



ER2FOOD

Strategic support for facilitating the adoption of Energy and Resources efficiency as drivers for the technical and business development of Egyptian SMEs and start-ups of the FOOD sector

Sustainability assessment



This project has received funding from Europe Aid /
Contract ENI 2021/425-091



Agenda

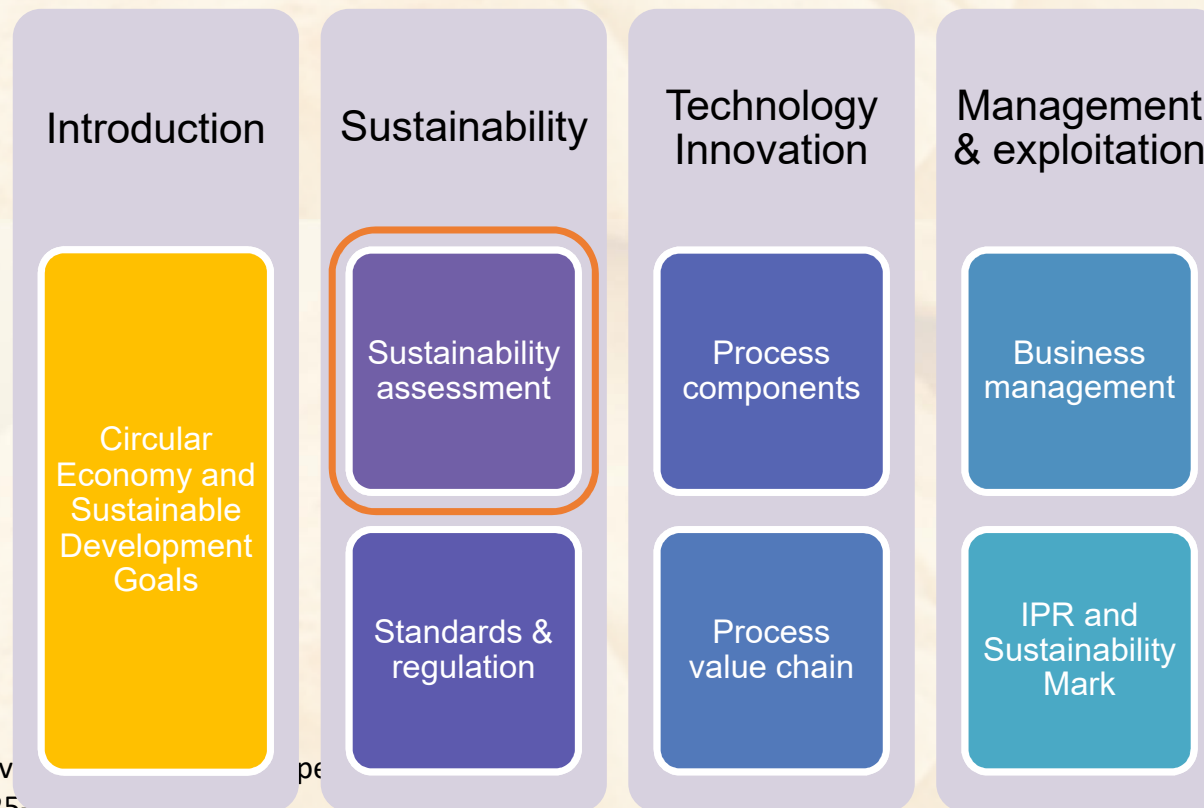
- **Introduction to the module: scope and goal**
- Definition of Sustainability
- Major Environmental Concerns for Bakeries
- Energy Audit Process
- Conclusions





Introduction to the module: scope and goals

This is one of the training modules defined for the group: “Sustainability”





SCOPE and GOALS

The goal of the project:

- ER2FOOD project aims at providing strategic support and expert consultancy services to Egyptian MSMEs and start-ups from the value chain of industrial bakery, for facilitating the adoption of Energy and Resources efficiency as drivers of their technical and business development

The goals of the module:

- To investigate the Sustainability definition
- To introduce the Sustainable Development Goals SDGs
- To provide an overview of the Energy Auditing methodology



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Definition of Sustainability

Sustainable Development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs

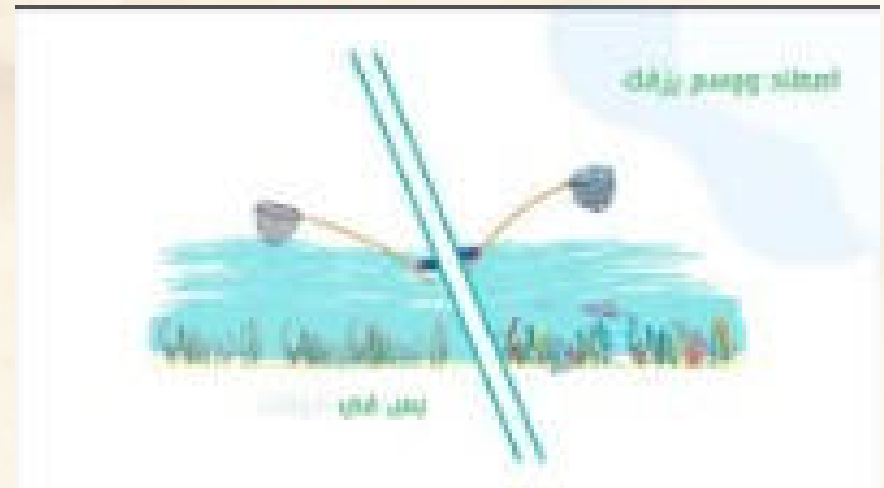
Our Common Future (also known as the "Brundtland Report"), 1983

Development is related to the nature of human-beings, it is something we cannot stop.

