

SUMMER SCHOOL



GEM 2020, online edition

Sept 7 – 16, 2020

<http://summerschoolbicocca.com/20-GEM.php>

GREEN ENERGY MANAGEMENT SUMMER SCHOOL

COORDINATION AND SCIENTIFIC COMMITTEE

Program coordinator: Silvana Stefani - silvana.stefani@unimib.it

Scientific committee:

Silvana Stefani, University of Milano - Bicocca, Italy
Maurizio Acciarri, University of Milano - Bicocca, Italy
Carlo Lucheroni, University of Camerino, Italy
Meruyert Narenova, University of International Business, Almaty, Kazakhstan
Luis Miguel Varela Cabo, University of Santiago de Compostela, Spain
Tiziano Vargiolu, University of Padova, Italy
Maria Teresa Vespucci, University of Bergamo, Italy

Location:

Sept 7-16, 2020, online edition

Università Milano Bicocca, Milan,



*"The future is green energy, sustainability,
renewable energy!"*

TIMETABLE

- **DAY 1 - 7/09/2020**

[GEM On line class room Web Conference \(WebEx\)](#)

14:00 - 14:45 Welcome and Greetings from Prof. **Gabriella Pasi** - - Pro rector for Internationalization, Prof. **Maurizio Acciarri**, **Silvana Stefani** - Summer School Coordinators - **Duman Aitmagambetov** – ViceRector for Strategic Development, Eurasian National University, KZ – Min. **Stefano Ravagnan** – Head of Secretary of Undersecretary Ricardo Merlo, IT

14:45 - 15:30 Guest Lecture from **Stefano Besseghini** - President of Regulatory Authority for Energy, Networks and Environment (ARERA, IT)

15:30 - 15:45 Q&A Session

15:45 - 16:30 Student Presentations and Group Work Presentation

- **DAY 2 - 8/09/2020**

[GEM On line class room Web Conference \(WebEx\)](#)

14:00 - 15:00 Ing. **Silvio Bosetti** - President of the Foundation of the Order of Engineers of Milan - The Green Energy Scenario

15:00 - 15:20 Q&A Session

15:20 - 15:30 Break

15:30 - 16:15 **The regional corner:** Prof. **Meruyert Narenova**, University of International Business, KZ, Focus on Energy in Central Asia

16:15 - 17:00 **The regional corner:** Prof. **Siyavush Azakov** - Focus on Energy in Trans Caucasian Region

- **DAY 3 - 9/09/2020**

[GEM On line class room Web Conference \(WebEx\)](#)

14:00 - 15:00 Prof. **Luis Miguel Varela Cabo** - Universidade de Santiago de Compostela (USC) - Renewable resources: the Spanish experience

15:00 - 15:20 Q&A Session

15:20 - 15:30 Break

15:30 - 16:30 **Focus on fragile environments:** Dr. **Alfredo Ramirez Diaz**,
Universidad de La Laguna, Tenerife - The Canary Islands

Group Work

- [DAY 4 - 10/09/2020](#)

[GEM on-line class room Web Conference \(WebEx\)](#)

14:00 - 15:00 Prof. **Joao Bento** - University of Aveiro (PT) - Multinational Energy
Corporations and Corporate Environmental Responsibility

15:00 - 15:20 Q&A Session

15:20 - 15:30 Break

15:30 - 16:30 **Focus on a fragile environment-** Prof. **Paolo Galli**, University of
Milano-Bicocca - Ecopolitics and Geopolitics: The Maldives case

16:30 - 17:00 Dr. **Silvia Checola**, REF-E - Water resource management and
sustainability: a case study in Faafu Atoll in Maldives Islands

Group Work

- [Day 5 - 11/09/2020](#)

[GEM on-line class room Web Conference \(WebEx\)](#)

14:00 - 15:00 Prof. **Maurizio Acciarri** - University of Milano-Bicocca - Focus on
Photovoltaic Energy

15:00 - 15:20 Q&A Session

15:20 - 15:30 Break

15:30 - 16:30 **The regional corner:** Dr. **Mostafa Boshta**, National Research
Center, Cairo (Egypt) - Focus on Egypt

