

# OSAMA Y. AYADI

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Dr. Osama Ayadi is an international energy expert and trainer, during the last decade he participated in many projects, conferences and workshops in Europe, North and South Africa and Middle East aiming to achieve his dream of ensuring clean, renewable and secure energy for all.

## EXPERIENCE

**JULY 2019 – PRESENT**

**ASSOCIATE PROFESSOR, MECHANICAL ENGINEERING DEPARTMENT**

THE UNIVERISTY OF JORDAN

**APRIL 2012 – JULY 2019**

**ASSISTANT PROFESSOR, MECHANICAL ENGINEERING DEPARTMENT**

THE UNIVERISTY OF JORDAN

### ACADEMIC EXPERIENCE

Participating in the development of several postgraduate and undergraduate programs and courses in the fields of sustainability, environment and energy in the framework of Tempus and Erasmus+ projects:

- HEBA: High level rEnewabBle and energy efficiency mAster courses
- Modernizing Undergraduate Renewable Energy Education: EU Experience for Jordan. "MUREE"
- Development of an interdisciplinary program on CLIMAtE change and Sustainability Policy. "CLIMASP"
- MAster oN SUsustainable development And Renewable Energy. "MANSUR"
- "Development of higher Education teaching modules on the Socio-economic Impacts of the Renewable Energy implementation. "DESIRE"

Preparation of the Mechanical Engineering-Renewable energy curriculum for the accreditation for the Prince Hussien bin Abdullah II Academy of civil protection.

Participated with the Accreditation and quality assurance commission for higher education institutions in the evaluation process for Energy related programs at different Jordanian universities.

## **COURSES TAUGHT AT SEVERAL JORDNAIAN UNIVERSITIES (JU, JUST AND GJU)**

- Undergraduate courses: Solar energy, Refrigeration systems, Air conditioning (I), Air conditioning (II), Energy conversion, Environmental control [for Architectures], Thermodynamics (I), and Engineering drawing.
- Graduated courses at the University of Jordan: Renewable energy systems, Energy conversion, Energy management, Photovoltaics, Concentrated Solar Power (CSP).
- Graduate course at the Jordanian University of Science and Technology (JUST): Concentrated Solar Power (CSP)
- Graduate course at the German Jordanian University (GJU): Advanced energy conversion
- Undergraduate courses at Al Hussein Technical University: Renewable energy systems, Air conditioning(I)

## **PROFESSIONAL EXPERIENCE**

- Site manager supervising the construction of a 16 MW solar roof top and car park systems at the University of Jordan.
- Design, performance evaluation and optimization of several solar energy and solar cooling systems installed in Italy, Tunisia, Morocco and Egypt.
- Member of the reviewing committee for the Jordanian Solar Energy Code.
- HYMENSO – Hybrid Concentrated Solar Thermal Power (CSP) and Photovoltaic (PV) plants for MENA Region
- Member of the committee responsible of the design and tender preparation of the University of Jordan's solar electricity project of 16 MWp.
- Design of the Mechanical systems for the new National Center for Diabetes, Endocrinology and Genetics building.
- Consultant for the mechanical designs of the new Shari'a faculty at the University of Joran.
- Member of the committee selected by the Higher Council for Science and Technology for the testing of the newly developed geothermal heating and cooling system.
- Member of the Accreditation Committee selected by Coalition of Energy Services Associations (CESA) in Jordan for the accreditation of energy service companies in the fields of HVAC, Solar thermal and solar PV.

## **TRAINING ACTIVITIES**

Developed and delivered several courses for engineers and technicians:

- Solar thermal systems M&O, 21<sup>st</sup> January – 1<sup>st</sup> February 2018, Ajlun reserve, organized by Cowater Jordan-SEED
- Solar photovoltaic, Dear Alla, organized by Cowater Jordan-SEED
- Renewable energy and energy management, the university of Jordan, organized by the center of consultation.
- Energy Management Experts, 1-3 August 2017, Hussein Business Park, organized by the Institute of New Sciences for Engineers – INSE
- Developed training material for the “Energy efficiency in buildings” Ajlun reserve, organized by Cowater Jordan-SEED
- Seminar on Energy Storage in Power Systems 19th October 2016, NEPCO Auditorium, organized by CIGRE Jordan.
- Panel discussion moderator, Energy Perspectives in Jordan, 16<sup>th</sup> April 2017, JEA
- Energy storage systems, 29<sup>th</sup> August 2017, JEA

