Green Skills and Sustainable Development

Marek Frankowicz

Jagiellonian University

SUSDEV Project

Wider Objective

Enhancement of the role of Higher Education Institutions in ensuring sustainable development of industry and society, support of national "green policies" in Partner Countries and promotion of "green culture" by means of Lifelong Learning

Specific Project Objectives

- Development of modules to foster green skills for different target groups and qualifications levels
- Enhancement of access of target groups to open education resources, promotion of LLL
- Enhancement of green culture and continuing education through training of teaching staff, external stakeholders and public administration

Expected Outputs and Outcomes:

- Analysis of "green policies and practices" in European Union and in Partner Countries
- Green Open Education Resources (OER) Repository and Network
- Green Training Centers (GTC) in Partner Countries
- Green Training Modules (GTM) for Ecology, Food Sector and Land Management

Key Terms

Green: The term „green" has been loosely applied to any effort, product or initiative that proposes to benefit the environment. The term is not scientific and there is little consensus about what activities can qualify as „green" and which cannot.

Green job: Jobs that help to protect ecosystems and biodiversity; reduce energy, materials, carbon and water consumption through high efficiency strategies; and minimize or altogether avoid generation of all forms of waste and pollution.

Sustainability: The long-term, responsible management of environmental, societal and business resource use.

Sustainable Development: An approach to development that meets the needs of the present in such a way that future generations can also meet their own needs.

Green Jobs

Green jobs are jobs that contribute to preserving or restoring environmental quality, while also meeting longstanding demands and goals of the labour movement, such as adequate wages, safe working conditions, and workers' rights. (Adapted from UNEP(2008) definition - See below)

Source: UNEVOC community

Green jobs are defined as jobs that reduce the environmental impact of enterprises and economic sectors, ultimately to levels that are sustainable. This definition covers work in agriculture, industry, services and administration that contributes to preserving or restoring the quality of the environment while also meeting the criteria for decent work - adequate wages, safe conditions, workers' right, social dialog and social protection. It also covers activities related to both mitigation and adaption to climate change.

This is a working definition. It implies in its inclusivity and breadth that every job can potentially become greener. As time goes on and the transition to a green economy intensifies, what is considered a green job today might not continue to be so regarded. The understanding of green jobs also varies from one country to another. Ultimately, countries will need to compose their own national definitions and set thresholds for practices considered green or non-green.

