

“Conditions for granting support if application is opened for activity “Conduction of energy  
and resource audits” under measure “Energy and resource efficiency of companies”

## **Requirements for resource audits**

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## 1. Definitions

**EQF** — European Qualification Framework

**Innovation** — use of new ideas and knowledge for implementing novel solutions, which includes the development and upgrade of products and services (product innovation); occupation and expansion of the respective markets (market innovation); creation and introduction of new production, supply, and sales methods (process innovation); innovations in management and the organisation of work (organisational innovation); and development of working conditions and personnel skills (human resources innovation).

**Waste** — substances, objects, or their residues, which are created by human activity and discarded at the time or place they were created. In the meaning of the Waste Act, waste means any movable property or registered ship which the holder discards, intends to, or is required to discard.

**Waste hierarchy** — a five-stage hierarchy where different waste handling activities are arranged in order of priority: prevention of waste generation — preparing for re-use — recycling — other recovery (e.g. burning, backfill) — disposal to landfills.

**Professional certificate** — a document which verifies the correspondence of the person with the occupation to the requirements established in the occupational standard.

**Resources** — available means and supplies of production in the most general sense. In production, resources mean all the production factors necessary for the manufacturing of products and services.

**Production residue** — a material or other resource which is not produced intentionally but which is left over from the production process (e.g. warm water, residual heat, sawdust, carbon dioxide).

**Production facility** — a separate complex of buildings, civil engineering works, or equipment, the independence of which enables calculating the economic indicators of the facility — production volumes, costs and revenue, and the investment made can be handled as a complete solution.

## 2. General

A resource use analysis focuses on the reduction of the resource intensity of a company, which should make the functioning of the company more cost-efficient. Economic growth must increasingly consist of a better use of resources. The aim of this guide is to ensure a consistently high quality of the resource use analyses of companies. As a result of the analysis, proposals shall be made for a resource-saving project or projects that the company should implement. The resource use analysis is divided according to the level of detail: preliminary and detailed analyses, which will be carried out by a competent and independent auditing team (hereinafter the team), ensuring the uniformity of the analysis and the reliability of the results. If a preliminary analysis looks at a company as a resource user as a whole, then a detailed analysis may concentrate on a lower level, i.e. a production facility or production process, depending on the resource intensity of the company. The difference between preliminary and detailed analyses lies primarily in the level of detail of handling the data, resources, and processes, as well as the performed measurements and the stages and thoroughness of the analysis (see Annex 1). The concept of an audit is used in a simplified manner in the energy and resource efficiency measure, as its primary objective is to prepare a resource use overview and analysis of a company, production facility, or production process and not to audit the economic activities in the traditional meaning of the term.

A resource use analysis, or a resource audit is a systematic procedure which:

- gives an adequate overview of the existing use of resources in the object to be analysed;
- is based on the input-output flow analysis of the object to be analysed;
- establishes the factors that influence the use of resources;
- determines and ranks the potential resource-saving measures.

A resource use analysis that is prepared based on the given methodology shall also correspond to the requirements of the Energy Sector Organisation Act (ESOA), which means that in assessing an energy resource, the analysis shall meet the minimum requirements of an energy audit.

These requirements include that the analysis shall:

- be based on updated, measured, reliable, and traceable data;
- map all input and output flows of the company in order to enable preparing a evidence-based overview of the general resource use and to reliably determine the most important options for achieving a saving in resources and improving energy efficiency;
- as an important part, include an energy audit that includes a detailed overview of the energy consumption profile of the buildings or groups of buildings, industrial processes or plants, including the transport of the company;
- to the greatest possible extent be based on not just the payback period but on the life-cycle cost analysis in order to consider, among other things, long-term saving, residual values of long-term investments, and discount rates;
- use verifiable calculations about the planned measures in order to present clear information about possible resource saving;

- be consistent, i.e. it must be possible to maintain the data used in the analysis for future analyses and for the purpose of monitoring the results.

## **2.1. Preliminary resource use analysis**

Preliminary resource use analysis is intended for companies that do not have previous analyses and/or sufficient certainty for the necessity of investments made in the framework of the resource-saving projects, whereas the analysis:

- gives an overview of the activities and future plans of the company;
- maps the current use of resources of the company;
- describes the potential resource-saving options;
- briefly describes potential resource-saving projects.

