

# *The Water Resources and Energy Systems*

— CONFERENCE 2026 —

1-3 July - Portici Research Center, Naples - Italy



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1<sup>ST</sup> JULY

09.00 - 09.30 WELCOME

09.30 - 11.00 **SESSION 1 - OPENING SESSION: CROSS-CUTTING PERSPECTIVES ON THE WATER-ENERGY NEXUS**

**Chairs:** *Girolamo Di Francia, Carlo Sansone*

**Co-chairs:** *Luigi Petta*

***Assessing energy efficiency and GHG emissions in wastewater treatment plants: a benchmark analysis from the Smartee-Plants Project***

**Luigi Petta**, *D. Di Trapani, M. Carciola, S. F. Corsino, A. Cosenza, G. Di Bella, G. Mancini, L. Gurreri, M., Langone, D. Mattioli, G. Sabia, A. Luciano, G. Gravina, G. Sciortino, M. Morello, M. Torregrossa, G. Viviani*

University of Palermo, University of Enna 'Kore', University of Catania, ENEA, ACQUAENNA S.C.p.A., AMAP S.p.A., SIDRA S.p.A.

***Optimizing Floating Solar PV Site Selection Using Satellite-Derived Water Surface Temperature from Sentinel-2 and Landsat 8 data***

**Antonio Iodice**, *A. S. Valente, G. Fattoruso, M. Fabbicino, G. Di Francia*

ENEA, University of Napoli Federico II

***From Seawater to Green Hydrogen: Unlocking Italy's Renewable Energy Storage Potential***

**Graziella Caruso**, *F. Melino*

University of Bologna

11.00 - 11.30 COFFEE BREAK

11.30 - 13.30 **ROUNDTABLE - WATER, ENERGY AND CRITICAL RAW MATERIALS: GOVERNING THE TRANSITION INTERDEPENDENCIES**

**Panellists:** *Anna Laura Pisello, Silvia Grandi, Claudia Brunori, Viviana Cigolotti, Carlo Sansone*

ENEA, University of Napoli Federico II, University of Perugia, CTS ENEA

13.30 - 14.30 LUNCH

14.30 - 16.00 **SESSION 2 - SMART MONITORING, FORECASTING AND AI FOR WATER-ENERGY SYSTEMS**

**Chairs:** *Savero De Vito, Andrea Zanela*

***Towards a Digital Twin of a Freshwater Floating Photovoltaic Ecosystem: Multi Sensor Monitoring, Numerical Modelling, and iSCADA Architecture***

**Ilker Erunsal**, *S. Dutto, L. Manco, G. Piantadosi, R. Cotroneo, S. De Vito, G. Di Francia*

ENEA, University of Napoli Federico II

***Optimization of Pumped Storage Systems using Reinforcement Learning: A Data-Driven Approach for Alpine Hydropower***

**Pranav Dhawan**, *M. Herrera, M. Righetti*

Free Univ. Bozen-Bolzano, Newcastle University

***A Transformer-based Framework for Photovoltaic Power Forecasting: Towards Smart Energy Management in Floating PV and Water-Energy Systems***

**Sofia Dutto**, *G. Piantadosi, I. Erunsal, G. Spinelli, S. De Vito, C. Sansone, G. Di Francia*

ENEA, University of Napoli Federico II



***Evaluating Weather Forecast Providers for Photovoltaic Energy Systems: A Digital Monitoring and Assessment Framework***

**Giovanni Spinelli**, S. Dutto, I. Erunsal, S. De Vito, G. Piantadosi, G. Di Francia

ENEA, University of Napoli Federico II

***Weather Informed LSTM for Enhanced Short Term Power Forecasting of Bifacial Floating PV Systems***

**Cristina Ventura**, G. M. Tina, G. Bellitto, L. Varsallona, C. Spampinato, S. Ferlito, G. Di Francia

ENEA, University of Catania

***A Hybrid AI and Simulation Framework for Optimal BESS Operation under Uncertainty***

**Behzad Pirouz**, F. Guerriero, J. Ramezani Paschapari

University of Calabria

16.00 - 16.30

COFFEE BREAK

18.30 - 20.00

SOCIAL EVENT



09.30 - 11.00

## SESSION 3 - ENERGY-EFFICIENT WASTEWATER TREATMENT AND RESOURCE RECOVERY

**Chairs:** Luigi Petta, Gianpaolo Sabia

### *Urban wastewater treatment and nitrogen recovery through heterotrophic aerobic assimilation*

**Stefano Papirio**, C. Belloni, M. Areniello, S. Matassa, I. Pikaar, F. Pirozzi, G. Esposito

University of Queensland, University of Napoli Federico II

### *Energy-Neutral Wastewater Treatment at Basin Scale*

**Michela Langone**, G. Barison, G. Andreottola, D. Mattioli

ENEA, University of Trento

### *Synergistic Integration of Low-Temperature Sludge Drying, Ammonia-based Heat Pumps and Waste Heat Recovery: A Water-Energy Nexus Case Study at Milano San Rocco WWTP*