Source: ILO/CEDEFOP 2011, Global

We define green jobs as positions in agriculture, manufacturing, construction, installation, and maintenance, as well as scientific and technical, administrative, and service-related activities, that contribute substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect and restore ecosystems and biodiversity; reduce energy, materials, and water consumption through high-efficiency and avoidance strategies; de-carbonize the economy; and minimize or altogether avoid generation of all forms of waste and pollution. But green jobs, as we argue below, also need to be good jobs that meet longstanding demands and goals of the labor movement, i.e., adequate wages, safe working conditions, and worker rights, including the right to organize labor unions.
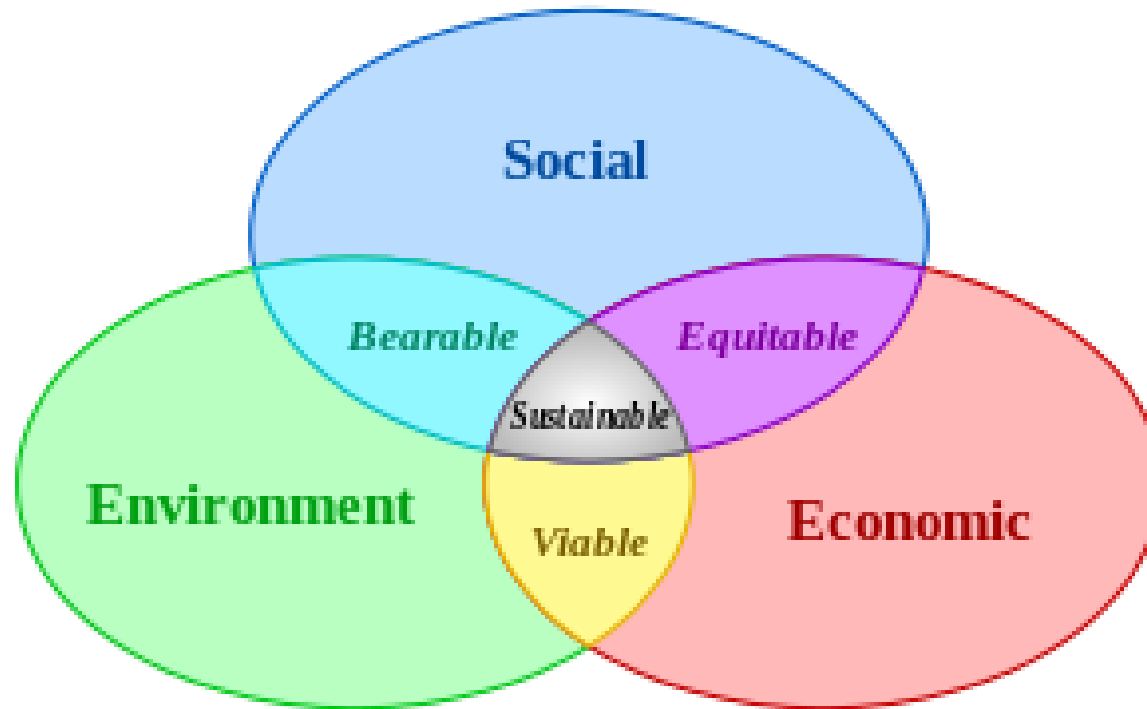
Source: UNEP 2008, Global

The three pillars of sustainability

ECONOMICS
Production & Resourcing
Exchange & Transfer
Accounting & Regulation
Consumption & Use
Labour & Welfare
Technology & Infrastructure
Wealth & Distribution

ECOLOGY
Materials & Energy
Water & Air
Flora & Fauna
Habitat & Food
Place & Space
Constructions & Settlements
Emission & Waste

POLITICS
Organization & Governance
Law & Justice
Communication & Movement
Representation & Negotiation
Security & Accord
Dialogue & Reconciliation
Ethics & Accountability

CULTURE
Engagement & Identity
Recreation & Creativity
Memory & Projection
Belief & Meaning
Gender & Generations
Enquiry & Learning
Health & Wellbeing

Vibrant
Good
Highly Satisfactory
Satisfactory+
Satisfactory
Satisfactory–
Highly Unsatisfactory
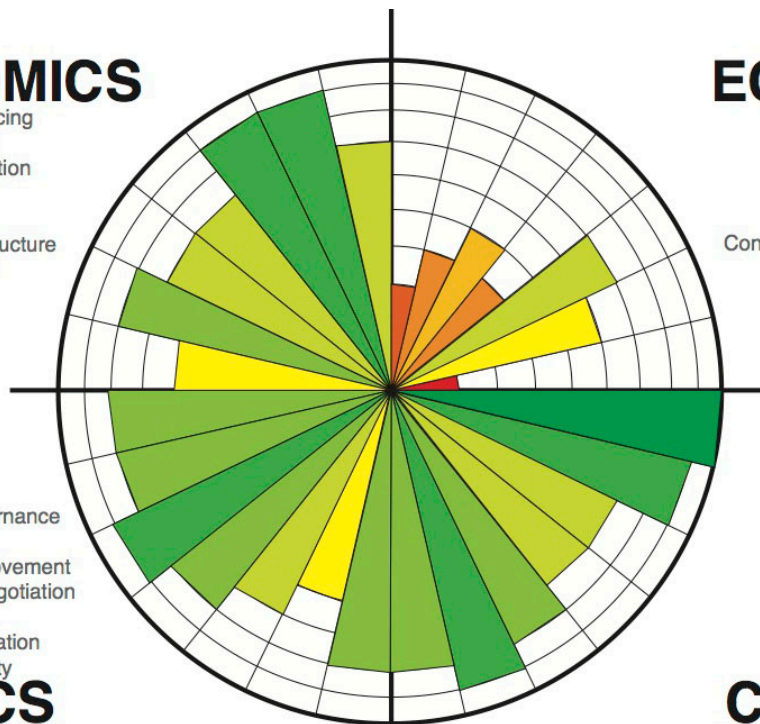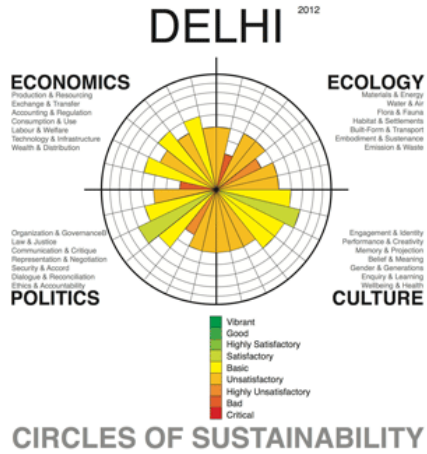Bad
Critical