Sustainability does not mean to stop the development.

Sustainability wants to raise awareness towards the impact of human activities on the environment and allow a less harmful Development.

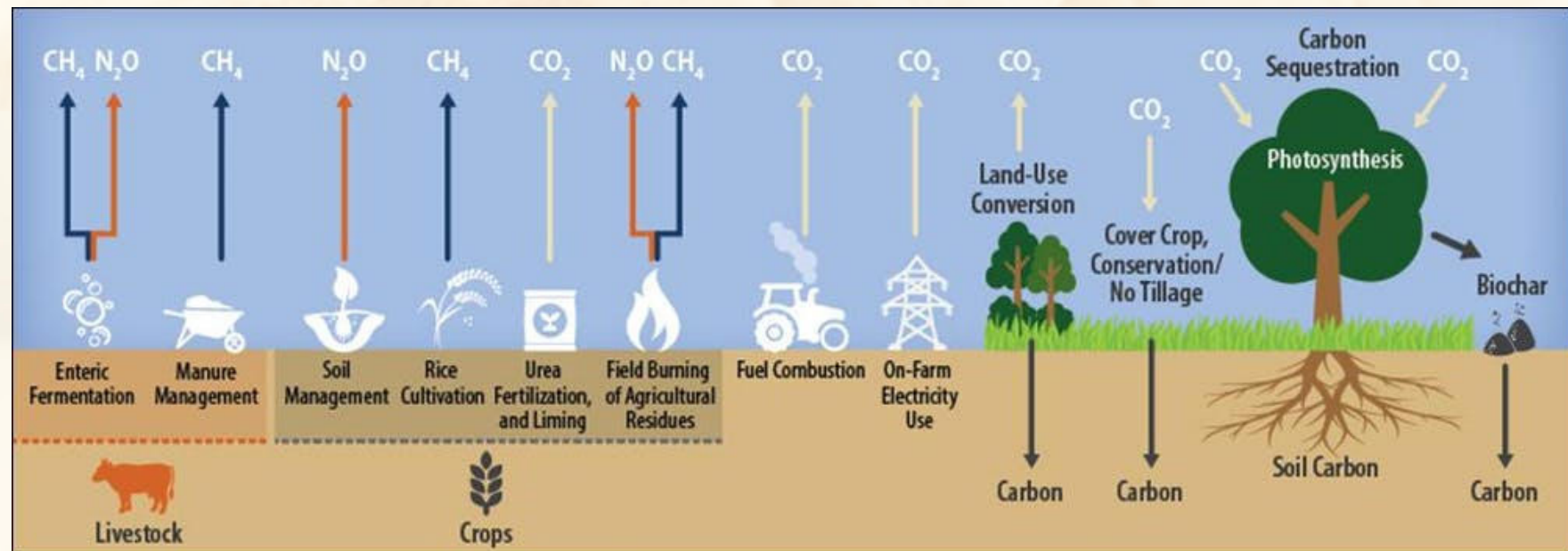
Sustainability can be implemented by improving the processes efficiency or by optimizing the resources consumption.





Consumption and Emissions

Fuels and resources consumption are responsible of Greenhouse Gases GHG emissions into the environment. The GHG emissions increase the air temperature and impact negatively the planet. The process is mostly irreversible.



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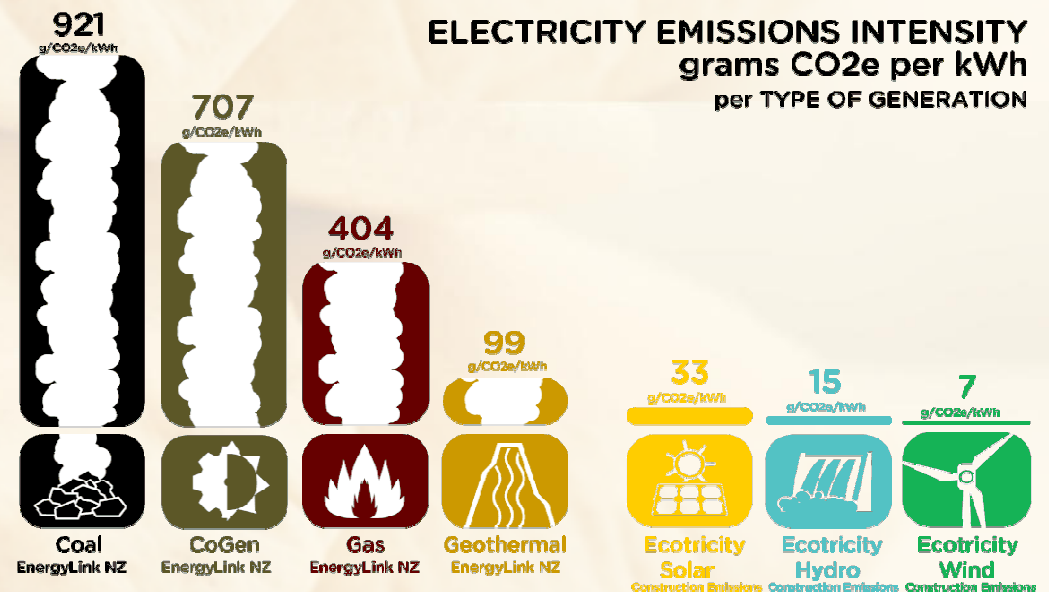
Emissions and Environment

