



IMES

MASTER IN BIOENERGY AND ENVIRONMENT



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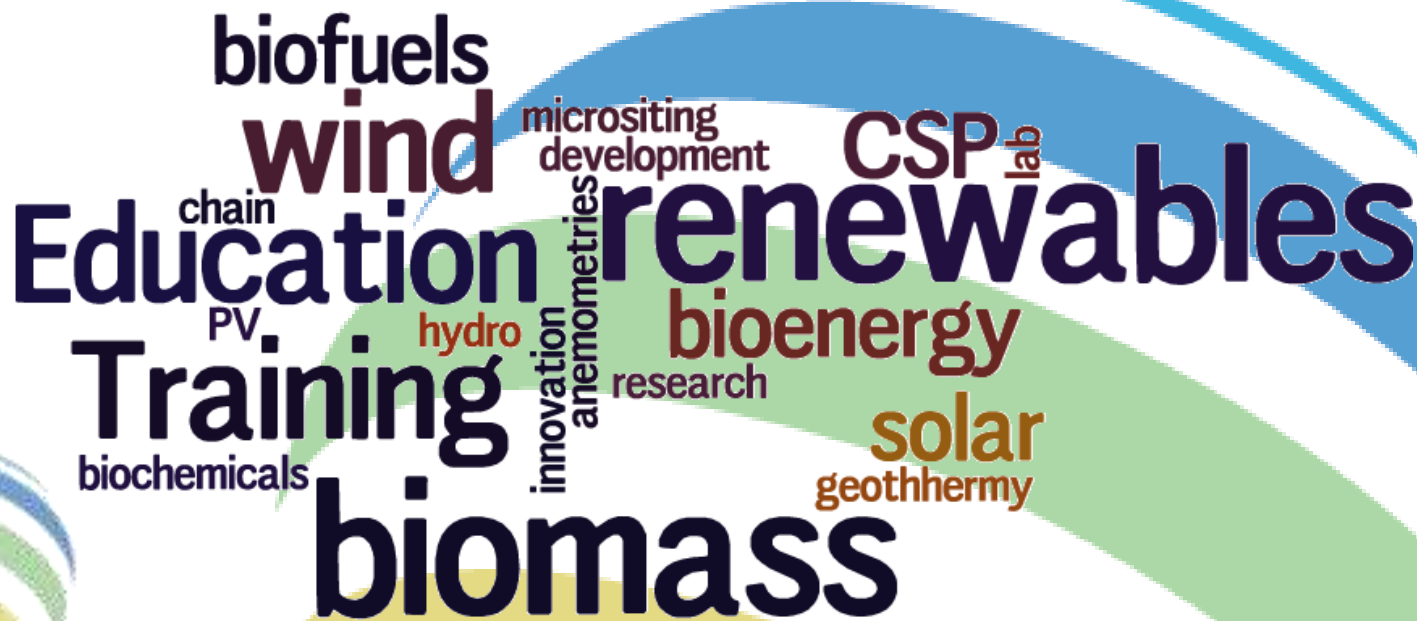
DIEF

Dipartimento di
Ingegneria Industriale





The Master is Managed by the CREAR – Research Centre on Renewable Energies of the University of Florence





C.R.E.A.R. CENTRO RICERCA
ENERGIE ALTERNATIVE E RINNOVABILI

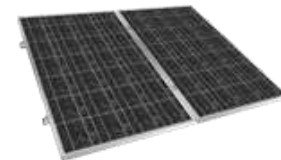


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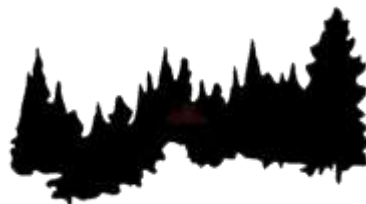
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DIEF
Dipartimento di
Ingegneria Industriale



GESAAF

Dipartimento di
Gestione dei Sistemi Agrari,
Alimentari e Forestali



DISPAA

Dipartimento di Scienze
delle Produzioni Agroalimentari
e dell'Ambiente



CREAR (Centro di Ricerca sulle Energie
Alternative e Rinnovabili)
Established January 1st 2005

Dipartimento di
Chimica "Ugo Schiff"



The Centre merges UNIFI competencies in the
following areas:
Energy Engineering, Electronics, Chemistry,
Agro-forestry, Geology, Economics

DST

Dipartimento di
Scienze della Terra



From the CREAR to the RE•CORD Consortium

- In **Year 2010** the **RE-CORD** Consortium has been established as a half private / half public **Not For Profit Research Centre** (following EU Legislation).
- *CREAR*, the *Montepaldi University farm*, *Spike Renewables* and *Pianvallico SpA* decided to set up an external unit completely dedicated to research activity and professional work, improving flexibility and laboratory management as well.
- The RE-CORD Consortium provides the skills and resources (laboratories and equipment) of its members, creating a critical mass capable to develop research and activities of primary-level science and technology, and it offers, as well, the possibility to carry out stage and research project during the Master, in cooperation with partner companies.