CIRCLES OF SUSTAINABILITY

DELHI 2012

ECONOMICS
Production & Resourcing
Exchange & Transfer
Accounting & Regulation
Consumption & Use
Labour & Welfare
Technology & Infrastructure
Wealth & Distribution

ECOLOGY
Materials & Energy
Water & Air
Flora & Fauna
Habitat & Settlements
Built-Form & Transport
Embodiment & Sustenance
Emission & Waste

Organization & Governance
Law & Justice
Communication & Critique
Representation & Negotiation
Security & Accord
Dialogue & Reconciliation
Ethics & Accountability

POLITICS

Engagement & Identity
Performance & Creativity
Memory & Projection
Belief & Meaning
Gender & Generations
Enquiry & Learning
Wellbeing & Health

CULTURE

Vibrant
Good
Highly Satisfactory
Satisfactory
Basic
Unsatisfactory
Highly Unsatisfactory
Bad
Critical

CIRCLES OF SUSTAINABILITY

MELBOURNE 2011

ECONOMICS
Production & Resourcing
Exchange & Transfer
Accounting & Regulation
Consumption & Use
Labour & Welfare
Technology & Infrastructure
Wealth & Distribution

ECOLOGY
Materials & Energy
Water & Air
Flora & Fauna
Habitat & Settlements
Built-form & Transport
Embodiment & Sustenance
Emission & Waste

Organization & Governance
Law & Justice
Communication & Critique
Representation & Negotiation
Security & Accord
Dialogue & Reconciliation
Ethics & Accountability

POLITICS

Identity & Engagement
Creativity & Recreation
Memory & Projection
Belief & Meaning
Gender & Generations
Enquiry & Learning
Wellbeing & Health

CULTURE

Vibrant
Good
Highly Satisfactory
Satisfactory
Basic
Unsatisfactory
Highly Unsatisfactory
Bad
Critical

CIRCLES OF SUSTAINABILITY

TEHRAN 2012

ECONOMICS
Production & Resourcing
Exchange & Transfer
Accounting & Regulation
Consumption & Use
Labour & Welfare
Technology & Infrastructure
Wealth & Distribution

ECOLOGY
Materials & Energy
Water & Air
Flora & Fauna
Habitat & Land
Place & Space
Constructions & Settlements
Emission & Waste

Organization & Governance
Law & Justice
Communication & Movement
Representation & Negotiation
Security & Accord
Dialogue & Reconciliation
Ethics & Accountability