To maintain our well-being and our lifestyle, we need to use natural resources, such as metals, minerals, forests, land, food, air and water. However, we are consuming these resources much faster than the time it takes for them to regenerate.

By destroying the flora and fauna that help preserve the balance of our ecosystem, we cause problems that will also have consequences in the future.

To be sure of being able to guarantee, for us and our children, a future characterized by a good quality of life, a dynamic economy and a healthy environment, we must change our habits in terms of exploiting resources individually and collectively.

Talking about resource efficiency means doing more with less, using resources in a sustainable way and minimizing the impact on the environment.



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Bakeries

Bakeries produce bread, cakes, pizza, pastries and biscuit products using flour as the basic ingredient. They vary in size and scale from small shop bakeries to in-store supermarket bakeries to very large scale bakeries. The main activities carried out in a bakery include, amongst others:

- Loading and unloading of raw materials and finished products
- Storage of raw materials (flour, water, eggs, yeast, leavening agents, preservatives and other ingredients such as onions, herbs, olives);
- Preparation (mixing, shaping, placing in tins);
- Baking (removing from tins, cooling, frosting, decorating);
- Packing (slicing, wrapping, packaging);
- Selling of products.

One of the main industry opportunities for significant carbon emissions reductions is improving oven combustion efficiency. The largest energy consumer in bakeries is the baking oven. Any business seeking to reduce costs and lessen environmental impacts, should look at their ovens and assess whether they are the most effective equipment to maximise carbon efficiency. → **Energy Audit**



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Major environmental concerns for bakeries

The **major environmental concerns** associated with bakeries are:

- Site selection;
- Solid waste;
- Wastewater;
- Noise;
- Odour and sanitary nuisances;
- Vehicular movement;
- Emissions and dust nuisances;
- Energy and resource consumption.





Major environmental concerns for bakeries

Concern	Recommendations
Site selection	<ul style="list-style-type: none">• Bakeries should preferably be located in commercial areas or in predominantly commercial areas within settlement boundaries.• Existing natural drains and watercourses on or in the vicinity of the site shall not be tampered with.
Solid waste	<p>Wastes may be generated at all stages from the production process (spoiled raw materials, eggshells, spillages) to packaging wastes (carton boxes, egg trays, plastic wrappings/bottles).</p> <ul style="list-style-type: none">• Domestic solid wastes to be collected in bins or waste handling receptacles of an appropriate size and rodent-proof.• No waste of any type to be disposed of in any watercourse including drains, canals and the surrounding environment.





Major environmental concerns for bakeries

Concern	Recommendations
Wastewater	<p>Wastewater arising from cleaning and spillages contain suspended solids, fats, oils and greases which if discharged without treatment will potentially pollute watercourses.</p> <ul style="list-style-type: none">• Installation of grease traps or oil water separators for removal of floatable solids. Attention: Maintenance of the grease trap or oil water separator is to be carried out by the owner.
Noise	<p>The bakery sector may be associated with noise emanating from electric appliances, air extractors and electric motors.</p> <ul style="list-style-type: none">• Provision of appropriate noise attenuating materials/structures to abate noise generated from equipment such as electric appliances and extraction systems.• Bakeries operating at peculiar hours (very early in the morning) should ensure that operations are carried out with minimal noise disturbance to the surrounding environment.





Major environmental concerns for bakeries

Concern	Recommendations
Odour and sanitary nuisances	<p>Odours may be released from cooking, baking as well as from the inappropriate storage and disposal of wastes, which attract rodents and flies.</p> <ul style="list-style-type: none">• Good housekeeping within the premises should be maintained at all times with the adoption of good cleaning and work practices such that there is no cross contamination of food.• Wastes should be kept in closed waste handling receptacles.• Provision of extractors and hoods to reduce odours from cooking and baking processes.• Odour controlling equipment (such as but not limited to scrubber or activated carbon filter) should be incorporated in the hood system.• Installation of bait stations/traps to control pests and rodents.





