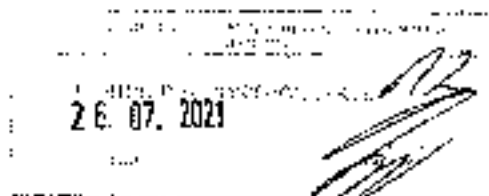




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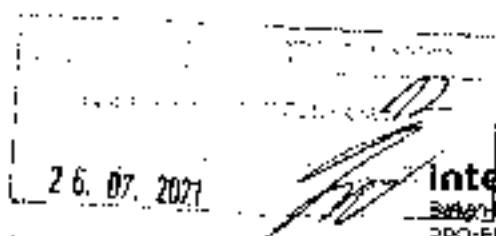
PRO-ENERGY - PROMOTING ENERGY EFFICIENCY IN PUBLIC BUILDINGS OF THE BALKAN-MEDITERRANEAN TERRITORY

Work Packages:	WP4- Capacity Building for Energy Managers
Activity:	4.2. Capacity Building for Energy Managers Training Curricula
Activity Leader:	Department of Electrical and Mechanical Services - Ministry of Transport, Communications and Works
Deliverable:	D4.4.2 Training Curricula

Version:	Draft 1.0	Date:	11/06/21
Type:	Report		
Availability:	Confidential		
Responsible Partner:	Department of Electrical and Mechanical Services		
Editor:	Frederick University		

PROJECT

PRO-ENERGY - Projekt "Realizacja zadań z zakresu OZE w powiecie
 węgrowskim"



Wzrost	180
Waga	75
CIężar ciała	22,2
CIężar ciała	22,2

Wzrost	180	Wzrost	180
Waga	75	Waga	75
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UWAGA
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IDENTIFICATION SHEET

Project No. 01	
Project Name	
Project Title	

Project Manager	Prof. Dr. ...
Coordinator	...
Administrative	...
Top	...
Chairman	...
Members	...
Secretary	...
Chairman	...
Members	...
Secretary	...

SECTION 1

1. Steps

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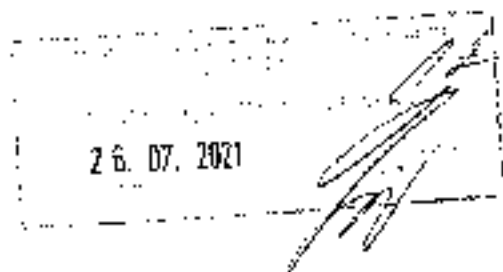
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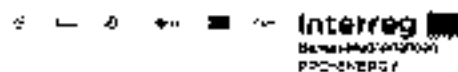
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3. Legislative framework for energy efficiency

3.1 Legislative framework for energy efficiency at EU level



Legislative framework for energy efficiency at EU level

Module 1.a



Module 1.a.1



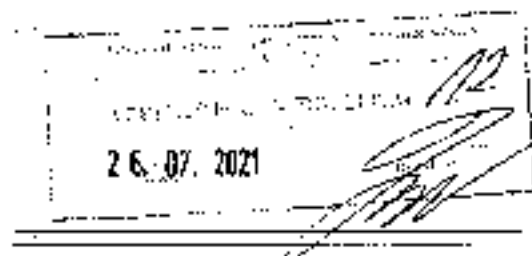
- State of the art: EU Performance Indicators, the knowledge on energy efficiency at EU level
- Review of developments in the policies, guidelines and regulations at EU level, the implementation of



Learning outcomes and key words (1/2)


At the end of the training you should know and understand the following terms and definitions:

- Energy efficiency
- Energy performance of building



Learning Outcomes of Energy (1/2)

Energy efficiency: Energy saving
regulation: Energy efficiency
framework: Energy efficiency
implementation: Energy efficiency




Measures adopted under Energy Efficiency Directive (1/2)

Measures adopted under Energy Efficiency Directive (1/2)



Energy efficiency Directive (2018/2002/EU)

Energy efficiency Directive (2018/2002/EU)



Measures adopted under Energy Efficiency Directive (2/2)

Measures adopted under Energy Efficiency Directive (2/2)



Measures adopted under Energy Efficiency Directive (2012)

An important element of the Energy Efficiency Directive is the introduction of energy audits for large enterprises

with more than 250 employees and/or turnover

exceeding 50 million EUR. The audits should identify energy saving opportunities and actions.



Clean Energy for all Europeans package (2018) (2018)

Energy efficiency is a key element of the Clean Energy for all Europeans package. The package includes:

Energy Efficiency Directive (EED) (2018/2002/EU)

Energy Efficiency Regulation (EER) (2018/910/EU)

Energy Efficiency Regulation (EER) (2018/910/EU)



Directive 2008/48/EC (1/2)

Consumer Credit Directive (2008/48/EC)

Directive 2008/48/EC

Consumer Credit



Consumer Credit

Consumer Credit

Directive 2008/48/EC

Consumer Credit Directive (2008/48/EC)

Consumer Credit Directive (2008/48/EC)

Consumer Credit Directive (2008/48/EC)

Consumer Credit Directive (2008/48/EC)

Directive 2008/28/EC (2/2)

Directive 2008/28/EC

Directive 2008/28/EC

Directive 2008/28/EC

Directive 2008/28/EC

Directive 2008/28/EC

Directive 2008/28/EC

Directive 2008/28/EC

Directive 2008/28/EC

Directive 2008/28/EC

Directive 2008/28/EC

EU energy production grade (1/2)

Total of A+ energy grade (10, 10.5, 11, 11.5, 12, 12.5, 13, 13.5, 14, 14.5, 15)

Other EU energy grades (10.5, 11, 11.5, 12, 12.5, 13, 13.5, 14, 14.5, 15)

Directive 2018/54/EC (2018)



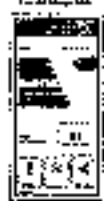
EU energy production grade (2/2)

Directive 2018/54/EC



EU energy production grade (2/2)

How to recognise a rated product?



The product energy efficiency class is indicated by the energy label.

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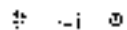
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1.2 Legislative framework for energy efficiency at national level

2.2.1 Greece



Legislative framework for energy efficiency at national level (Greece)

Module 1.3

11/11/2016

6/2/2017 11:43



- Identify the main energy efficiency instruments and the role of the state or national level and the regional level (Greece, Transnational case)
- Identify the main role of the authorities, guidelines and regulations to fulfill the energy efficiency and building goals



Learning outcomes and keywords (1/2)

Trainees are expected to understand, explain and apply the following concepts:

- Energy efficiency
- Energy conservation in building



Learning outcomes and keywords (2/2)

Energy efficiency Energy saving
Legislation Energy certificate
Benchmark
European directives



Introduction (1/2)

11/11/2016 11:43



11/11/2016 11:43
2016-2020

11/11/2016 11:43
11/11/2016 11:43



Introduction (2/2)

11/11/2016 11:43
2016-2020



11/11/2016 11:43
2016-2020

Energy Efficiency Regulation of Buildings (ENAB) (1/2)

11/11/2016 11:43
2016-2020

11/11/2016 11:43
2016-2020

11/11/2016 11:43
2016-2020



Energy Efficiency Regulation of Buildings (KENAKI 17/17)

1. **Kenya Energy Efficiency Regulatory Board**
2. **Kenya Energy Efficiency Regulatory Board**
3. **Kenya Energy Efficiency Regulatory Board**

- 1. **Kenya Energy Efficiency Regulatory Board**
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- 3. **Kenya Energy Efficiency Regulatory Board**



Energy efficiency policy making trends

Covenant of Mayors for Climate and Energy (17/2)



1. **Kenya Energy Efficiency Regulatory Board**
2. **Kenya Energy Efficiency Regulatory Board**

- 1. **Kenya Energy Efficiency Regulatory Board**
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Covenant of Mayors for Climate and Energy (2/2)



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- 1. **Kenya Energy Efficiency Regulatory Board**
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- 3. **Kenya Energy Efficiency Regulatory Board**



Energy Communities Framework

1. **Kenya Energy Efficiency Regulatory Board**
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TO THANK YOU!