POLITICS

Engagement & Identity
Performance & Creativity
Memory & Projection
Belief & Meaning
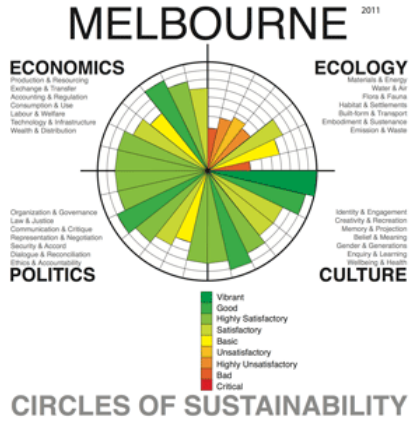Gender & Generations
Enquiry & Learning
Health & Wellbeing

CULTURE

Vibrant
Good
Highly Satisfactory
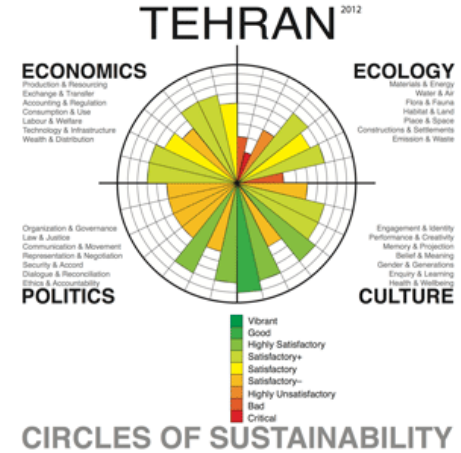Satisfactory+
Satisfactory
Satisfactory–
Highly Unsatisfactory
Bad
Critical

CIRCLES OF SUSTAINABILITY

Sustainable development

The organizing principle for meeting human development goals while at the same time sustaining the ability of natural systems to provide the natural resources and ecosystem services upon which the economy and society depend. The desired result is a state of society where living conditions and resource use continue to meet human needs without undermining the integrity and stability of the natural system. Sustainable development can be classified as development that meet the needs of the present without compromising the ability of future generations

Sus Dev

SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY	2 ZERO HUNGER	3 GOOD HEALTH AND WELL-BEING	4 QUALITY EDUCATION	5 GENDER EQUALITY	6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY	8 DECENT WORK AND ECONOMIC GROWTH	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	10 REDUCED INEQUALITIES	11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION	14 LIFE BELOW WATER	15 LIFE ON LAND	16 PEACE, JUSTICE AND STRONG INSTITUTIONS	17 PARTNERSHIPS FOR THE GOALS	SUSTAINABLE DEVELOPMENT GOALS

Greening

The process of pursuing knowledge and practices with the intention of becoming more environmentally friendly, enhancing decision-making and lifestyle in more ecologically responsible manner, that can lead to environmental protection and sustainability of natural resources for current and future generations.

Green Economy

The **green economy** is defined as an economy that aims at reducing environmental risks and ecological scarcities, and that aims for sustainable development without degrading the environment. It is closely related with ecological economics, but has a more politically applied focus.

The 2011 UNEP Green Economy Report argues "that to be green, an economy must not only be efficient, but also fair. Fairness implies recognising global and country level equity dimensions, particularly in assuring a just transition to an economy that is low-carbon, resource efficient, and socially inclusive."

Green Economy

Karl Burkart defines a green economy as based on six main sectors:

- Renewable energy
- Green buildings
- Sustainable transport
- Water management
- Waste management
- Land management

Green Economy Roadmap

In 2012, the ICC published the Green Economy Roadmap, containing contributions from experts from around the globe brought together in a two-year consultation process. The Roadmap represents a comprehensive and multidisciplinary effort to clarify and frame the concept of "green economy". It highlights the essential role of business in bringing solutions to common global challenges. It sets out the following 10 conditions which relate to business/intra-industry and collaborative action for a transition towards a green economy:

- Open and competitive markets
- Metrics, accounting, and reporting
- Finance and investment
- Awareness
- Life cycle approach
- Resource efficiency and decoupling
- Employment
- Education and skills
- Governance and partnership
- Integrated policy and decision-making

Triple bottom line

Triple bottom line (or otherwise noted as **TBL** or **3BL**) is an accounting framework with three parts: **social, environmental (or ecological) and financial**. Some organizations have adopted the TBL framework to evaluate their performance in a broader perspective to create greater business value. The term was coined by John Elkington in 1994.