Major environmental concerns for bakeries

Concern	Recommendations
Emissions and dust nuisances	<p>Bakeries have ovens which may be electric or diesel-fired or gas-fired. Emissions from diesel-fired ovens include volatile organic compounds and oxides of carbon, nitrogen and sulphur, which are associated with various environmental and health impacts.</p> <p>Dust may arise from raw material storage, handling, drying activities as well as from unloading of flour.</p> <ul style="list-style-type: none">• All necessary precautions should be taken at all times to avoid dust emission.• Flour should be properly stored in an enclosed structure with ventilation and extraction equipment.• Good housekeeping should be maintained at all times in all areas with adoption of good cleaning and working practices.• Chimney stacks should be located furthest away from adjoining buildings and should be consistent with good engineering practices.





Major environmental concerns for bakeries

Concern	Recommendations
Vehicular movement	<p>Loading and unloading of raw materials and finished products and vehicular movement from customers may cause traffic congestion or excessive noise potentially leading to complaints.</p> <ul style="list-style-type: none">• Provision for adequate parking, loading and unloading facilities.• Loading and unloading of raw materials/ goods should be carried out in such a way that no disturbance is caused to the neighbourhood.
Energy and resource consumption	<p>→ Check below the Energy Audit section</p>





Major environmental concerns for bakeries

General recommendations:

- Use local and organic ingredients;
- Use less packaging;
- Reduce your packaging waste;
- Decrease your water usage;
- Improve oven efficiency;
- Decrease fuel consumption;
- Increase share of renewable energy sources;
- Donate or repurpose your unsold products.





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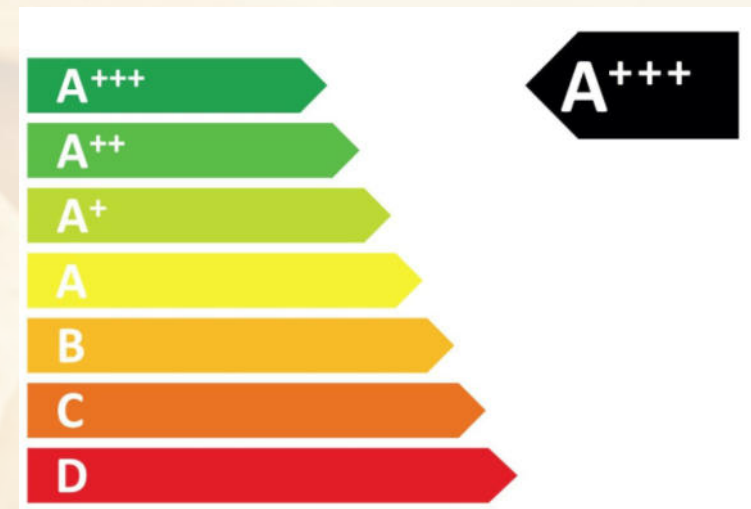
Energy Audit

Sustainability assessment

“an energy audit is a systematic inspection and analysis of the energy use and consumption of a plant, building, system or organization, with the aim of identifying and reporting on energy flows and the potential for energy efficiency improvements” (EN 16247-1)

Objectives:

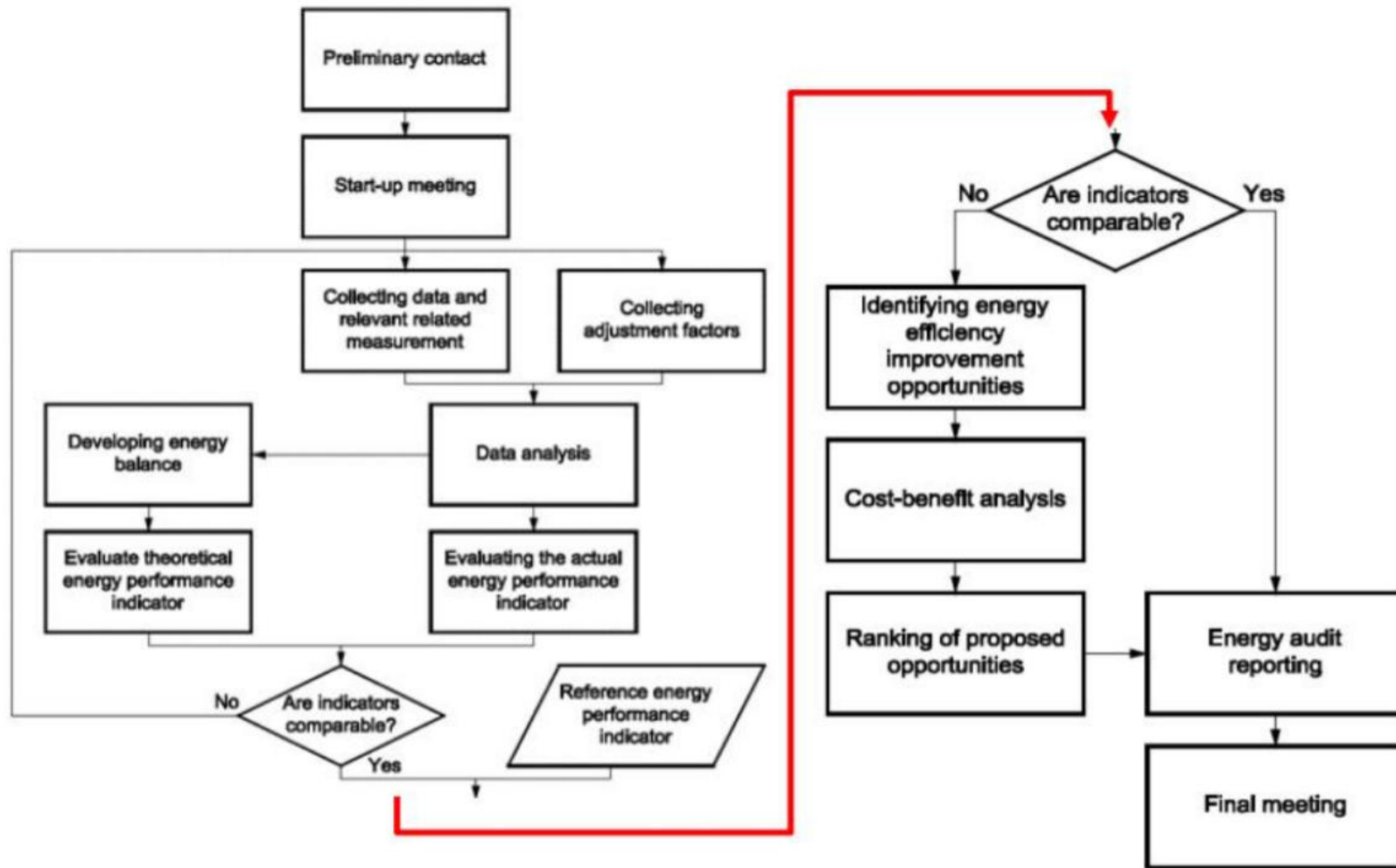
- Take a picture of the baseline energy consumptions and flows
- Evaluate consumptions referred to plant production (KPIs – EnPIs)
- Benchmarking with BAT for the sector
- Identify opportunities for improvement of energy efficiency
- Define an Energy Efficiency Action Plan



