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Expert program toolkit

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5) Green skills

I. Theoretical part

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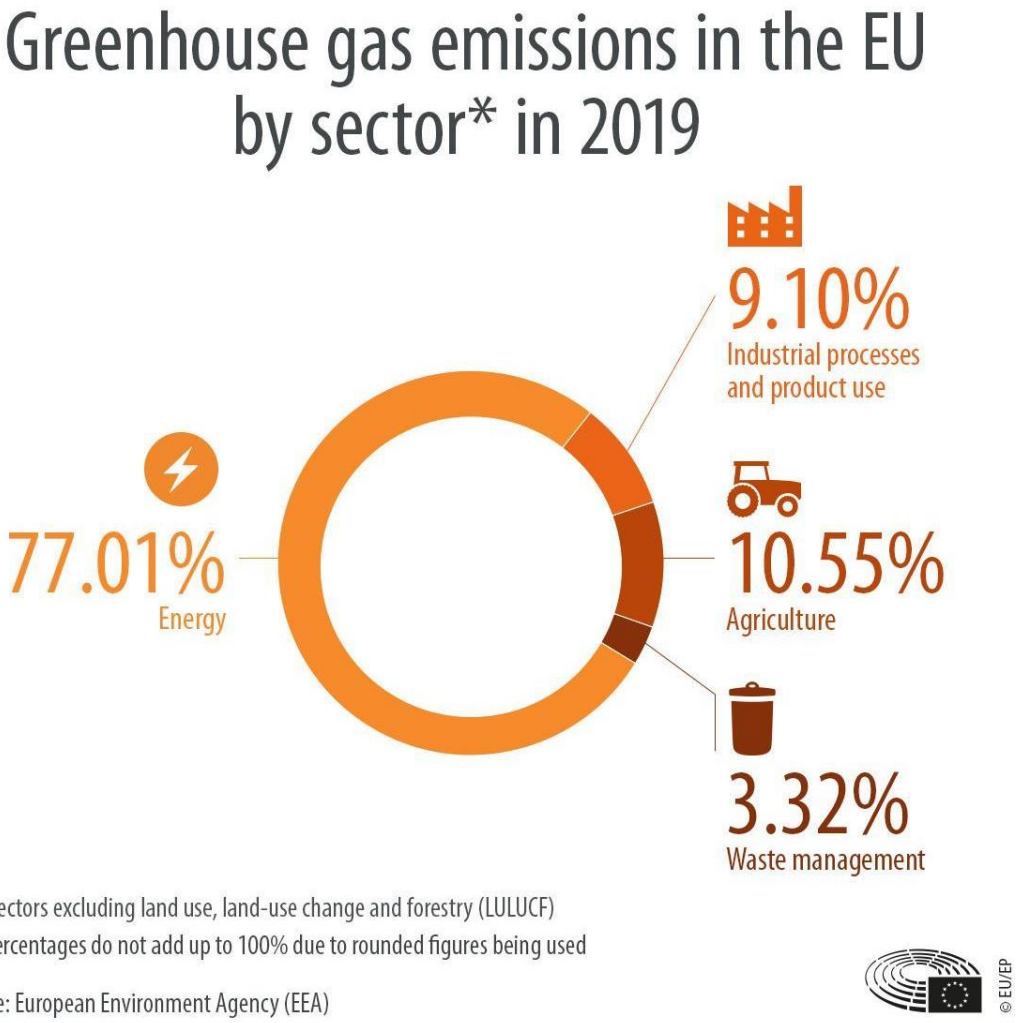
I. Theoretical part

1. Environmental sustainability and climate change

Climate change is already affecting Europe in various forms, depending on the region. It can lead to biodiversity loss, forest fires, decreasing crop yields and higher temperatures. It can also affect people's health.
In 2021, the EU made climate neutrality, the goal of zero net emissions by 2050, legally binding in the EU. It set an interim target of 55% emission reduction by 2030 with the ***European Green Deal***, this goal of zero net emissions is enshrined in the climate law. The European Green deal is the roadmap for the EU to become, climate-neutral by 2050.



The ***Climate Pact***, the movement of people united taking steps to build a more sustainable Europe, launched by the European Commission as part of the European Green Deal, will continue the EU's work in this area and actively support labor organizations, educational bodies, and public authorities to help those seeking employment in the green economy.