#### **MASTER THESIS SUPERVISED**

- Yousef Al Turk, Design of a control system to optimize the Performance of a solar air conditioning system under Jordanian climate.
- Zaid Al Atari, Mechatronic Design of Solar Tracking System for Compact Linear Fresnel Reflectors
- Obadah Abdel Ghani, Performance simulation for optimization of a supposed 50mw hybrid natural gas- CSP operated power plant in Jordan.
- Mohammad Al Matarneh, Modeling and simulation of a combined solar thermal and ground source heat pump system.
- Ahmad Al Omari, Integrating Solar PV (Photovoltaic) Plants with the Electricity Grid through Conventional Power Plants (Hybridization), Analytical Framework and Qatrana CCPP Case Study
- Rami Al Asaad, Techno-economic assessment of grid connected photovoltaic systems in Jordan.
- Ishraq Al Salaheen, Techno-economic assessment of concentrating solar power and wind hybridization in Jordan
- Majdi Al Jarrah, Evaluating the performance of energy auditing to the local education buildings in accordance with the international energy auditing standard ISO-50002
- Mohammad Al Qasas, Characterization of PV systems using thermographic infrared camera in Jordan.
- Layali Abu Hussien, Performance comparison for sun tracking mechanism PV and concentrated PV solar panels with fixed system PV panels in Jordan.
- Leena Jarrar, Techno-economic aspects of electricity generation from a farm scale biogas project

#### **PARTICIPATED IN THE ORGANIZATION AND SCIENTIFIC COMMITTEES OF SEVERAL CONFERENCES:**

- The 9th Jordanian International Mechanical Engineering Conference, Amman, Jordan, 16-18 October, 2018.

- Sixth Global Conference on Renewables and Energy Efficiency for Desert Region (GCREEDER) 2016 Scientific committee coordinator, Amman, Jordan 3 – 5 April 2018
- First International conference on Mechanical Engineering and Its Applications, Al Tafila Technical University, Tafila 10-11 October 2018
- Fifth Global Conference on Renewables and Energy Efficiency for Desert Region (GCREEDER) 2016 Scientific committee coordinator, Amman, Jordan 4 – 6 April
- The 5th Jordanian IIR International Conference on Refrigeration and Air Conditioning 5th JIIRCRAC, Aqaba, Jordan, 8-10 March, 2015.
- The 8th Jordanian International Mechanical Engineering Conference, Amman, Jordan, 22–23 September, 2014.
- Third Global Conference on Renewables and Energy Efficiency for Desert Region (GCREEDER) 2011 Scientific committee coordinator, Amman, Jordan 10 – 12 September 2013

#### **OCTOBER 2007 – APRIL 2012**

#### **RESEARCHER IN THE FIELD OF SOLAR ENERGY, POLITECNICO DI MILANO-ITALY**

Working on the design, modeling and simulation, monitoring and performance evaluation of several solar energy and solar cooling systems installed within European and MENA region :

- Mediterranean Food and Agro Industry Applications of Solar Cooling technologies. "MEDISCO"
- Increasing the Market Implementation of Solar Air Conditioning Systems for Small and Medium Applications in Residential and Commercial Buildings. " SOLAIR"
- Integrated small scale solar heating and cooling systems for a sustainable air-conditioning of buildings "SOLERA"
- Polygeneration with advanced small and medium scale thermally driven air-conditioning and refrigeration technology. "POLYSMART"
- High solar fraction heating and cooling systems with combination of innovative components and methods. "HIGH-COMBI"

Delivered several courses for engineers and technicians in Italy, Egypt, Montenegro and Tunisia

- Training course for ‘Solar thermal systems for installers’, MONTESOL Programme July 5th to 7th, 2011, City hotel, Podgorica-Montenegro
- Training course for ‘Solar thermal systems for installers’, EGYSOL Programme March 27th to 30th, 2011, NREA headquarter, Cairo-Egypt

#### **JULY 2007 – SEPTEMBER 2007**

#### **RESEARCH AND DEVELOPMENT, CLIMATEWELL AB. STOCKHOLM- SWEDEN**

TRNSYS model development and validation via experimental measurements of the Climatewell 10 chiller.