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Energy Audit Process



Taken from EN 16247-1

Specific provisions on:

- Buildings (EN 16247-2)
- Industries (EN 16247-3)
- Transports (EN 16247-4)

Guidelines from National authorities for EU EED audits



Energy Audit Main Phases



- all phases can be covered remotely through a desk analysis and teleconference tools
- the only exception is the visual inspection part of the site visit





Data Collection - What do we ask?

- Plant General Data
- Total Energy Consumption
- Monitored Consumption Trends
- Production Values
- Equipment List with Power
- Process Flow Diagram
- Site Layout

The image displays a series of six questionnaire pages for sustainability assessment, organized into two rows of three pages each. Each page contains various tables and text boxes for data collection.

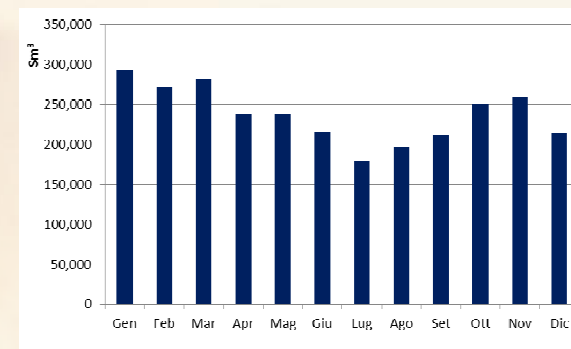
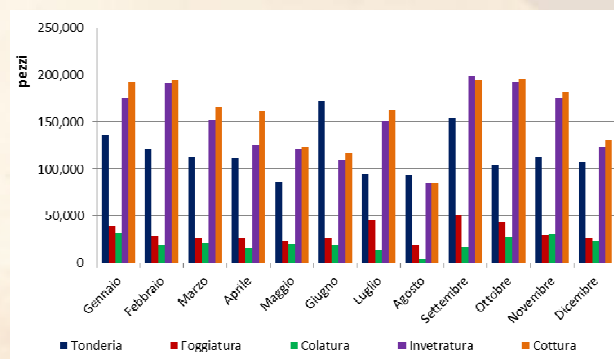
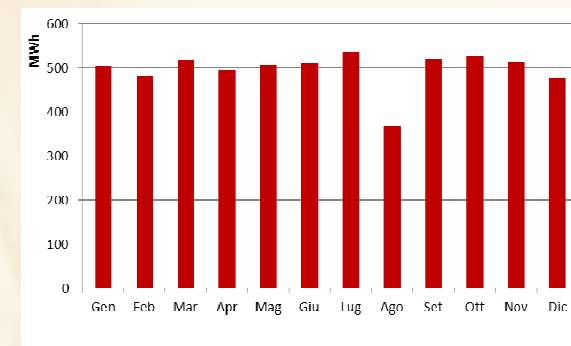
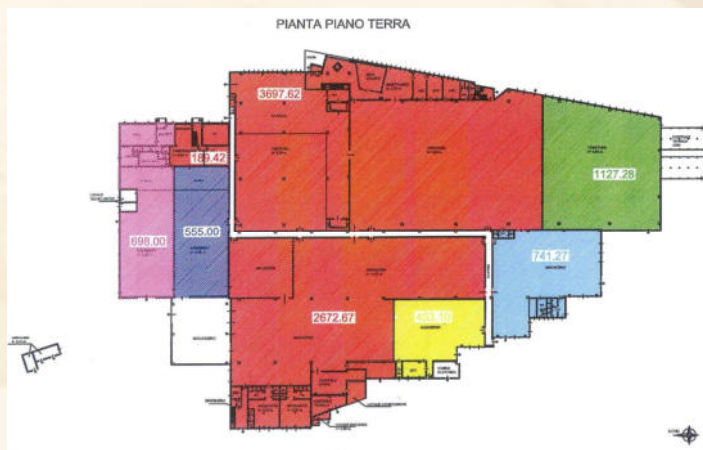
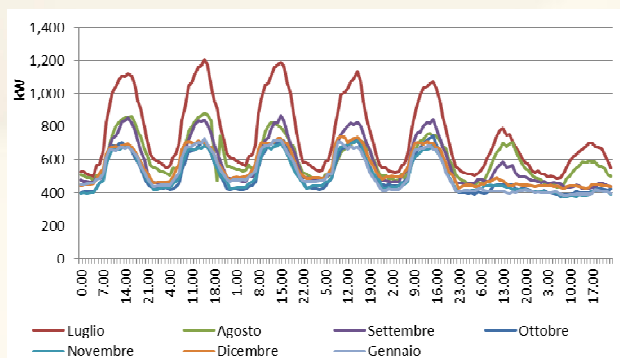
- Page 1 (Top Left):** Titled "QUESTIONARIO PER RACCOLTA DATI GENERALI (BY INDUSTRY)". It includes a section for "Informazioni Generali" with a table for "Dati Generali" and a section for "Informazioni Specifiche" with a table for "Dati Specifici".
- Page 2 (Top Middle):** Titled "QUESTIONARIO PER RACCOLTA DATI ENERGETICI (BY INDUSTRY)". It includes a section for "Informazioni Generali" with a table for "Dati Generali" and a section for "Informazioni Specifiche" with a table for "Dati Specifici".