Legislative framework for energy efficiency at national level (Cyprus)

Module 1.0

Module 1.0



- Review of the main EU and national policies, instruments for the energy efficiency of buildings at national level (Cyprus)
- Identify the main role of the operators, guidelines, and regulatory instruments in Cyprus

Interreg
EURO-MEDITERRANEAN
OPERATIONAL PROGRAM

Learning objectives and keywords (1/2)

Review of the main EU and national policies, instruments for the energy efficiency of buildings at national level (Cyprus)

- Energy efficiency
- Energy performance certificate

Interreg
EURO-MEDITERRANEAN
OPERATIONAL PROGRAM

Learning objectives and keywords (2/2)

Energy efficiency legislative framework European Directives Energy saving Green certificates

Interreg
EURO-MEDITERRANEAN
OPERATIONAL PROGRAM

Introduction (1/2)

Energy efficiency in buildings

Energy efficiency in buildings is a key element of the EU energy policy, which aims to reduce greenhouse gas emissions and improve energy security. The EU has set a target of 32.5% energy efficiency in buildings by 2030. This target is supported by the Energy Efficiency Directive (EED) and the Energy Performance of Buildings Directive (EPBD).

Interreg
EURO-MEDITERRANEAN
OPERATIONAL PROGRAM

Introduction (2/2)

Energy efficiency in buildings is a key element of the EU energy policy, which aims to reduce greenhouse gas emissions and improve energy security. The EU has set a target of 32.5% energy efficiency in buildings by 2030. This target is supported by the Energy Efficiency Directive (EED) and the Energy Performance of Buildings Directive (EPBD).

Interreg
EURO-MEDITERRANEAN
OPERATIONAL PROGRAM

Energy Efficiency Directive (EED) 2018/2002/EU (1/2)

Energy efficiency in buildings is a key element of the EU energy policy, which aims to reduce greenhouse gas emissions and improve energy security. The EU has set a target of 32.5% energy efficiency in buildings by 2030. This target is supported by the Energy Efficiency Directive (EED) and the Energy Performance of Buildings Directive (EPBD).

Interreg
EURO-MEDITERRANEAN
OPERATIONAL PROGRAM

Energy Efficiency Directive (EED) 2018/2002/EU (2/2)

Energy efficiency in buildings is a key element of the EU energy policy, which aims to reduce greenhouse gas emissions and improve energy security. The EU has set a target of 32.5% energy efficiency in buildings by 2030. This target is supported by the Energy Efficiency Directive (EED) and the Energy Performance of Buildings Directive (EPBD).

Interreg
EURO-MEDITERRANEAN
OPERATIONAL PROGRAM

Covenant of Mayors for Climate and Energy (1/2)



1. The signatories of this Covenant of Mayors for Climate and Energy (the Covenant) are committed to:

- reducing greenhouse gas emissions by at least 40% by 2020, and by at least 55% by 2030, compared to 1990 levels;
- increasing the share of renewable energy in gross final consumption of energy by at least 27% by 2020, and by at least 39% by 2030;
- increasing energy efficiency by at least 12.5% by 2020, and by at least 17.5% by 2030, compared to 2007 levels;



Covenant of Mayors for Climate and Energy (2/2)



2. The signatories of this Covenant of Mayors for Climate and Energy (the Covenant) are committed to:

- increasing the share of renewable energy in gross final consumption of energy by at least 27% by 2020, and by at least 39% by 2030;
- increasing energy efficiency by at least 12.5% by 2020, and by at least 17.5% by 2030, compared to 2007 levels;



Smart Grid Initiative

The Smart Grid Initiative is a project of the European Commission, aimed at developing and demonstrating smart grids in Europe. The project is funded by the European Union and involves the participation of several European countries.



Smart Grid Initiative

Smart Grid Initiative

Other initiatives

The Smart Grid Initiative is a project of the European Commission, aimed at developing and demonstrating smart grids in Europe. The project is funded by the European Union and involves the participation of several European countries.



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1. The signatories of this Covenant of Mayors for Climate and Energy (the Covenant) are committed to:

- reducing greenhouse gas emissions by at least 40% by 2020, and by at least 55% by 2030, compared to 1990 levels;
- increasing the share of renewable energy in gross final consumption of energy by at least 27% by 2020, and by at least 39% by 2030;
- increasing energy efficiency by at least 12.5% by 2020, and by at least 17.5% by 2030, compared to 2007 levels;

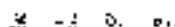
2. The signatories of this Covenant of Mayors for Climate and Energy (the Covenant) are committed to:

- increasing the share of renewable energy in gross final consumption of energy by at least 27% by 2020, and by at least 39% by 2030;
- increasing energy efficiency by at least 12.5% by 2020, and by at least 17.5% by 2030, compared to 2007 levels;

THANK YOU!



1.2 Bulgaria



Section 3 Bulgarian legislative framework for energy efficiency

APR 2017 - Energy efficiency requirements in energy audits

10/11/2016

2016-11-10 14:30:00



The Energy Efficiency Directive (EED) is a key piece of legislation in the EU's energy policy. It aims to improve energy efficiency in buildings, industry, and transport. The EED sets binding targets for energy efficiency improvements and requires member states to transpose the directive into national law.

The aim of the project is to support the development of energy efficiency and renewable energy sources in the area of the State of Bosnia and Herzegovina. The project is a 100% co-financed measure supported by the Ministry of Energy, Water Supply and Heat of Bosnia and Herzegovina. The project is implemented by the Ministry of Energy, Water Supply and Heat of Bosnia and Herzegovina.

The project is implemented by the Ministry of Energy, Water Supply and Heat of Bosnia and Herzegovina. The project is a 100% co-financed measure supported by the Ministry of Energy, Water Supply and Heat of Bosnia and Herzegovina. The project is implemented by the Ministry of Energy, Water Supply and Heat of Bosnia and Herzegovina.

1. Energy efficiency and renewable energy sources
2. Development of the energy market in Bosnia and Herzegovina
3. Energy efficiency and renewable energy sources
4. Energy efficiency and renewable energy sources
5. Energy efficiency and renewable energy sources

The project is implemented by the Ministry of Energy, Water Supply and Heat of Bosnia and Herzegovina. The project is a 100% co-financed measure supported by the Ministry of Energy, Water Supply and Heat of Bosnia and Herzegovina. The project is implemented by the Ministry of Energy, Water Supply and Heat of Bosnia and Herzegovina.

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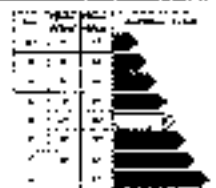
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The 2019-2021 Energy Efficiency Fund (EEF) is a key instrument for the implementation of the Energy Efficiency Directive (EED) in Germany. It aims to support energy efficiency measures in buildings, industry, and transport. The EEF is managed by the Federal Government and the states. The EEF is a key instrument for the implementation of the Energy Efficiency Directive (EED) in Germany. It aims to support energy efficiency measures in buildings, industry, and transport. The EEF is managed by the Federal Government and the states.



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- Support of energy efficiency measures in buildings, industry, and transport
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- Support of energy efficiency measures in buildings, industry, and transport


4. Energy Efficiency of Buildings

4.1 Objectives of the European Union

Energy Efficiency of buildings: Objectives of the European Union

Module 2-a

Module 2-a



- To comply with the energy efficiency and climate change objectives of the EU
- To support the implementation of the energy efficiency and climate change objectives of the EU

Interreg
Region-Mecklenburg
PRO-ENERGY

Energy efficiency in buildings (EED)

The Energy Efficiency Directive (EED) is a key instrument for the implementation of the Energy Efficiency Directive (EED) in Germany. It aims to support energy efficiency measures in buildings, industry, and transport. The EED is managed by the Federal Government and the states.

- Support of energy efficiency measures in buildings, industry, and transport
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- Support of energy efficiency measures in buildings, industry, and transport

Interreg
Region-Mecklenburg
PRO-ENERGY

Learning outcomes and keywords (2-3)

Take the time to read through the following points to understand the activities.

Energy efficiency
Energy management
Energy monitoring systems



Learning outcomes and keywords (3-4)

Energy efficiency Energy management

Energy monitoring Energy use systems

Energy Renewable energy management



Energy Efficiency in buildings (1-3)

Energy efficiency

Energy efficiency in buildings
Energy efficiency in buildings

Energy efficiency Energy efficiency



Energy Efficiency in buildings (2-3)

Energy

Energy efficiency in buildings
Energy efficiency in buildings



Energy efficiency

Energy efficiency in buildings
Energy efficiency in buildings



Energy Efficiency in buildings (3-5)

Energy efficiency

Energy

Energy efficiency in buildings
Energy efficiency in buildings

Energy

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Energy

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Energy efficiency in buildings



Objectives of the Energy Efficiency

Energy efficiency

Energy efficiency in buildings
Energy efficiency in buildings



Energy Efficiency in buildings (3-5)

Energy

Energy efficiency in buildings
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Energy efficiency in buildings
Energy efficiency in buildings



Energy Efficiency in buildings (3-5)

Energy

Energy efficiency in buildings
Energy efficiency in buildings

Energy efficiency in buildings
Energy efficiency in buildings



Regulation (EU) 2017/1001

EU Trade Mark Regulation

EU Trade Mark Regulation (EUTMR) is the primary legal instrument governing the registration and protection of trade marks in the European Union. It was adopted in 2017, replacing the previous Trade Mark Directive and Regulation.