The members of the RE•CORD Consortium



CREAR is the Research Centre on Renewable Energy of the University of Florence



The Montepaldi Farm is the Farm of the University of Florence, where Agricultural test fields are available



Spike Renewables is a Ltd, taking care of the Production Engineering of Research Results



IPT Pianvallico SpA is a joint-stock company providing services and infrastructures to enterprises, industries and public entities

2005:
CREAR
(University of
Florence)
founded; Basic
and applied
Research on
Alternative and
Renewable
Energies



2009:
test field area at
Montepaldi
Farm;
Chemical Lab
established
In Mugello at
Pianvallico area



2014:
BIOENTECH
founded;
Innovative Start-
Up (L.212/2012)
for Product
industrialisation
& Business
development

2005

2008

2009

2010

2014



2008:
Spike
Renewables
founded;
Engineering
Society



2010:
RE-CORD
consortium
founded



Biomass to energy: a strongly interdisciplinary chain



chemistry



law

economy



technology



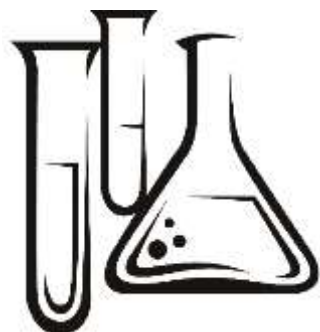
agriculture

forestry





The IMES Master aims to train the next generation of bioenergy project managers and technicians



Bioenergy Project Manager & Developer

Main goal of IMES Master is to give the professional skills required for private or public entities undertaking in bioenergy field, from the production process to the management of energy projects. The knowledge of legislation in environmental and bioenergy fields plays a key role in the administration of National or European projects. The skills obtained with the Master are suitable for Industries, Companies and Public Administration, like Departments of Environment Politics, National or European Energy Agencies.



Where do we come from?



*Master set up through a
Europe – USA Education & Training
Cooperation started in year 2002*



Established in 2002 thanks to the Support of the Joint Programme DG Education and Culture (EU) and FIPSE (USA)

Aim:

- **to set up a Master Programme on Environmental and Bioenergy issues**
- **foster the cooperation on Education and Training in between EU and USA and within the EU Partners**



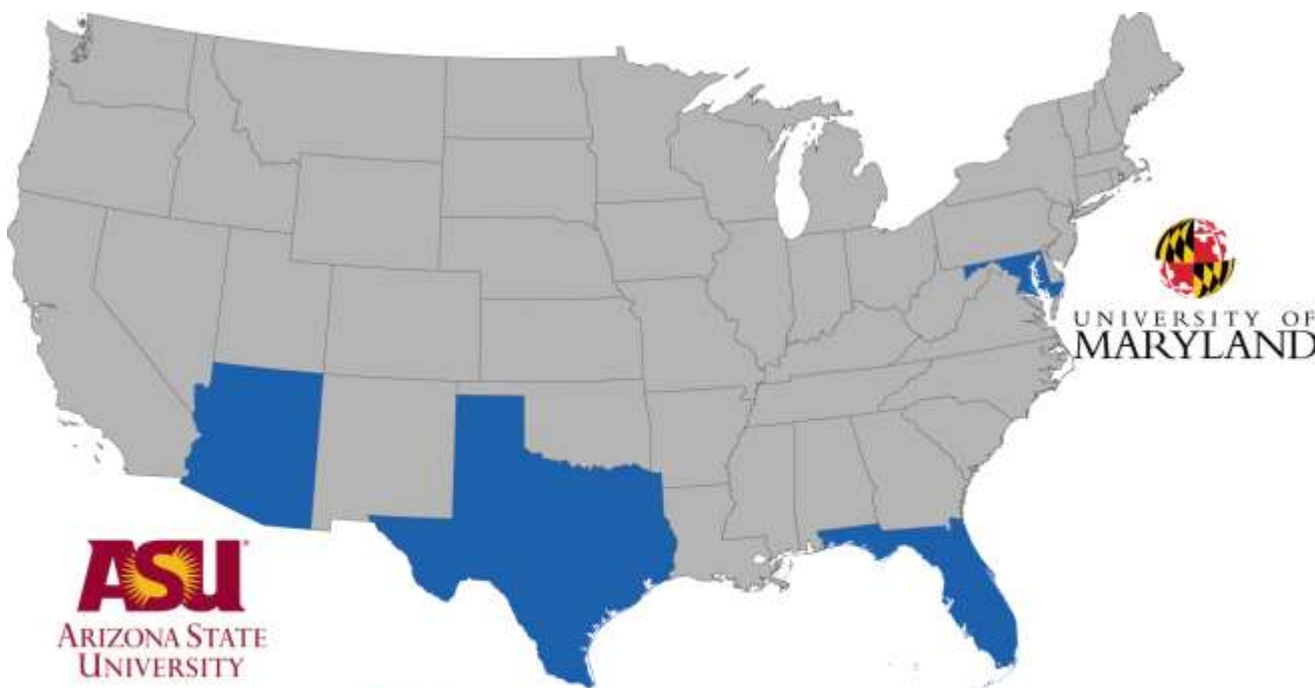
Three EU Universities involved:

- **Università di Firenze**
- **Aston University**
- **Universidade Nova de Lisboa**





Education and Culture DG



Cooperation and student mobility with USA Universities (FIPSE)

- Baylor University
- Arizona State University
- Embry Riddle Aeronautical University
 - this cooperation later transferred to the University of Maryland



MINISTERO DELL'AMBIENTE
E DELLA TUTELA DEL TERRITORIO E DEL MARE



**Since 2011/2012
Edition IMES has the
Patronage of the
Italian Ministry of the
Environment**



The Organising Committee



Prof. Francesco Martelli
Director



Prof. Susanna Nocentini



Prof. Guido Chelazzi



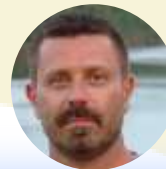
Prof. Giovanni Liberatore



Prof. Alberto Reatti



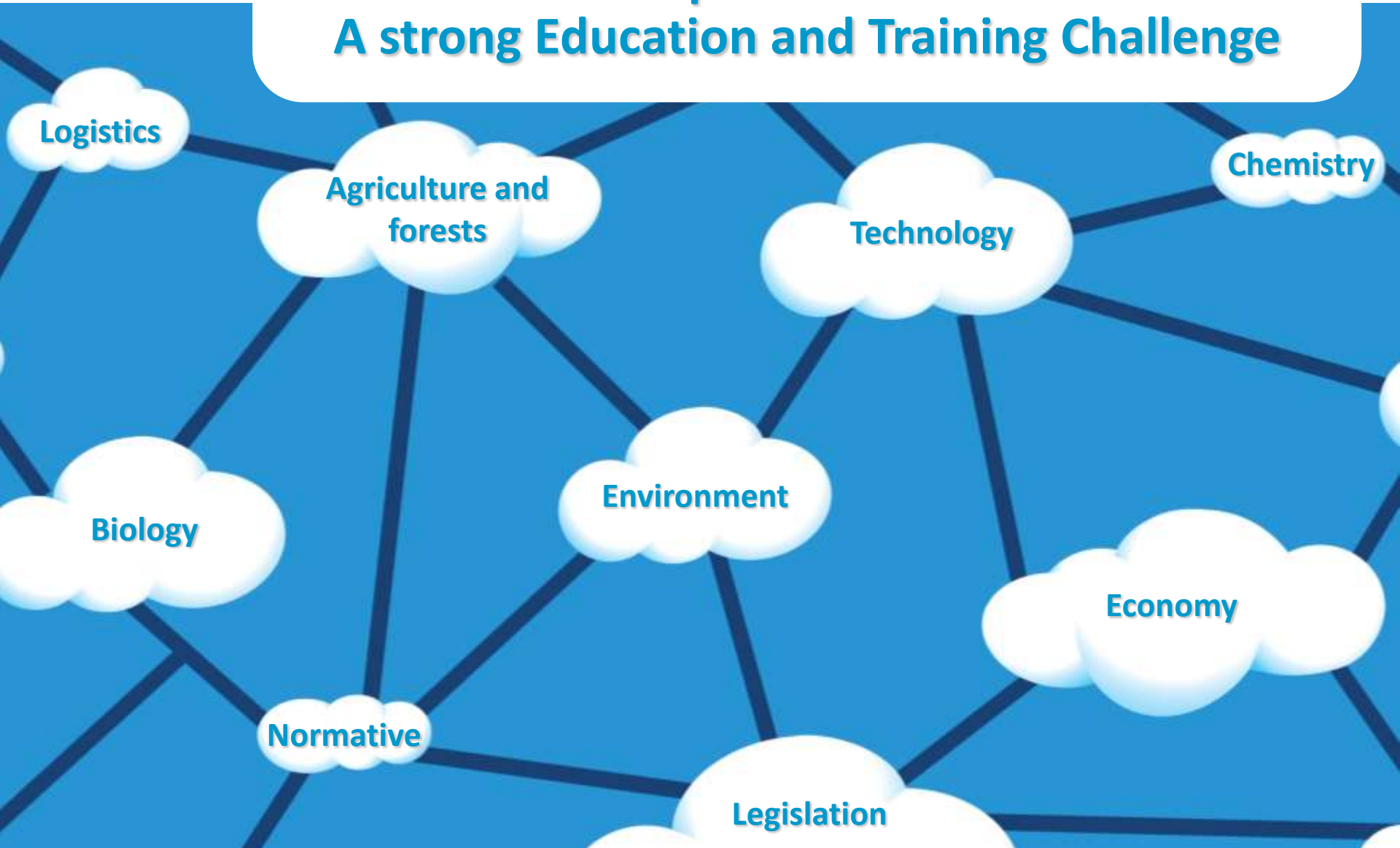
Dr. Emiliano Fratini, PhD



Dr. Enrico Palchetti, PhD

- The Director and the Organising Committee are due to the management of the IMES Master Course in all his aspects.
- A staff of renowned scientific experts in all the fields of interest of the biomass to energy chain supervises the IMES Master activities.