## EDUCATION

**MARCH 2012**

### **Ph.D. IN ENERGY, POLITECNICO DI MILANO - ITALY**

Dissertation: Solar cooling systems utilizing concentrating solar collectors; design, experimental evaluation & optimization

Courses: Fuel cell energy systems, Measurements for engineering systems, Experimental thermal fluid dynamics, Power system economics, Renewables for terawatt world energy challenge, Refrigeration and heatpump technology, Research management, Electronic resources for research

**JULY 2007**

### **M.Sc. MECHANICAL ENGINEERING – SOLAR ENERGY, DALARNA UNIVERSITY - SWEDEN**

Degree of Master of Science with a Major in Mechanical Engineering-Solar energy.

Thesis: Measurements, Modelling and System Simulation of Thermo- Chemical Accumulator used for Solar Cooling.

**SEPTEMBER 2004**

### **Bsc. MECHANICAL ENGINEERING, THE UNIVERSITY OF JORDAN- JORDAN**

1<sup>st</sup> Class Honors.

Graduation Project: design, manufacturing and assembly of a lid capping machine.

## TRAINING

- Photovoltaic Designer and installer training. Nicosia – Cyprus (8-12/7/2019)

- I've participated in four training of trainers workshops dealing with different aspects of the "Development of Higher Education Teaching Modules on the Socio-Economic Impacts of the Renewable Energy Implementation"
  - Economics of Renewable Energy systems. Dresden –Germany (1-3/8/2018)
  - Technological Innovation of RES. Nicosia – Cyprus (26-30/2018)
  - Climate effects, environmental management and sustainable development. Rome (17-21/7/2017)
  - Energy transition. Wuppertal-Germany (10-14/7/2017)
- Cultural intelligence and successful teams. British council, Milan- Italy 29/4-21/6/2011
- Trainers meet trainers. Technical University Hamburg Harburg, Germany 28/10-30/10/2015
- Training of trainers. Canada Global Consulting and Training Centre Ltd. , held in Amman- Jordan
- Instructional Matrix Analysis System. Canada Global Consulting and Training Centre Ltd. Held in Amman- Jordan
- Renewable energy systems. Kassel University, Germany
- Advanced solar collectors. Czech Technical University, Prague, Czech Republic

## LANGUAGES

- Arabic (mother)
- English (Fluent)
- Italian (spoken: v. good, written: fair)

## MEMBERSHIP

- Association of energy engineers AEE
- International Solar Energy Society ISES
- International Energy Agency Task 38: Solar Air-Conditioning and Refrigeration
- International Energy Agency Task 44: Solar and heat pump systems
- Jordanian Engineering Association
- "Our Common Future" Fellow

## COMPUTER SKILLS

● TRNSYS	● MS project
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<ul style="list-style-type: none"> <li>● AutoCAD</li> <li>● Matlab</li> <li>● HAP</li> <li>● PVsyst</li> </ul>	<ul style="list-style-type: none"> <li>● Excel VBA</li> <li>● LabVIEW</li> <li>● Sketch up</li> </ul>
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## COMMUNICATION SKILLS

- Effective **intercultural communication skills** gained through working and studying in intercultural environment, in addition to training courses attended in this area.
- Effective **presentation skills** developed during exposure to a variety of conferences and training activities for hundreds of engineers and technicians, as well lecturing at different courses and universities.

