# ANDREAS OLYMPIOS

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## PROFILE

Postdoctoral Research Fellow in ONISILOS MSCA programme, developing innovative tools that contribute to the optimal design, operation and integration of energy conversion and energy storage technologies.

## EDUCATION

**Imperial College London** 2018 – 2022

*PhD in Energy - Clean Energy Processes Laboratory - Department of Chemical Engineering* *London,UK*

- PhD Thesis: Technoeconomic and whole-energy system analysis of low-carbon heating technologies.
- Prestigious doctoral training programme at the Grantham Institute - Climate Change and the Environment.
- Published and presented several first-author papers in high-impact journals and international conferences.
- Collaborated with internationally recognised industrial partners (Mitsubishi Electric, National Grid, Sainsbury's).
- Research interests include: techno-economic modelling, design and operational optimisation of heating and cooling technologies; thermodynamics; identification of energy-system implications of decarbonisation; smart control of distributed energy resources; combined heat and power; thermo-mechanical energy storage.

**University of Nottingham** 2014 – 2018

*MEng Mechanical Engineering - First Class - Degree average: 88%* *Nottingham,UK*

- Ranked as **Best Student** of the MEng course of the Department of Mechanical Engineering.
- MEng Project: Economic model predictive control for distributed energy resources.

**The English School, Nicosia** 2006 – 2013

- GCEs: Mathematics **A*** (International Award 600/600), Physics **A***, Economics **A**, Modern Greek **A**

## PROFESSIONAL EXPERIENCE

**FOSS Research Centre for Sustainable Energy, University of Cyprus** 2023 - present

*Postdoctoral Research Fellow* *Nicosia, Cyprus*

- Distinguished ONISILOS MSCA fellowship programme for Experienced Researchers (ERs) with international, intersectoral and interdisciplinary character.

**European Commission** 2023 - present

*Expert* *Brussels, Belgium*

- Appointed to assist with managing of EU funding programmes in 2023.

**Department of Chemical Engineering, Imperial College London** 2022 - 2023

*Postdoctoral researcher* *London, UK*

- Modelling, optimisation and integration of energy conversion and energy storage technologies.

**Department of Chemical Engineering, Imperial College London** 2018 - 2022
*Graduate Teaching Assistant* *London, UK*

- Awarded an Associate Fellowship for the UK Higher Education Academy (HEA) in 2021.
- Nominated for a Student Academic Choice Award (SACA), recognising and rewarding excellence among staff.
- Delivered teaching tutorials to 100+ students for "Fluid Mechanics" and "Heat and Mass Transfer" modules.
- Supervised 12+ undergraduate and MSc thesis students.

**CarbonShift** 2022
*Optimisation Engineer* *London, UK*

- Developing intelligent solutions for decarbonising buildings (start-up company).

**KIOS Research Centre, University of Cyprus** 2016, 2017
*Undergraduate Researcher* *Nicosia, Cyprus*

- Examined a range of water-leakage-estimation and water-demand-forecasting techniques using statistical analysis.

## PROJECTS WITH INDUSTRIAL PARTNERS

- Mitsubishi Electric: Developed thermal network and optimisation models for the smart operation of domestic heat pumps with thermal storage for different system configurations, locations and objective functions. 2020-2022.
- CarbonShift: Developed optimisation models for decarbonising various types of commercial buildings. 2022.
- National Grid: Conducted an independent peer-review assessment of Element Energy's Spatial GB Clean Heat Pathway Model. 2021.
- Sainsbury's: Created cloud-based optimisation algorithms for the real-time operation control of combined heat and power (CHP) systems in Sainsbury's supermarkets. 2020.

## INDIVIDUAL EDITOR, REVIEWER AND CONFERENCE-CHAIRING ACTIVITIES

Young Editor in Applied Energy - selected out of hundreds of applications (2022 - present).

Reviewer for: Applied Energy, Progress in Energy, Renewable Energy, Frontiers in Energy Research, Ambient Energy, Energy Efficiency, American Society of Mechanical Engineers (2018 - present).

Co-chair in sessions "Heating and cooling" and "Clean energy technologies and systems for sustainability " in the SDEWES Conference (2021, 2022).

## JOURNAL ARTICLES

Aunedi M, **Olympios AV**, Pantaleo AM, Markides CN, Strbac G. System-driven design and integration of low-carbon domestic heating technologies. Renewable and Sustainable Energy Reviews 2023; 187: 113695.

Mersch M, Sapin P, **Olympios AV**, Ding Y, Mac Dowell N, Markides CN. A unified framework for the thermo-economic optimisation of compressed-air energy storage systems with solid and liquid thermal stores. Energy Conversion and Management 2023; 287: 117061.