Group Work

- [Day 6 - 12/09/2020](#)

[GEM on-line class room Web Conference \(WebEx\)](#)

14:00 - 15:00 Prof. **Silvana Stefani** - University of Milano-Bicocca - Managing adverse weather conditions through financial instruments: rainfall and temperature

15:00 - 15:20 Q&A Session

15:20 - 15:30 Break

15:30 - 16:30 Prof. **Marina Calloni** University of Milano-Bicocca - Rights for the Common

16:30 - 17:00 Dr. **Maria Vittoria Franceschelli** JPO Sustainable Development Programm at ILO - Promoting green jobs and decent work

- [Day 7 - 14/09/2020](#)

[GEM on-line class room Web Conference \(WebEx\)](#)

14:00 - 15:00 Prof. **Maria Teresa Vespucci** - University of Bergamo - Optimization models for decision making in Green Energy Management

15:00 - 15:20 Q&A Session

15:20 - 15:30 Break

15:30 - 16:00 CESI Expert -

16:00 - 16:30 - RSE (Research into Electrical Systems) expert

- [Day 8 - 15/09/2020](#)

[GEM on-line class room Web Conference \(WebEx\)](#)

14:00 - 15:00 Prof. **Tiziano Vargiolu** - University of Padua - Energy Finance and electricity markets

15:00 - 15:00 Q&A Session

15:20 - 15:30 Break

15:30 - 16:30 Prof. **Maurizio Bettiga** - Chalmers University of Technology - Fuels from biomass conversion

- [Day 9 - 16/09/2020](#)

[GEM on-line class room Web Conference \(WebEx\)](#)

14:00 - 14:45 Dr. **Virginia Canazza** - CEO REF-E, Milano, IT "Energy Transition towards decarbonization: challenges in the Italian market"

14:45 - 15:00 Q&A Session

15:00 - 15:15 Break

15:15 - 17:00 - **GROUP WORK PRESENTATIONS**

Closing ceremony with GEM certificates delivery - Farewell and Goodbye

TEACHING STAFF AND REPRESENTATIVES

Name, Surname	Affiliation and Position	Title of speech	Date
Silvio Bosetti	Manager, CSD Engineering and Board of Engineers, Milano	The world energy scenario: Focus on renewables	08-set
Meruyert Narenova	Professor, University of International Business, Almaty, Kazakhstan	Focus on Energy in Central Asia	08-set
Siyavush Azakov	Professor of the Petroleum Engineering Department BHOS, Baku, Azerbaijan	Focus on Energy in Trans Caucasian Region	08-set
Luis Miguel Varela Cabo	Professor, USC, Spain	Renewable resources: the Spanish experience	09-set
Alfredo Jesús Ramírez Díaz	PhD & Researcher, ULL, Spain	Focus on fragile environments: The Canary Islands	09-set
Joao Bento	Professor, University of Aveiro, Portugal	Multinational Energy Corporations and Corporate Environmental Responsibility	10-set
Paolo Galli	Professor, University Milan- Bicocca, Italy	Ecopolitics and Geopolitics: The Maldives case	10-set
Silvia Checola	Consultant in REF-E, Milan, Italy	Water resource management and sustainability: a case study in Faafu Atoll in Maldives Islands	10-set
Maurizio Acciarri	Professor, UNIMIB, Italy	Focus on Photovoltaic Energy	11-set
Mostafa Boshta	National Research Center, Cairo (Egypt)	Focus on Energy in Egypt	11-set
Silvana Stefani	Professor, UNIMIB, Italy	Managing adverse weather conditions through financial instruments: rainfall and temperature	12-set
Marina Calloni	Professor, UNIMIB, Italy.	Struggles for the commons. Sharing responsibility in a global world	12-set
Maria Vittoria Franceschelli	JPO Sustainable Development Program at ILO	Promoting green jobs and decent work	12-set
Maria Teresa Vespucci	Professor, UNIBG, Italy	Optimization models for decision making in Green Energy Management	14-set
Tiziano Vargiolu	Professor, UNIPD, Italy.	Energy Finance and electricity markets	15-set
Maurizio Bettiga	Pro bono scientific and technical advisor, Sweden.	Fuels from biomass conversion	15-set
Virginia Canazza	CEO and Partner REF-E. Milan, Italy	Energy Transition towards decarbonization: challenges in the Italian market	16-set