The triple bottom line consists of **social equity, economic, and environmental factors**. The phrase, **"people, planet, and profit"** to describe the triple bottom line and the goal of sustainability, was coined by John Elkington in 1994

Cradle-to-cradle design

Cradle-to-cradle design (also referred to as **Cradle to Cradle**, **C2C**, **cradle 2 cradle**, or **regenerative design**) is a biomimetic approach to the design of products and systems that models human industry on nature's processes viewing materials as nutrients circulating in healthy, safe metabolisms. The term itself is a play on the popular corporate phrase "Cradle to Grave," implying that the C2C model is sustainable and considerate of life and future generations (i.e. from the birth, or "cradle," of one generation to the next versus from birth to death, or "grave," within the same generation.)

C2C suggests that industry must protect and enrich ecosystems and nature's biological metabolism while also maintaining a safe, productive technical metabolism for the high-quality use and circulation of organic and technical nutrients. It is a holistic economic, industrial and social framework that seeks to create systems that are not only efficient but also essentially waste free. The model in its broadest sense is not limited to industrial design and manufacturing; it can be applied to many aspects of human civilization such as urban environments, buildings, economics and social systems.

Tragedy of the commons

The **tragedy of the commons** is a term used in social science to describe a situation in a shared-resource system where **individual users acting independently according to their own self-interest behave contrary to the common good of all users by depleting or spoiling that resource through their collective action.** The concept and phrase originated in an essay written in 1833 by the British economist William Forster Lloyd, who used a hypothetical example of the effects of unregulated grazing on common land (also known as a "common") in the British Isles. The concept became widely known over a century later due to an article written by the American ecologist and philosopher Garrett Hardin in 1968. In this modern economic context, **commons** is taken to mean any shared and unregulated resource such as atmosphere, oceans, rivers, fish stocks, or even an office refrigerator.

Green Skills (Skills for Sustainability)

Technical skills, knowledge, values and attitudes needed in the workforce to develop and support sustainable social, economic and environmental outcomes in business, industry and the community.
Source: NCVER 2013, Australia

Abilities needed to live in, develop and support a society which aims to reduce the negative impact of human activity on the environment.
Source: CEDEFOP 2014, Europe

Environmental awareness skills refer to the knowledge, abilities, values and attitudes [in the general population] needed to live in, develop and support a society which reduces the impact of human activity on the environment. These generic 'green' skills include the capacity to include environmental concerns alongside others (such performance and safety) in taking decisions, including in the choice of processes and technologies.
Source: EU commission (Skills panorama) 2015, Europe

Examples of Green Skills

https://www.google.pl/url?sa=i&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwicwJCX5ZjcAhVEDiwKHYFgAwwQjRx6BAgBEAU&url=https%3A%2F%2Foecdskillsandwork.wordpress.com%2F2016%2F10%2F07%2Fdefining-green-skills-using-data%2F&psig=AOvVaw2BgQMmoH_OtA6KPQl3_lnD&ust=1531458326162350

Green/Sustainability K&S Statements

PROPOSED GREEN/SUSTAINABILITY KNOWLEDGE AND SKILL STATEMENTS

All Career Clusters™	Manufacturing
Agriculture, Food, & Natural Resources	Science, Technology, Engineering & Mathematics
Architecture & Construction	Transportation, Distribution & Logistics
Information Technology	

PROJECT OVERVIEW

The goal of this U.S. Department of Education funded project is to incorporate green- and sustainability-related knowledge and skills standards into existing career clusters. These standards follow the format currently used by the National Career Clusters™ Framework and represent an addendum to that collection. Find the current collection at http://www.careertech.org/resources/clusters/knowledge-skills.html.