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In order to tackle pressing environmental challenges like climate change, pollution and plummeting biodiversity, nations and businesses need to transition towards greener, resilient and climate-neutral economies and societies.
For this reason, the International Labour Organization ILO created the ***Guidelines for a just transition toward environmentally sustainable economies and societies for all***.

A Just Transition means greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind.
A Just Transition involves maximizing the social and economic opportunities of climate action while minimizing and carefully managing any challenges – including through effective social dialogue among all groups impacted, and respect for fundamental labor principles and rights.
Ensuring a just transition is important for all countries at all levels of development. It is also important for all economic sectors – by no means limited to energy supply – and in urban and rural areas alike.

[1] https://www.europarl.europa.eu/news/en/headlines/priorities/climate-change/20180703STO07129/eu-responses-to-climate-change

2. Towards a greener economy

A properly functioning circular economy does not only depend on the government and industry, consumers, too, have a role to play by choosing sustainable products, using them longer, repairing them or recycling them at the end of their life cycle.

The **circular economy** is an economy model that aims to minimize the withdrawal of resources, the biological ones, by reintegrating them into the biosphere and the technical ones by prolonging their use, promoting their reuse and putting them back into the cycle with recycling, thus minimizing production and waste disposal. The circular economy aims to replace the linear operating model of the traditional economy which is based on the massive withdrawal of natural resources, their transformation into products that are consumed, generating large quantities of waste that are disposed of.

The **green economy** aims to save and efficiently use resources and energy, on the development of renewable energy, recycling and renewal of materials in order to have better quality inclusive well-being, protecting natural capital and eco-systemic services.
The green economy is a vision of the economy in the era of the global climate crisis and environmental scarcity which therefore considers the ecological question a decisive driver for the possibilities of development, better well-being and social inclusion that takes into account not only a more equitable distribution of goods, but also of the damages caused to natural capital and ecosystem services.
The circular economy can be considered the pillar of a green economy.

The transition to a climate-neutral economy will trigger a fundamental transformation across a wide range of sectors. New jobs will be created, while some jobs will be replaced and others redefined.

It’s becoming necessary to:

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- promote and support green employment
- address the skilling and reskilling of workers
- anticipate changes in workplaces of the future

For this reason, **green skills** are now a requirement for accessing the most diverse professions, because of the great importance that environmental issues are acquiring even within the production sector.

[2] https://europa.eu/climate-pact/about/priority-topics/green-skills_en

3 https://www.ilo.org/global/topics/green-jobs/WCMS_824102/lang--en/index.htm

3. What are green skills

According to the definition of UNIDO - the United Nations organization for industrial development, **Green Skills** are the *knowledge, abilities, values and attitudes needed to develop and support a sustainable and resource-efficient society*.

Green Skills today means all those skills that allow us to respond to the need for sustainable reconversion of production in every type of reality, from public and private offices to shops, industries, and companies.

Green skills can be summarized in two main areas:
- predisposition to energy saving
- attitude to environmental sustainability

The demand for green skills is now transversal and concerns all professions. An increasing number of companies are looking for professional profiles able to work with tools and products related to eco-sustainability. There are entire production sectors such as sustainable tourism, sustainable construction and mechatronics where the foundations of the Green Economy have a great impact.

Companies evaluate, as green skills for work, all those factors such as the attitude to energy saving and environmental sustainability, so they turn to human resources that demonstrate ability, skills, and attention in making corporate activities more environmentally friendly. Among the new trends that change the labor market, there is not only the creation and/or activation of new green jobs, in fact, but the attitude to energy saving and environmental sustainability is also the first skill required by companies immediately after the so-called soft skills.
Green skills are presented both as a specific technical skill and as a personal orientation and a cultural propensity. They not only concern the ability to set up the technological renewal of production chains, or greater energy or water efficiency but are also assessed on the basis of the ability to change individual and organizational behaviors on the objectives of eco-sustainability within the production processes.

[4] https://www.fondazionesviluppososteni bile.org/circular-economy-pilastro-green-economy/

[5] https://www.unido.org/stories/what-are-green-skills

[6] https://jobspa.it/blog/competenze-green-piu-richieste-in-futuro

Why green jobs are essential for the future (video)

4. Circular economy within the machinery revamping

The "green professions" include both specific professions, which are required to meet the new needs of the Green Economy, and those that will have to face the challenge of reskilling skills in a green key.
The professions in which these skills are most required are: civil engineers, electronic and telecommunications engineers, construction site management technicians, occupational safety technicians, energy and mechanical engineers.