**Marco Blazina**, A. D'Anna, S. Cavallaro, F. Taschini

MM Spa, ETC Engineering

### *Techno-Economic Assessment of Sludge Drying Using Thermal Energy Recovered from WWTP effluent*

**Silvia Di Fabio**, F. Bertelli, M. Langone, D. Mattioli

ENEA, HUBER Technology

### *Upgrading sewage sludge treatment through pyrolysis and biochar valorization: assessing feasibility and improvement potential*

**Giulia Nardella**, S. Di Fabio, R. Tuffi, L. Pucci, L. Petta, M. Fabbricino

ENEA, University of Napoli Federico II, Gori Spa

### *Advancing energy-efficient wastewater treatment through machine learning-based fouling prediction in the electro-Living Membrane bioreactor*

**Stefano Cairone**, V. Belgiorno, V. Naddeo, T. Zarra

University of Salerno

11.00 - 11.30

COFFEE BREAK

11.30 - 13.30

## OPEN MIC: MAY AI BE A GREEN AI?

**Moderator:** Girolamo Di Francia

### *Sostenibilità Energetica delle Infrastrutture: come conciliare la crescente domanda computazionale con gli obiettivi di decarbonizzazione e uso responsabile delle risorse*

Giovanni Ponti

ENEA

### *Integrazione dell'AI nell'orchestrazione delle infrastrutture moderne per l'efficienza energetica*

Giancarlo Sperli

University of Napoli Federico II

13.30 - 14.30

LUNCH



14.30 - 16.00

## **SESSION 4 - HYDROGEN, STORAGE AND INTEGRATED WATER-ENERGY INFRASTRUCTURE**

**Chairs: Grazia Fattoruso, Michela Langone**

***Economic assessment of biological methanation using green hydrogen in a large Italian wastewater treatment plant: model application and scenario analysis***

**Antonio Giuliano, A. Pianese, B. Notari, L. Petta, M. Fabbicino**

ENEA, University of Napoli Federico II, University of Bologna

***Water-Energy Nexus in Practice: Reusing Industrial Wastewater for Green Hydrogen Production***

**Rossella Scorzelli, M. Delfino, S. Rahmani, A. Annunziata, A. D'Angola, G. Fattoruso, B. Murgante, G. Monteleone**

ENEA, University of Basilicata

***From waste to watts: unlocking green hydrogen via wastewater electrolysis and reverse osmosis***

**Emanuela Marzi, C. Renzi, G. Nigliaccio**

ENEA

***Floating Photovoltaics: When Does Bifaciality Pay Off***

**Leonardo Micheli, G. M. Tina, D. L. Talavera, W. van Sark**

Sapienza University of Rome, University of Catania, University of Jaén, Utrecht University

***A sandbox for testing hydropower reservoir operation strategies, including hybridization scenarios***

**Domenico Micocci, C. Bragalli, E. Toth**

University of Bologna

***An Integrated Modelling Framework for Managing Reservoir Siltation in Hydropower Systems***

**Andrea Abbate, L. Mancusi, M. Tangi**

RSE S.p.a.

16.00 - 16.30

COFFEE BREAK

16.30 - 18.00

**INTERNAL EVENT: PTR 1.11 PROJECT MEETING**

20.00

SOCIAL DINNER



09.00 - 09.30

## INVITED LECTURE

**Chairs: Girolamo Di Francia, Luigi Petta**

**Water use for energy production: general framework and focus on thermoelectric power generation in Italy**  
Stefano Tersigni

ISTAT

09.30 - 11.00

## SESSION 5 - FLOATING PHOTOVOLTAICS, HYDROPOWER AND WATER BODY MONITORING

**Chairs: Grazia Fattoruso, Andrea Zanela**

**State of the Art of Environmental Monitoring for Floating Photovoltaic Systems: Metrics and Assessment Strategies**

**Ramiro dell'Erba, L. Blasi, S. Bossi, G. Cupertino, A. Cipollini, M. Santoro, L. Parrella, S. Schiavo, S. Manzo**  
ENEA