- Page 3 (Top Right):** Titled "QUESTIONARIO PER RACCOLTA DATI DI PRODUZIONE (BY INDUSTRY)". It includes a section for "Informazioni Generali" with a table for "Dati Generali" and a section for "Informazioni Specifiche" with a table for "Dati Specifici".
- Page 4 (Bottom Left):** Titled "QUESTIONARIO PER RACCOLTA DATI DI EQUIPAGGIAMENTO (BY INDUSTRY)". It includes a section for "Informazioni Generali" with a table for "Dati Generali" and a section for "Informazioni Specifiche" with a table for "Dati Specifici".
- Page 5 (Bottom Middle):** Titled "QUESTIONARIO PER RACCOLTA DATI DI PROCESSO (BY INDUSTRY)". It includes a section for "Informazioni Generali" with a table for "Dati Generali" and a section for "Informazioni Specifiche" with a table for "Dati Specifici".
- Page 6 (Bottom Right):** Titled "QUESTIONARIO PER RACCOLTA DATI DI SITO (BY INDUSTRY)". It includes a section for "Informazioni Generali" with a table for "Dati Generali" and a section for "Informazioni Specifiche" with a table for "Dati Specifici".





Data Collection - What do we ask?

- Electricity/Fuel Bills
- Plant layouts
- List of equipment/assets
- Electrical schemes
- Feasibility studies/offers



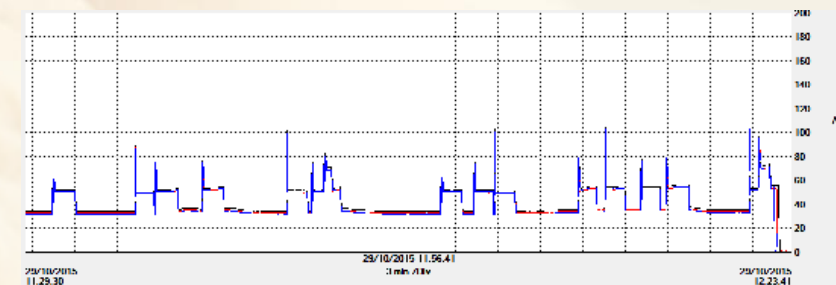
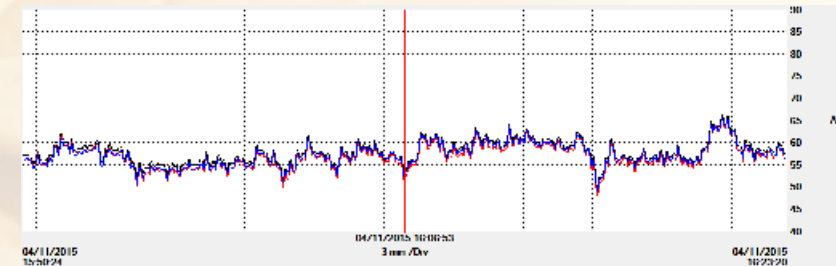
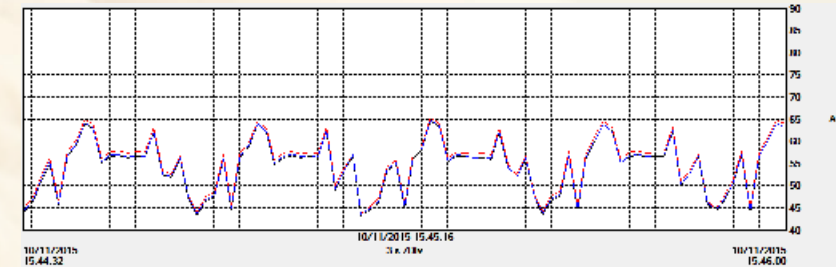
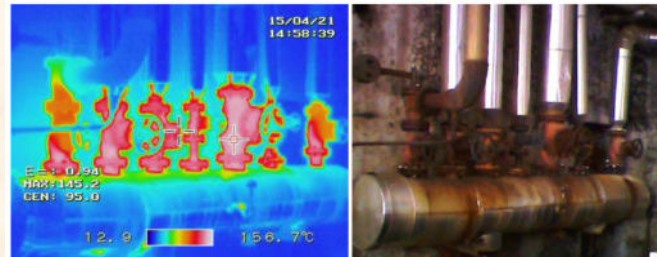
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Data Collection - Tools and Measurements

