



**University of Genoa**

**Department of Mechanical and Energy Engineering**

# **Energy and Environmental Sustainability in Higher Education**

**The case of the "*Master in Innovative Technologies for Energy Saving and Environmental Control - GreenMA*"**



**Tempus**

**GREENMA Project  
530620-TEMPUS-1-2012-JPCR**

**Conference on Education and Science  
for Sustainable Development  
Moscow 21<sup>st</sup> April 2015**

**Vincenzo Bianco, Ph.D.**  
**Associate Professor of Energy  
and Thermal Sciences**

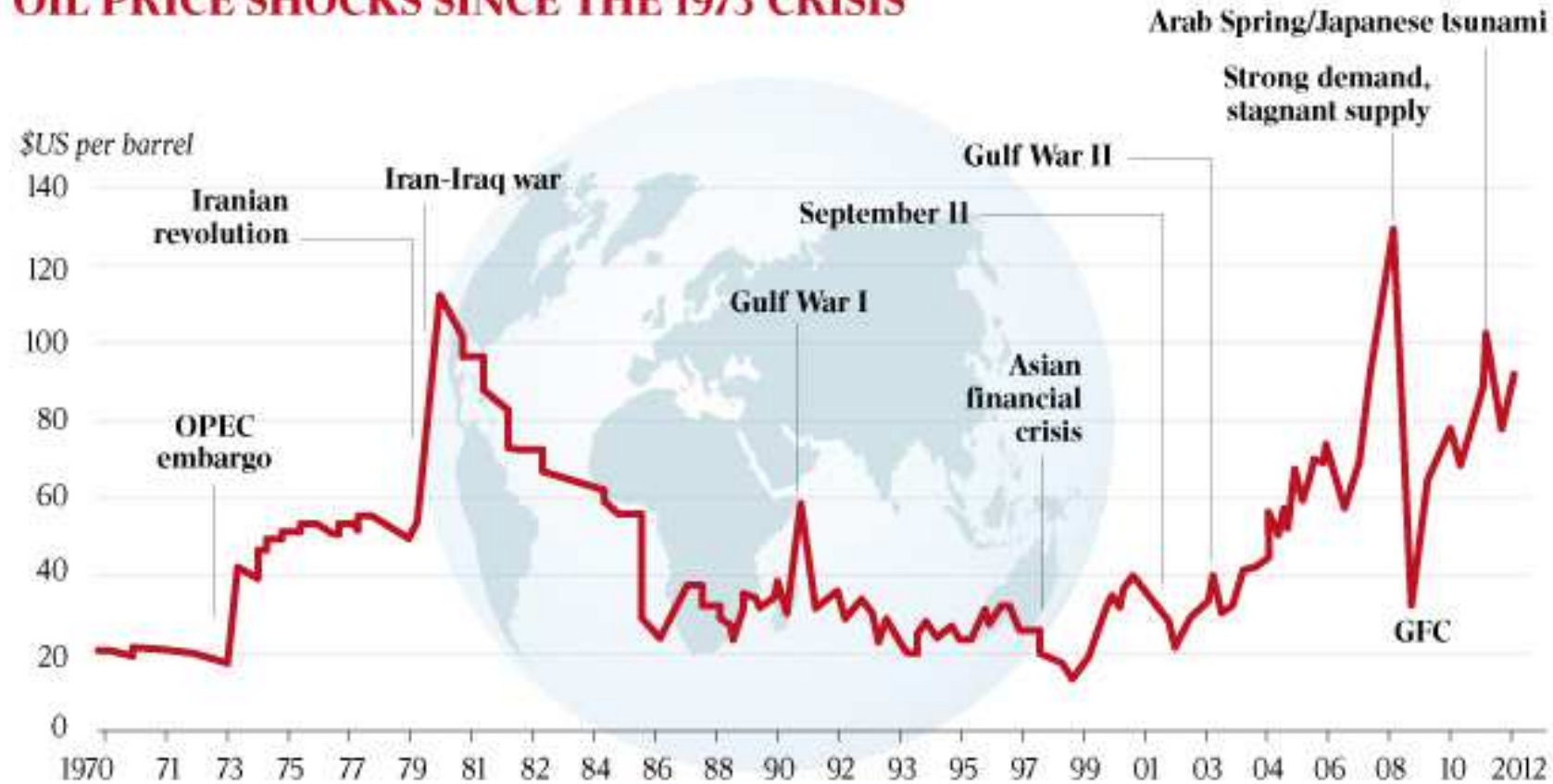
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- 2** The GreenMA Case
- 3** Selection of Results from “On Field” Survey

# Energy Efficiency: economic motivations

## OIL PRICE SHOCKS SINCE THE 1973 CRISIS\*



\*inflation-adjusted crude oil price

Source: [www.InflationData.com](http://www.InflationData.com)