## **2.2. Detailed resource use analysis**

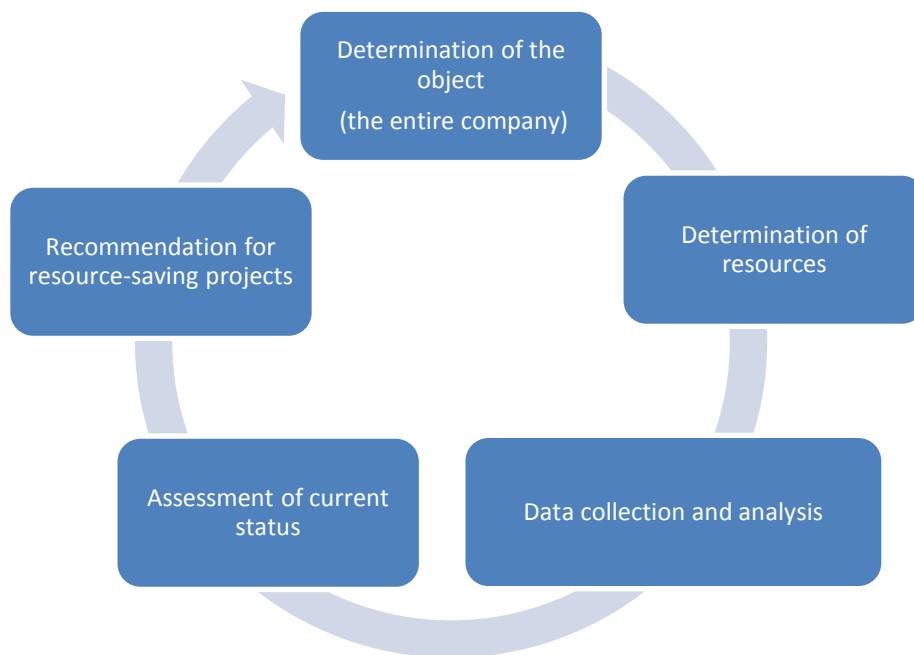
Detailed resource use analysis focuses on an area of activity/activities which is/are defined in the previously prepared preliminary resource use analysis, or other previously conducted analyses which are prepared with regard to the resource use of the company, and:

- gives an overview of the activities and future plans of the company;
- based on previously conducted analyses, gives an overview of the resource use of the company and possible resource-saving projects based on different objects and resources of the company;
- chooses the important object(s) and resources for detailed resource use analysis and justifies the choice;
- analyses the current resource use of the chosen object in detail and prepares the base scenario(s) for resource use (based on different resources);
- takes into consideration the characteristics of production (e.g. recurrence);
- determines the production and production unit of the chosen object(s);
- prepares and describes the resource-saving project(s) for the object(s) together with the achieved saving (difference between the resource use of the base scenario and the project scenario), the estimated cost, the payback time, and the accompanying risks;
- based on the analysis results, chooses the resource-saving project(s) that are to be implemented immediately or later in the occurrence of certain circumstances;
- prepares the sensitivity analysis of the chosen project(s) (e.g. by changing the revealing rate of the saving, the level of the project investments or current costs, etc.) in order to assess the impact of the variability of the chosen variables on the profitability of the project;
- prepares the action and monitoring plan necessary for the implementation of the chosen project(s).

Only a report corresponding to the requirements for the detailed resource use analysis can serve as a basis for submitting an application for financing a resource-saving project in the future.

### 3. Guide for the preparation of a preliminary resource use analysis

A preliminary resource use analysis consists of the determination of the object and resources, data collection and analysis, assessment of the current status, and recommendations for resource-saving projects. The quality of the analysis also depends on the client, as the enterprise plays a major role in ensuring the accuracy and quality of source data. Stages of the analysis are presented in Figure 1.



**Figure 1.** Stages of a preliminary resource use analysis

#### 3.1. Requirements for the performer of the analysis

The team preparing the preliminary audit consists of one or several competent and independent specialists who may not be related to the owner or management of the company to be analysed, the manufacturer of products, supplier, installer and/or maintenance specialist related to the company to be analysed or to the implementers of the solutions of the potential resource-saving project(s) in an extent that would create doubts about the independence and impartiality of the team members (submit a respective written confirmation).

Forming a team is in the competence of the lead auditor. The team is formed based on the needs of the company, the resources and processes to be analysed, the general work volume, the areas of activities and technologies to be analysed. A justification for forming the team and the selection of team members together with the description of the roles and activities will be added to the report. The formed team shall correspond to the minimum competence requirements defined in legal acts (e.g. the Building Code), provided that such requirements have been established.