The hope of European companies is that positions related to the reduction of environmental impacts in the technological-digital field will develop.
As an example, in the most structured companies, it can be found the position of the mobility manager: a person in charge of corporate mobility, who is responsible for coordinating employee travel from home to work in a more sustainable way .

The fundamental principle on which the economic model of the circular economy is based, which aims to minimize the withdrawal of resources by promoting the reuse of biological resources by reintegrating them into the biosphere and of the technical ones by prolonging their use, is perfectly suited to the refitting sector and machinery revamping.
The concept of circular economy is the basis for explaining some of the benefits of refurbishing obsolete machinery. This covers the economic as well as the social and environmental aspects.

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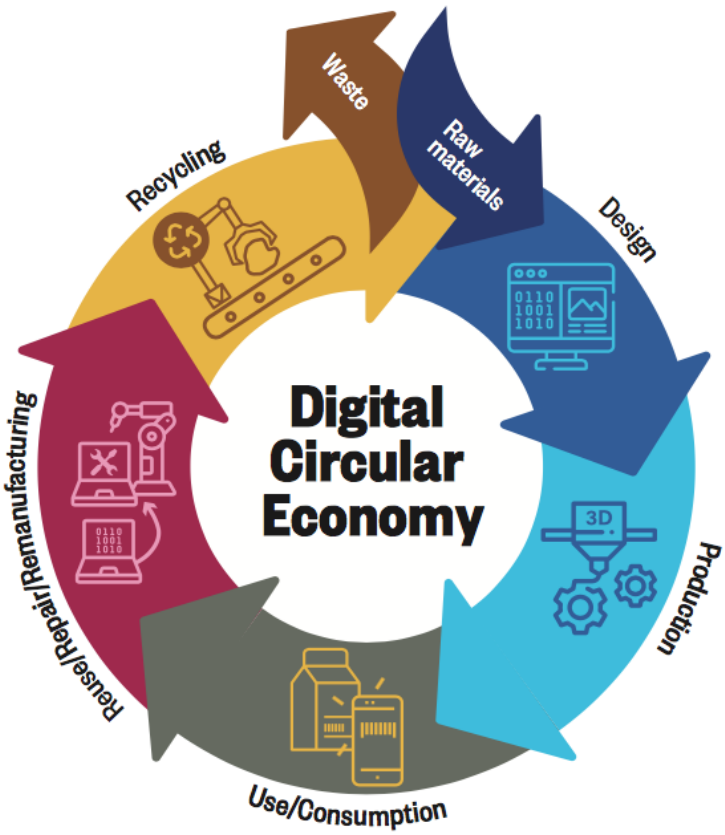
The adoption of the circular systems in the industry consists of reuse, sharing, repair, revamp, refurbishment, remanufacturing and recycling to create a close-loop system, minimizing the use of resource inputs and the creation of waste, pollution and carbon emissions. Many of these aspects are included in the machinery revamping.

The recovery of obsolete machinery will have a strong influence on this whole model as it responds not only to environmental programs for waste management, energy efficiency and raw material reduction, but will also contribute decisively to the circular economy.

The machinery revamping brings positive financial and economic benefits. By raising the productivity of industry, modernized machines also raise the overall production of the economy; as a result, employment, national income, and the growth rate of the economy increase.

Revamping is generally cheaper than buying new products or equipment. For example, when revamping a vehicle, functional parts are reused (like the seats, chassis, gears, windows, etc.). This not only increases safety due to using more advanced tech solutions, but also reduces operating costs.
Also, revamping or retrofitting are common practices that embrace key principles of the “circular economy”, whereby machines are designed with ease of maintenance in mind and with much of the materials to be recycled at the end of their lifetime. Spare parts of old/obsolete machines are repaired or reproduced for more effective use, thus reducing the amount of waste and expanding the lifetime of the product while using fewer resources. These practices are key aspects in improving the environmental performance of machine tools as well, while not ensuring customer demands for productivity and reliability.