Key Features:

- Single set of rules for all EU member states.
- Streamlined procedures for registration and enforcement.
- Enhanced protection for rights holders.

EU Intellectual Property Portal

Directive 2014/104/EU

Directive on Actions for Damages in Competition Law

Directive 2014/104/EU is a landmark piece of legislation that aims to improve the effectiveness of competition law enforcement by ensuring that victims of anti-competitive behavior can obtain full and effective compensation for the damage they have suffered.

Key Objectives:

- Ensure that victims of anti-competitive behavior can obtain full and effective compensation.
- Improve the effectiveness of competition law enforcement.

EU Intellectual Property Portal

Directive 2014/100/EU

Directive on Rental Right and Lending Right

Directive 2014/100/EU is a landmark piece of legislation that aims to harmonize the rules on rental right and lending right in the EU. It was adopted in 2014, replacing the previous Rental Right Directive and Lending Right Directive.

Key Features:

- Single set of rules for all EU member states.
- Streamlined procedures for rental and lending.
- Enhanced protection for rights holders.

EU Intellectual Property Portal

Directive 2006/115/EC

Directive on Rental Right and Lending Right in the Field of Intellectual Property

Directive 2006/115/EC is a landmark piece of legislation that aims to harmonize the rules on rental right and lending right in the EU. It was adopted in 2006, replacing the previous Rental Right Directive and Lending Right Directive.

Key Features:

- Single set of rules for all EU member states.
- Streamlined procedures for rental and lending.
- Enhanced protection for rights holders.

EU Intellectual Property Portal

Directive 2009/29/EC

Directive on Energy Efficiency

Directive 2009/29/EC is a landmark piece of legislation that aims to improve energy efficiency in the EU. It was adopted in 2009, replacing the previous Energy Efficiency Directive.

Key Features:

- Single set of rules for all EU member states.
- Streamlined procedures for energy efficiency.
- Enhanced protection for energy consumers.

EU Intellectual Property Portal

- Directives (policy)**
- Energy Efficiency - European Commission
 - Directive on the Right to Repair - European Commission
 - Energy Efficiency - European Commission
 - Energy Efficiency - European Commission

EU Intellectual Property Portal

EU Intellectual Property Portal is the central hub for all EU intellectual property information. It provides access to a wide range of resources, including legislation, case law, and administrative procedures.

Key Features:

- Single point of access for all EU IP information.
- Streamlined procedures for registration and enforcement.
- Enhanced protection for rights holders.

EU Intellectual Property Portal

THANK YOU!!



Energy Efficiency of buildings:

Energy control

Module 2.1.0

... module 2.1.0

... module 2.1.0

- familiarise with the concepts of energy audit and energy conservation, and the energy efficiency
- Better understanding of the energy efficiency level of the management systems in the plants and how they can be improved and what actions are required to do so.

Interreg

Learning outcomes and keywords (1.1.1)

... and the energy efficiency level of the management systems in the plants and how they can be improved and what actions are required to do so.

Interreg

Learning outcomes and keywords (2.1.1)

... and the energy efficiency level of the management systems in the plants and how they can be improved and what actions are required to do so.

Interreg

Learning outcomes and keywords (3.1.1)

Energy efficiency Energy consumption

Energy monitoring Energy use system

Energy management Energy storage

Energy audit

Interreg

Energy Efficiency (1.1.1)

... and the energy efficiency level of the management systems in the plants and how they can be improved and what actions are required to do so.

Interreg

Energy Efficiency (2.1.1)

... and the energy efficiency level of the management systems in the plants and how they can be improved and what actions are required to do so.

Interreg

Energy Management (3.1.1)

... and the energy efficiency level of the management systems in the plants and how they can be improved and what actions are required to do so.

Interreg

Energy Measurement (EM)

Energy Measurement (EM) is a key component of the Energy Performance Contract (EPC) process. It involves the installation of meters and sensors to monitor energy consumption in real-time. This data is used to establish a baseline and track performance against targets. The EPC team uses this information to identify areas for improvement and implement energy-saving measures. The Energy Measurement (EM) phase is critical for ensuring the accuracy and reliability of the data used in the EPC model.

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Energy Performance Certificate (EPC)

The Energy Performance Certificate (EPC) is a document that rates the energy efficiency of a building. It is based on a range of factors, including the type of building, the age of the building, the type of heating system, and the type of insulation. The EPC is used to inform tenants and potential buyers of the energy efficiency of a building. It is also used by landlords to identify areas for improvement and to implement energy-saving measures. The EPC is a key component of the Energy Performance Contract (EPC) process.

Energy Service Companies (ESCOs)

Energy Service Companies (ESCOs) are organizations that provide energy efficiency services to their clients. They typically offer a range of services, including energy audits, energy modeling, and the implementation of energy-saving measures. ESCOs are often used by building owners and managers to improve the energy efficiency of their buildings and to reduce their energy costs. The ESCO logo is visible in the bottom right corner of the slide.

Energy Measurement (EM)

- 1. The EPC team will install meters and sensors to monitor energy consumption in real-time.
- 2. The EPC team will establish a baseline of energy consumption.
- 3. The EPC team will track performance against targets.
- 4. The EPC team will identify areas for improvement.
- 5. The EPC team will implement energy-saving measures.

Energy Efficiency and EPC

1. The EPC team will install meters and sensors to monitor energy consumption in real-time.
2. The EPC team will establish a baseline of energy consumption.
3. The EPC team will track performance against targets.
4. The EPC team will identify areas for improvement.
5. The EPC team will implement energy-saving measures.

THANK YOU!



**Energy Efficiency of buildings:
 Energy efficiency measures**

Module 2.1

Module 2.1



- Find out what the key energy indicators are & energy efficiency indicators, and their relevance
- Identify the main energy indicators for energy efficiency based on the building energy audit, and the main energy efficiency measures and their possible energy efficiency potential, and their application to buildings

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 European Regional Development Fund
 PRO ENERGY

Learning outcomes and keywords (1/1)

After this module, you should be able to:

- identify the key energy indicators and energy efficiency indicators, and their relevance
- identify the main energy indicators for energy efficiency based on the building energy audit, and the main energy efficiency measures and their possible energy efficiency potential, and their application to buildings

Interreg
 European Regional Development Fund
 PRO ENERGY

Learning outcomes and keywords (2/3)

After this module, you should be able to:

- identify the key energy indicators and energy efficiency indicators, and their relevance
- identify the main energy indicators for energy efficiency based on the building energy audit, and the main energy efficiency measures and their possible energy efficiency potential, and their application to buildings


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Learning outcomes and keywords (1/1)

Energy efficiency **Energy consumption**

Energy monitoring **Energy systems**

Energy management **Energy efficiency**



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Energy Efficiency measures

Module 2.1

After this module, you should be able to:

- identify the key energy indicators and energy efficiency indicators, and their relevance
- identify the main energy indicators for energy efficiency based on the building energy audit, and the main energy efficiency measures and their possible energy efficiency potential, and their application to buildings

Interreg
 European Regional Development Fund
 PRO ENERGY

Behavioral Issue



After this module, you should be able to:

- identify the key energy indicators and energy efficiency indicators, and their relevance
- identify the main energy indicators for energy efficiency based on the building energy audit, and the main energy efficiency measures and their possible energy efficiency potential, and their application to buildings

Interreg
 European Regional Development Fund
 PRO ENERGY

Behavioral Issue - Social dynamics

After this module, you should be able to:

- identify the key energy indicators and energy efficiency indicators, and their relevance
- identify the main energy indicators for energy efficiency based on the building energy audit, and the main energy efficiency measures and their possible energy efficiency potential, and their application to buildings

Interreg
 European Regional Development Fund
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Community based initiatives (1921)

- 1921 - first community based initiative
- first public housing estate
- first public day care centre in the world



Community based initiatives
1921 - 1929



Community based initiatives (1971)

- 1971 - first community based initiative
- first public housing estate
- first public day care centre in the world

Community based initiatives
1971 - 1979



Liquid news based

1980 - 1989

- 1980 - first liquid news based initiative
- first public housing estate
- first public day care centre in the world



Direct feedback

1990 - 1999

- 1990 - first direct feedback initiative
- first public housing estate
- first public day care centre in the world



Direct feedback



- 1990 - first direct feedback initiative
- first public housing estate
- first public day care centre in the world

Direct feedback
1990 - 1999



Design for Living (1991)

1. The first Design for Living initiative in the world (1991)
2. Design for Living (1991) - the first initiative in the world to use a design for living approach to design public housing, day care and other community services
3. Design for Living (1991) - the first initiative in the world to use a design for living approach to design public housing, day care and other community services

Design for Living

- 1991 - first design for living initiative
- first public housing estate
- first public day care centre in the world

Design for Living

- 1991 - first design for living initiative
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THANK YOU!!