**Biomass to energy chain is a Highly
Interdisciplinary Topic, involving several
independent issues
A strong Education and Training Challenge**



IMES: the Course Programme

The Programme consists of Five Main Topics:

- **Biomass Production**
 - Forest Biomass Production, Agricultural Energy crops and residues, Cultivation and harvesting techniques.
- **Power Generation And System Analysis**
 - Introduction to Energy Conversion Principles, Power plant technologies.
- **Renewable Energy & Bioenergy Generation**
 - Renewable Energy Technologies, Biomass Energy Conversion Technologies, Chemical and Physical Characteristic of Biofuels.
- **Environment**
 - General ecology, Environment and Air Pollution, Environmental Impact Assessment of Bioenergy System.
- **Business Management and Economy**
 - Energy Market & EMS, Principles of economic and financial analysis of projects, Environmental legislation.



Quality of Teaching is our first concern.

A staff of University Professors and Researchers working together with Professionals from Industry and Research to give the Best quality in Education and Training.

People whose everyday work is to face the multiple challenges of Bioenergy, RES and Environmental issues.



Prof. Francesco Martelli - Director

- Full Professor since 1980 at the Department of Industrial Engineering, University of Florence, Founder and Director of the CREAR Centre.
- He is Chairman of the European Turbomachinery Committee, organiser and chairman of several International and EU Conference, as well as coordinator of many EU and National projects.
- He has more than 30 years experience in the field of Energy, CFD modelling and Environmental Impact Modelling of Energy Production Plants.
- Author of more than 130 publications on International Journals and Conferences, he is the **Director of the IMES Master since its establishment.**



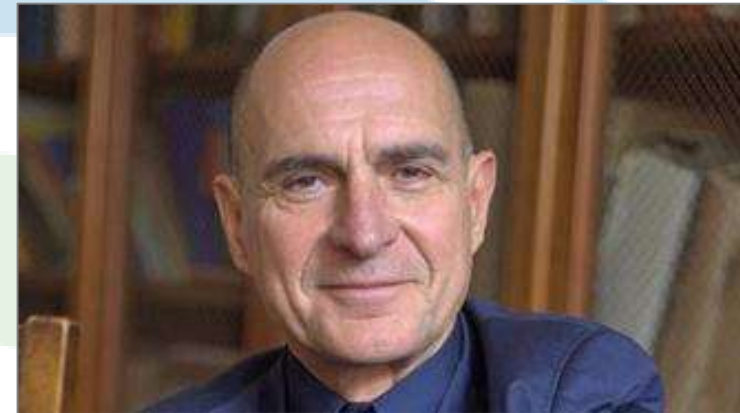
Prof. David Chiaramonti

- **David Chiaramonti** is Contract Professor of “Bioenergy” at the University of Florence.
- His main scientific interest is on the production and the use of biofuels, either liquid, gaseous or solid. His research works cover thermochemical biomass conversion processes as well as liquid biofuel production and use.
- He has published more than 120 scientific papers in these areas, chapters in books and studies, as well as articles in specialised magazines. He is also member of editorial boards of several scientific journals.
- **He has been one of the creators of the IMES Master.**
- Since 2010 he is President of the no-profit research consortium RE-CORD.



Prof. Guido Chelazzi

- Prof. **Guido Chelazzi** is Full Professor of Ecology at the University of Florence.
- President of the Natural History Museum of Florence and Pro-rector for Research and Technology Transfer, his main fields of interest are Ecotoxicology of Water Species, Paleoecology, Genetics and Preservation of endangered vertebrates.
- He is Author of more than 130 Papers; his book “L'impronta originale. Storia naturale della colpa ecologica” has been published in 2013 by Einaudi.
- He is Member of the IMES Master Organising Committee



Prof. Alberto Reatti



- Prof. **Alberto Reatti** scientific activity started soon after his M.S. Degree and focused mainly in the field of resonant switching converters and optimization of PWM converters.
- His present field of activity also includes Photovoltaics and Concentration Solar Power for CHP production.
- He is presently Associate Professor at the University Of Florence.
- He has been “Research Associate” at Wright State University, Dayton, Ohio, USA.
- Prof. Reatti research activity resulted in more than 50 journal and conference papers.
- He is Member of the IMES Master Organising Committee

Prof. Giovanni Liberatore

- Prof. **Giovanni Liberatore**, graduated in Economics, holds a PhD In Economics.
- He is Full Professor of Economics since 1992 and Adjunct Professor of Principles of Financial Accounting at the New York University (Abroad Program) since 1998. He also collaborates with the Luiss Business School since 1995.
- He is author of Papers and Monographies on Accounting, Control and Economic Assessment of Enterprises.
- He operates also as consultant for Societies and Public Bodies for Accounting and Project Finance.
- He is Member of the IMES Master Organising Committee