Requirements for the team:

- the team (lead auditor and team members) shall have the knowledge and skills in at least the following topics:
  - performance of energy and organisation audits;
  - risk assessment and economic analysis;
  - life cycle analysis, principles of environmental audits and their implementation;
  - based on the company to be analysed, competence at the required level in the field of construction, real estate, geomatics, energy, technology, production, processing, etc.
- the lead auditor (team leader) has at least:
  - experience in project management;
  - undergone a training related to resource management;
  - a professional certificate of an accredited engineer (EQF level 8) in one of the following areas:
    - construction, architecture, real estate, and geomatics;
    - energy and electricity;
    - technology, production, and processing.

### **3.2. Determination of the object**

The object investigated during a preliminary resource use analysis is generally the entire company. In certain cases, the production facility/facilities can also be determined as the objects. The basis and reasons for determining the object and the data presented by the client shall be described in the report.

In cooperation with the company, the team determines the object based on the following aspects:

- characteristics of the company;
- location and placement of the company (e.g. whether all the objects of the company are located on one territory or in different locations);
- availability and integrity of detailed resource data;
- objectives set in the preliminary resource use analysis.

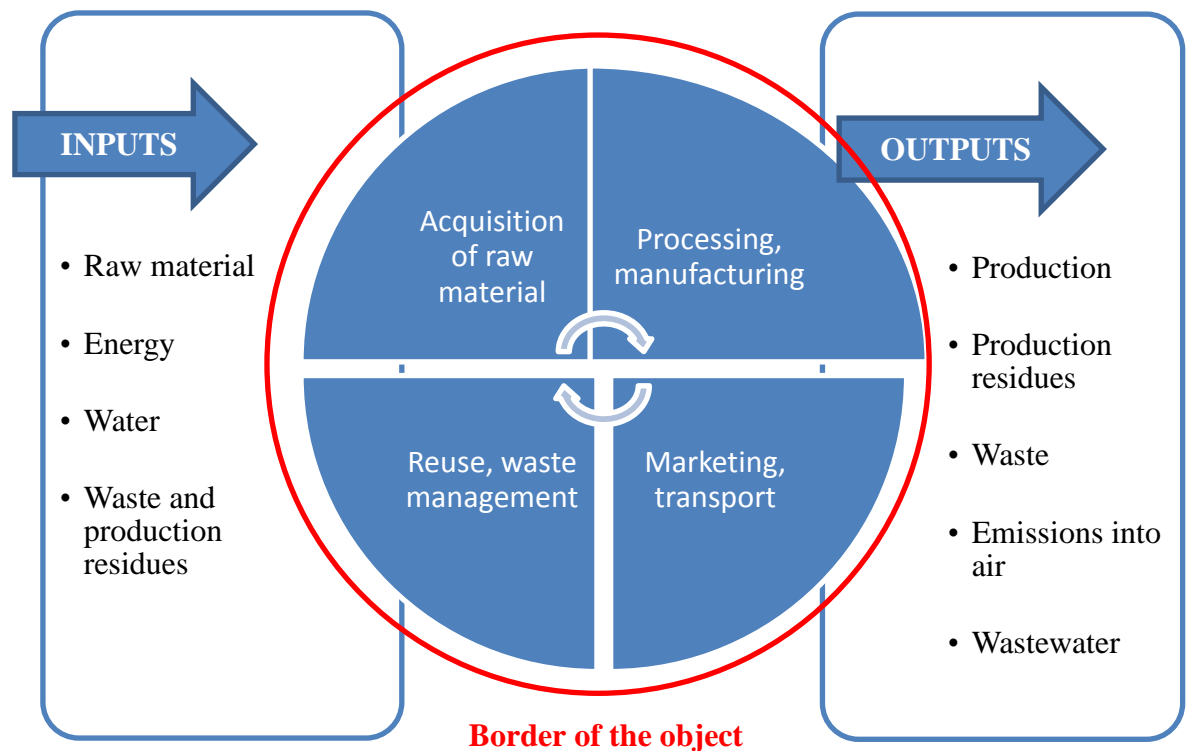
Among other information, the client shall make at least the following data available for the team:

- a detailed description of the company, its units, and processes;
- border(s) of the object(s) and the descriptions of input and output flows;
- general data of the company;
- other information necessary for the preparation of the analysis.