Source https://www.climate-kic.org/wp-content/uploads/2019/07/DRCE.pdf

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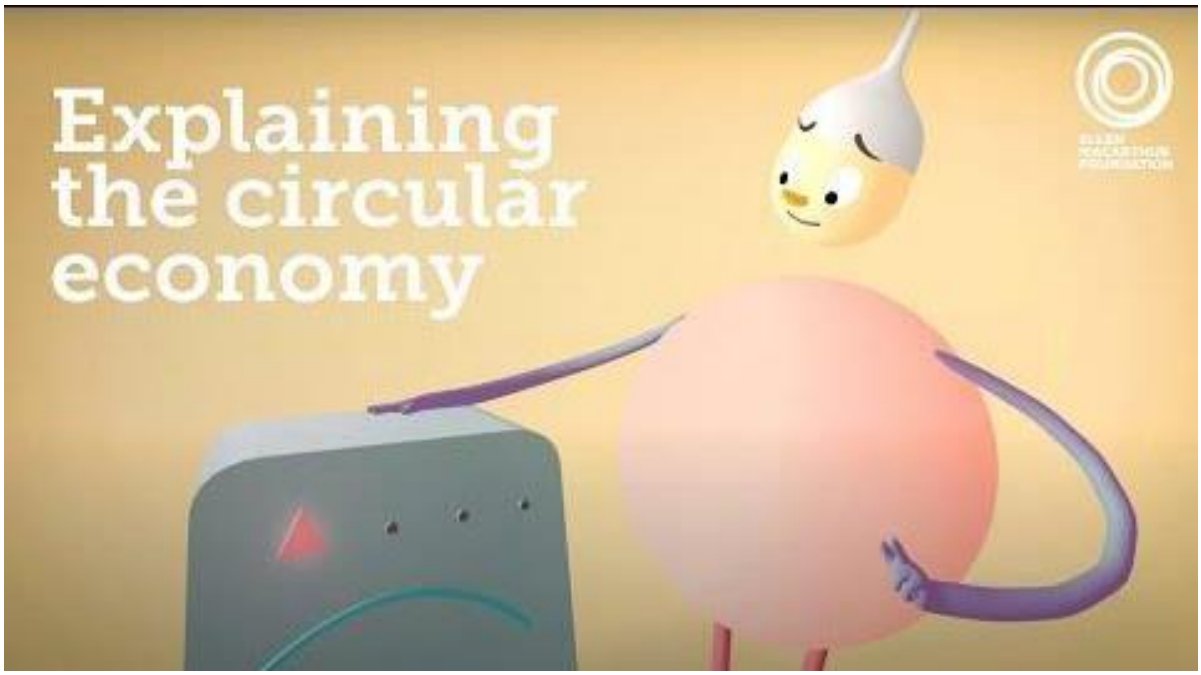
Machinery revamping is one of the key elements of circular economy. The companies that are using this system are able to retail and recycle the machines or their parts and modernize their equipment. In this way, companies will reduce the costs, update the machines according to their needs and follow the method of the digital circular manufacturing and modernizing of machines.

What If We Don't Buy Products and We Buy Service? Circular Economy Explained (Video)



[7] https://excelsior.unioncamere.net/index.php?option=com_content&view=article&id=349:le-competenze-green&

[8] https://laborability.com/approfondimenti/leuropa-alla-ricerca-di-competenze-green-e-digital

[9] https://blog.ener2crowd.com/circular-economy-e-green-economy/

5. Benefits of revamping for a greener economy

Economic benefits

- **Update of the software and/or hardware**
  The installation of a new software or hardware could be very expensive for the companies. Updating the current software/hardware installations costs are reduced without bearing the expenses for a new software version.

- **Increase in productivity**
  Replacing outdated machines can be quite expensive. For companies, revamping is the best solution to update their machines and systems according to their needs at the lowest cost.
  The use of machines after revamping helps producers to increase their income because a piece of updated machinery will operate faster. Users, operating a computer or one part of the new machine, will be able to complete the work faster than many workers engaged in doing the same work manually.

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- **Increased efficiency of the worker**
  By increasing the efficiency of workers, they can perform their duties in a better way than they would do manually. In this way, they will produce more accurately and faster qualitative products in larger quantities, moreover workers with more skills and competencies will be able to also increase their income.