Prof. Susanna Nocentini

- **Susanna Nocentini** is full professor of Forest management at the Department of Agricultural, Food and Forestry Systems of the University of Florence.
- Her main scientific activity concerns integration between silviculture, management, biodiversity conservation and adaptation to global change in forest ecosystems, with a focus on the theory of complexity and the systemic approach in forestry.
- She is author of over 200 scientific papers in national and international journals, congress proceedings and book chapters.
- She is Member of the IMES Master Organising Committee



Dr. Enrico Palchetti, PhD

- Dr. **Enrico Palchetti**, full researcher at the Department of Plant, Soil and Environmental Science of the University of Florence, holds a PhD in Agro-biotechnologies for tropical production.
- He has 12 years of experience in R&D mainly in the area of Renewable Energy in agriculture and in the tropical agricultural productions.
- He collaborates with private companies involved in the biofuel production in tropical and subtropical countries with a special focus on *Jatropha curcas*.
- He is author of more than 60 Scientific Papers.
- He is Member of the IMES Master Organising Committee



Dr. Emiliano Fratini, PhD

- Dr. **Emiliano Fratini**, graduated in Chemistry, holds a PhD in Chemical Sciences at the University of Florence.
- He was Research Scholar at the Nuclear Engineering Department, MIT (USA) and he performed Research Activities in collaboration with several research Institutes, such as Laboratoire Léon Brillouin in Saclay, NIST Center for Neutron Research and Hahn-Meitner Institute in Berlin.
- Presently Assistant professor in Physical Chemistry, he is author of about 100 publications on peer review journals, and owns 3 national and international patents.
- He is Member of the IMES Master Organising Committee



Eng. Leonardo Nibbi M.Sc.

- Eng. **Leonardo Nibbi**, presently Fellow Researcher at the Department of Industrial Engineering, University of Florence.
- His experience in the renewable energy field since 1999 is mainly devoted to: the logistic of the biomass to energy chain, with particular attention to the use of GIS tools for correct planning; sustainability of solid, gaseous and liquid biofuels; market and legislation for solid biofuel; micro siting and assessment of wind farms through the use of WAsP; Education and Training in the Renewable Energy Fields, with particular attention to Biomass to Energy and Wind Energy fields.
- **He tutors students and manages the IMES Master since 2005.**



Eng. Matteo Prussi, PhD

- Eng. **Matteo Prussi**, PhD, graduated in Industrial Engineering, holds a PhD in research and development of renewable and alternative system for the energy production.
- Presently Fellow Researcher in the field of Biofuels at the University of Florence, he is also Director of the no-profit research consortium RE-CORD.
- His main scientific interest is on the production and use of biofuels, either liquid, gaseous or solid. His research works cover thermochemical biomass conversion processes as well as liquid biofuel production from alternative feedstock (algae) and use. He published many scientific papers in these areas, chapters in books and studies, as well as articles in magazines.



Dr.Silvia Maltagliati, PhD

- Dr.**Silvia Maltagliati**, formerly senior technician at the **Environmental Protection Agency of Tuscany (ARPAT)**, is presently Seconded National Expert at the Unit F2, Bioproducts and Processing of the **DG RTD (Science, Research and Innovation) in Brussels**
- She has her focus expertise in the field of Environmental Modelling.
- After her Master degree in Physics, she achieved a PhD in “Energy and innovative industrial technologies”.
- Previously Contract Professor of Biofluid-Dynamics and of Biomechanics at the University of Florence, **she has been one of the creators of the IMES Master.**



Dr. Giacomo Santini, PhD

- Dr. **Giacomo Santini**, graduated in Biological Sciences, holds a PhD in Animal Biology (Ethology).
- He is presently assistant professor for “Models & Methods in Conservation Biology” and for “Ethology and Animal Ecology”.
- His main scientific interests are about the behaviour and ecology of invertebrates, modelling in ecology and Community and Population Ecology.
- He is author of over 45 scientific papers on international ISI-indexed journals.



Dr. Silvia Bargigli, PhD

- Dr. **Silvia Bargigli**, Graduated in Environmental Chemistry, she holds a PhD in Life Cycle Assessment and is presently **EHS Manager at Siemens AG** by the Energy Management Division.
- Her current activity focusses on Product-related Environmental Protection topics, among which: Life Cycle Assessment, Environmental Product Declarations, and Chemicals legislations (REACH, RohS,...)
- She previously worked as EHS Specialist and Waste Manager for Boehringer Ingelheim GmbH, as Environmental Technician in the Environmental Department of the Province of Florence, as Fellow Researcher for ENEA, as well as Contract Professor on LCA at the University of Siena.



Eng. Marco Pacinotti M.Sc.