## LATEST PUBLICATIONS

- Ayadi, O., Hamdan, M., Al-Far, Y., Tayseer, A., Al-Abadi, S., A'saf, A., Al-Oran, O., 2021. Parametric Investigation of Nano-Fluids Utilization in Parabolic Trough Collector, in: 2021 12th International Renewable Engineering Conference (IREC). IEEE, pp. 1–5.
- Ayadi, O., Jamra, M., Jaber, A., Ahmad, L., Alnaqep, M., 2021. An Experimental Comparison of Bifacial and Monofacial PV Modules, in: 2021 12th International Renewable Engineering Conference (IREC). IEEE, pp. 1–8.
- Hussein, L.A., Ayadi, O., Fathi, M., 2021. Performance Comparison for Sun-Tracking Mechanism Photovoltaic (PV) and Concentrated Photovoltaic (CPV) Solar Panels with Fixed System PV Panels in Jordan, in: 2021 12th International Renewable Engineering Conference (IREC). IEEE, pp. 1–8.
- Al-Rashed, R., Faza, T., Ayadi, O., 2021. Potential of using Off-grid PV/Wind/Diesel Battery Hybrid Energy System in Jordan, in: 2021 12th International Renewable Engineering Conference (IREC). IEEE, pp. 1–7.
- Ayadi, O., Abdalla, O., Hallaq, Y., Aldalabih, A., 2021. Developing an Energy Benchmark for Residential Buildings in Jordan, in: 2021 12th International Renewable Engineering Conference (IREC). IEEE, pp. 1–5.
- Ayadi, O., & Al-Dahidi, S. (2019). Comparison of solar thermal and solar electric space heating and cooling systems for buildings in different climatic regions. *Solar Energy*, 188, 545-560.
- Imam, R., Ayadi, O., 2020. Powering electric tower cranes by solar energy for sustainable construction. *Int. J. Constr. Manag.* 1–11. <https://doi.org/10.1080/15623599.2020.1814940>

- Abu-Rumman, M., Hamdan, M., & Ayadi, O. (2020). Performance enhancement of a photovoltaic thermal (PVT) and ground-source heat pump system. *Geothermics*, 85, 101809.
- Al-Dahidi, S., Ayadi, O., Adeeb, J., Louzazni, M., Hemidat, S., Saidan, M., ... & Sandouqa, A. (2019). Assessment of Artificial Neural Networks Learning Algorithms and Training Datasets for Solar Photovoltaic Power Production Prediction. *Frontiers in Energy Research*, 7, 130.
- Jarrar, L., Ayadi, O., & Al Asfar, J. (2020) Techno-economic aspects of electricity generation from a farm based biogas plant. *Journal of Sustainable Development of Energy, Water and Environment Systems*
- Nsour, W., Taa'mneh, T., Ayadi, O., & Al Asfar, J. (2019). Design of Stand-Alone Proton Exchange Membrane Fuel Cell Hybrid System under Amman Climate. *Journal of Ecological Engineering*, 20(9).
- Al-Dahidi, S., Ayadi, O., Alrbai, M., & Adeeb, J. (2019). Ensemble Approach of Optimized Artificial Neural Networks for Solar Photovoltaic Power Prediction. *IEEE Access*, 7, 81741-81758.
- H. Abusamaha, F. Dawoud, B. Al- Qalab, O. Ayadi, "Experimental and Theoretical Study on a Wind Energy Unit" *Journal of Ecological Engineering*, Volume 20, Issue 6, July 2019, pages 207–214. <https://doi.org/10.12911/22998993/109459>
- Alrbai, M., Qawasmeh, B.R., Al-Dahidi, S., Ayadi, O., 2020. Influence of hydrogen as a fuel additive on combustion and emissions characteristics of a free piston engine. *Therm. Sci.* 24, 87–99.
- S. Al-Dahidi, O. Ayadi, J. Adeeb, M. Alrbai, B.R. Qawasmeh, "Extreme Learning Machines for Solar Photovoltaic Power Predictions," *Energies*, vol. 11, 2725, 2018. <https://doi.org/10.3390/en11102725>
- O. Ayadi, I. Alsahen, Techno-Economic Assessment of Concentrating Solar Power and Wind Hybridization in Jordan, *J. Ecol. Eng.* 19 (2018) 16–23. doi:10.12911/22998993/81239.
- O. Ayadi, R. Al-Assad, J. Al Asfar, Techno-economic assessment of a grid connected photovoltaic system for the University of Jordan, *Sustain. Cities Soc.* 39 (2018) 93–98. doi:<https://doi.org/10.1016/j.scs.2018.02.011>.
- R. Al-Rbaihat, A. Sakhrieh, J. Al-Asfar, A. Alahmer, O. Ayadi, A. Al-Salaymeh, Z. Al\_hamamre, A. Al-bawwab, M. Hamdan, Performance Assessment and Theoretical Simulation of Adsorption Refrigeration System Driven by Flat Plate Solar Collector, *JJMIE*. 11 (2017).
- H. Abu Samaha, F. Dawoud, B. Al- Qalab and O. Ayadi, Experimental and theoretical study for Wind Energy Unit, Sixth Global Conference on Renewables and Energy Efficiency for Desert Region (GCREEDER) 2016 Scientific committee coordinator, Amman, Jordan 3 – 5 April 2018
- W.Nsour, T.Taamneh, O.Ayadi J. Al Asfar, Design of stand-alone PV-PEMFC Hybrid System under Amman Climate, Sixth Global Conference on Renewables and Energy Efficiency for Desert Region (GCREEDER) 2016 Scientific committee coordinator, Amman, Jordan 3 – 5 April 2018