States may, but are not required to, develop and implement career and technical education programs of study in one or more of the states' 16 Career Clusters™ identified by the National Association of State Directors of Career Technical Education Consortium that are recognized by the Office of Vocational and Adult Education. The 16 career clusters are occupational categories with industry-validated knowledge and skills statements that define what students need to know and be able to do in order to realize success in a chosen field. Within each of the career clusters, career pathways have been developed, which outline sequences of academic, career, and technical courses and training that begin as early as ninth grade and lead to progressively higher levels of education and higher-skilled positions in specific industries or occupations. Most, if not all, states are using one or more of the career clusters as the basis for implementing their career pathways.

These standards have been identified to help states and local programs to prepare individuals for green occupations by incorporating green knowledge and skills standards into existing career clusters and, in turn, career pathways beginning with the six career cluster areas that are likely to experience the greatest need for green workers: Agriculture, Food & Natural Resources; Architecture & Construction; Information Technology; Manufacturing; Science, Technology, Engineering & Mathematics; and Transportation, Distribution & Logistics.

There is a collection of green- and sustainability-related knowledge and skill standards that apply to all 16 Career Clusters™. This collection also includes definitions of many of the commonly used terms found in the each of the six cluster-specific collections. It will be published at the same online location as the six collections of green and sustainability Career Cluster™ standards. That location will be determined in the spring of 2012.

Version 2.0: June 15, 2012

Green Skills: Example 1

Define the following key terms and explain their relationship to one another:

- Green

- Green job

- Sustainability

- Sustainable development

Green Skills: Indicators 1

- When presented with a term, provide the correct definition.
- Share the definition of sustainability and sustainable development in a presentation.
- Identify distinctions between the four key terms.
- Write a company memo explaining the company approach to sustainability.
- Identify examples of sustainability initiatives by organizations within a career pathway of interest.
- Prepare a report that describes the sustainability efforts of a given company in a career pathway of interest.

Green Skills: Example 2

Utilize problem-solving skills to address a real world opportunity to help create healthier ecosystems and communities while protecting or increasing organizational health

Green Skills: Indicators 2

- Given a company scenario about a sustainability issue (e.g. spiking energy prices, mercury pollution from coal-fired power plants, material shortages, economic slowdown and increased unemployment), what actions can be taken at the corporate and individual level to help create healthier ecosystems, social systems, and bottom line performance.

- Research and explain examples of how problem-solving skills can be used by employees in a variety of roles and situations in an organization to promote sustainability.

Green Skills: Example 3

Recognize the social, health, environmental, and economic costs and benefits of renewable energy production (e.g., solar, wind, and biofuels) in comparison to non-renewable energies (e.g., coal, oil, and natural gas).

Green Skills: Indicators 3

- Compare the costs and benefits of renewable energies (e.g., solar, wind) and non-renewable energies (e.g., coal, natural gas), including often excluded factors such as impact on human and ecosystem health, volatile energy prices, and regulatory disparities regarding subsidies, financing and education of consumers.

- Conduct a cost-benefit analysis of growing biofuel crops versus other high market value crops.

- Compare biofuel production and use to other forms of renewable energy (e.g., solar, wind) and non-renewable energies (e.g., coal, natural gas, oil- based gasoline and diesel).

- Explain how renewable energies can be combined with conservation and green materials to create sustainable consumption and production.

Green Skills: Example 4

Apply sustainability principles, policies, and practices to environmental service systems to facilitate development of solutions for environmental and related human welfare issues, problems, and applications.

Green Skills: Indicators 4

- Evaluate present environmental services testing in light of the precautionary principle of sustainability.
- Identify agricultural and development practices and testing services that cause or reduce soil erosion or help to restore soil fertility.
- Explain how to interact with water sources, including extraction, use, and restoration practices, to maximize sustainable yields.
- Explain how fisheries practices, regulations and technologies, and appropriate testing/measurement affect the capacity to replenish a sustainable population of fish.
- Describe causes of air pollution and the ability of ecosystems to absorb this pollution without causing environmental disruption (e.g., global warming) or human health issues and the implications for environmental testing.
- Describe how a composting facility collects food waste and distributes the resource back into the same bio-region.