CONTENTS of LESSONS

Focus on Photovoltaic Energy



Maurizio Acciarri
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Professor,
 University of Milano – Bicocca,
 Milano, Italy

Installations of photovoltaic (PV) power plants have shown high growth rates around the world. This trend is expected to continue with increasing adoption of solar power, aided by the falling cost of solar generated power and rising prices of fossil fuels.

Recently, the debate on renewable energy sources and/ or low environmental impact has received a new impetus. For countries such as Italy, which enjoy favorable geographic locations the use of photovoltaic cells represent an important opportunity for the introduction of energy generators distributed throughout reducing dependence on foreign supplies. However, the production of photovoltaic energy is currently too expensive compared with traditional sources and covers a small percentage of the national and European energy needs. The reduction in costs and a wider spread can occur by investing in research to increase the efficiency of conversion of existing devices or the development of new technologies, reducing the use of raw materials used or by increasing the production yield.

Most solar cells are currently used in inorganic base and in particular silicon-based, systems – on III – V materials and thin films of Si, CdTe and $\text{CuIn}_x\text{Ga}_{1-x}\text{Se}_2$ (CIGS).

During the lessons are going to be presented the operating principles of highlighting the strengths and weaknesses of the different technologies. You will discover the desirable characteristics and possible candidates for the cells of the "new generation" low – cost and high conversion efficiency.

Focus on Energy in Trans Caucasian Region



Siyavush Azakov
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Professor of Petroleum Engineering Department
 Baku Higher Oil School
 Baku, Azerbaijan

IN PROGRESS

Multinational Energy Corporations and Corporate Environmental Responsibility



Joao Bento
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Professor of Economics
University of Aveiro, Portugal

Drawing on the promotion of foreign direct investment in the Sustainable Development Goals, I discuss some of the key concepts, theories, and effects of multinational corporations and their investment activities in international energy markets.

I mainly discuss the environmental impact of multinational corporations' operations and particularly their relations to corporate environmental responsibility in oil, gas, coal and power markets (renewables and non-renewables).

This speech is based on my paper published in 2019 and entitled *Environmental impact of FDI. The case of US subsidiaries*. **Multinational Business Review**, 27(3): 221-246. (<https://www.emeraldinsight.com/doi/full/10.1108/MBR-06-2017-0038>)

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Fuels from biomass conversion



Maurizio Bettiga
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Pro bono scientific and technical advisor,
Chalmers University of Technology
Gothenburg, Sweden.

According to the concept of the forthcoming bio-based economy, fossile hydrocarbon resources are replaced with “fresh” carbon chains deriving from plant and animal raw materials, as well as waste

The transition towards a bio-based economy entails developing industrial processes to derive chemicals and energy carriers from biomass, at large scale and competitive prices. Plant material is mainly constituted by cellulose, hemicellulose and lignin, all complex carbon chain based polymers with different properties. Each of these polymers can be the raw material for the production of a number of fuel and chemicals, via mechanical, thermal, chemical or biological conversion. During my lecture, I will give an overview of the concept of bioeconomy, followed by an explanation of the different types of raw materials, their properties and availability. The main biofuels, both industrially

available and under development, will be presented, along with the processes that are used or are expected to be used for their industrial production.

The world green energy scenario: Focus on renewables



Silvio Bosetti

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Manager,
CSD Engineering and Board of Engineers,
Milan, Italy

The aim is to introduce you to the World Energy OUTLOOK and its most relevant Trends. We will focus on the ELECTRICITY power production and the RENEWABLES Solutions (Energy Green Scenario) facing recent issues: increasing of demand, COP 21 Agreement (Paris12/ 2015) and fossils price (2014 – 2016) particularly in the economics and regulatory aspects and which are the Decision system supports will be discussed.