- Power/Energy Logger
- Current Clamp
- Infrared Camera
- Infrared Thermometer

Mainly used to assess current efficiency level and spot improvements



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Data Collection - Visual Inspection

- discussion on-site with plant personnel
- real layout of plants and systems
- nominal data of installed devices
- type of equipment
- presence of control systems
- improvement of management practices
- spaces/areas for new devices

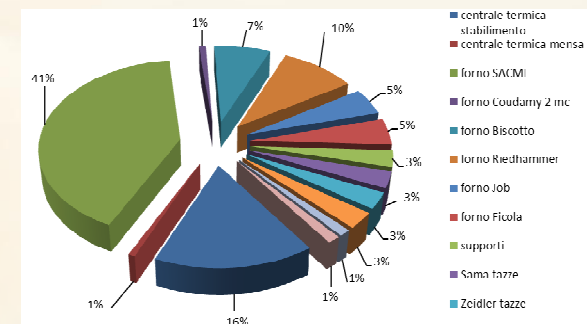
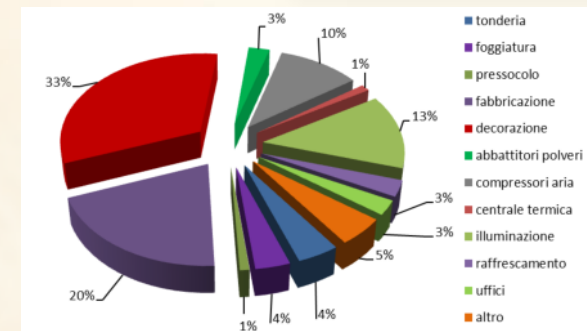
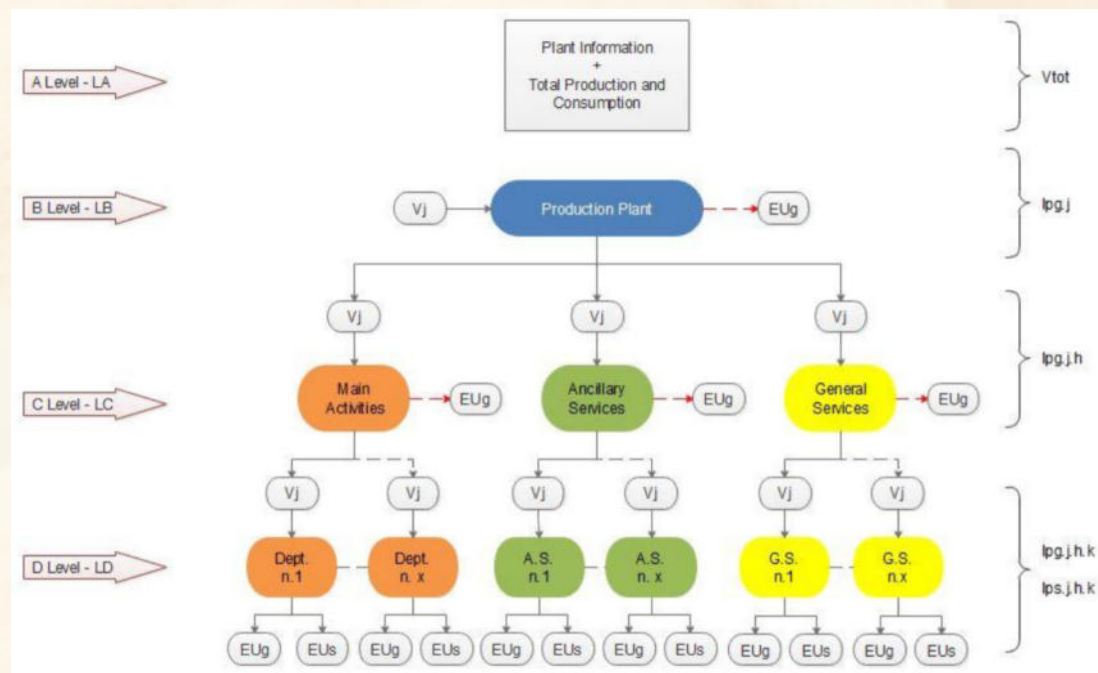