- **Create employment opportunities**
  Machinery creates employment and increases productivity, reducing costs for the industry and making goods and products cheaper; this leads to demand increase. The industry needs more workers in order to face the demand.
  Some of the categories of increasing demand are Mechanical Engineers, Aerospace Engineering and Operations Technicians, Electro-mechanical Technicians, Sales Engineers, Computer and Information Research Scientists, Computer Programmers.

Social benefits

A need to update or "revamp" such machines, without wasting resources for buying new equipment, results in a variety of benefits for businesses and the society itself.
In fact, revamping or "retrofitting" has become a highly significant approach in achieving sustainability at all social, economic, and environmental levels, and improve people's standard of living.

- Reusing machinery components makes the process of modernization cheaper and more attractive, it also optimizes energy performance and help to prolong the life of machines

- Revamping pieces of machinery creates educational opportunities. It requires educated and skilled manpower for their operations, repairs, maintenance, and modernization. This leads to the demand of formal or non-formal technical education, which in turn creates a demand for relevant teaching staff. Educational opportunities regarding revamping extend to a large number of education fields, for example, engineering, machine learning, 3D design, software development, etc.

- Replacing or renewing outdated components of a machine, which results in better effectiveness of the entire machine, also results in a better workplace environment. Revamping ensures that a machine functions according to the latest technology demands and current standards of practices. In this way, the everyday work of employees dealing with machines and construction work is improved, including their working conditions and safety aspects.

- Revamping creates employment. Although a general notion regarding the machine industry tends to hold that machines replace the human workforce, a lot of human creativity is still needed when modernizing machines. when updating a machine, there are many levels that must be conserved: structure, dimensions, security systems etc. This turns revamping into an almost manual technique, unique to each brand and context, the need to Workers are always needed to manufacture new machines, or maintain, repair, and modernize older ones.

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Environmental benefits

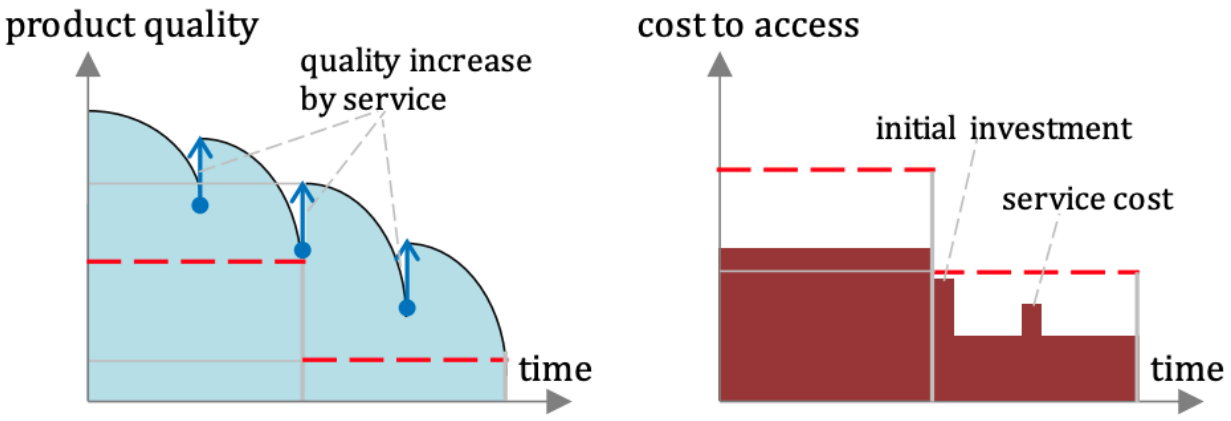
Today environmental sustainability is an important part of any economic activity and particularly in the field of industry.

The recovery of obsolete machinery will have a strong influence on this whole model as it responds not only to environmental programs for waste management, energy efficiency and raw material reduction, but will also contribute decisively to the circular economy.

One of the biggest challenges that industry is facing today is the need to further improve its **environmental performance** in order truly to become compatible with sustainable development. The industry must be an active actor in the process through responsible entrepreneurship and eco-efficiency. Increased environmental performance will mean reducing the negative environmental impacts that occur at each stage of the product life-cycle, from the extraction of raw materials through the production processes, transport and distribution of products to the use and disposal of products.
We must think about the need to promote a more sustainable model of economic activity that meets the double challenge of reducing its emissions and using its resources efficiently.
In this way, the model will move from being part of the problem to being part of the solution.