The most recent forecasts and economic outlook will be illustrated, showing the potential of Central Asia countries and the current situation in Europe. The effect of shale gas and oil on prices and current production will be discussed and clarified.

Struggles for the commons: Sharing responsibility in a global world



Marina Calloni

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Professor,
University of Milano – Bicocca,
Milano, Italy

Ancient Greek philosophy tried to identify the origin of reality in the combination of four natural roots, like water, fire, earth, air. Energy for life is the union and combination of these different elements, which also determine human nature, which keeps the trace of cosmic energy (i.e., star dust).

Placing in the background this ancient philosophical tradition, my presentation is aimed at reconsidering the significance of the four roots as mentioned above from a global perspective. These elements have to be “protected” not only because of the survival of humanity but of the environment at large, where human beings are part of. The recognition of environmental/ animal rights has thus transformed the previous understanding of

human rights as based on an anthropocentric view. As a matter of facts, some Latin – American constitutions (Ecuador and Bolivia) recognize the earth as a subject of law.

Therefore, the presentation will be focused on recent debates about the commons that is common resources which do not have to be privatized or controlled/ exploited by major companies because considered as “property” of humanity as a whole, so they have to be employed only for common purposes in the respect of the environment.

The issues of responsibility and sustainability become thus central for individual, communitarian and global levels while choosing behaviors, social policies and political actions.

Energy Transition towards decarbonization: challenges in the Italian market



Virginia Canazza
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CEO and Partner REF-E,
Milano, Italy

IN PROGRESS

Water resource management and sustainability: a case study in Faafu Atoll in Maldives Islands



Silvia Checola
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Consultant in REF-E,
Milano, Italy

This study contributes to the existing literature in proposing an integrated approach to water management and energy renewable production in a fragile environment. After 2004 tsunami, the natural water supply system in Maldives Islands has been disrupted, thereby requiring action for providing safe drinkable water to the population of atolls. A LCC CO2 analysis is conducted on alternative actions taking as benchmark the current situation. In the action resulted optimal, rainwater and sun, the resources naturally available in the environment, are integrated with a desalination system for drinking and cooking. The Levelised Cost of Water (LCOW) is calculated for each alternative. The case study can be extended to other islands in Maldives.

Focus on fragile environments: The Canary Islands



Alfredo Jesús Ramírez Díaz
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PhD and Researcher,
 University of La Laguna,
 Spain

IN PROGRESS

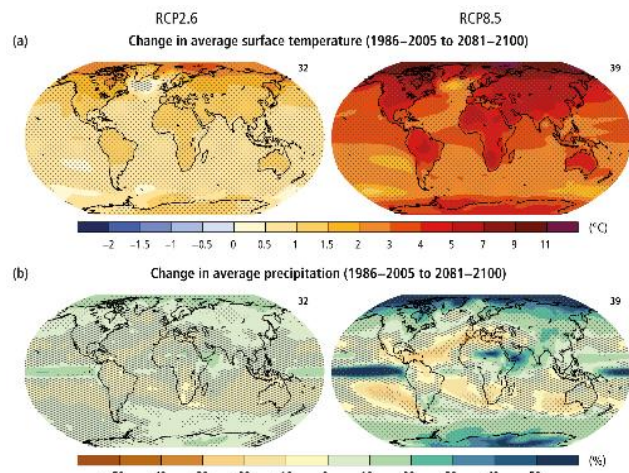
Managing adverse weather conditions through financial instruments: rainfall and temperature



Silvana Stefani
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Professor,
 University of Milano – Bicocca
 Milano, Italy

National and international policy initiatives have focused on reducing carbon emissions as a means by which to limit future climate warming. Much less attention has been paid by policymakers to monitoring, modeling and managing the impacts of climate change on the dynamics of Earth surface systems, including glaciers, rivers, mountains and coasts. However, it is almost universally recognized that the risks connected to climatic changes are high and somehow unpredictable in their consequences. Moreover, the attempts of managing the climatic changes at a global level, i.e. the decisions taken in the 2016 Paris conference, have been recently counterbalanced by a not clear – cut US