**Toward Deep-Learning Robotic Visual Inspection for Condition Monitoring and Predictive Maintenance of Floating Photovoltaic Systems in Inland Water Bodies**

**Andrea Zanela**

ENEA

**Robotic Platform Equipped with Sensors for Water Quality Monitoring under Floating Photovoltaic Plants**  
**Silvia Bossi, G. Cupertino, L. Blasi, M. Santoro, A. Cipollini, S. Schiavo, L. Parrella, S. Manzo, R. dell'Erba**

ENEA

**Water-Energy Nexus in Italy: A Systematic Literature Review for Integrated Resource Planning**  
**Caterina Carà, G. Mattiazzo**

Politecnico di Torino

**Water and Energy Management by Sustainable Parking Areas at the Fisciano Campus of the University of Salerno**

**Roberta D'Ambrosio, A. Longobardi**

University of Salerno, CUGRI

**Photomobile Polymers in Solar-Driven Opto-Valves for Efficient Irrigation and Plant Cooling**

**Giuseppe Nenna, A. De Girolamo Del Mauro, F. Loffredo, F. Villani, T. Fasolino, M. Montanino, G. Sico, R. Miscioscia, B. Guilcapi, A. D'Avino, D. Sagnelli, L. Petti**

ENEA, ISASI-CNR

11.00 - 11.30

COFFEE BREAK

11.30 - 13.30

## SESSION 6 - WATER QUALITY, EMERGING CONTAMINANTS AND ENVIRONMENTAL RISK

**Chairs: Saverio De Vito, Roberta Guzzinati**

**Ecotoxicological Effects and Ecological Risk of Microplastics and Plastic Leachates Across Environmental Matrices**

**Ramiro dell'Erba, L. Blasi, S. Bossi, G. Cupertino, A. Cipollini, M. Santoro, L. Parrella, S. Schiavo, S. Manzo**  
ENEA

**Removal of emerging contaminants through UV technology in laboratory scale experiments**

**Luigi Sciubba, R. Guzzinati, S. Busi, G. Sabia, M. Melis, P. Giacò, L. Petta**

ENEA, University of Ferrara



**Microplastics in wastewater treatment plants: planning and optimization of sampling and analytical procedures**

**Roberta Guzzinati**, . M. Cellamare, S. Busi, M. Ferraris, S. Casu, I. Casadei, L. Petta

ENEA, University of Bologna

**Antibiotic Contamination in Wastewater and Marine Water Samples in the Northern Adriatic Sea**

**Claudia Stevanin**, T. Chenet, A. Pagnoni, V. Costa, M. Cescon, C. Fabbro, L. Pasti

OGS Trieste, University of Ferrara

**Rooftop rainwater Harvesting potential to satisfy non-potable water demand in the Island of Ventotene, Italy**

**Michela Langone**, T. Chenet, A. Pagnoni, V. Costa, M. Cescon, C. Fabbro, L. Pasti

ENEA, Politecnico di Torino

**Evaluation of microalgae phycoremediation potential in integrated wastewater treatment technologies**

**Antonia Senatore**, M. Melis, P. Giacò, L. Sciubba, R. Guzzinati, S. Busi, C. Baldisserotto, S. Pancaldi

ENEA, University of Ferrara

13.30 - 14.30

LUNCH

14.30 - 16.00

**SESSION 7 - GOVERNANCE, PLANNING AND SOCIO-TECHNICAL DIMENSIONS OF THE WATER-ENERGY NEXUS**

**Chairs: Grazia Fattoruso, Roberta Guzzinati**

**Spatial assessment of hydroclimatic freshwater vulnerability in thermoelectric power plants in Italy**

**Alessandro Stracqualursi**, R. Borghesi

ISPRA

**Water Loss Assessment in Distribution Systems: Implications for Resource Availability and Energy Demand**

**Gianpaolo Sabino**, G. Fattoruso, A. S. Valente, L. Cimorelli, A. D'Aniello, M. Fabbicino, G. Di Francia

ENEA, University of Napoli Federico II

**Economic and Investment Perspectives of the Italian Wastewater Sector**

**Andrea Di Piazza**, T. Tellini, G. Sabia, L. Petta, E. Mauro, A. Polizzi, F. Mazzarella

ENEA, Utilitalia, Fondazione Utilitatis

**Desalination in the EU Energy-Water Nexus: Closing the Regulatory Gap to Unlock Economic Potential**

**Flavia Cavaliere**, A. Díaz de la Rosa

MUR, University of A Caruna (Spain)