5. Energy Savings

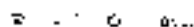


Problema
Problema de eficiență în fabrica de ciment
și în echipamentul
de procesare a sa

Soluția
Zona de fabrica de ciment
și echipamentul



1. Introduction to Energy



Energy concept

Definiție
Energia este capacitatea de a realiza lucru mecanic sau de a încălzi un corp. Energia este o mărime scalară și se măsoară în joule (J) sau în kilowatt-ore (kWh).

Forme de energie
Energia poate fi stocată în diferite forme, cum ar fi energia chimică, energia electrică, energia termică, energia mecanică etc.

Conservarea energiei
Energia nu poate fi creată sau distrusă, ci doar transformată dintr-o formă în alta.

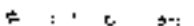


Renewable Energy

Definiție
Energia regenerabilă este energia care este produsă din surse care se reînnoiesc în mod natural și care nu sunt epuizabile.



Tipuri de energie regenerabilă
Energia solară, energia eoliană, energia hidroelectrică, energia geotermală, energia mareelor etc.



Non-Renewable Energy

Definiție
Energia nerenegabilă este energia care este produsă din surse care nu se reînnoiesc în mod natural și care sunt epuizabile.

Tipuri de energie nerenegabilă
Energia fosilă, energia nucleară, energia hidroelectrică etc.

Impactul asupra mediului
Energia nerenegabilă are un impact semnificativ asupra mediului, în special datorită emisiilor de gaze de seră și a poluării.

Soluții
Reducerea consumului de energie nerenegabilă și trecerea la surse regenerabile sunt soluții pentru a reduce impactul asupra mediului.



Renewable Energy

Definiție
Energia regenerabilă este energia care este produsă din surse care se reînnoiesc în mod natural și care nu sunt epuizabile.



Tipuri de energie regenerabilă
Energia solară, energia eoliană, energia hidroelectrică, energia geotermală, energia mareelor etc.

Renewable Energy

1.1 Energy Sources of Wind energy
There are two types of wind energy: on-land and offshore. On-land wind energy is the most developed, but offshore wind energy is the fastest growing.



1.1.1 On-land wind energy
On-land wind energy is the most developed, but offshore wind energy is the fastest growing. The type of wind energy is divided into on-land and offshore. On-land wind energy is the most developed, but offshore wind energy is the fastest growing. The type of wind energy is divided into on-land and offshore. On-land wind energy is the most developed, but offshore wind energy is the fastest growing.

Renewable Energy

1.2.1 Solar energy
Solar energy is generated by the sun. It is a clean and renewable energy source. It is a clean and renewable energy source. It is a clean and renewable energy source.



1.2.1.1 Solar energy
Solar energy is generated by the sun. It is a clean and renewable energy source. It is a clean and renewable energy source. It is a clean and renewable energy source.

2. Solar Energy



Solar energy - General aspects

The sun is the source of solar energy. It is a clean and renewable energy source. It is a clean and renewable energy source.

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Renewable Energy

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Renewable Energy

1.2 Energy sources of solar energy
Solar energy is generated by the sun. It is a clean and renewable energy source. It is a clean and renewable energy source. It is a clean and renewable energy source.



Classification of solar radiation



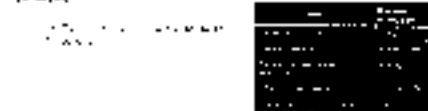
Transformation of solar energy



Classification of solar systems

Classification

The solar system is divided into three main categories based on the type of solar energy used: solar thermal energy, solar photovoltaic energy, and solar hybrid energy.



Classification of solar thermal energy

Classification

The solar thermal energy is divided into three main categories based on the temperature of the solar collector: low temperature solar thermal energy, medium temperature solar thermal energy, and high temperature solar thermal energy.

The low temperature solar thermal energy is used for space heating and domestic hot water. The medium temperature solar thermal energy is used for industrial processes and power generation. The high temperature solar thermal energy is used for power generation.

Classification of solar thermal energy

Classification

Temperature range	Typical applications	Typical collector
Low temperature (< 100°C)	Space heating, domestic hot water, industrial processes, power generation	Flat plate collector, evacuated tube collector
Medium temperature (100°C - 400°C)	Industrial processes, power generation	Parabolic trough collector, solar tower collector
High temperature (> 400°C)	Power generation	Solar tower collector

Low temperature solar thermal energy PRO-ENERGY



Low temperature solar thermal energy PRO-ENERGY

Classification

The low temperature solar thermal energy is used for space heating and domestic hot water. It is typically generated by flat plate collectors or evacuated tube collectors. The energy is stored in a storage tank and used when needed.



Description of capture subsystem

Classification

The capture subsystem is responsible for capturing solar radiation and converting it into heat. It typically consists of a solar collector and a storage tank. The solar collector is connected to the storage tank, which is connected to the distribution system.



Low temperature solar thermal energy PRO-ENERGY

Classification

The low temperature solar thermal energy is used for space heating and domestic hot water. It is typically generated by flat plate collectors or evacuated tube collectors. The energy is stored in a storage tank and used when needed.



Description of storage subsystem

Classification

The storage subsystem is responsible for storing solar energy for use when needed. It typically consists of a storage tank and a distribution system. The storage tank is connected to the distribution system, which is connected to the solar collector.



3. Photovoltaic Solar Energy



Introduction to photovoltaic energy PRO-ENERGY

- Photovoltaic (PV) solar energy is the result of a flow of solar energy that flows in a certain power.
- The process is based on the impact of solar photons on a material with a certain photoelectric effect, which causes the release of electrons called solar cells. The generated electric potential and the electric current can be used from a solar electric panel.



Solar cells

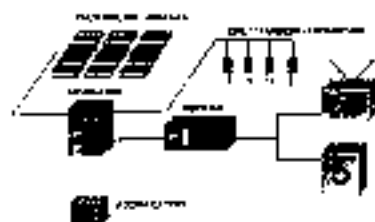
The solar cells are made of silicon, which is a semiconductor. The silicon atoms are arranged in a regular lattice structure. When a photon of light strikes the silicon, it can knock an electron out of its orbit. The electron then moves through the silicon, creating an electric current.



Description of PV systems



Description of PV systems



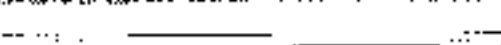
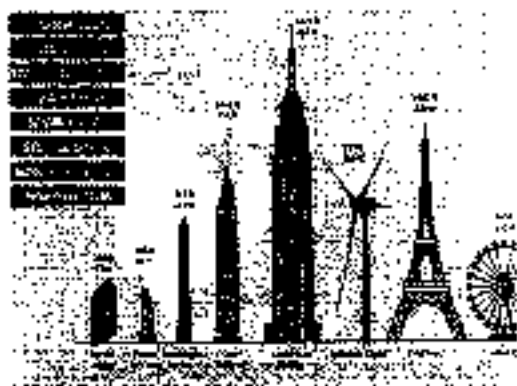
4. Wind Energy



Wind Energy - Introduction

Wind energy is a form of renewable energy that is generated by the wind. It is a clean and sustainable source of energy that can be used to generate electricity. Wind energy is one of the most abundant and accessible sources of renewable energy. It is a clean and sustainable source of energy that can be used to generate electricity. Wind energy is one of the most abundant and accessible sources of renewable energy.

- Advantages
- Disadvantages
- Costs
- Future



Wind energy - Introduction

Wind energy is the kinetic energy of air moving across the earth's surface. It is a clean, renewable energy source.

Wind energy is converted into electricity by wind turbines. The wind turns the blades, which are connected to a rotor and a generator. The generator produces electricity.

Wind energy is a clean, renewable energy source. It is converted into electricity by wind turbines. The wind turns the blades, which are connected to a rotor and a generator. The generator produces electricity.

Classification of wind turbines

Wind turbines are classified into two main types: horizontal axis wind turbines (HAWT) and vertical axis wind turbines (VAWT).

HAWT: The blades are positioned horizontally and rotate around a horizontal axis. They are the most common type of wind turbine.