### 3.3. Identification of resources

All resource flows related to the object to be analysed shall be described in the resource use analysis report (the possible border of the object together with potential input and output flows is provided in Figure 2). If it is decided that some resources will be excluded from the analysis, this decision shall be accounted for in the report and respective clarifications shall be added. Generally, only resources (those with small volumes), which are irrelevant in the economic activities of the company or the production facility and which do not have a significant impact on the total resource use of the company, may be left out of the analysis. The resources handled in the framework of the preliminary resource use analysis may be the following:

- raw material (primary and secondary);
- electricity and heat;
- water (including wastewater);
- waste and production residues (taking into consideration the principles of waste hierarchy).



- **Figure 2.** Input and output flows of the production process and the border of the object to be assessed

### **3.4. Assessment of current status**

In order to obtain an overview of the object and its flows, the current status of the object is assessed. It is recommended to prepare a block diagram or a scheme of source streams, which indicate the different production facilities, the input and output flows, and the borders of the object.

The following activities will be performed when assessing the current status of the company:

- an on-site inspection (including measurements if necessary);
- the current resource use of the object will be mapped for at least one full year and, if possible, for a longer period of time on a monthly basis (as an exception, short-term and measured data about individual processes may be used if the used period of time gives a sufficient overview of the resource flows and the factors influencing it);
- data about all the input and output flows will be collected and analysed and as a result, an assessment will be given to the current resource use status (invoices, cost documents, measurement results, etc.);
- quantitative indicators will be determined (the quantity of used resources);
- qualitative indicators will be determined (where and how the different resources have been used).

### **3.5. Recommended resource-saving projects**

As a result of the preliminary resource use analysis, resource-saving measures for companies will be recommended based on objects(s) and resources. A project / projects will be formed based on the measures, which include at least the following:

- a recommended action plan (description of activities);
- potential saving of resources;
- estimated cost;
- estimated simple payback time;
- the accompanying risks and hazards that may influence the saving of the project resources;
- unambiguous information about which resource-saving projects are reasonable to implement first and for which a more detailed resource use analysis needs to be prepared.



