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Course for Energy Management Specialist

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Framework

“Renewable energy” is energy produced from renewable sources of natural resources such as the sun, wind and water, which are non-polluting, through technologies that ensure a natural replenishment of your reserves.

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Introduction

What are the benefits of installing technologies that use renewable energy sources?

There are many reasons why the use of energy from renewable sources should be privileged, namely:

- The use of safe and local resources;
- The reduction of dependence on fossil, polluting and non-renewable fuels;
- The reduction of greenhouse gas emissions;
- The creation of new jobs, in emerging markets, such as renewable energy related industries;
- The reduction of the energy bill. In some cases, it is even possible to profit from the production of renewable energy, through the sale of the surplus to the local energy supplier / distributor.

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Introduction

I want to install a renewable energy system in my home. Where should I start?

First of all, you must make sure that the house becomes as energy efficient as possible.

To this end, you can start by improving the thermal behavior of your home, for example, by applying thermal insulation, which directly impacts the energy needs for air conditioning in the space. You should also opt for more efficient equipment that requires less water and energy consumption to satisfy the same needs, namely appliances and lighting systems.

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Introduction

What systems are available to install in my home?

There are different technologies that allow the production of energy from renewable sources. However, it is necessary to pay attention to some specific requirements necessary for its installation.

- For the installation of photovoltaic systems and solar thermal systems, it is necessary to have an available coverage area and to pay attention to the orientation of the panels;
- Many of these systems have indoor and outdoor production units, so space is required for their installation (for example, solar thermal systems, biomass, heat pumps, etc.)
- In the case of hydroelectric systems, it is necessary to have a watercourse close to the dwelling.

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Introduction

What do you want to achieve?

Firstly, it is necessary to define what are the objectives that are intended to be achieved by installing a system that uses renewable energy sources. This will influence the decision to choose the most appropriate technology to meet your needs. As a rule, consumers seek to save and reduce polluting gas emissions, which is increasingly possible to achieve simultaneously.

Other factors may also be relevant:

For example, in case you need to replace or intervene in your conventional electric boiler or central heating system, sometimes it becomes more economically viable to replace it with new, more efficient equipment, such as a biomass boiler or heat pump.

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Introduction

If your priority is to reduce emissions of polluting gases, you should consider a technology that allows space heating using wood or the production of electricity using a wind turbine or photovoltaic solar system.

If you want to contribute to sustainable development, but your budget is reduced, you can consider a slightly more economical solution, such as the installation of a solar thermal system for preparing hot water.

If, on the other hand, the house is located in a rural environment, with no possibility of connection to the electricity grid, it may be economically more viable to resort to the production of electricity through hydropower or a combination of wind and solar photovoltaic energy.

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Introduction

There are many factors to consider before and after installing this type of technology in your home. However, it should be noted that these solutions make it possible to reduce the energy bill and its carbon footprint.

This course will help you to ensure that you complete all the important and necessary steps to install your equipment and / or system, so that you can get the most out of it.

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Introduction

In general, an Energy Manager should perform the following functions:

- Identification of the actions, interventions and procedures necessary to promote a rational use of energy;
- Knowledge and critical sense regarding the results of energy balances, based on actual measurements and uses and also on economic parameters.

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ISO 50001 - Energy Management Systems

As an Energy Manager, you should know about ISO 50001.

ISO 50001 presents a “set of interconnected and related elements, which aim to establish an energy policy, in line with specific objectives, as well as the processes and procedures necessary to achieve those same objectives”.

Energy management has the following main objectives:

- Achieve and maintain an optimized use of energy, throughout the organization;
- Minimize energy costs and wastage, without jeopardizing production and service quality;
- Reduce dependence on energy imports;
- Increase energy security, economic competitiveness and environmental quality.

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ISO 50001 - Energy Management Systems

Benefits of implementing an ISO 50001 Energy Management System:

- Cost reduction;
- Higher levels of energy efficiency;
- Possibility of coordinating energy efficiency programs, energy production, renewable energy and alternative energy sources;

- Facilitates external financial support and incentives (electricity services, third-party financing, tax benefits, among others);
- Integration of good energy management practices in commercial activities;
- Optimize the operation of energy-consuming equipment;
- Improves operations and capital cost decisions;
- It allows implementing best energy management practices;
- Improves the ability to compare, measure and report the different energy efficiency indicators
- It improves transparency and communication on the management of energy resources;
- Assists in the assessment and weighting of priorities in terms of new, more energy efficient technologies;
- It represents a benchmark for promoting energy efficiency at the level of the entire organization.