VAWT: The blades are positioned vertically and rotate around a vertical axis. They are less common than HAWT.

General characteristics of the wind

Wind is a natural phenomenon that is caused by the uneven heating of the Earth's surface. It is a clean, renewable energy source.

Wind speed is the most important characteristic of the wind. It is measured in meters per second (m/s) or kilometers per hour (km/h).

Wind direction is also an important characteristic of the wind. It is measured in degrees.

Wind energy is a clean, renewable energy source. It is converted into electricity by wind turbines. The wind turns the blades, which are connected to a rotor and a generator. The generator produces electricity.

Wind power applications

Wind power is used in a variety of applications, including:

- Electricity generation
- Water pumping
- Desalination
- Artificially induced wind

5. Biomass

Biomass is a renewable energy source that is derived from organic materials. It can be used to produce energy through combustion or fermentation.

Biomass is a clean, renewable energy source. It is converted into energy through combustion or fermentation. The energy is then used to generate electricity or heat.

Biofuel

Biofuel is a renewable energy source that is derived from biomass. It can be used to power vehicles and generate electricity.

Biofuel is a clean, renewable energy source. It is converted into energy through combustion or fermentation. The energy is then used to generate electricity or heat.

Introduction to Biomass

Biomass is a renewable energy source that is derived from organic materials. It can be used to produce energy through combustion or fermentation.

Biomass is a clean, renewable energy source. It is converted into energy through combustion or fermentation. The energy is then used to generate electricity or heat.

From biomass to advanced biofuel and bioproducts

Biomass is converted into advanced biofuel and bioproducts through a series of steps:

- Feedstock selection
- Pre-treatment
- Enzymatic hydrolysis
- Fermentation
- Distillation
- Refining

The biomass and energy vector

Biomass (wood chips, wood, grass, compostable waste, etc.) can be converted to energy by means of biomass gasification or other biomass conversion technologies.

The same energy is used for the production of heat and electricity.

Energy from biomass can be used for the production of electricity, heat, and gas.

Advantages: biomass is a renewable energy source. The energy from biomass can be used for the production of electricity, heat, and gas.



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Energy efficiency of profuse

The energy efficiency of biomass gasification is high, especially when the gas is used for power generation.

Energy efficiency (%)	Efficiency (%)
Gasification (with gas engine)	75%
Gasification (with gas turbine)	70%
Gasification (with gas engine and heat recovery)	85%
Gasification (with gas turbine and heat recovery)	80%
Gasification (with gas engine and heat recovery and district heating)	90%
Gasification (with gas turbine and heat recovery and district heating)	85%

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Waste used by biomass

The waste used by biomass is mainly agricultural waste, wood chips, and other biomass. This waste is converted into energy by means of biomass gasification or other biomass conversion technologies.



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Advantages of high alk

The advantages of high alk are: high energy efficiency, low emissions, and low investment costs.

High alk is a gasification technology that produces a gas with a high alk content.

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Anaerobic digestion processes and biogas digesters

Anaerobic digestion is a process that converts biomass into biogas and digestate. The process is carried out in a biogas digester.



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Characteristics of biogas

Biogas is a gas that is produced from biomass. It consists of methane and carbon dioxide. The energy content of biogas is high.



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Biogas

Biogas is a gas that is produced from biomass. It consists of methane and carbon dioxide. The energy content of biogas is high.

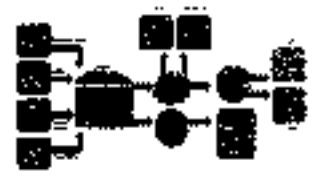


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Biogas uses

Biogas can be used for power generation, heating, and as a transport fuel.

- Power generation
- Heating
- Transport fuel



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Introduction to hybrid system



Introduction to hybrid system

Introduction to hybrid system



Introduction to hybrid system

Introduction to hybrid system

Introduction to hybrid system



Introduction to hybrid system

1. Introduction to hybrid system
2. Introduction to hybrid system
3. Introduction to hybrid system
4. Introduction to hybrid system
5. Introduction to hybrid system
6. Introduction to hybrid system
7. Introduction to hybrid system
8. Introduction to hybrid system



Introduction to hybrid system

Introduction to hybrid system



Combining gas with diesel generation in hybrid microgrid

Combining gas with diesel generation in hybrid microgrid



Combining gas with diesel generation in hybrid microgrid

1. Combining gas with diesel generation in hybrid microgrid
2. Combining gas with diesel generation in hybrid microgrid
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6. Combining gas with diesel generation in hybrid microgrid
7. Combining gas with diesel generation in hybrid microgrid
8. Combining gas with diesel generation in hybrid microgrid



Off grid microgrid

Off grid microgrid

Off grid microgrid



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 PRO-ENERGY

Off-grid microgrids

An off-grid microgrid is a self-sufficient energy system that can operate independently or in conjunction with the main power grid.

Key components include:

- Local renewable energy sources (e.g., solar, wind)
- Energy storage systems (e.g., batteries)
- Microgrid controller
- Interconnection with the main grid (optional)

Key benefits of off-grid microgrids include:

- Energy independence
- Resilience to grid outages
- Reduced energy costs
- Environmental friendliness

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7. Energy storage systems

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Energy storage systems

Energy storage systems (ESS) are used to store energy for later use, helping to balance supply and demand, reduce costs, and increase the reliability of the power grid.

Key components include:

- Energy storage technology (e.g., batteries, pumped hydro, flywheels)
- Energy management system (EMS)
- Grid connection

Key benefits of ESS include:

- Grid stability
- Renewable energy integration
- Peak shaving
- Energy arbitrage

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Types of energy storage

1. Mechanical energy storage
2. Chemical energy storage
3. Electrical energy storage
4. Thermal energy storage
5. Kinetic energy storage
6. Potential energy storage
7. Other energy storage technologies

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Types of energy storage

1. Mechanical energy storage
2. Chemical energy storage
3. Electrical energy storage
4. Thermal energy storage
5. Kinetic energy storage
6. Potential energy storage
7. Other energy storage technologies

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Battery technologies

Battery technologies are used to store energy for later use, helping to balance supply and demand, reduce costs, and increase the reliability of the power grid.

Key components include:

- Battery cells
- Battery management system (BMS)
- Energy storage system (ESS)

Key benefits of battery technologies include:

- High energy density
- Long cycle life
- Low self-discharge rate
- Wide operating temperature range

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Types of Batteries

1. Lead-acid batteries
2. Nickel-cadmium (NiCd) batteries
3. Nickel-metal hydride (NiMH) batteries
4. Lithium-ion (Li-ion) batteries
5. Sodium-ion (Na-ion) batteries
6. Zinc-air batteries
7. Flow batteries
8. Solid-state batteries
9. Other battery technologies

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Shell thermal insulation

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Balkan-Mediterranean
PDC Energy

Introduction to thermal insulation and energy

- 1. Introduction
- 2. Energy conservation
- 3. Thermal insulation
- 4. Thermal insulation materials



Thermal insulation is a process of reducing the amount of heat energy that is lost from a building.

Thermal insulation materials are used to reduce the amount of heat energy that is lost from a building.

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PDC Energy

Introduction to thermal insulation materials

- 1. Introduction
- 2. Energy conservation
- 3. Thermal insulation
- 4. Thermal insulation materials



- 1. Introduction
- 2. Energy conservation
- 3. Thermal insulation
- 4. Thermal insulation materials

Interreg
Balkan-Mediterranean
PDC Energy

Introduction to thermal insulation and energy

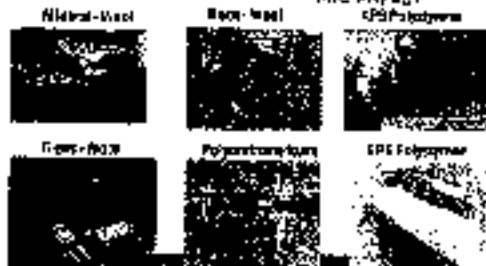
- 1. Introduction
- 2. Energy conservation
- 3. Thermal insulation
- 4. Thermal insulation materials



Thermal insulation is a process of reducing the amount of heat energy that is lost from a building.

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Thermal insulation materials



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PDC Energy

Thermal insulation materials



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Balkan-Mediterranean
PDC Energy

Lighting



Interreg
Balkan-Mediterranean
PDC Energy

Double Glazing Windows

- 1. Introduction
- 2. Energy conservation
- 3. Thermal insulation
- 4. Thermal insulation materials



Interreg
Balkan-Mediterranean
PDC Energy

External Shading



Green Roofs

• Green roofs can reduce building heat loss and air conditioning energy use, reduce urban air pollution, improve water quality, reduce storm water runoff, and improve aesthetics.

