditors are obliged to use it. It would also be the case, if a political agreement for the use of NEAD platform among BSR countries would be reached. Otherwise, the NEAD platform already now could be considered as introduced in the BSR as a voluntary tool, because currently the energy auditors are forced to use the calculation methodologies and existing platforms stated by the national legislation which is binding for them. In addition, the platform has to be adapted to the country specific needs of national energy audit practice or an agreement on common data input requirements from energy audits (calculation methodology) among all BSR countries has to be reached as it was previously mentioned.

For this purpose, a risk assessment matrix is developed with three potential scenarios (S) as briefly described above:

- S1 – the NEAD platform is introduced on BSR level. It is defined by the national legislations, adapted to the country-specific needs and is used by the energy auditors on daily basis to conduct an energy audit. This can be considered as the best-case scenario.
- S2 – the NEAD platform is introduced partly on BSR level. It is defined by the national legislations, but it is not adapted to the country-specific needs but is available for the usage. It could be the case where use of the NEAD platform as it is now is stated by the national legislations, but the CAMS project partner suggestions for NEAD platform improvements based on the testing results have not been adapted, and no common requirements on energy data input from energy audits among all project partner countries have been defined.
- S3 – the NEAD platform is not introduced on BSR level. It is not adapted to the country-specific needs and is not available for the usage. This could correspond to the situation where the NEAD platform as it is now, is used on a voluntary basis in each CAMS partner country as an international data collection tool.

The scenarios are selected from the NEAD platform development point of view and from the majority of CAMS project partners' perspective according to the outcomes of Chapter 2. However, the development of the platform itself does not determine its usage. In this case the users of the NEAD platform will be the independent experts (energy auditors) in the field of companies and building energy efficiency. Thus, it is identified how likely (L) the NEAD platform will be used by the energy auditors according to each above-mentioned scenarios:

- L1 - the likelihood of the NEAD platform usage is high. All or most of the energy auditors are using the platform.
- L2 – the likelihood of the NEAD platform use is average. Only few or small group of energy auditors are using the platform.
- L3 – the likelihood of the NEAD platform use is low. Almost nobody or very few energy auditors are using the platform.

The different colours (see Table 2) in the risk assessments matrix indicates the degree of the potential risk:

- Green colour – there is no risk, or the risk is very low. No further risk analysis of corrective actions should be taken.
- Yellow colour – the risk is average. It is recommended to make in-depth risk analysis and to identify the potential corrective actions.
- Red colour – the risk is high. In-depth risk analysis and identification of the potential corrective actions should be done.

Table 2

Risk assessment matric[3]

Likelihood of the NEAD platform use (L)	Introduction of the NEAD platform (S) on BSR level		
	INTRODUCED (S1)	**PARTLY (S2)**	**NOT INTRODUCED (S3)**
HIGH (L1)	LOW	AVERAGE	HIGH
AVERAGE (L2)	LOW (3)	AVERAGE	HIGH
LOW (L3)	AVERAGE	HIGH (1, 2)	HIGH

According to the above methodology, the following risks of the NEAD platform have been identified:

1. The use of NEAD platform is not set by the national legislation, thus the uptake of the platform will be slow and partly (S2) and the use of the platform by energy auditors will be low (L3), because the energy auditors will use the already existing national databases or similar tools (business as usual).
2. There is no financial or technical support for the maintenance of the NEAD platform on BSR level. Thus, the NEAD platform is introduced partly (S2) because it will not correspond to the country sector specific needs. It is more likely that the platform will be low (L3) used because it will not meet the legal and sector specific requirements.
3. The energy auditors are not trained to use the NEAD platform. The introduction of the NEAD platform is done (S1), but the usage of it may be average (L2) and very low at the beginning.

The highest risks of not implementing the NEAD platform in BSR is if no changes are made to the existing national legislation and the NEAD platform will not be adapted to the country specific needs due to lack of technical and financial support for the adaptation, implementation, and maintenance of the platform. It can be considered that there is no or low risk of the platform implementation, due to the current practice of energy auditors to use the existing platforms.

[3] Resource: https://www.stakeholdermap.com/risk/risk-assessment-matrix-simple-3x3.html and https://www.ccohs.ca/oshanswers/hsprograms/risk_assessment.html

Annex 2: List of stakeholders

The list of stakeholders involved in testing of NEAD platform, evaluating its' applicability to country-specific conditions and formulating opinion and policy recommendations:

Estonia:
- Tartu Regional Energy Agency
- The Ministry of Economy and Communication
- The State Real Estate Ltd
- Estonian Union of Cooperative Housing
- Estonian Society of Heating and Ventilation Engineers, certifying body of auditors
- Talltech
- The Tartu city government, building office
- The Tallinn city government, strategy office
- The Stockholm Environment Institute Tallinn office
- Multiple energy management, engineering and consulting companies
- Energy auditors in their SME

Latvia:
- Ministry of Economics
- The State Construction Control Bureau of Latvia (administrates Building Information System)
- Association of Heat, Gas and Water Technology Engineers of Latvia
- Ltd EKODOMA – engineering consulting company, industry leading energy auditors, researchers.
- Baltic Environmental Forum Latvia
- Regional Energy Agencies.
- Campaign/stakeholder platform "Let"s live warmer!"

Sweden:
- County Administrative Board of Dalarna
- Boverket - National board of housing, building and planning
- Energimyndigheten – Swedish energy agency
- Naturvårdsverket – Swedish environmental protection agency
- Länsstyrelser – 21 County Administrative Boards of Sweden
- Energikontoret Dalarna - Regional energy agency
- Energikartläggare - Energy auditors

Poland:
- Foundation of Energy Saving in Gdansk
- Ministry of Development, Labor and Technology, Department of Low-Emissions Economy (National gov. body responsible for the longterm Renovation Strategy of Buildings)
- Marshal Office of Pomeranian Region, Energy Planning Department
- Regional Fund for the Protection of Environment and Water Management – Energy Advisors team
- Association of Energy Auditors (ZAE)
- Association of Energy Conservation Agencies (SAPE)
- Polish Ecological Club (NGO within the Climate Coalition in cooperation with 25 other NGO's active at the national and transnational level)

- the two municipalities of Sopot and Władysławowo
- the Housing cooperative MSM Szkuner I
- the Real Estate managing company in Gdansk

Russian Federation:
- Peter the Great St.Petersburg Polytechnic University (SPbPU)
- Ministry of Energy
- Committee on Energy and Engineering Support of St. Petersburg
- Committee for the Fuel and Energy Complex of the Leningrad Region
- State budgetary institution "Energy Saving Center" of Saint-Petersburg
- State Treasury Institution of the Leningrad Region "Center for Energy Saving and Energy Efficiency of the Leningrad Region"
- Self-regulatory energy audit organizations
- Energy auditors

The final version of this document will be disseminated not only to the key stakeholders involved in testing NEAD and formulating policy recommendations, but various groups of local, national, and regional experts, policy makers and flagship leaders.

- On local and nation level:
  - Officials in central and local governments
  - Energy auditors
  - Representatives and associations of energy end-users
  - Construction, building, housing, industry and service sector representatives
  - Housing cooperatives, building managers
  - Academic and training institutions

- EU and BSR level policy makers, influencers
  - EUSBSR Policy Area “Energy” and “Climate” coordinators and steering groups
  - European Commission, DG Energy
  - Council of the Baltic States

- BSR flagship leaders
  - Project “AREA 21”
  - Project Effect4buildings – Effective Financing Tools for implementing Energy Efficiency in Buildings