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ISO 50001 - Energy Management Systems

Requirements for implementing an ISO 50001 Energy Management System:

ISO 50001 specifies requirements for an organization to establish, implement, maintain and improve an energy management system, namely:

- Specifies an Energy Management System that allows:
 - Develop and implement an energy policy
 - Establish objectives, goals and action plans that take into account legal requirements;
- Specifies requirements for all factors that affect:
 - The supply, use and consumption of energy;
 - Measurement, documentation and reports;
 - Delimitation of strategies and practices related to the use of energy and involving equipment, processes, systems and employees.

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ISO 50001 - Energy Management Systems

The organization must appoint a team and the person responsible for the organization's Energy Management.

The number of elements to be part of the Energy Management team must be in accordance with the size of the organization. In addition to the person in charge of the energy management team, representatives from each of the operational areas and whose activities involve significant energy consumption must also be appointed.

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Main skills of an Energy Management specialist

The Energy Manager must have the competence to assist in making decisions that impact with the effective implementation of the proposed actions and interventions.

To this end, it is necessary that the Energy Manager is officially appointed and recognized by those responsible for the organization. In this way, all stakeholders must be informed and actively collaborate in the implementation of this system, in order to contribute to the success of the initiative.

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Main skills of an Energy Management specialist

DEMING CYCLE

The management method consists of 4 steps:

PLANEAR (PLAN): identify the problem or objectives and propose strategies and goals;

ACT (DO): implementation of planned actions

VERIFY (CHECK): verification carried out by measuring and monitoring the actions implemented and assessing any differences in relation to the established objectives;

IMPROVE (ACT): measures are taken to continuously improve the management system implemented

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Main skills of an Energy Management specialist

Energy diagnosis (or preliminary energy audit)

An energy diagnosis is an analysis that aims to:

- Establish the organization's energy consumption
- Determine potential savings
- Identify the areas with the greatest potential for implementing improvement measures
- Identify immediate improvements and savings (namely, interventions with low or no cost or with periods of return on investment of less than 2 years)

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Main skills of an Energy Management specialist

Detailed Energy Audit

A detailed energy audit provides a more accurate estimate of costs and potential savings by analyzing the interactions between the different systems in the organization.

The first step involves defining the energy audit itself: assessing the situation of the costs of electricity, thermal, HVAC systems, maintenance and energy needs, as well as identifying potential lines of development.

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Main skills of an Energy Management specialist

Firstly, it is necessary to analyze electricity supply and service contracts in order to:

- Check if the contract is covered by a free market or not;
- Accurately identify the locations and equipment responsible for the consumption of electricity;
- Equipment power (kWh) and energy consumed (kWh / year) by equipment and systems, individually and globally;
- Division of the different uses of electricity by expense centers, with the respective invoices;
- Require the installation of new, digital energy measurement equipment, so that the data reports to real data (obtained through measurements) and not estimated data

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Main skills of an Energy Management specialist

Survey all data related to energy consumption and costs:

- All electrical equipment and systems
- All equipment and thermal systems
- Means of transport
- Calculation of energy consumed (kWh), associated costs and CO₂ emissions
- Analysis of contractual values, power factor values, peak power, etc.

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Main skills of an Energy Management specialist

Given the example of PLANTS FOR PUBLIC LIGHTING

Public Administration priorities for Public Lighting Systems are:

- Greater security;
- Reduction of energy costs;
- Reduction of maintenance costs;
- Quality of lighting systems;
- Concern, prevention and respect for environmental issues;
- Rapid intervention and maintenance;
- Greater management control;
- Reduction of citizens' complaints

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Main skills of an Energy Management specialist

STREET LIGHTING

An intervention in the public lighting sector will certainly provide considerable savings, given that the existing solutions still include low efficiency lamps, such as mercury vapor or incandescent lamps.

In this way, the combined intervention between high efficiency lamps and centralized technical management, will allow significant savings and reductions in CO2 emissions to be achieved.

It should be noted that there are sanctions provided for in the European Directive applicable to European countries that exceed the CO2 quotas they have committed themselves to, so these interventions can help to meet the defined goals and objectives, combined with European public policies.

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Main skills of an Energy Management specialist

STREET LIGHTING

Ferromagnetic ballasts, for example, absorb about 15% of the lamp power (for example, a high pressure sodium lamp with a power of 100W with ferromagnetic ballast, actually consumes as much energy as if it were a lamp with power 115 W).

In this way, the replacement of ferromagnetic ballasts by electronic ballasts is also a measure that allows for potential energy savings.

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Main skills of an Energy Management specialist

STREET LIGHTING

To improve energy performance and extend the average lamp life, a technology has been developed to regulate the luminous flux and to remotely control the system.

- Adjustable electronic ballasts replace auxiliary current units (starters, reactors and capacitors), performing their function with only one component. In addition, electronic ballasts also function as current stabilizers and power reducers.