• Because green roofs reduce heat loss, they can also reduce energy use for heating.

• Many governments offer financial incentives for green roofs.


green-roofs.com





5. Energy Behavior

Energy behavior


Module 4.a



Module 4.a



- Energy behavior becomes a topic in energy efficiency programs, especially in the context of energy audits and energy management systems.
- Energy behavior is a key element in energy efficiency programs, especially in the context of energy audits and energy management systems.



Learning outcomes and keywords (1/2)

Students will be able to understand the importance of energy efficiency in buildings and the role of energy audits in improving energy efficiency.

- Energy Efficiency
- Energy audits
- Energy Management Systems



Learning outcomes and keywords (2/2)

- Energy behavior
- Energy audits
- Energy efficiency
- Energy management systems



Introduction

Energy efficiency measures

- Energy efficiency measures are interventions that reduce energy consumption in buildings, industry, transport, and other sectors.
- Energy efficiency measures can be implemented through a variety of measures, including energy audits, energy management systems, and energy efficiency programs.



Energy efficiency measures
Types of interventions



Connectivity and commitment

11th November 2013



10:00 - 10:15 Introduction
10:15 - 10:30 **Energy**
10:30 - 10:45 **Energy**
10:45 - 11:00 **Energy**
11:00 - 11:15 **Energy**
11:15 - 11:30 **Energy**
11:30 - 11:45 **Energy**
11:45 - 12:00 **Energy**



Social dynamics of Energy Behavior

11th November 2013



10:00 - 10:15 Introduction
10:15 - 10:30 **Energy**
10:30 - 10:45 **Energy**
10:45 - 11:00 **Energy**
11:00 - 11:15 **Energy**
11:15 - 11:30 **Energy**
11:30 - 11:45 **Energy**
11:45 - 12:00 **Energy**



Feedback measures (11/2)

11th November 2013




10:00 - 10:15 Introduction
10:15 - 10:30 **Energy**
10:30 - 10:45 **Energy**
10:45 - 11:00 **Energy**
11:00 - 11:15 **Energy**
11:15 - 11:30 **Energy**
11:30 - 11:45 **Energy**
11:45 - 12:00 **Energy**




Feedback measures (12/2)

11th November 2013



10:00 - 10:15 Introduction
10:15 - 10:30 **Energy**
10:30 - 10:45 **Energy**
10:45 - 11:00 **Energy**
11:00 - 11:15 **Energy**
11:15 - 11:30 **Energy**
11:30 - 11:45 **Energy**
11:45 - 12:00 **Energy**



Financial incentives and alternatives

11th November 2013



10:00 - 10:15 Introduction
10:15 - 10:30 **Energy**
10:30 - 10:45 **Energy**
10:45 - 11:00 **Energy**
11:00 - 11:15 **Energy**
11:15 - 11:30 **Energy**
11:30 - 11:45 **Energy**
11:45 - 12:00 **Energy**




Domestic instruments to mobilise investment in energy efficiency in buildings

11th November 2013



10:00 - 10:15 Introduction
10:15 - 10:30 **Energy**
10:30 - 10:45 **Energy**
10:45 - 11:00 **Energy**
11:00 - 11:15 **Energy**
11:15 - 11:30 **Energy**
11:30 - 11:45 **Energy**
11:45 - 12:00 **Energy**



Regulatory intervention

11th November 2013



10:00 - 10:15 Introduction
10:15 - 10:30 **Energy**
10:30 - 10:45 **Energy**
10:45 - 11:00 **Energy**
11:00 - 11:15 **Energy**
11:15 - 11:30 **Energy**
11:30 - 11:45 **Energy**
11:45 - 12:00 **Energy**



Energy efficiency directive (Directive 2012/27/EU)

11th November 2013



10:00 - 10:15 Introduction
10:15 - 10:30 **Energy**
10:30 - 10:45 **Energy**
10:45 - 11:00 **Energy**
11:00 - 11:15 **Energy**
11:15 - 11:30 **Energy**
11:30 - 11:45 **Energy**
11:45 - 12:00 **Energy**



Measures adopted under Energy Efficiency Directive (1/14)

- Energy audits for large enterprises
- Energy audits for SMEs
- Energy audits for public buildings
- Energy audits for public buildings



Measures adopted under Energy Efficiency Directive (2/14)

- Energy audits for large enterprises
- Energy audits for SMEs
- Energy audits for public buildings
- Energy audits for public buildings



Measures adopted under Energy Efficiency Directive (1/14)

- Energy audits for large enterprises
- Energy audits for SMEs
- Energy audits for public buildings
- Energy audits for public buildings



1. Energy audits: The elements of Member States compliance to assess the state of the situation of energy, energy efficiency, and energy audits for SMEs and large enterprises (1/14)
2. Energy audits: The elements of Member States compliance to assess the state of the situation of energy, energy efficiency, and energy audits for SMEs and large enterprises (2/14)
3. Energy audits: The elements of Member States compliance to assess the state of the situation of energy, energy efficiency, and energy audits for SMEs and large enterprises (3/14)

6.1 Feedback measures



Energy behavior Feedback measures

Module 4.b

THANK YOU!!!



Module 4.b



- Energy audits for large enterprises
- Energy audits for SMEs
- Energy audits for public buildings
- Energy audits for public buildings



Learning outcomes and keywords (1/2)

Learners are expected to understand, make and apply in, the using terms and conditions.

- Feedback
- Feedback methods
- Feedback elements, Feedback



Learning outcomes and keywords (2/2)

Energy behavior Energy consumption
Energy security Employer activities
Energy security Employer activities



Introduction

Energy with energy



Energy with energy
Energy with energy
Energy with energy
Energy with energy



Types of Feedback

Feedback types (1/1)

- Direct feedback
- Indirect feedback
- Immediate feedback
- Delayed feedback
- Written feedback
- Verbal feedback
- Non-verbal feedback
- Self-feedback
- Peer feedback
- Managerial feedback
- 360-degree feedback
- Anonymous feedback
- Public feedback
- Private feedback
- Formal feedback
- Informal feedback
- Structured feedback
- Unstructured feedback
- Quantitative feedback
- Qualitative feedback
- Objective feedback
- Subjective feedback
- Specific feedback
- General feedback
- Constructive feedback
- Destructive feedback
- Positive feedback
- Negative feedback
- Encouraging feedback
- Discouraging feedback
- Supportive feedback
- Non-supportive feedback
- Timely feedback
- Untimely feedback
- Relevant feedback
- Irrelevant feedback
- Actionable feedback
- Non-actionable feedback
- Clear feedback
- Unclear feedback
- Concise feedback
- Verbose feedback
- Simple feedback
- Complex feedback
- Easy feedback
- Difficult feedback
- Fair feedback
- Unfair feedback
- Honest feedback
- Dishonest feedback
- Open feedback
- Closed feedback
- Transparent feedback
- Opaque feedback
- Accessible feedback
- Inaccessible feedback
- Available feedback
- Unavailable feedback
- Visible feedback
- Invisible feedback
- Audible feedback
- Inaudible feedback
- Readable feedback
- Unreadable feedback
- Understandable feedback
- Ununderstandable feedback
- Useful feedback
- Unuseful feedback
- Valuable feedback
- Valueless feedback
- Meaningful feedback
- Meaningless feedback
- Impactful feedback
- Non-impactful feedback
- Inspiring feedback
- Non-inspiring feedback
- Motivating feedback
- Non-motivating feedback
- Encouraging feedback
- Discouraging feedback
- Supportive feedback
- Non-supportive feedback
- Timely feedback
- Untimely feedback
- Relevant feedback
- Irrelevant feedback
- Actionable feedback
- Non-actionable feedback
- Clear feedback
- Unclear feedback
- Concise feedback
- Verbose feedback
- Simple feedback
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- Unfair feedback
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- Open feedback
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- Transparent feedback
- Opaque feedback
- Accessible feedback
- Inaccessible feedback
- Available feedback
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- Visible feedback
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- Audible feedback
- Inaudible feedback
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- Useful feedback
- Unuseful feedback
- Valuable feedback
- Valueless feedback
- Meaningful feedback
- Meaningless feedback
- Impactful feedback
- Non-impactful feedback
- Inspiring feedback
- Non-inspiring feedback
- Motivating feedback
- Non-motivating feedback



Feedback types (2/3)