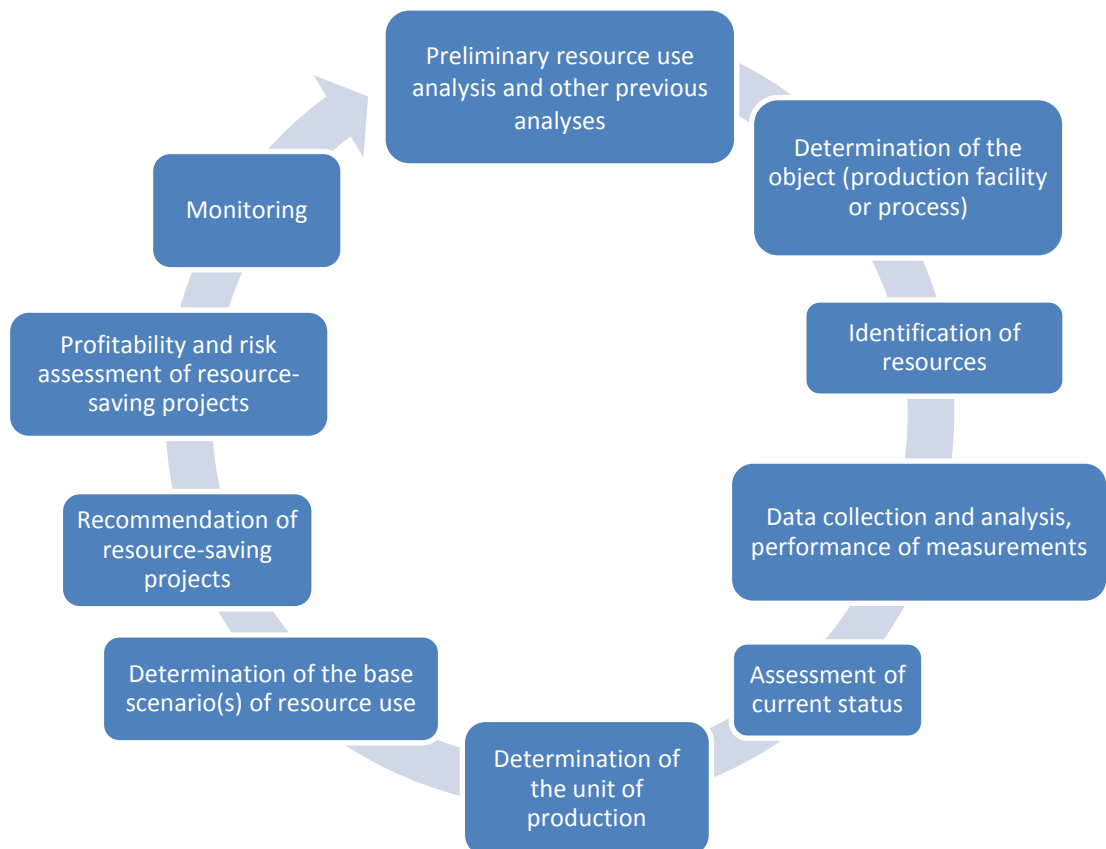
### 3.6. Report

As the result of the preliminary resource use analysis, a report will be prepared, which must include the following:

- introduction (including the purpose for preparing the analysis, names and professional certificate numbers of the persons preparing the analysis (including all the involved specialists));
- summary;
- characterisation of the company (including the structure and economic indicators of the company);
- previous resource-saving analyses and activities of the company;
- the object to be analysed (including buildings, processes, and production, and an explanation of the bases for choosing the object to be analysed);
- on-site inspection, the performed measurements, and results (including the origin of the data serving as the basis for the analysis and an overview of the performed measurements and the general principles for the performance of measurements);
- resource use based on different resources (raw material, energy, water, waste) (including an explanation of the bases for choosing the resources to be analysed);
- recommended resource-saving projects (including an explanation of the bases for preparing the packages of resource-saving measures and an assessment thereof) and other general recommendations;
- annexes (e.g. photos, charts, measurement data, data tables, confirmation letters about the independence of the team, a confirmation letter from the company about the accuracy of the analysis input data, etc.).

#### 4. Guide for the preparation of a detailed resource use analysis

A detailed resource use analysis consists of the descriptions of previous analyses (generally the entire company, may also be prepared by the company itself), the determination of the object and resources, data collection and analysis, performance of measurements, assessment of the current status, determination of the unit of production and resource use base scenario(s), recommendations for resource-saving projects, the assessment of their profitability and risks, and the post-project monitoring of the saving of resources. The quality of the analysis also depends on the client, as it is the company that plays a major role in ensuring the accuracy and quality of source data. Stages of the analysis are presented in Figure 3.



**Figure 3.** Stages of a detailed resource use analysis

#### 4.1. Requirements for the performer of the analysis

The team preparing the detailed audit consists of one or several competent and independent specialists who may not be related to the owner or management of the company to be analysed, the manufacturer of products, supplier, installer and/or maintenance specialist related to the company to be analysed or to the implementers of the solutions of the potential resource-saving project(s) in an extent that would create doubts about the independence and impartiality of the team members (submit a respective written confirmation).

Forming a team is in the competence of the lead auditor. The team is formed based on the needs of the company, the resources and processes to be analysed, the general work volume, the areas of activities and technologies to be analysed. A justification for forming the team and the selection of team members together with the description of the roles and activities will be added to the report. The formed team shall correspond to the minimum competence requirements defined in legal acts (e.g. the Building Code), provided that such requirements have been established.

Requirements for the team:

- the team (lead auditor and team members) shall have the knowledge and skills in at least the following topics:
  - performance of energy and organisation audits;
  - risk assessment and economic analysis;
  - life cycle analysis, principles of environmental audits and their implementation;
  - based on the company to be analysed, competence at the required level in the field of construction, real estate, geomatics, energy, technology, production, processing, etc.;
  - one of the team members has at least one of the following professional certificates:
    - EQF level 8 — accredited energy efficiency specialist;
    - EQF level 7 — certified energy efficiency specialist;
    - level V — certified energy auditor
- the lead auditor (team leader) has at least:
  - experience in project management;
  - undergone a training related to resource management;
  - a professional certificate of a accredited engineer (EQF level 8) in one of the following areas:
    - construction, architecture, real estate, and geomatics;
    - energy and electricity;
    - technology, production, and processing.

## **4.2. Determination of the object**

The object(s) investigated in the framework of the detailed resource use analysis may be a production facility / production facilities or a production process / production processes. The bases and reasons for determining the object and the data presented by the client shall be described in the report.

In cooperation with the company, the team determines the object based on the following aspects:

- preliminary resource use analysis or other previous analyses;
- characteristics of the company;
- location and placement of the company (e.g. whether all the objects of the company are located on one territory or in different locations);
- availability and integrity of detailed resource data;
- the objectives set in the detailed resource use analysis.