JANUARY 2017 – HDD with threshold 2.43 °C	
Price	139.58 €
Risk loading	34.74 €
Final price	174.32 €
Hedging	
Payoff	451.60 €
Gain (loss)	277.28 €

FEBRUARY – HDD with threshold 7.5 °C	
Price	565.61 €
Risk loading	98.86 €
Final price	664.47 €
Hedging	
Payoff	167 €
Gain (loss)	(497.47 €)

policy. Surprisingly, the financial world does not seem to care much about the problem. Yet, it is estimated that 80% of world industry is affected (totally or in part) by climate. In particular, agriculture, building industry

and hospitality activities are heavily dependent on climate. Rain or low temperatures may cause cancellations or change of destination for tourists; heavy rain or high temperature damage crops and cause exit of farmers from the market. The present work contributes to the financial and climate literature by proposing a scientific framework for rainfall and temperature risk management using specific financial instruments, the weather derivatives. The aim is to mitigate the negative impacts of rain or temperature on the business performance of a company. As a first step, based on a well – established literature we propose a technique for modelling temperature time series; then, we price a financial instrument (one – month forward) for hedging against high levels of temperature. A similar analysis is performed on rainfall and a one month forward is also priced. We checked our results in the geographical area of Arezzo, Tuscany, for temperature daily data 1951 – 2016 and rainfall daily data 1992 – 2016. We show how a “negative” weather performance can be counterbalanced by the “positive” performance of the correspondent financial instrument.

Those financial instruments, typically Over the Counter, can be personalized and tailored according to the specific needs. This can be done through the pricing of the tick size (one Celsius degree or one rain mm) and the specific weather station close to the client. In our analysis, we have chosen 20€ as a tick size both for temperature and rainfall, but of course building contractors and farmers give a different value to one Celsius degree.

Energy Finance and Electricity Markets



Tiziano Vargiolu
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Professor,
 University of Padova,
 Italy

- Why finance in the Energy industry?
- A primer of Mathematical Finance;
- Pricing with recombining trees;
- Pricing power plants as real options.

Renewable resources: the spanish experience



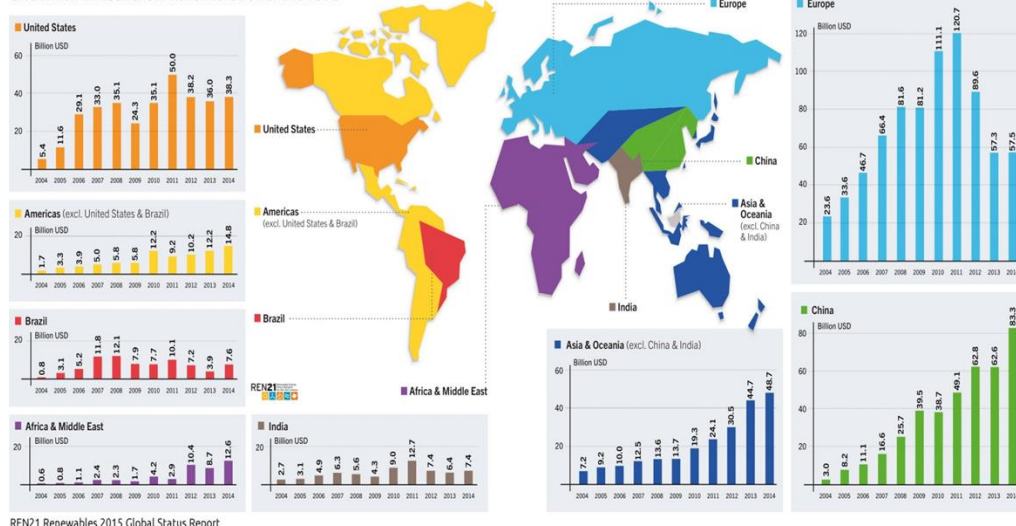
Luis M. Varela

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Full Professor of Condensed Matter Physics
University of Santiago de Compostela, Spain