When we talk about sustainability, we do not refer exclusively to environmental issues, such as energy efficiency or climate change. The principle of sustainability is based on the connections between the environment, society and the economy.

Machinery revamping ensures that machines function smoothly according to modern technology demands. When modern equipment is up-to-date, through incorporating the latest technologies and features, they work more efficiently and are more probably to eliminate potential faults.
As a result, state-of-art components used for revamping results in the expand of the performance capacities of machines and leads to an overall more efficient workplace, that is safer and user-friendly for workers and employees, while being profitable for the employers.



Modernized machines help to increase the production and durability of goods and products. By incorporating state-of-art technologies to existing machinery, old machines become more productive and last longer, allowing mass and automate production of the products, and thus leading to large-scale production, reducing of costs, and raising of profits.

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6. A more sustainable economic model - The Triple Bottom Line (TBL)

In 1994, author and entrepreneur, John Elkington, built upon the concept of the **triple bottom line** (TBL) in hopes to transform the current financial accounting-focused business system to take on a more comprehensive approach in measuring impact and success. Historically, businesses operated in service solely to their financial bottom line. However, as a result of the triple bottom line theory and application, some businesses began to realize the connection among environmental health, social well-being and the organization's financial success and resilience.

Triple bottom line theory expands business success metrics to include contributions to environmental health, social well-being, and a just economy. These bottom-line categories are often referred to as the **three "P's"**: **people**, **planet**, and **prosperity**.

The rationale of this theory consisted in encouraging companies to operate in the reference economic context through strategies and decisions that were able to simultaneously enhance (i) the environment (planet), (ii) the social context (people) and (iii) the economic-financial aspect (profit). These were three elements which, if jointly considered by the company, would have allowed the creation of greater production value, while operating, at the same time, greater attractiveness for investors and consumers and favoring an environment more consciously oriented towards ecological and social sustainability between employees.

[10] https://sustain.wisconsin.edu/sustainability/triple-bottom-line/

Image Source https://www.researchgate.net/figure/The-interconnection-of-the-elements-of-the-Triple-Bottom-Line-concept_fig1_329185478

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- **People**

  This bottom line measures businesses' impact on human capital. A company using the triple bottom line has a responsibility to not only shareholders but also employees, vendors, customers, the community where it does business and anyone else impacted by the organization, whether directly or indirectly. It recognizes the interdependency of all the human relationships and interactions that enable the company to operate. This can translate into actions such as providing quality healthcare benefits and flexible work schedules to employees, offering opportunities for professional or educational advancement, creating a safe work environment, and engaging in fair labor practices.

- **Planet**

  Companies following the TBL model work to reduce their ecological footprint. They recognize that the smaller environmental impact a company has, the longer it can operate. At its most basic level, this involves not producing products that are unsafe or unhealthy for the planet and the people on it, but it also includes reducing consumption, waste and emissions. It involves specific actions, such as using renewable energy sources, reducing energy use, disposing of toxic materials safely and adopting a host of green corporate policies.

- **Profit**

  All companies are concerned about their financial standing, but businesses committed to the triple bottom line look at profits in terms of not just what they can do for shareholders, but also how they can help the broader community. In this model, a company helps stimulate economic growth and create wealth by compensating employees fairly, supporting local suppliers with its business, generating innovation, and paying its fair share of taxes. It also makes financially prudent but ethically driven decisions about how and where <to source materials, products or labor.

  In recent years, mainly due to the growing interest in environmental and social issues and in order to identify a criterion that was - even more than the Triple Bottom Line - capable of evaluating an investment as socially responsible, they have been elaborated by economic doctrines more avant-garde the so-called ESG (Environmental, Social, Governance) factors. Today, banking and financial institutions, and even more specialized organizations such as ESG rating agencies, are increasingly using the aforementioned paradigm as a yardstick to guide investment choices and the allocation of capital. From this it follows that a company, for example, to access certain forms of financing or public incentives, must necessarily make sustainable and responsible investments, respectful of environmental and social aspects, as well as aimed at generating profits.

  The environmental and social components play an increasingly predominant role also in the choices of consumers who prefer companies that carry out their business in a sustainable and responsible way. This creates a strong link between socially responsible investments and corporate reputation. ESG factors as a guiding criterion for identifying corporate strategies and policies contribute significantly to improving and increasing the company's reputation among investors and consumers.