Among other information, the client shall make at least the following data available for the team:

- a detailed description of the company, its units, and processes (including the selected object);
- border(s) of the object(s) and the descriptions of input and output flows;
- general data of the company;
- other information necessary for the preparation of the analysis.

## **4.3. Identification of resources**

All resource flows related to the object to be analysed shall be described in the resource use analysis report (the possible border of the object together with potential input and output flows is provided in Figure 2). If it is decided that some resources will be excluded from the analysis, this decision shall be accounted for in the report and respective clarifications shall be added. Generally, only resources, which are irrelevant in the economic activities of the company or the production facility and which do not have a significant impact on the total resource use of the company, may be left out of the analysis. The analysis only focuses on the resources that have a significant impact on the economic indicators of the selected object.

The resources handled in the framework of the detailed resource use analysis may be the following:

- raw material (primary and secondary);
- electricity and heat;
- water (including wastewater);
- waste and production residues (taking into consideration the principles of waste hierarchy).

#### **4.4. Assessment of current status**

In order to obtain an overview of the object and its flows, the current status of the object is assessed. It is recommended to prepare a block diagram or a scheme of source streams, which indicate the different production facilities, the input and output flows, and the borders of the object.

The following activities will be performed when assessing the current status of the company:

- an on-site inspection (including the measurements);
- the current resource use of the object will be mapped for at least one full year and, if possible, for a longer period of time on a monthly basis (as an exception, short-term and measured data about individual processes may be used if the used period of time gives a sufficient overview of the resource flows and the factors influencing it);
- data about all the input and output flows will be collected and analysed and as a result, an assessment will be given to the current resource use status (invoices, cost documents, measurement results, etc.);
- quantitative indicators will be determined (the quantity of used resources);
- qualitative indicators will be determined (where and how different resources have been used);
- the base scenarios of the significant resources used will be determined.

#### **4.5. Recommended resource-saving projects**

As a result of the detailed resource use analysis, resource-saving measures for companies will be recommended based on objects(s) and resources. A project / projects will be formed based on the measures, which will be put in order based on the possibilities of the company and the significance of the projects. A project description shall be prepared for each project, which shall include at least the following:

- a detailed action plan (detailed description of activities, including the comparison of alternatives);
- identification of the production of the selected object(s) and the unit of production;
- an assessment of the resource-saving potential, which determines the following:
  - base scenario of resource use (based on resources);
  - the use of each resource after the preparation of the project;
  - the saving of resources occurring during the life cycle of the project (investment) based on resources (difference between the resource use of the base scenario and the project scenario).
- the cost (including the cost of the initial investment, current costs);
- payback time;
- the accompanying risks and hazards that may influence the saving of resources;
- a sensitivity analysis (e.g. by changing the revealing rate of the saving, the level of the project investments, or current costs, etc.) in order to assess the impact of the variability of the chosen variables on the profitability of the project. The state aid requirements regulating the amount of support shall also be taken into consideration;
- a monitoring plan for the saving of resources;

- unambiguous information about which resource-saving projects are reasonable to implement first and which should be implemented later in the occurrence of certain circumstances;
- the contribution of the project to the increase of the productivity of the resource (€/kg, €/unit of production, relative quantities);
- the innovation aspect of the project.

#### **4.6. Monitoring plan**

A monitoring plan shall be prepared for the resource-saving project(s) prepared as a result of the detailed resource use analysis in order to monitor resource efficiency and to achieve a saving in resources. The data available for the monitored object and resources must be as solid as possible. It is recommended to prepare a monitoring plan for each object. In addition, the possibility to use ICT solutions and the costs thereof will be assessed in order to simplify the reporting.

A monitoring plan includes at least the following:

- indicators characterising the saving of resources by the project (based on resources, in a more detailed way if necessary);
- a five-year plan to assess the achievement of the objectives of the project (starting from the date of making the investment);
- what and how to measure — the monitoring technology (including the monitoring of the saving of resources per one unit of production);
- when to measure — monitoring frequency (at least once a year).