The current state of the art of renewable energies is reviewed from the economic and technical points of view, with a special attention to the European and Spanish experiences. After an introduction to the gross figures of world energy and renewable energy scenarios, we will review the major advances in renewable energies harvesting, storage and distribution, with attention to the currently best available techniques and materials and their forecasted evolution. The economics and regulation of renewable energy sector is the concern of the second part of the presentation, which ends with a review of the European and Spanish renewable energy sectors, including imports, energy efficiency, demand and supply, investments, etc., as well as legislation and the current plans for the transition to a new decarbonized economy.

Global New Investment in Renewable Power and Fuels



Optimization models for decision making in Green Energy Management



Maria Teresa Vespucci

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Professor,
University of Bergamo,
Italy

The lecture aim is to present some examples of mathematical optimization models applied to the solution of problems stemming from the introduction of generation from renewable energy sources (RES) into conventional power systems. After a brief introduction to optimization models and solution algorithms, real life applications will be discussed:

- annual scheduling of a hydraulic valley linear programming model
- daily coordination of wind power and hydro power production stochastic optimization
- model
- determining the optimal power generation mix for a power producer risk neutral and risk
- averse stochastic optimization models
- optimal operation of medium-voltage AC networks with distributed generation and storage
- devices nonlinear optimization model
- optimal planning and economic evaluation of trigeneration districts mixed integer linear
- optimization model

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PREVIOUS GEM EDITIONS

Year	Edition	City	Place
2013	First	Milano	UNIMIB
2014	Second	Milano	UNIMIB
2015	Third	Milano	During MILANO EXPO 2015 "Food for the planet"
2016	Fourth	Erice (Sicily, IT)	Center of Theoretical Physics "Ettore Majorana" , Erice, Italy
2017	Fifth	Astana (KZ)	During ASTANA EXPO 2017 "Future Energy"
2018-1	Sixth	Tenerife (SP)	Universidad La Laguna, Tenerife
2018-2	Seventh	Milano- Biella	UNIMIB - Fondazione Michelangelo Pistoletto
2019-1 GEM-Europe	Eighth	Aveiro (PT)	Universidade de Aveiro
2019-2 GEM-Asia	Ninth	Baku (AZ)	BHOS (Baku Oil Higher School)
2020	Tenth	Online	All around the world
2021	Eleventh	Dubai	During DUBAI EXPO 2020 "Connecting Minds, Creating the Future"

CREDITS AND THEIR RECOGNITION

GEM 2020 provides 5+1 credits for a total of 44 – 48 hours of Lectures and Seminars.

5 credits will be granted upon a group presentation the last day of the School on a subject previously agreed with the GEM directors or any of the GEM teachers. At the end of School, GEM will provide a certification for the 5 credits.

In order to earn the 1 extra credit, participants are requested to write a short scientific paper with a GEM teacher of their interest on their area of specialization. The GEM teacher will evaluate the paper. If the evaluation is positive, GEM will provide a certification for the 5+1 credit.

In case a grade is needed by the student, GEM will grade the presentation and the paper.

Please, make sure with the Coordinator of your School or Academic Program that the participation to GEM will be approved and considered as an activity within your academic curriculum. The Coordinator of your School or Academic Program may as well decide to recognize less than 5+1 credits.

*In any case all participants, whether interested or not to get credits, will receive the **Certificate of Attendance** after the Summer School.*



“There is an urgent need to stop subsidizing the fossil fuel industry, dramatically reduce wasted energy, and significantly shift our power supplies from oil, coal, and natural gas to wind, solar, geothermal, and other renewable energy sources. Start to improve your future!”

TEAM BUILDING ACTIVITIES & LEISURE TIME IN 4TH EDITION, ASTANA



“Together everyone achieves more!”



TEAM BUILDING ACTIVITIES & LEISURE TIME IN 5TH EDITION, TENERIFE



AT BAKY OIL HIGHER SCHOOL AND ACTIVITIES IN BAKU EDITION, 2019