  The growing protection of the environment and respect for human capital are two aspects that, today in particular, require specific attention in any area. Thanks to the Triple Bottom Line concept and ESG factors, social and environmental issues play a role of increasing importance in the economic sector, and their evaluation represents an essential step in the sustainable and responsible investment strategies of companies.

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[11] https://www.previti.it/dal-concetto-di-triple-bottom-line-ai-fattori-esg-le-nuove-politiche-globali
[12] www.business.com/articles/triple-bottom-line/
[13] https://www.previti.it/dal-concetto-di-triple-bottom-line-ai-fattori-esg-le-nuove-politiche-globali

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II. Interactive methods to develop Green Skills

1. Example of digital green skills practical application: Retrofitting of an old FM Radio (case study)

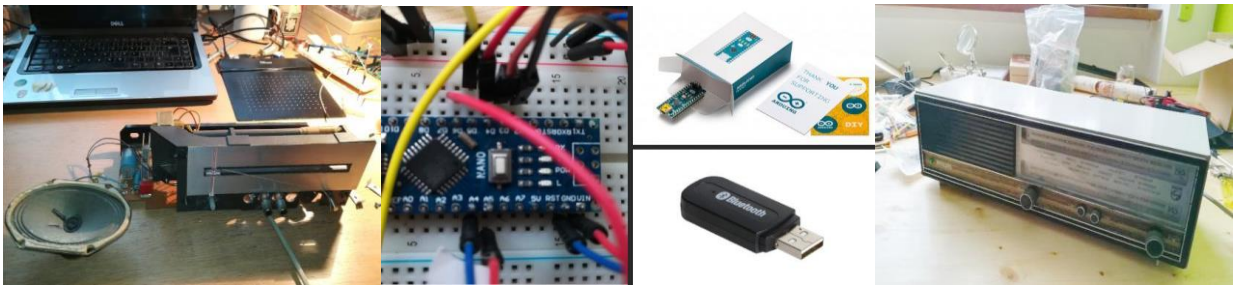
Green Skills today means all those skills that allow us to respond to the need for sustainable reconversion of production in every type of reality, from public and private offices to shops, industries, and companies.

Green skills can be summarized in two main areas:
- predisposition to energy saving
- attitude to environmental sustainability

Precisely in the context of environmental sustainability, lies the need to apply green skills to retrofit old machinery and objects with the intention of giving them new life and a new cycle of use, avoiding the purchase of a new product that would feed the intrinsic mechanism of the linear classic economic model.

A practical example for developing green skills in the digital field, can be seen in the case study about the Retrofitting of an old FM radio providing Bluetooth connectivity through an ARDUINO microcontroller.

The model used is the Arduino Nano which controls the turning on of the Bluetooth stick and the operation of the FM radio module. Through Arduino you can then select whether to operate the radio or Bluetooth through a button for the switch. In this way our radio can be used both to listen to the FM radio and to listen to music from our smartphone.



Author: Giulio Pons
Source: https://hackaday.io/project/162367-retrofitting-of-an-old-fm-philips-radio
https://www.youtube.com/watch?v=MuXsjAEGdNI

[1] https://jobspa.it/blog/competenze-green-piu-richieste-in-futuro

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2. Promote and develop Green Skills through Gaming: Penji protects the planet! (online game)

Penjii Protects the planet is a mobile game that aims to teach players how to save their planet! This game is developed by Caped Koala Studios a result of an Erasmus+ project "Promoting Green Skills Through Games" project with partners from Austria, Croatia, Ireland and Spain all working together to promote Green Skills.

This game is an endless runner-style game, where the penguin Penjii runs around the planet to combat the problems facing our planet.

Penjii visits 4 different parts of the world (the Antarctic, a Beautiful Beach, a Chaotic City, Your Home) and each level aims to teach players about a specific problem facing our environment and planet.

https://capedkoala.com/penjii-protects-the-planet/

3. Develop Green Skills through learning by doing: The renewable power of green skills for women in Zambia (video)

The women in the Kalulushi compound in the Copperbelt Province, built their own houses with green technologies. With the help of the ILO through the Zambia Green Jobs Program and the Zambia Homeless and Poor people Federation, they got a loan to buy a small plot of land and they were trained in green technologies skills learning by doing to build houses using bricks made by sustainable materials.

https://www.youtube.com/watch?v=4K3AiZaiMoc

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