**Olympios AV**, Sapin P, Freeman J, Olkis C, Markides CN. Operational optimisation of an air-source heat pump system with thermal energy storage for domestic applications. Energy Conversion and Management 2022; 273: 116426.

**Olympios AV**, Aunedi M, Mersch M, Krishnaswamy A, Stollery C, Pantaleo AM, Sapin P, Strbac G, Markides CN. Delivering net-zero carbon heat: Technoeconomic and whole-system comparisons of domestic electricity- and hydrogen-driven technologies in the UK. Energy Conversion and Management 2022; 262: 115649.

Hoseinpoori P, **Olympios AV**, Markides CN, Woods J, Shah N. A whole-system approach for quantifying the value of smart electrification for decarbonising heating in buildings. Energy Conversion and Management 2022; 268: 115952.

Zhao Y, Song, Liu M, Zhao Y, **Olympios AV**, Sapin P, Yan J, Markides CN. Thermo-economic assessments of pumped-thermal electricity storage systems employing sensible heat storage materials. Renewable Energy 2022; 186: 431-56.

**Olympios AV**, McTigue JD, Farres-Antunez P, Tafone A, Romagnoli A, Li Y, Ding Y, Steinmann WD, Thess A, Wang L, Chen, H, Markides CN. Progress and prospects of thermo-mechanical energy storage — A critical review. Progress in Energy 2021; 3: 022001.

**Olympios AV**, Pantaleo AM, Sapin P, Markides CN. On the value of combined heat and power (CHP) systems and heat pumps in centralised and distributed heating systems: Lessons from multi-fidelity modelling approaches. Applied Energy 2020; 274: 115261.

**Olympios AV**, Le Brun N, Acha S, Shah N, Markides CN. Stochastic real-time operation control of a combined heat and power (CHP) system under uncertainty. Energy Conversion and Management 2020; 216: 112916.

## BOOK CHAPTERS

**Olympios AV**, McTigue JD, Sapin P, Markides CN. Pumped-thermal electricity storage based on Brayton cycles. Encyclopedia of Energy Storage 2022; 2: 6:18.

## MAGAZINE ARTICLES

Mersch M, **Olympios AV**, Markides CN. Beyond batteries and pumped-hydro for large-scale energy storage. Professional Engineering Magazine. Institution of Mechanical Engineers. January 2022.

## DATASETS

**Olympios AV**, Mersch M, Sapin P, Pantaleo AM, Markides CN. Library of price and performance data of domestic and commercial technologies for low-carbon energy systems. Zenodo 2021.

## CONFERENCE PAPERS

**Olympios AV**, Kourougianni F, Yiasoumas G, Arsalis A, Makrides G, Kyprianou A, Papanastasiou P, Georghiou GE. Towards novel modelling tools for building energy performance and optimal integration of multi-energy vector technologies. In Proc: The 7th International Conference on Renewable Energy Sources and Energy Efficiency - Energy Security (RESEE); 12 – 14 October 2023; Nicosia, Cyprus.

Arsalis A, Kourougianni F, **Olympios AV**, Yiasoumas G, Papanastasiou P, Georghiou GE. Integration of green hydrogen, heating and cooling subsystems to a 40 kW photovoltaic-60 kWh battery energy storage system living lab nanogrid. In Proc: The 7th International Conference on Renewable Energy Sources and Energy Efficiency - Energy Security (RESEE); 12 – 14 October 2023; Nicosia, Cyprus.

**Olympios AV**, Arsalis A, Kourougianni F, Pantaleo AM, Papanastasiou P, Markides CN, Georghiou GE. Technology design and operation optimisation of integrated electricity-heat-cold-hydrogen systems in buildings. In Proc: The 18th Conference on Sustainable Development of Energy, Water and Environment Systems (SDEWES); 24 – 29 September 2023, Dubrovnik, Croatia.

Li Y, Xu J, Song J, **Olympios AV**, Harraz A, Sapin P, Markides CN. Techno-economic optimisation of organic Rankine cycle (ORC) systems with computer-aided molecular design (CAMD) and comprehensive expander models. In Proc: The 7th International Seminar on ORC Power Systems; 4 – 6 September 2023, Seville, Spain.

Sapin P, **Olympios AV**, Mersch M, Markides CN. Design and operational optimisation of an integrated thermal energy storage ground-source heat pump with time-varying electricity prices. In Proc: The 14th IEA Heat Pump Conference (HPC); 15 – 18 May 2023, Chicago, Illinois.