Energy Balances and Indicators

Sustainability assessment

- total consumption
- for main activities
- for auxiliary services
- for general services
- by energy carrier
(electricity/fuels)
- comparison with BAT



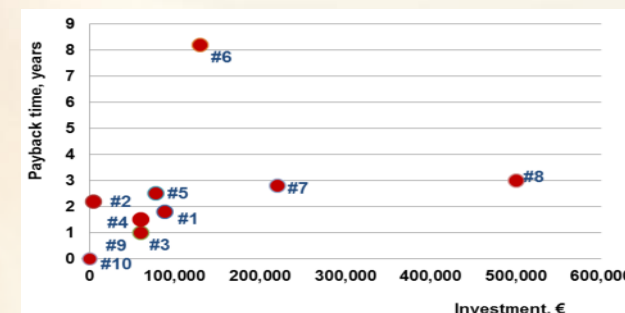
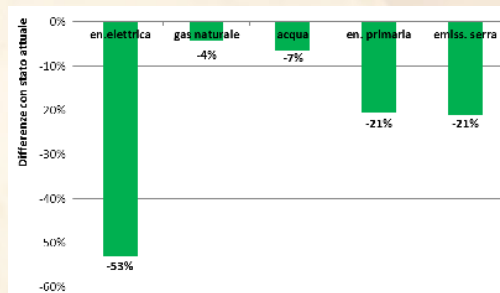
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Energy Efficiency Action Plan

- proposal for improvement measures
- estimation of investment needs
- evaluation of energy savings
- potential for cutting GHG emissions
- evaluation of financial performance
- check of available incentives
- definition of action plan

#	Misura	Investimento Totale	Risparmi Totali	Tempo di Ritorno Investimento	Risparmi En. Elettrica	Risparmi Gas Naturale	Risparmi Acqua	Emissioni Gas Serra Evitate	Risparmi Percentuali	Priorità
		€	€/anno	anni	MWh/anno	Nm³/anno	m³/anno	tCO₂/anno	-	
0	Interventi Straordinari e Buone Pratiche Gestionali	Molto Basso	-	Molto Basso	-	-	-	-	5,0% (en. el.) 10,0% (gas) 10,0% (acqua)	Alta
1	Sistema di Misura e Monitoraggio dei Consumi	104.800	80.300	1,3	234,7	115.100	28.117	330,9	5,0% (en. el.) 5,0% (gas) 5,0% (acqua)	Alta
2	Ottimizzazione del Sistema Aria Condizionata	1.600	5.100	0,4	31,5	-	-	15,3	0,6% (en. el.)	Alta
3	Ottimizzazione del Sistema Vapore	40.000	20.700	1,9	-	60.300	-	113,7	2,6% (gas)	Medio-Alta
4	Sostituzione dei Corpi Illuminanti	148.300	62.100	2,4	388,0	-	-	187,2	8,2% (en. el.)	Medio-Alta
5	Installazione di Inverter sui Motori Elettrici	30.800	15.000	2,0	99,5	-	-	45,4	2,0% (en. el.)	Medio-Alta
6	Sostituzione dell'impianto di Cogenerazione	1.200.000	240.600	5,0	1.740,1	-113.800	-	629,3	37,1% (en. el.) - 4,9% (gas)	Media
7	Miglioramento del Recupero Termico	Medio-Alto	-	Medio	-	-	-	-	10,0% (gas)	Medio-Bassa
8	Demineralizzazione dell'Acqua di Lavaggio	40.000	16.100	2,5	-	36.600	7.835	69,0	1,6% (gas) 1,5% (acqua)	Media
9	Graduale Miglioramento dell'Involucro Edilizio	Medio-Alto	-	Medio	-	-	-	-	10,0% (gas)	Media



Sustainability assessment

#	Measure	Name	Phases	2015												2016																		
				A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N											
1	EXTRAORDINARY REORGANIZATION OF THE PREMISES	Design																																
		Delivery																																
		Installation																																
2	ENERGY METERING AND MANAGEMENT SYSTEM	Design																																
		Delivery																																
		Installation																																
3	OPTIMIZATION OF COMPRESSED AIR SYSTEM	Design																																
		Delivery																																
		Installation																																
4	OPTIMIZATION OF LIGHTING SYSTEMS	Design																																
		Delivery																																
		Installation																																
5	REPLACEMENT OF FUEL OIL WITH WOOD CHIPS	Design																																
		Delivery																																
		Installation																																
6	REVAMPING OF THE OLD HYDRO PLANT	Design																																
		Delivery																																
		Installation																																
7	OPTIMIZATION OF AIR CONDITIONING SYSTEMS	Design																																
		Delivery																																
		Installation																																



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Conclusions

- Companies can reach the economic growth sustainably.
- Bakeries have negative impacts on the environment
(energy & resource consumption impact the environment).
- The energy audit allows to assess the areas where companies can optimize the production, reduce consumption and limit the GHG emissions.





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