- Direct feedback
- Indirect feedback
- Immediate feedback
- Delayed feedback
- Written feedback
- Verbal feedback
- Non-verbal feedback
- Self-feedback
- Peer feedback
- Managerial feedback
- 360-degree feedback
- Anonymous feedback
- Public feedback
- Private feedback
- Formal feedback
- Informal feedback
- Structured feedback
- Unstructured feedback
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Energy with energy



Feedback types (3/3)



- Direct feedback
- Indirect feedback
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- Delayed feedback
- Written feedback
- Verbal feedback
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- Self-feedback
- Peer feedback
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- Non-impactful feedback
- Inspiring feedback
- Non-inspiring feedback
- Motivating feedback
- Non-motivating feedback



Direct feedback

Energy with energy

Energy with energy
Energy with energy
Energy with energy
Energy with energy



Internal feedback

- Energy audits
- Energy management systems
- Energy labels
- Energy contracts
- Energy management systems



Dissemination by external feedback measures

- Energy audits
- Energy management systems
- Energy labels
- Energy contracts
- Energy management systems



1. Dijk, S., 2006. The effectiveness of feedback on energy consumption. In: *Energy Efficiency in Buildings – Selected EU Policy and Research on Environmental Change*. Institute for Energy Research.
2. *Energy efficiency – Energy efficiency – what are the benefits?* http://www.enr.nl/energy_efficiency_enr/energy_efficiency_enr.html
3. Dijk, S., 2007. The role of energy labels in the development of energy management systems. *Energy Efficiency*, 1(1), 3-16.
4. *Energy efficiency – Energy efficiency – what are the benefits?* http://www.enr.nl/energy_efficiency_enr/energy_efficiency_enr.html

THANK YOU!



Energy behavior Feedback measures

Module 4.c

interreg

Why do we?



- Energy behavior is the most important feedback measure. It is the most important measure for energy efficiency.
- Energy behavior is the most important measure for energy efficiency.
- Energy behavior is the most important measure for energy efficiency.



Learning outcomes and Key words (1.1)

- Energy efficiency is the most important measure for energy efficiency.
- Energy efficiency is the most important measure for energy efficiency.
- Energy efficiency is the most important measure for energy efficiency.



Learning outcomes and Key words (2.1)

Energy behavior	Energy consumption
Energy security	Employee incentive
	measures



Introduction

Energy efficient policies

Businesses
2008-9

Energy efficiency



Business
2009-10

Energy efficiency

Business
2010-11

Energy efficiency



Social dynamics of Energy Behaviour

Energy efficiency: Δ = 10% (2008-9)

Energy efficiency: Δ = 10% (2009-10)

Energy efficiency: Δ = 10% (2010-11)

Energy efficiency: Δ = 10% (2011-12)

Energy efficiency: Δ = 10% (2012-13)

Energy efficiency: Δ = 10% (2013-14)



Feedback measures (1/2)

Energy
2008-9

Energy efficiency



Energy
2009-10

Energy efficiency

Energy
2010-11

Energy efficiency

Energy efficiency



Feedback measures (2/2)

Energy
2008-9

Energy efficiency

Energy
2009-10

Energy efficiency

Energy
2010-11

Energy efficiency

Energy
2011-12

Energy efficiency

Energy
2012-13

Energy efficiency



Learning by looking or by doing

Energy efficiency: Δ = 10% (2008-9)

Energy efficiency: Δ = 10% (2009-10)

Energy efficiency: Δ = 10% (2010-11)

Energy efficiency: Δ = 10% (2011-12)

Energy efficiency: Δ = 10% (2012-13)

Energy efficiency: Δ = 10% (2013-14)



Direct feedback (EPA, 2013)

Energy efficiency: Δ = 10% (2008-9)

Energy efficiency: Δ = 10% (2009-10)

Energy efficiency: Δ = 10% (2010-11)

Energy efficiency: Δ = 10% (2011-12)

Energy efficiency: Δ = 10% (2012-13)

Energy efficiency: Δ = 10% (2013-14)



Learning by reading and reflecting

Lernaktivitäten und Reflexion

Die Lernaktivitäten sind in der folgenden Tabelle dargestellt:

Lernaktivität	Reflexion
1. Lesen und Reflektieren	1.1. Was habe ich gelernt?
2. Diskutieren und Reflektieren	2.1. Was habe ich gelernt?
3. Schreiben und Reflektieren	3.1. Was habe ich gelernt?
4. Präsentieren und Reflektieren	4.1. Was habe ich gelernt?
5. Anwenden und Reflektieren	5.1. Was habe ich gelernt?

Die Reflexion ist ein zentraler Bestandteil des Lernens. Sie ermöglicht es den Lernenden, ihre eigenen Lernprozesse zu reflektieren und zu optimieren. Durch die Reflexion können die Lernenden ihre eigenen Stärken und Schwächen erkennen und diese in ihre weiteren Lernaktivitäten einbringen.

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Learning by reading and reflecting

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1. Lesen und Reflektieren	1.1. Was habe ich gelernt?
2. Diskutieren und Reflektieren	2.1. Was habe ich gelernt?
3. Schreiben und Reflektieren	3.1. Was habe ich gelernt?
4. Präsentieren und Reflektieren	4.1. Was habe ich gelernt?
5. Anwenden und Reflektieren	5.1. Was habe ich gelernt?

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Learning by reading and reflecting

Lernaktivitäten und Reflexion

Die Lernaktivitäten sind in der folgenden Tabelle dargestellt:

Lernaktivität	Reflexion
1. Lesen und Reflektieren	1.1. Was habe ich gelernt?
2. Diskutieren und Reflektieren	2.1. Was habe ich gelernt?
3. Schreiben und Reflektieren	3.1. Was habe ich gelernt?
4. Präsentieren und Reflektieren	4.1. Was habe ich gelernt?
5. Anwenden und Reflektieren	5.1. Was habe ich gelernt?

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Learning by reading and reflecting

Lernaktivitäten und Reflexion

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5. Anwenden und Reflektieren	5.1. Was habe ich gelernt?

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- Gather data on energy consumption from smart meters
- Register smart meters
- Analyse data and compare energy consumption with 270,000 other buildings in the region

• Key findings:
 - 20% of buildings in the region were using 20% more energy than their neighbours

• Energy saving opportunities:
 - 20% of buildings could save 10% of energy costs by using smart meters

Energy saving opportunities

Interreg
 European Regional Development Fund
 2014-2020

1. Hays, S. 2009. The effectiveness of well-being measurement: A review for the Environmental Reporting Group and the Institute for Public Energy Research. Bristol: IPRER.
2. Achebe, C. 2014. Energy through behaviour change: can it really work? Evidence from the Consumer Direct programme.
3. <https://www.gov.uk/guidance/energy-efficiency-travel-behaviour>
4. <https://www.gov.uk/guidance/energy-efficiency-transport-behaviour>

THANK YOU!!

Interreg
 European Regional Development Fund
 2014-2020

6.2 Feedback and goal setting

5 4 3 2 1 **Interreg**
 European Regional Development Fund
 2014-2020

Energy behavior
 Feedback and goal setting
 Module 4.3

Module Aim

- Identify energy behavior with the introduction to the feedback and goal setting module. Its objective is to emphasize the importance of energy efficiency
- Discuss the role of energy audits, behavior change interventions, and energy saving tips via goal setting.

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 European Regional Development Fund
 2014-2020

Learning outcomes and keywords (1/2)

Trainers should aim to ensure that, when training is completed, attendees will be able to:

- understand
- describe the
- identify the

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 European Regional Development Fund
 2014-2020

Learning outcomes and keywords (2/2)

Energy behavior	Energy consumption
Energy efficiency	Employee motivation

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 European Regional Development Fund
 2014-2020

Feedback Basics

How important is feedback?

Feedback is an important part of the learning process

Feedback is a key component of the learning process



Feedback models (1-2)

Feedback model

How to give and receive feedback



Feedback is a key component of the learning process



Feedback questions (3-7)

Feedback

How to give and receive feedback

Feedback is a key component of the learning process



Feedback and goal setting (8-12)

Feedback

How to give and receive feedback

Feedback is a key component of the learning process

Feedback is a key component of the learning process



Feedback and goal setting (13-21)

Feedback and goal setting

Feedback is a key component of the learning process



SMART goals and a plan (22)

SMART goals

SMART goals are a key component of the learning process



SMART goals and a plan (23-28)

SMART goals

SMART goals are a key component of the learning process



1. **SMART** goals are a key component of the learning process
2. SMART goals are a key component of the learning process
3. SMART goals are a key component of the learning process
4. SMART goals are a key component of the learning process
5. SMART goals are a key component of the learning process
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26. SMART goals are a key component of the learning process
27. SMART goals are a key component of the learning process
28. SMART goals are a key component of the learning process



THANK YOU!!