- R. Al-Rashed, T. Faza', A. Gatasheh, O. Ayadi, Potential of using Off-grid PV/Wind/Diesel Battery Hybrid Energy System in Jordan, Sixth Global Conference on Renewables and Energy Efficiency for Desert Region (GCREEDER) 2016 Scientific committee coordinator, Amman, Jordan 3 – 5 April 2018
- Rami Al-Assad, Osama Ayadi, and Jamil Al Asfar, Model Validation for a Photovoltaic System in Jordan Jordan, Sixth Global Conference on Renewables and Energy Efficiency for Desert Region (GCREEDER) 2016 Scientific committee coordinator, Amman, Jordan 3 – 5 April 2018
- Ahmad Al Omari, & Ayadi, O. (2017). Integrating solar PV with the electricity grid through conventional power plants. In 2017 8th International Renewable Energy Congress (IREC) (pp. 1–6). IEEE. <http://doi.org/10.1109/IREC.2017.7926015>
- Al-Omari A., Ayadi O., Qudah M. (2016) Integrating Solar PV with the Electricity Grid through Conventional Power Plants (Hybridization); Qatrania CCP Case Study. Integration of Large Capacity Renewable Energy Systems on Transmission & Distribution Networks Conference, Amman-Jordan, April 26th – 27th 2016
- Al-Omari A., Al-Issawi M., Al-Salaymeh A., Ayadi, O. (2016) Energy Audit for a Power Plant Output and its In-House Load: A Case Study in Jordan. GCREEDER 2016, Amman-Jordan, April 4th – 6th 2016
- Al Turk Y., Ayadi O., (2015) Optimize and validate the Performance of a Solar Air Conditioning System under Jordanian Climate. 5th Jordanian IIR International Conference on Refrigeration and Air Conditioning 5th JIIRCRAC, Aqaba, Jordan, 8-10 March, 2015.
- Ayadi O., Al-Atari, Z., (2014) Design and Manufacturing of Linear Fresnel Reflectors for Industrial Process Heat, The 8th Jordanian International Mechanical Engineering Conference, Amman, Jordan, 22–23 September, 2014.
- Al Asfar, J., Ayadi O., & Al Salaymeh, A. (2014). Design and Performance Assessment of a Parabolic Trough Collector. Jordan Journal of Mechanical and Industrial Engineering.
- Ayadi O., Mauro, A., Aprile, M., & Motta, M. (2012). Performance assessment for solar heating and cooling system for office building in Italy. Energy Procedia, 30(0), 490–494. doi:<http://dx.doi.org/10.1016/j.egypro.2012.11.058>
- Ayadi O., Motta M., Assessment and optimization of a novel solar refrigeration system applied in agro-food industry, 4th Jordanian IIR International Conference on Refrigeration and Air Conditioning 4th JIIRCRAC, Amman, Jordan, 10-12 September, 2012.
- Ayadi O., Mauro A., Motta M. (2011), Solar Heating and Cooling System for Office Building in Italy; Description and Performance Assessment. In Proceedings of Otti 2011, CD-rom, Larnaca, Cyprus, 12-14 October.