# Energy Efficiency: economic motivations

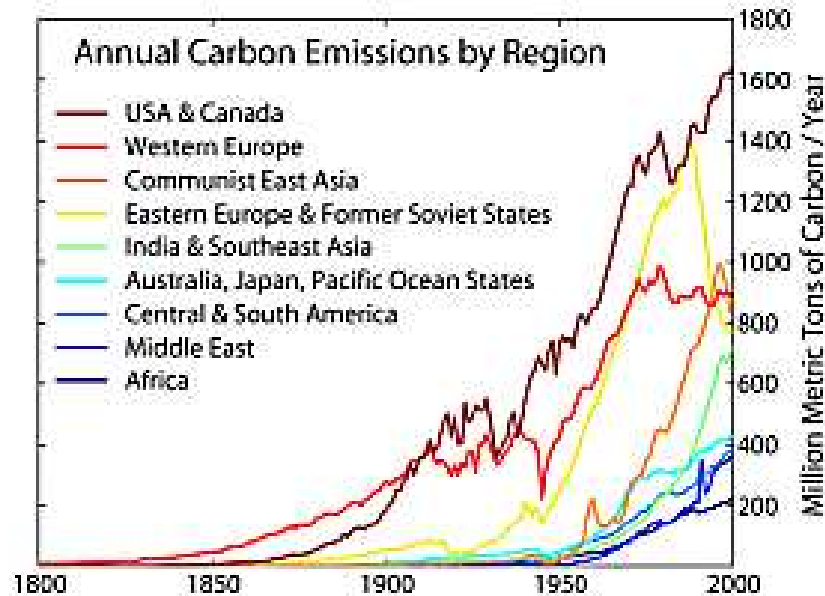
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**In 1973, for the first time, energy efficiency became a “hot topic” on the agenda of the most influential policy makers**

**Since then many researchers have been devoted to energy efficiency, which has been referred to as a “hidden fuel”**

# Energy Efficiency: environmental motivations

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- The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change, which commits its Parties by setting internationally binding emission reduction targets
- Recognizing that developed countries are principally responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities."

**Energy generation represents one of the most carbon intensive sectors, therefore an increase of its efficiency means less carbon emissions**

# Energy Efficiency: EU policies

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**EU Energy Efficiency Policy is based on different criteria, among which:**

- **Definitions of target**
- **Mandatory planning**
- **Incentives linked to reach pre-determined target**
- **Product labelling**
- **Buildings/Processes certifications**
- **Creation of markets to sell energy efficiency titles or carbon emissions allowances**

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# Partnership



**University of Genoa**



**City University of London**



**University of Alicante**



**Silesian University of Technology**



**Voronezh State University of Architecture and Civil Engineering**



**Tambov State Technical University**



Уральский федеральный университет  
имени первого Президента России Б. Н. Ельцина

**Ural Federal University**



**Mendeleev University of Chemical Technology**



**Ivanovo State University of Chemistry and Technology**



**Ivanovo State University of Architecture and Civil Engineering**



**North Ossetian State University**



**Tyumen State University of Architecture and Civil Engineering**



**Perm National Research Polytechnic University**



**Stavropol State Agrarian University**



**Vladimir State University**

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# Definition of a new Master Course