Green Skills: Example 5

Apply green technologies and sustainability principles in managing resource recycling programs.

Green Skills: Indicators 5

- Analyze the marketability and sustainability of recyclable goods.

- Develop strategies for reducing the flow of recoverable material into the waste stream.

- Identify ways to „close the loop" with a recycling or resource recovery program.

- Identify approaches for analysis and testing processes that can identify conservation, recycling, and resource recovery opportunities in a given context.

Green Skills: Example 6

Apply green technologies and sustainability principles in developing waste management systems.

Green Skills: Indicators 6

- List green technologies that could impact waste management.

- Describe the impact of sustainability principles on waste management.

- Design a waste management system for a greenhouse that utilizes green technologies.

Green Skills: Example 7

Understand the role of environmental health and safety in creating a sustainable society.

Green Skills: Indicators 7

- List the components of an environmental health and safety program.
- Identify measures to include in an environmental health and safety program that promote environmental and human health.
- Describe the need for environmental chemical testing.
- List environmental chemicals that are commonly found and pose a risk to human and environmental health.
- Explain the differences between naturally occurring chemicals and human introduced chemicals in the environment.
- Explain the role of human activity in causing changes in occurrence of naturally occurring chemicals.
- Conduct environmental chemical testing for surface water and ground water.
- Conduct air emissions testing.
- Conduct environmental chemical testing for soil.

Green Skills: Example 8

Develop strategies to influence natural resource management and utilization policies and practices through application of sustainability principles.

Green Skills: Indicators 8

- Explain current national and state policies that impact natural resource preservation and conversation activities.

- Describe examples of natural resource „commons" restoration.

- List institutional practices that contribute to protection and restoration of large, public bodies of water.

Green Skills: Example 9

Employ green technologies and sustainability practices that prevent and/or mitigate negative environmental impacts in materials (e.g., coal, sand, natural gas) extraction.

Green Skills: Indicators 9

- List green technologies and sustainability practices that can help prevent and/or mitigate potential negative impacts of material extraction.

- From raw material extraction to finished product, trace the environmental and social impact of one consumer product and make recommendations for improvement.

Green Skills: Example 10

Explain green and sustainable IT policies and standards that relate to reducing permanently damaging environmental, social, and financial/economic impacts

Green Skills: Indicators 10

- Identify various ways that employees can work remotely and securely.
- Identify various alternative travel options to individuals' work sites
- Identify various ways to improve the office work space environment.
- Compare the environmental and social costs of working from home with those of travelling to, and working in, an office.
- Identify IT services that are needed to create an effective work-at-home environment.
- Identify needs and cost effectiveness of power redundancy on systems that don't require 24/7 use.
- Outline a process to identify and eliminate unused or underused services that continue to be provided.

Green Skills Module Structure

- Introduction to Green Skills
- Example of National Green Skills Policy (Australia)
- Example of Green Skills Statements (USA)
- Green Skills and Green Jobs, Skills Anticipation (CEDEFOP, EU institutions)
- SUSDEV project – identification of green skills for specific sectors
- Dialogue with Stakeholders – Awareness of the importance of green skills and sustainability issues
  - Internal stakeholders – academic decision makers, teachers and students
  - External stakeholders – socio-economic environment, policy makers

Green Skills Module Learning Outcomes

- Knowledge of European and world trends
- Awareness of the role of higher education in promoting green skills
- Ability to formulate subject/sector-specific green skills and related performance indicators
- Ability of setting up a dialogue with external stakeholders on green skills and sustainability issues

Thank you for your attention!

marek.frankowicz@gmail.com

Skype: marek.frankowicz