#### **4.7. Report**

As a result of the detailed resource use analysis, a report will be prepared, which shall include the following:

- introduction (including the purpose for preparing the analysis, names and professional certificate numbers of the persons preparing the analysis (including all the involved specialists));
- summary;
- characterisation of the company (including the structure and economic indicators of the company);
- previous resource-saving analyses and activities of the company;
- the object to be analysed (including buildings, processes, and production, and an explanation of the bases for choosing the object to be analysed);
- on-site inspection, the performed measurements, and results (including the origin of the data serving as a basis for the analysis and an overview of the performed measurements and the general principles for the performance of measurements);
- resource use based on different resources (raw material, energy, water, waste) (including an explanation of the bases for choosing the resources to be analysed);

- description of resource-saving projects in accordance with chapter 4.5 (separately based on projects — project 1, project 2, etc., including an explanation of the bases for preparing the packages of resource-saving measures and an assessment thereof);
- comparison and rating of resource-saving projects (including the mutually exclusive effect of the projects);
- general recommendations (including the saving potential of the company);
- annexes (e.g. photos, charts, measurement data, data tables, confirmation letters about the independence of the team, a confirmation letter from the company about the accuracy of the analysis input data, measures excluded from resource-saving projects, etc.).

### Annex 1. Difference between a preliminary and detailed resource audit

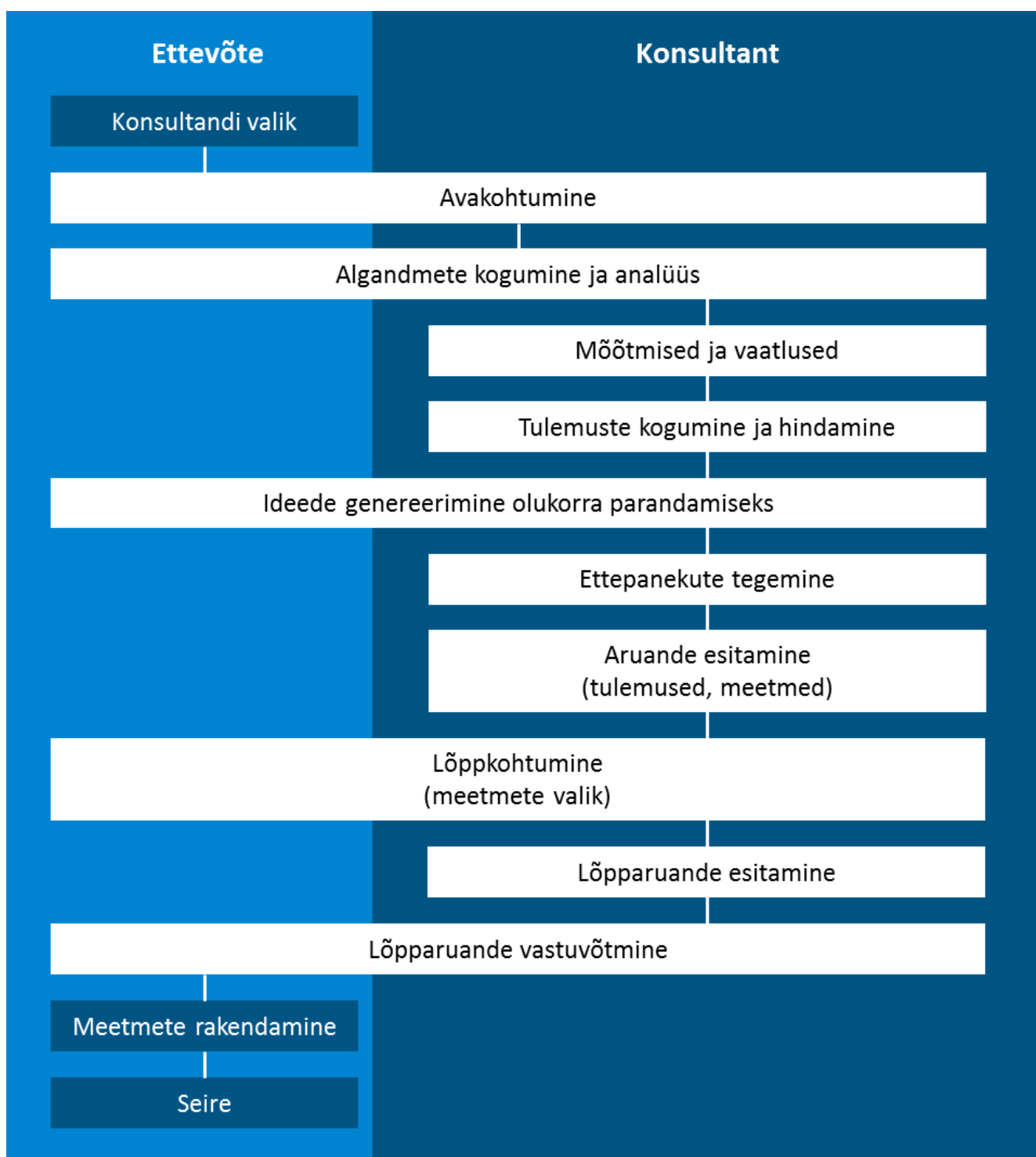
**Table 1.** Main differences between a preliminary and detailed resource use analysis (resource audit).