**Olympios AV**, Song J, Ziolkowski A, Shanmugam VS, Markides CN. Development of data-driven compressor performance maps and costing correlations for small-scale heat-pumping applications. In Proc: The 17th Conference on Sustainable Development of Energy, Water and Environment Systems (SDEWES); 6 – 10 November 2022, Paphos, Cyprus.

Aunedi M, **Olympios AV**, Pantaleo AM, Markides CN, Strbac G. System-driven design of hybrid electricity- and hydrogen-based systems for domestic heat decarbonisation. In Proc: The 17th Conference on Sustainable Development of Energy, Water and Environment Systems (SDEWES); 6 – 10 November 2022, Paphos, Cyprus.

Mersch M, Sapin P, **Olympios AV**, Ding Y, Markides CN. Thermo-economic optimisation of grid-scale compressed-air energy storage systems with solid and liquid thermal storage. In Proc: The 17th Conference on Sustainable Development of Energy, Water and Environment Systems (SDEWES); 6 – 10 November 2022, Paphos, Cyprus.

Hoseinpoori P, **Olympios AV**, Markides CN, Woods J, Shah N. An analysis of the investment trade-offs in smart electrification for decarbonising heating: A whole system perspective. In Proc: The 43rd International Association for Energy Economics Conference (IAEE); 31 July – 4 August 2022, Tokyo, Japan.

**Olympios AV**, Krishnaswamy A, Stollery C, Mersch M, Pantaleo AM, Sapin P, Markides CN. Techno-economic comparison of hydrogen- and electricity-driven technologies for the decarbonisation of domestic heating. In Proc: The 16th Conference on Sustainable Development of Energy, Water and Environment Systems (SDEWES); 10 – 15 October 2021, Dubrovnik, Croatia.

Mersch M, **Olympios AV**, Sapin P, Mac Dowell N, Markides CN. Solar-thermal heating potential in the UK: A techno-economic whole-energy system analysis. In Proc: The 34th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS); 28 June – 2 July 2021, Taormina, Italy.

Song J, **Olympios AV**, Mersch M, Sapin P, Markides CN. Integrated organic Rankine cycle (ORC) and heat pump (HP) systems for domestic heating. In Proc: The 34th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS); 28 June – 2 July 2021, Taormina, Italy.

**Olympios AV**, Hoseinpoori P, Mersch M, Pantaleo AM, Simpson M, Sapin P, Mac Dowell N, Markides CN. Optimal design of low-temperature heat-pumping technologies and implications to the whole-energy system. In Proc: The 33rd International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS); 29 June – 3 July 2020 Osaka, Japan.

Sapin P, Simpson M, **Olympios AV**, Mersch M, Markides CN. Cost-benefit analysis of reversible reciprocating-piston engines with adjustable volume ratio in pumped thermal electricity storage. In Proc: The 33rd International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS); 29 June – 3 July 2020, Osaka, Japan.

Hart MBP, **Olympios AV**, Le Brun N, Shah N, Markides CN, Acha S. Pre-feasibility modelling and market potential analysis of a cloud-based CHP optimiser. ASHRAE Annual Conference; 29 June – 2 July 2020.

**Olympios AV**, Pantaleo AM, Sapin P, van Dam KH, Markides CN. Centralised vs distributed energy systems options: district heating for the Isle of Dogs in London. In Proc: The 11th International Conference on Applied Energy (ICAE); 12 – 15 August 2019; Västerås, Sweeden.

**Olympios AV**, Le Brun N, Acha S, Lambert RSC, Shah N, Markides CN. Installation of a dynamic controller for the optimal operation of a CHP engine in a supermarket under uncertainty. In Proc: The 32nd International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS); 23 – 28 June 2019; Wrocław, Poland.

Harraz AA, Najjaran A, Sacks R, Freeman J, **Olympios AV**, Mac Dowell N, Markides CN. Experimentally validated simulations of a diffusion absorption refrigeration system. In Proc: The 32nd International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS); 23 – 28 June 2019; Wrocław, Poland.

## INVITED TALKS AND PRESENTATIONS

**Olympios AV**, Sapin P, Mersch M, Markides CN. Do we need more efficient heating technologies in the future? Integrated Development of Low-carbon Energy Systems Conference 2023: Decarbonising the UK Energy System. 20 November 2023; London, UK. ▶

**Olympios AV**. The basics of the nanogrid concept from design to implementation: Integration of heating and cooling technologies. BERLIN Project Webinar (ENI CBC Med Programme). 26 July 2023; Online.

**Olympios AV**. Pathways towards domestic heat decarbonisation: a technology-to-system approach. FOSS Research Centre for Sustainable Energy Seminar. 21 February 2023; Nicosia, Cyprus.