## “Old-Style Approach” – Staff centered design

Resources  
already available

Tradition

Interests of the  
Academic Staff

Existing  
Organization of  
Studies

## “New Approach after Bologna” – Student centered design

Fit for purpose

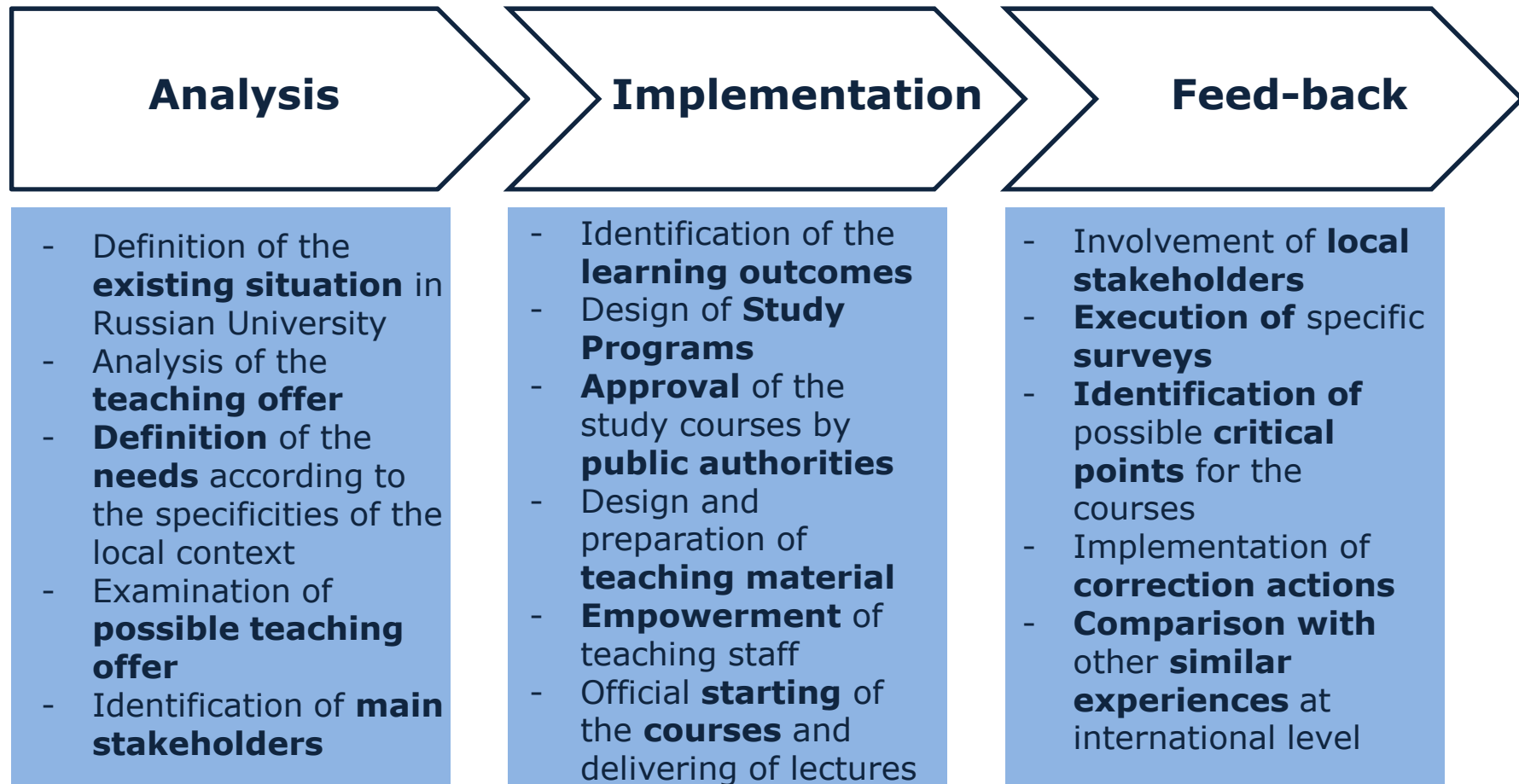
Change of  
Paradigm

Learning  
Outcomes

Organization  
related to the  
desired results

# Process of “Capacity Building”

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# Main parameters of the involved stakeholders

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## Number of Employees

	Frequency	%
<b>1-19</b>	<b>12</b>	<b>13.1</b>
<b>10-49</b>	<b>19</b>	<b>18.2</b>
<b>50-100</b>	<b>22</b>	<b>14.1</b>
<b>101-250</b>	<b>14</b>	<b>16.2</b>
<b>Over 250</b>	<b>19</b>	<b>17.2</b>
<b>No answer</b>	<b>13</b>	<b>21.2</b>
<b>Total</b>	<b>99</b>	<b>100.0</b>

## Annual Revenues

	Frequency	%
<b>Less than 50 mln. Roubles</b>	<b>28</b>	<b>28.3</b>
<b>No more than 100 mln. Roubles</b>	<b>15</b>	<b>15.2</b>
<b>No more than 500 mln. Roubles</b>	<b>19</b>	<b>19.2</b>
<b>No more than 2500 mln. Roubles</b>	<b>6</b>	<b>6.0</b>
<b>Over 2500 mln. Roubles</b>	<b>6</b>	<b>6.0</b>
<b>No answer</b>	<b>25</b>	<b>25.3</b>
<b>Total</b>	<b>99</b>	<b>100.0</b>

# Feedback answers 1/2

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## Assessment of the General Interest about the Master Course

	Strongly disagree	Disagree	Agree	Strongly agree	No answer
<b>There is a need of master graduates with specific competencies in the field of sustainable energy management and development</b>	<b>5 (5.1)</b>	<b>7 (7.1)</b>	<b>52 (52.4)</b>	<b>35 (35.4)</b>	<b>- (-)</b>

# Feedback answers 2/2

## Specific Educational Contents

	Strongly disagree	Disagree	Agree	Strongly agree	No answer
Specialized subjects (e.g. Wind Engineering, Biomass Chemistry, etc.) are more important than base subjects (e.g. heat transfer, organic chemistry, etc.)	7 (7.1)	30 (30.3)	24 <b>(24.2)</b>	23 <b>(23.2)</b>	15 (15.2)
It is necessary to devote most of time to the specialized subjects	4 (4.0)	17 (17.2)	37 <b>(37.4)</b>	29 <b>(29.3)</b>	12 (12.1)
Base subjects are more important than specialized subjects	8 (8.1)	53 <b>(53.5)</b>	21 (21.2)	- (-)	17 (17.2)
It is necessary to devote most of time to base subjects	8 (8.1)	52 <b>(52.5)</b>	20 (20.2)	2 (2.0)	17 (17.2)
Both base and specific subjects are equally important	9 (9.1)	20 (20.2)	50 <b>(50.5)</b>	20 <b>(20.2)</b>	- (-)



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**Thank you for your  
attention!**

**Web Site: <http://greenma.tstu.ru/>**

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**Contacts:**

**Vincenzo Bianco, Ph.D.**

**Associate Professor of Energy  
and Thermal Sciences**

**E-mail: [vincenzo.bianco@unige.it](mailto:vincenzo.bianco@unige.it)**

**Web: <https://energyadvisory.wordpress.com/>**

**Phone: +39 010 353 2872**



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