- Eng. **Marco Pacinotti**, MSc of Industrial engineering at the University of Florence and at University of Georgia (USA), is presently working in **Saudi ARAMCO** as **project developer** responsible for acquisition and permitting of all renewable projects, in particular responsible for the wind program.
- He previously worked for the CREAR, performing research in wind energy, concentrated solar power and cooling, where he developed two prototypes from design to commissioning.
- He also worked five years in ENEL as Project Developer and Project Engineer; during this period he developed around 600 MW of wind projects in Romania, plus several due diligences for wind projects in several countries.



Sabrina Bruschi, M.Sc.

- **Sabrina Bruschi** M.Sc. in Sociology, has a 15 years experience in the Certification of Management Systems for Enterprises.
- She started working as a consultant for Enterprises on Management Systems for Quality, Environment, Safety, Ethics.
- Since 2008 she works for **TÜV Sud**, with the role of **Sales Regional Manager** for the Centre-Sud Area of Italy.



Eng. Caterina Susini, M.Sc.

- Eng. **Caterina Susini**, is an Environmental Engineer whose main expertise is in the field of Waste Management and Waste Water Treatment, with a special focus on Anaerobic Digestion of the organic fraction of Municipal Solid Wastes.
- Since 2005, she is the **responsible of the MSW treatment plant of SEA Risorse**, the Municipal Waste management, Disposal and Collection enterprise of the Viareggio Area (Tuscany, Italy).
- She teaches “Anaerobic Digestion” for IMES.



Dr. Antonio Borzì, PhD

- Dr. **Antonio Borzì** has a law degree from the University of Florence, with a thesis on constitutional law, holds a Ph. D. in constitutional law.
- He was a research associate in constitutional law and is an attorney at law. He was a member of the research group for the Observatory of Environmental Protection Legislation (O.Le.A.) of Ceradi – Luiss Guido Carli, coordinated by Professor Stefano Grassi. He was an official of the Regional Environmental Protection Agency for the Region of Calabria, and worked at the Ministry of the Environment.
- Presently, he is an **official at the AEEG, the Italian Regulatory Authority for Electricity Gas and Water.**



Eng. Lucia Recchia, PhD

- M.Sc. in Environmental Engineering in 2002 and Ph.D. in Agricultural and Forestry Engineering in 2006 at the University of Florence, Italy.
- She is currently research fellow at the University of Florence. **She is accredited ISCC auditor.**
- Her research activity focuses on the evaluation of energy consumption of industrial and agro-industrial processes, the assessment of the impacts of phytosanitary products, the noise and vibration modelling for agricultural operations, the development and implementation of multicriteria analysis, LCA methodology, Carbon Footprint approach and the application of GIS tools.



Dr. Paolo Sospiro, PhD

- Dr. **Paolo Sospiro**, PhD in Development Economic, graduated in Political Economy with a thesis on Poverty and Famine in Ethiopia.
- Erasmus Visiting Student at the ISCTE in Lisbon (Portugal), where he followed the African Mestrado, he specialised on International Aid at University of Ancona and then worked in different countries as Economist on International Aid projects.
- He is Contract Professor on Development Economics at **University of Macerata** since 2006.
- His main research interests are: Development, Education, Poverty and Inequality, Energy, Transport, Waste Management and Water Supply and consumers behavior.



Eng. Alessandro Cappelletti, PhD

- Eng. **Alessandro Cappelletti**, PhD, is presently Fellow Researcher at the Department of Industrial Engineering, University of Florence.
- His main field of interest is the use of alternative fuels in gas turbine.
- He worked in many Italian and International projects on the design, numerical simulation and testing of new combustion system fueled with Hydrogen, Vegetal-oil and Pyrolysis oil.
- He collaborated with the main Italian energy companies such as ENEL, GE –Nuovo Pignone and Turbec (now Ansaldo Energia).
- He's also working on the development of innovative PV concentrated solar system, for the Combined Heat and Power production.



Maurizio Cocchi, M.Sc.

- M.Sc. Agronomist and graduated at the IMES Master in Bioenergy and Environment, since 2007 Maurizio Cocchi is working in the field of bioenergy as consultant and project manager in national and international projects, carrying out feasibility studies, biomass resources assessments, market and policy assessments, training, capacity building and dissemination activities.
- Since 2012 he is also **editor of BE-Sustainable**, a quarterly magazine of bioenergy and the bioeconomy published by ETA-Florence.
- He has been Member of the IEA Bioenergy Task 40 “Sustainable International Bioenergy Trade: Securing Supply and Demand”



Forest Biomass Production

- Fundamentals of Forestry
- Short Rotation Forestry (SRF) and forest residues

Agricultural Energy crops and residues

- Energy Crops, Agricultural Residues and their Valorisation
- Crops for Biofuels Production

Cultivation and harvesting techniques

- Evaluation of suitable and available areas
- Estimating the environmentally compatible bioenergy potential from agriculture
- Sustainability Criteria for Biofuels
- Cultivation and harvesting techniques