**Water-Energy Nexus Benefits of WASH and Energy-Efficiency Retrofits in School Infrastructure**

**Sonia Giovinazzi**, J. Wu, C. Fonseca Ferreira, R. I. Fernandez Miranda, M. De Los Angeles Martinez, C. D. Vildanova, L. Voronina

ENEA, World Bank Group

**A Water-Energy Nexus Assessment of Air Conditioning Systems**

**Luca Socci**, F. Santesi, C. Lisini, A. Rocchetti, C. Arrighi

University of Firenze

16.00 - 17.00

COFFEE BREAK | CLOSING CEREMONY & AWARDS



## POSTER SESSION

Day 1, Wednesday 1<sup>st</sup> July | 11:00–16:00

Day 2, Thursday 2<sup>nd</sup> July | 09:30–16:00

Poster Session Chairs: **Sonia Manzo e Giuseppe Nigliaccio**

**P1 - Lignin Valorization Pathways within the Energy-Water Nexus: Process Integration and Sustainability Assessment for Bio-Based Polyurethane Production**

R. Loffredo, A. Giuliano, M. T. Petrone, I. De Bari

**P2 - Multipurpose Atmospheric Water Generators: the Advantages of an Integrated Approach**

L. Cattani, A. Magrini

**P3 - Biomethanation of pyrolysis gas derived from municipal sewage sludge: start-up of a pilot-scale bioreactor coupled with a venturi-type injector as external gas-mass transfer system**

M. Langone, V. Pelagalli, A. Giuliano, S. Matassa, M. Race, P. N. L. Lens, A. Frugis, L. Petta, G. Esposito

**P4 - Comparison of hydrological and machine learning methods for streamflow data gap filling in Campania region (Southern Italy)**

G. Nicoletti, A. Longobardi, E. Bagkis, T. Kassandra, K. Karatzas

**P5 - SDGs Measures for Floating Photovoltaic on Freshwater Basins**

R. Cotroneo, S. De Vito, I. Erunsal

**P6 - Numerical Study of the Thermal Behavior of Water Bodies Partially Covered by Floating Photovoltaic Systems**

S. Aneli, G. Arcidiacono, A. Gagliano, A. Osama, G. M. Tina

**P7 - A Multi-Objective AI and Simulation Framework for Sustainable Energy Investment Decision-Making**

J. R. Paschpari, F. Guerriero, B. Pirouz, G. Iazzolino

**P8 - Climate change information for water resources and energy systems in Italy**

M. Antonelli, A. Dell'Aquila, M. V. Struglia

**P9 - Floating Photovoltaics in Inland Waters: Governance, Environmental Monitoring and Regulatory Compliance**

R. dell'Erba, L. Blasi, S. Bossi, A. Cipollini, G. Cupertino, M. Santoro

**P10 - Correlation between precipitation deficit and water scarcity at Tanagro river basin**

M. F. Palmiero, A. Longobardi, P. Villani

**P11 - Energy Implications of Stormwater Management Strategies on a WWTP Served by Combined Sewers**

D. Mattioli, G. Sabia, M. Langone, M. Altobelli, M. Evangelisti, M. Maglionico

**P12 - Water Resource Management in the Context of Climate Change in Italy: Strategies for Resilience and Circular Water Use**

M. Langone, G. Sabia, R. Guzzinati, D. Mattioli, A. Giuliano, S. Di Fabio, C.M. Cellamare, L. Sciubba, S. Busi, A. Cerbone, S. D'Accurso, S. Casu, M. Ferraris, A. Spagni, L. Petta

**P13 - Water-Saving Solar Surfaces: Advanced Polymeric Coatings for Sustainable Mirror Maintenance in CSP**

A. Castaldo, E. Gambale, G. Vitiello



**P14 - The role of local groundwater resources in the framework of the economic development of the Ufita River Valley (Irpinia, Southern Italy)**

A. Aquino, M. Ginolfi, F. Ruggiero, R. Somma, A. Trocciola, V. Tozza, S. Aquino

**P15 - Design of a Spatio-Temporal Measurement Campaign for Assessing the Environmental Impact of Floating Photovoltaic Systems**

R. dell'Erba, L. Blasi, S. Bossi, G. Cupertino, A. Cipollini, M. Santoro, G. M. Tina

**P16 - SEWAT: Sustainable Energy by Waves Trap**

G. T. Maellaro, G. Guardigni, V. Maellaro

**P17 - Estimation of Solar Radiation through Satellite Image Processing for Energy and Water Applications**

I. Balog, G. Caputo



# EW-2026: The Water Resources and Energy Systems Conference

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