**Olympios AV**, Markides CN. Characterisation of current and disruptive technologies for their inclusion in whole-energy system models. Integrated Development of Low-carbon Energy Systems Conference 2022: Decarbonising the UK Energy System. 17 November 2022; London, UK.

**Olympios AV**, Markides CN. Electrification vs. hydrogen in domestic heating: a technology-to-system approach. Integrated Development of Low-carbon Energy Systems Seminar; 3 February 2022; London, UK.

**Olympios AV**, Markides CN. Technology R&D pathways from an energy system perspective: Updates and opportunities. Sargent Centre for Process Systems Engineering Annual Industrial Consortium Meeting; 3 December 2021; London, UK. ▶

**Olympios AV**, Markides CN. Design of low-carbon heating technologies: Extending the capabilities of whole-energy system models. Clean Energy Processes Laboratory Seminar; 21 October 2021; London, UK.

**Olympios AV**, Markides CN. Prospects of grid-scale thermo-mechanical energy storage. Energy Storage towards a Net-Zero Future Workshop. Supergen Energy Storage. 24 June 2021; UK. ▶

**Olympios AV**, Markides CN. Design of low-carbon heating technologies: Extending the capabilities of whole-energy system models. Engaging Sustainability Joint DTP Conferecnce; 8 September 2020; London, UK.

**Olympios AV**, Pantaleo AM, Markides CN. Modelling of current and innovative distributed technologies for the decarbonisation of heat provision. Poster presentation. Integrated Development of Low-carbon Energy Systems Industry Showcase Event; 14 November 2019; London, UK.

**Olympios AV**, Markides CN. Technologies within systems: Modelling, future development and innovation. Integrated Development of Low-carbon Energy Systems Symposium; 30 September 2019; London, UK.

## STUDENT THESES (CO-SUPERVISION)

Ng Lucas. Modelling green energy conversion networks for generating hydrogen electric vehicle fuel. UG Project. University of Cyprus. 2023.

Kasinis E. Techno-economic modelling of a sustainable photovoltaic-green hydrogen system for public building applications. UG Project. University of Cyprus. 2023.

Kishan A, Aidan S. Assessing the competitiveness of heat pump technologies in the UK domestic heating system. MEng Thesis. Imperial College London. 2022.

Alaedine O. Evaluation of hydrogen-driven technologies for the decarbonisation of domestic heating. MSc Thesis. Imperial College London 2022.

Ziolkowski A, Shanmugam VS. Development of compressor efficiency maps for the techno-economic modelling of small-scale heat-pumping applications. MEng Thesis. Imperial College London 2021.

Dragomir RA. Techno-economic modelling and comparison of hydrogen driven technologies for the decarbonisation of domestic heating. Imperial College London 2021.

Qi M. Combined organic Rankine cycle and heat pump systems for the domestic heating sector. MSc Thesis. Imperial College London 2021.

Bai P. Database construction of a compressor search engine. MSc Thesis. École Polytechnique 2021.

Krishnaswamy A, Stollery C. Techno-economic analysis of a novel hydrogen powered air-source absorption heat pump for domestic heating. MSc Thesis. Imperial College London 2020.

Cheong HS. Investigation of an integrated organic Rankine cycle – heat pump system for domestic heating. MSc Thesis. Imperial College London 2020.

Main H. A thermoeconomic assessment of hybrid PV-T CCHP systems for residential buildings. MSc Thesis. Imperial College London 2019.

## UNIVERSITY ACHIEVEMENTS

· ONISILOS MSCA fellowship programme for Experienced Researchers - Postdoctoral Fellowship, 2023 - present

· Science and Solutions for a Changing Planet Doctoral Training Partnership - PhD Scholarship, 2018 - 2022

· IMechE Institution Best Student Award - Meritorious performance in MEng Course, 2018

· IMechE Frederic Barnes Waldron Best Student Award - Top across all departmental programmes, 2018

· University of Nottingham Best Student Award in MEng Mechanical Engineering - 2018

· BP Scholarship - Academic excellence in conjunction with extracurricular activities, 2016

· Course Representative - Department of Mechanical Engineering, University of Nottingham, 2016 - 2017

## TECHNICAL SKILLS AND OTHER INTERESTS

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|---|---|
| **Programming languages** | Python, MATLAB, SQL, C, R, LabVIEW |
| **Mathematical modelling** | Pyomo, GAMS, AMPL |
| **Computer-aided design** | Solidworks, Creo Parametric |
| **Editing tools** | LateX, Microsoft Office |
| **Languages** | English (Fluent), Greek (Native) |
| **Interests** | Tennis, Football, Chess |