- Ayadi O., Motta M., (2010),Improvement of Solar Cooling Plant Performance Based on Simulation and Experimental Activities. In Proceedings of EuroSun 2010 , CD-rom,Graz, Austria, 28 September – 1 October
- Ayadi O., Motta M. and Aprile M. (2009),An Assessment and Optimization of the Performance of a Novel Solar Refrigeration System Applied In Agro-Food Industry. In Proceedings of International Solar Energy Society Solar World Congress 2009, CD-rom, Johannesburg, South Africa, October 11-14.
- Bales C., Ayadi O. (2009) Modelling of a Commercial Absorption Heat Pump with Integral Storage. In Proceedings Effstock 2009 The 11th International Conference on Energy Storage, CD-rom, Stockholm, Sweden, June 14-17.
- Ayadi O., Doell J., Aprile M., Motta M., Nuenz T. (2008) Solar Energy Cools milk. In Proceedings of 1st International Conference on Solar Heating, Cooling and Buildings on CD-rom, Lisbon, Portugal, October 7-10.

## CONFERENCES

- The 9th Jordanian International Mechanical Engineering Conference, Amman, Jordan, 16-18 October, 2018. (Organizing and scientific committees)
- Sixth Global Conference on Renewables and Energy Efficiency for Desert Region (GCREEDER) 2016 Scientific committee coordinator, Amman, Jordan 3 – 5 April 2018 (Organizing and scientific committees)
- First International conference on Mechanical Engineering and Its Applications, Al Tafila Technical University, Tafila 10-11 October 2018 (Organizing committees)
- Fifth Global Conference on Renewables and Energy Efficiency for Desert Region (GCREEDER) 2016 Scientific committee coordinator, Amman, Jordan 4 – 6 April 2016 (Organizing and scientific committees)
- The 5th Jordanian IIR International Conference on Refrigeration and Air Conditioning 5th JIIRCAC, Aqaba, Jordan, 8-10 March, 2015. (Organizing and scientific committees)
- The 8th Jordanian International Mechanical Engineering Conference, Amman, Jordan, 22–23 September, 2014. (Organizing and scientific committees)

- Third Global Conference on Renewables and Energy Efficiency for Desert Region (GCREEDER) 2011 Scientific committee coordinator, Amman, Jordan 10 – 12 September 2013 (Organizing and scientific committees)
- Fourth Jordanian IIR International Conference on Refrigeration and Air Conditioning 4th JIIRCRAC, Amman, Jordan, 10-12 September, 2012.
- SolarPACES 2011 (Solar Power And Chemical Energy Systems), Granada, Spain 20-23 September 2011
- SolarPACES 2010 (Solar Power And Chemical Energy Systems), Perpignan, France 21-24 September 2010
- IEA Task 38 Solar Air-Conditioning and Refrigeration “expert meeting” Graz, Austria 27-28 September 2010
- EuroSun 2010 “International Conference on Solar Heating, Cooling and Buildings”. Graz, Austria 28 September- 1 October 2010
- Our Common Future “The interdisciplinary congress for a cross-generational dialogue about issues of our common future” - Climate change and Energy group
  - Intermediate meeting: Essen, Germany 21 June 2010
  - Conference: Hannover & Essen, Germany 2-6 November 2010
- Otti - 4th International Conference Solar Air-Conditioning Larnaka, Cyprus, 12 October – 14 October 2009
- Effstock 2009 - The 11th International Conference on Energy Storage International Fairs in Stockholm, Sweden, 14-17 June 2009
- Otti - 3rd International Conference Solar Air-Conditioning Università degli Studi di Palermo, Palermo, Sicily, Italy, 30 September – 2 October 2009
- The International Solar Energy Society Solar World Congress 2009 Sandton Convention Center, Johannesburg, South Africa, 11-14 October 2009

- IEA Task 38 Solar Air-Conditioning and Refrigeration “expert meeting”  
Solar Info Center, Freiburg, Germany, 27-28 April 2009
- IEA Task 44 “Solar and heat pump systems”  
EURAC research center, Bolzano , Italy 29-30 April