Prof. Susanna Nocentini
University of Florence



Dr. Barbara Mariotti, PhD
University of Florence



Dr. Enrico Palchetti, PhD
University of Florence



Eng. Lucia Recchia, PhD
University of Florence

Introduction to Energy Conversion Principles

- Basics and Thermodynamic Principles
- Fundamentals of Energy Engineering
- Thermodynamic Cycles

Power plant technologies

- Introduction to Turbomachinery
- Turbines, Steam Plants, Internal and External Combustion Engines
- Organic Rankine Cycles
- CHP and Cogeneration
- System Analysis
- Small and Medium Size Heating Plants, District Heating
- Interfacing Production and Conversion



Prof. Francesco Martelli
University of Florence



Prof. Alberto Reatti
University of Florence



Eng. Leonardo Nibbi, M.Sc.
University of Florence



Eng. Alessandro Cappelletti,
PhD
University of Florence

Renewable Energy Technologies

- Wind, Solar H&C, Photovoltaics, CSP, Mini Hydro, Geothermal, Carbon Storage



Prof. David Chiaramonti
University of Florence

Biomass Energy Conversion Technologies

- Biomass Pre-treatment, Drying
- Thermochemical Conversion, Biomass Combustion, Gasification, Pyrolysis, Torrefaction
- Anaerobic Digestion, Microalgae



Eng. Matteo Prussi, PhD
University of Florence



Dr. Emiliano Fratini, PhD
University of Florence

Chemical and Physical Characteristic of Biofuels

- Chemistry of Biofuels
- 1st and 2nd Generation Biofuels
- Green Chemistry and by-products



Eng. Caterina Susini, M.Sc.
SEA Risorse S.p.A.



Eng. Marco Pacinotti, M.Sc.
Saudi Aramco

General ecology

- Ecology of Organisms, Populations, Communities and Ecosystems
- Environmental Monitoring, Applied Ecology, Natural Resources Preservation

Environment and Air Pollution

- Air quality and Air pollutants, Boundary Layer Physics
- Air Pollution Emissions: Monitoring and Dispersion Modelling

Environmental Impact Assessment of Bioenergy System

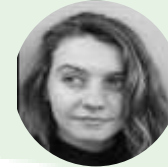
- Fundamentals of Life Cycle Assessment
- Waste Management, GHS, CLP, REACH, MSDS



Prof. Guido Chelazzi
University of Florence



Dr. Giacomo Santini, PhD
University of Florence



Dr. Silvia Maltagliati, PhD
European Commission – DG RTD



Dr. Silvia Bargigli, PhD
Siemens AG

Energy Market & EMS

- System Management, EMAS, ISO 140001, ISO 50001
- Biomass Market, Energy Market

Principles of economic and financial analysis of projects

- Fundamentals of Economy
- Economic aspects of energy
- How to submit a Proposal

Environmental legislation

- Fundamentals of law
- National and International Environmental Legislation
- Waste Management, Land remediation



Prof. Giovanni Liberatore
University of Florence



Sabrina Bruschi, M.Sc.
TÜV Süd - Italia



Dr. Antonio Borzì, PhD
Authority of Electricity and Gas



Dr. Paolo Sospiro, PhD
University of Macerata



Maurizio Cocchi, M.Sc.
ETA Renewable Energies



In order to widen the Master contents, several renowned Researchers and Experts are regularly invited to hold Seminars on specific topics.

These Seminars are held both as front lessons or as video conference.

As a matter of example, in the latest editions, lecturers were invited from Deutsches Biomasseforschungszentrum (DBFZ), Arizona State University, Viessmann Academy, Italian National Research Centre IVALSAs and Efeso Consulting.



Dr. - Ing. Franziska Müller-Langer
*DBFZ Deutsches
Biomasseforschungszentrum*



Dr. - Ing. Marco Klemm
*DBFZ Deutsches
Biomasseforschungszentrum*



Dr. Raffaele Spinelli, PhD
CNR Ivalsa



Prof. Larry Olson,
Arizona State University



Mauro Braga
Viessmann Academy



Filippo Garini, M.Sc.
Efeso Consulting

**TRAINING FOR THE
«REAL WORLD»:
THREE MONTHS OF
MANDATORY STAGE
IN PUBLIC OR
PRIVATE
ENTITIES**

INTERNSHIP

etaflorence **renewable**energies

Your partner in renewable energies



VIESSMANN Group



Green Energy



LUND UNIVERSITY

ARPAT
Agenzia regionale
per la protezione ambientale
della Toscana



**SOME
PREVIOUS
INTERNSHIP HOSTS**

INCOMING EDITION (9th)

Academic Year 2015/16

- Front lessons in English if students from abroad are present
- Registration fee: 4000€



A blurred photograph of three people in an office setting. On the left, a man in a light blue shirt and dark trousers stands near a whiteboard. In the center, a man in a light-colored shirt and dark trousers is gesturing with his hands. On the right, a woman in a light-colored top and dark trousers is looking towards the man in the center. The background is bright and out of focus, suggesting a large window or open-plan office.