Taking into account the example of mercury vapor lamps, if the voltage is below 190 / 195V, they tend to go out. In turn, the high pressure sodium vapor lamps operate with voltages of 170V. This means that, in the case of mercury vapor lamps, the voltage cannot be less than 195V and therefore it is not possible to obtain energy savings of more than 30%. With sodium lamps, energy savings of around 50% can be achieved.

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Main skills of an Energy Management specialist

STREET LIGHTING

Installation of systems for automatic control of the luminous flux depending on the availability of natural light or occupation - Often the lighting systems are on even when the availability of natural light is significant or when there are no occupants in the space being illuminated .

The installation of this type of control devices allows to turn off the lighting system, or to reduce its intensity, in periods when it does not need to be switched on, so it is possible to obtain significant energy savings and avoid wasting it.

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Main skills of an Energy Management specialist

STREET LIGHTING

The automatic control devices of the lighting system have several advantages:

- Energy savings, thanks to the control of the voltage that limits the current reaching the lamp, thus reducing the power absorbed in periods when a lower luminous flux is sufficient;
- Homogeneity of the luminous flux, through automatic adjustment, avoiding the existence of shaded areas;
- Increased average lamp life, by stabilizing the voltage

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Main skills of an Energy Management specialist

STREET LIGHTING

The remote control system makes it possible to control electrical loads through PLM technology and to send the collected data, which are centralized in a single system.

There are several operators and technologies that effectively deal with remote control in public lighting, such as I-illumination, Dibawatt, Power One, Reverberi, EFI, Andros, Hera Luce, Satel, UMPI, Eligene, etc. good operational performance.

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Main skills of an Energy Management specialist

STREET LIGHTING

Remote control systems are generally made up of three elements:

- Control box
- Collection unit

- Service Management Server

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Main skills of an Energy Management specialist

STREET LIGHTING

To summarize, we can conclude that mercury vapor lamps are highly inefficient and polluting and their replacement with high efficiency light sources and lower installed power should be considered.

In almost all situations, it is possible to reduce the consumption of electrical energy by replacing equipment with equipment that has a better energy performance and, therefore, more energy efficient.

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Main skills of an Energy Management specialist

Another aspect that has become more and more relevant is related to the consumption of energy by the built park.

The European Directive on the Energy Performance of Buildings defines criteria and methodologies, the levels of requirements of which tend to increase, in line with the strategy for the decarbonisation of the built park. Thus, the concept of NZEB - Buildings with almost zero energy needs emerged.

The building regulations provide that all public buildings constructed after 31 December 2018 must have almost zero energy needs. From January 1, 2021, this requirement will be extended to all new buildings.

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Main knowledge of the energy management expert

THERMAL ACCOUNT, TAX DEDUCTIONS OR WHITE CERTIFICATES?

In Italy the three mechanisms coexist right now. The ecobonus or tax deductions for the energy upgrading of buildings is confirmed at 65% until the end of 2019, while white certificates or energy efficiency certificates (TEE) can no longer be accumulated.

What then is the most effective incentive?

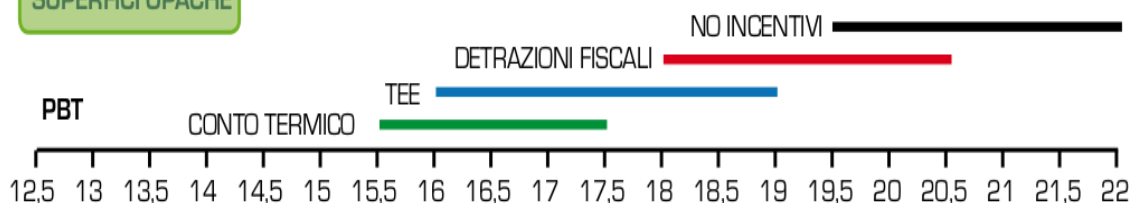
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Main knowledge of the energy management expert

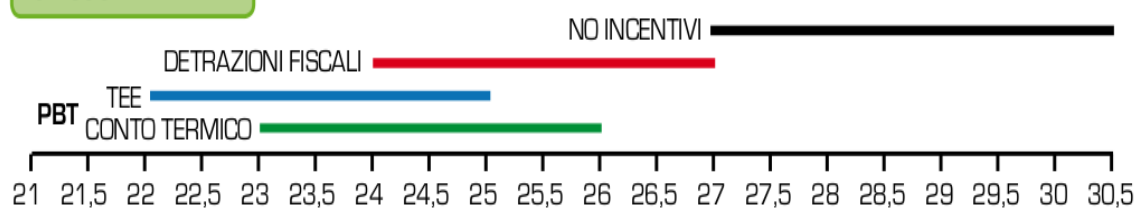
The result is summarized in the table below, which shows the convenience (or non-convenience) of the thermal account compared to the other mechanisms in different hypotheses.