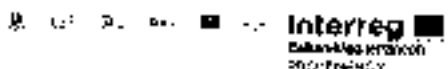
7. Ways to save energy



Section 5 Ways to save energy

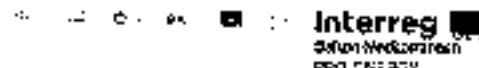
Ways to save energy and improve energy efficiency

100 pages
ISBN: 978-92-897-1385-1



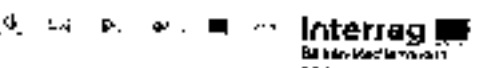
Energy efficiency is a key to sustainable development and climate change mitigation. It is the most cost-effective way to reduce greenhouse gas emissions and to improve energy security. This publication provides information on energy efficiency measures for buildings, industry and transport. It also includes information on energy efficiency financing and energy audits.

100 pages



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100 pages

- Creating a high quality business environment to attract investment, especially in the renewable energy sector
- Improving energy efficiency and reducing energy consumption
- Encouraging investment in the energy sector through the development of energy infrastructure
- Promoting energy efficiency
- Promoting energy efficiency in the public sector
- Promoting energy efficiency in the private sector

Energy efficiency program in the Balkans

- Energy efficiency
- Energy efficiency in the public sector
- Energy efficiency in the private sector
- Energy efficiency in the energy sector
- Energy efficiency in the energy sector



- Energy efficiency program in the Balkans
- Energy efficiency in the public sector
- Energy efficiency in the private sector
- Energy efficiency in the energy sector
- Energy efficiency in the energy sector



Energy efficiency program in the Balkans

- Energy efficiency
- Energy efficiency in the public sector
- Energy efficiency in the private sector
- Energy efficiency in the energy sector
- Energy efficiency in the energy sector



Energy efficiency program in the Balkans

- Energy efficiency
- Energy efficiency in the public sector
- Energy efficiency in the private sector
- Energy efficiency in the energy sector
- Energy efficiency in the energy sector

Energy efficiency program in the Balkans

Country	Energy efficiency program in the Balkans
Bulgaria	Energy efficiency program in the Balkans
Croatia	Energy efficiency program in the Balkans
Albania	Energy efficiency program in the Balkans
North Macedonia	Energy efficiency program in the Balkans
Slovenia	Energy efficiency program in the Balkans
Serbia	Energy efficiency program in the Balkans
Montenegro	Energy efficiency program in the Balkans
Bosnia and Herzegovina	Energy efficiency program in the Balkans
Kosovo	Energy efficiency program in the Balkans
Turkey	Energy efficiency program in the Balkans

Energy efficiency program in the Balkans

- Energy efficiency
- Energy efficiency in the public sector
- Energy efficiency in the private sector
- Energy efficiency in the energy sector
- Energy efficiency in the energy sector

Energy efficiency program in the Balkans

- Energy efficiency
- Energy efficiency in the public sector
- Energy efficiency in the private sector
- Energy efficiency in the energy sector
- Energy efficiency in the energy sector

CO2-Fuß

→ Erhöhen Sie den Energieeffizienzstandard für öffentliche Gebäude, was zu einer Reduzierung der CO₂-Emissionen führt.

→ Führen Sie Energieeffizienzmaßnahmen für öffentliche Gebäude durch, um die CO₂-Emissionen zu reduzieren.

→ Führen Sie Energieeffizienzmaßnahmen für öffentliche Gebäude durch, um die CO₂-Emissionen zu reduzieren.

→ Führen Sie Energieeffizienzmaßnahmen durch.



Erneuerbare

→ Erhöhen Sie die Nutzung erneuerbarer Energien in öffentlichen Gebäuden.

→ Führen Sie Energieeffizienzmaßnahmen für öffentliche Gebäude durch, um die CO₂-Emissionen zu reduzieren.

→ Führen Sie Energieeffizienzmaßnahmen für öffentliche Gebäude durch, um die CO₂-Emissionen zu reduzieren.



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Erneuerbare

→ Erhöhen Sie die Nutzung erneuerbarer Energien in öffentlichen Gebäuden.

→ Führen Sie Energieeffizienzmaßnahmen für öffentliche Gebäude durch, um die CO₂-Emissionen zu reduzieren.

→ Führen Sie Energieeffizienzmaßnahmen für öffentliche Gebäude durch, um die CO₂-Emissionen zu reduzieren.



Erneuerbare

→ Erhöhen Sie die Nutzung erneuerbarer Energien in öffentlichen Gebäuden.

→ Führen Sie Energieeffizienzmaßnahmen für öffentliche Gebäude durch, um die CO₂-Emissionen zu reduzieren.

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Energy efficiency and renewable energy

Energy efficiency and renewable energy

Energy efficiency and renewable energy

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Energy efficiency and renewable energy



Energy efficiency and renewable energy

Energy efficiency and renewable energy

- 1. The first step is to identify the energy efficiency measures that can be implemented in the building.
- 2. The second step is to estimate the potential energy savings from these measures.
- 3. The third step is to prioritize the measures based on their cost-effectiveness and the potential for energy savings.
- 4. The fourth step is to implement the measures and monitor the energy savings over time.

Energy efficiency and renewable energy

B. Good practices

The slide features a navigation bar at the top with icons for home, back, forward, and search, along with the Interreg logo. The main content area contains the following text:

- 1. Introduction
- 2. Re-operation
- 3. Operation
- 4. Maintenance
- 5. Safety
- 6. Security
- 7. Environmental protection
- 8. Social and economic development
- 9. Conclusions

At the bottom, there is a footer with the text: "Introduction in Good Practices" and "1 / 10".

1 Introduction in Good Practices

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At the bottom, there is a footer with the text: "2. Re-operation" and "2 / 10".

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At the bottom, there is a footer with the text: "3. Operation" and "3 / 10".

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Lighting Design - Low Carbon Lighting Solutions

- 1. The project aims to demonstrate the benefits of low carbon lighting solutions in public buildings.
- 2. The project will focus on the following areas:
 - a. Energy efficiency
 - b. Environmental impact
 - c. Cost effectiveness
- 3. The project will involve the following activities:
 - a. Assessment of current lighting systems
 - b. Design of low carbon lighting solutions
 - c. Installation of low carbon lighting solutions
 - d. Monitoring and evaluation of the project

For more information, please contact the project manager at [redacted]

Lighting Design - Assessment of Best Practice

- 1. The project aims to assess the current state of lighting design practice in public buildings.
- 2. The project will focus on the following areas:
 - a. Energy efficiency
 - b. Environmental impact
 - c. Cost effectiveness
- 3. The project will involve the following activities:
 - a. Survey of public buildings
 - b. Assessment of lighting systems
 - c. Identification of best practice
 - d. Dissemination of best practice

For more information, please contact the project manager at [redacted]

Lighting Design - Energy Efficient Lighting

- 1. The project aims to demonstrate the benefits of energy efficient lighting solutions in public buildings.
- 2. The project will focus on the following areas:
 - a. Energy efficiency
 - b. Environmental impact
 - c. Cost effectiveness
- 3. The project will involve the following activities:
 - a. Assessment of current lighting systems
 - b. Design of energy efficient lighting solutions
 - c. Installation of energy efficient lighting solutions
 - d. Monitoring and evaluation of the project

For more information, please contact the project manager at [redacted]

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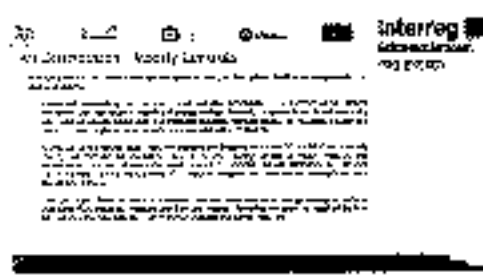
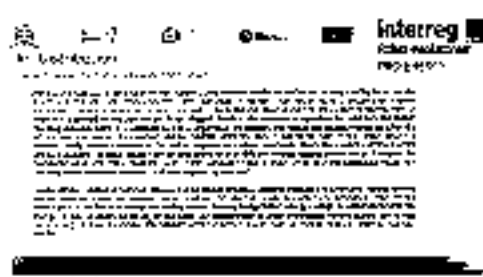
For more information, please contact the project manager at [redacted]

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For more information, please contact the project manager at [redacted]

5. Air Distribution System



Planning and budgeting application - Interreg System
 Application for the submission of the 2021-2027 Interreg Operational Program (OP) to the Commission.

The Commission is currently reviewing the application and will contact you if any further information is required.

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26.07.2021