	<b>Preliminary resource use analysis</b>	<b>Detailed resource use analysis</b>
Analysis starting point	There are no previous analyses about the use of resources and resource efficiency or such analyses are outdated. In addition, the company often has no management systems.	Is based on the previously prepared preliminary resource use analysis or other analyses, which give an overview of the resource use of the company.
Team of auditors	The team leader is at the level of a accredited engineer, depending on the area of activity of the - company.	The team leader is at the level of a accredited engineer, depending on the area of activity of the company. At least 1 member is either an energy efficiency specialist or an energy auditor.
Determination of the object	Generally, the entire company or production facility/facilities.	Production facility/facilities or production process(es).
Identification of resources	In cooperation with the company, based on the peculiarity of the company and its input and output flows.	In cooperation with the company, based on the peculiarity of the company and its input and output flows, and depending on the object serving as the focus of the analysis, focusing solely on significant resources.
Measurements	Measurements are generally not necessary; instead, short-term measurements based on larger resource consumers are performed.	If necessary, perform additional measurements in order to get sufficiently detailed and reliable data about the resources and processes that allow assessing resource-saving projects. If possible, continuous measurements are used.
Assessment of current status	In order to assess the current status, the current use of resources by the company (the selected object) will be mapped for at least one full year and, if	In order to assess the current status, the current use of resources by the selected object will be mapped for at least one full year on a monthly basis. Determination of the base scenario(s) of resource use.

	<b>Preliminary resource use analysis</b>	<b>Detailed resource use analysis</b>
	possible, even for a longer period of time on a monthly basis.	
Determination of the unit of production	<i>Not applied</i>	In order to find the potential for saving resources, a unit of production of the selected object will be determined, based on which the resource use will then be analysed.
Potential for saving resources	The potential saving of resources will be assessed.	For assessing the detailed resource-saving potential, the base scenario of resource use (based on resources) and the use of each resource after the end of the project, as well as the saving of resources occurring during the life cycle of the project (investment) based on resources (difference between the resource use of the base scenario and the project scenario) will be determined.
Recommendation of resource-saving project(s)	As a result of the analysis, resource-saving measures will be recommended based on the object(s) and resources. A project description will be prepared for each project, which includes the description of the activities, the resource-saving potential, the estimated cost and simple payback time, and the accompanying risks and hazards. In addition, recommendations for the detailed resource use analysis. Comparison with a comparable company.	As a result of the analysis, detailed resource-saving measures will be recommended based on the object(s) and resources. A project description will be prepared for each project, which includes a detailed description of the activities, determination of the production and the unit of production, the resource-saving potential, the cost and payback time, the accompanying risks and hazards, the sensitivity analysis, the comparison of alternatives based on measures, the monitoring plan, and the contribution of the project to the increase in the rise of the productivity of the resource. The projects will be put in order based on the possibilities of the company and the significance of the projects. In addition, the mutually exclusive effect of the projects will be assessed.
Assessment of the profitability of a resource-saving project	An estimated simple payback time will be determined.	In addition to the simple payback time, the discounted cash flow models (IRR, NPV, etc.) are also be used for assessing the resource-saving project(s). The economic calculations for the object and resource(s) determined above are performed based on the unit(s) of production.
Monitoring plan	<i>Not applied</i>	A monitoring plan will be prepared for resource-saving projects in order to monitor resource efficiency and the achievement of saving in - resources. The data available for the monitored object and resources shall be as reliable as possible. The monitoring plan shall include a detailed description of the data of processes and resources and the frequency of the monitoring methodology.



## Annex 2. Possible stages of a resource audit



*/figure:/*

Company

Consultant

Selection of consultant

First meeting

Collection and analysis of source data

Measurements and observations

Collection and assessment of results

Generating ideas for improving the situation

Making proposals

Submitting the report (results, measures)

Final meeting (selection of measures)

Submission of final report

Acceptance of final report

Implementation of measures

Monitoring