The range of variation of the return time or payback time (PBT) depends on the different sizes and types of installations or interventions. The graphs show the convenience of the thermal account for these interventions applied to areas typical of the public, such as schools and hospitals.

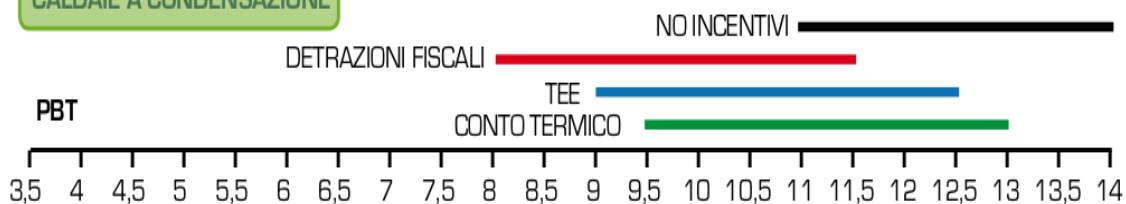
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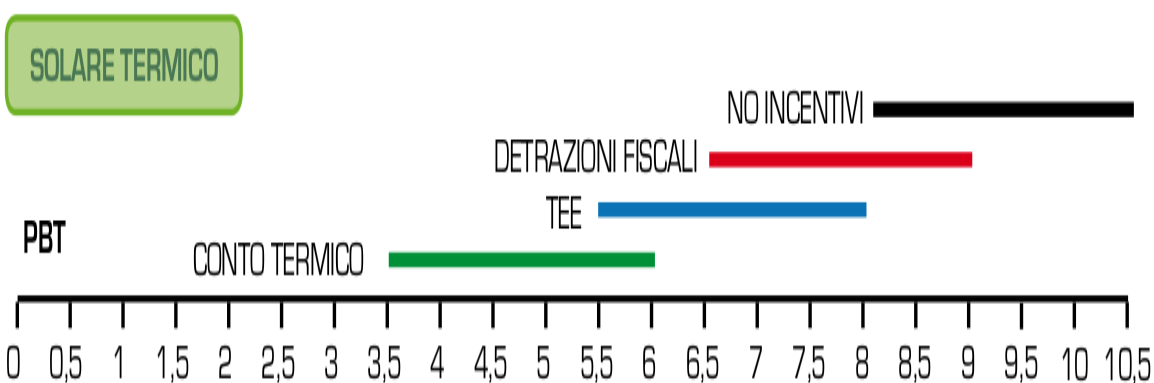
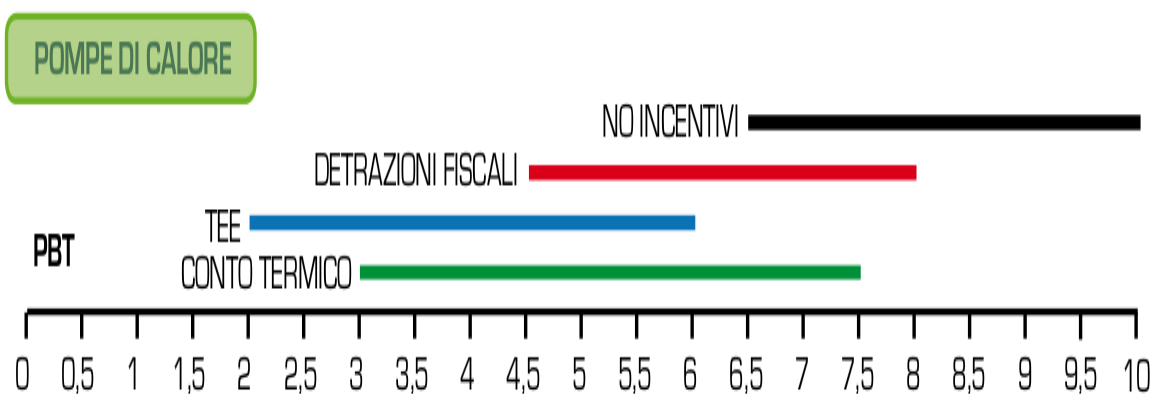
CHIUSURE VETRATE



CALDAIE A CONDENSAZIONE



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Conclusions

Renewable energies can be used both for the production of electrical energy and for the production of thermal energy.

The offerings of renewable energy technologies in different countries are increasingly more and more diversified, already responding to most of the needs that are currently imposed.

In addition, energy produced from renewable sources can be integrated into the national electricity grid, or it can also be used in remote applications in rural areas.