**RESEARCH AND DEVELOPMENT
ACTIVITIES AT CREAR / RE-CORD
AS A SUPPORT FOR IMES
EDUCATION AND TRAINING**

Research & Development @ CREAR / RE•CORD

- Thermochemical conversion into upgraded biofuels: metanation, pyrolysis, torrefaction, HydroThermal Carbonization, HydroThermal Liquefaction, charcoal production etc.
- Liquid biofuels: oil crops, extraction and cleaning, cogeneration, BTL, Ethanol from Lignocellulosic Biomass, Microalgae, Green chemistry
- Biomass Combustion
- Test of organic matrix for Anaerobic digestion
- Biomass to energy chain: logistics, LCA, sustainability, optimization
- Development and Test of small scale gasification systems
- Redesign of Internal Combustion Engines and MGT Combustion Chambers to burn Liquid biofuels and Hydrogen
- CFD to optimise ponds for microalgae production
- Wind Energy: CFD to design new Wind Generators
- Wind Energy: micrositing and Measurement Assessment
- Concentrated Solar Power (CSP) for heat and electricity simultaneous production

Pilot and Demonstration Plants

torrefaction
CHP
ICE
pyrolysis
MGT
gasification
combustion
PVO
cogeneration



Externally fired biomass/NG gas turbine system (50-100 kWe)

Open-top twin-fire gasification unit (up to 100 kg/h, 100 kWe)

Downdraft Imbert-type gasification system (10 kWe)

Straight vegetable oil engine (7 kWe)

Briquetting equipment (100 kg/h)

Torrefaction/Carbonisation plant

Pilot and Demonstration Plants





- Test rigs for biofuels are available for CREAR and RE-CORD researchers to test:
 - feasibility/running
 - performances
 - emissions

Biofuel Test Rigs

- Equipment: MGT
 - good performance also for small sizes
 - good emissions
 - reliability
 - limited maintenance requirements

Biodiesel
PVO
EtOH
Pyrolysis Oil
...



PYROLYSIS

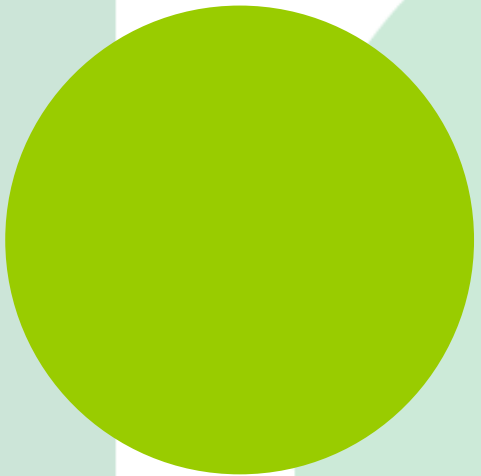
TORREFACTION & CARBONISATION



- **Optimisation of cultivation**
- **Conversion into Biofuels**
 - **By-products**
- **Pyrolysis of Microalgae**
 - **Oil characterization**



MICROALGAE FOR BIOFUELS



1st and 2nd Gen Biofuels

Established in 2011, RE-CORD lab is specialized in analysis of solid and liquid biofuels such as wood chips, pellets, sawdust, biodiesel, vegetable oils, pyrolysis oils, etc.

For each kind of biofuel selected bundles of analysis that allow a careful and complete characterization are available.



Research Network and Projects



A strong worldwide network of partners collaborate with us to perform research, development and implementation of new technologies in the renewable energy field.

EDUCATION & TRAINING @ CREAR

- Courses
 - Within the University Courses, modules specifically devoted to RES are available
- IMES Master in Bioenergy and Environment
 - Since 2002, provides the training for the correct management of the bioenergy chain
- MC-EnMa Project
 - TEMPUS Project started March 2014, for implementation of a Master in “Energy Management” in Libya at Tripoli, Bengasi and Sebha Universities.
- Training for Enterprises and Entities
 - Training in the RES fields



Training for Enterprises and Entities

- Training for Enterprises, Associations, Public Bodies etc. in the RES field
- Training courses for ISES Italia and the “Scuola di Formazione di ISES ITALIA” in the RES field, in particular for the bioenergy issues
- Training Courses for AIEL and ARSIA (Tuscany Region) in the micro wind, bioenergy and renewables for farmers
- Training Courses for Training Entities: SSA (Società Servizi Avanzati, Prov. di Arezzo); Formatica (Pisa), Fiorile (Firenze) etc.
- Training Courses for Not for Profit associations: Federconsumatori



UNIVERSITÀ
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FIRENZE



IMES Master CONTACTS



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CREAR – RE-CORD
Centro Ricerca Energie Alternative e Rinnovabili
Dipartimento di Ingegneria Industriale
Università degli Studi di Firenze

<http://crear.unifi.it/imes>