veski innovation fellow

Professor Pierluigi Mancarella

research project

The "FlexCity" revolution: techno-economic modelling of urban energy systems as the clean power stations of the future

project summary

Lower cost clean energy options are needed to help Victoria achieve its ambitious target where 40 per cent of the state's energy is to be generated from renewable sources by 2025.

With this goal in mind, Professor Pierluigi Mancarella will take a revolutionary approach to planning and operating our communities, towns and cities as flexible, low carbon Urban Virtual Power Plants.

The aim is to create a "FlexCity" powered by clean energy with smart grid technologies; where buildings, districts, and local players actively participate in the operation of the system to create new, sustainable energy-related businesses.

Professor Mancarella will produce tools that support decision making for the operation and planning of sustainable and more resilient energy systems. These tools will also protect against the risks that might hinder the development of successful low carbon energy businesses.

His research brings together innovation across technical, environmental, commercial, regulatory and socio-economic dimensions.

It also builds on Victoria's growing strength in smart grid technologies such as battery storage, microgrids, and others envisioned in various recent documents and initiatives.

By providing new insights into multiple technical and economic aspects of urban energy systems in a smart grid context, this work will put the State of Victoria at the forefront of the energy decarbonisation issue in Australia and worldwide, reinforcing its vision to become a low carbon economy and allowing it to export technical and commercial innovation knowledge.

The **veski** funding will also have an impact on most energy-related sectors and relevant industry players in Victoria and beyond, from distribution companies to renewable energy developers, retailers and aggregators.

In particular, the research outcomes and the tools developed will be presented to all interested parties and will be the basis for further business developments such as consultancy and new industry-driven research and collaborations.

There are also fundamental environmental and health-related public benefits set to arise from the work that will decarbonise and decrease the local pollution which results from urban energy systems. Furthermore, the new commercial arrangements and business models arising from this research will contribute towards meeting the environmental targets set out by the Victorian Government at a lower cost, and it will promote new local businesses and activities of local entrepreneurs and foster a culture of clean energy awareness in the Victorian community.

personal history

Professor Mancarella is a world-renowned specialist in techno-economics of energy networks, modelling of integrated energy systems, integration of low carbon energy technologies into power systems, planning of energy infrastructure under uncertainty, and development of business cases for smart grids.

In a relatively short career, Professor Mancarella has distinguished himself and acquired a world-leading profile through his work in the United Kingdom as a postdoctoral research at Imperial College London and as an academic at the University of Manchester.

He has accomplished this by pioneering the concept of multi-energy systems and by developing innovative techno-economic modelling approaches to distributed energy systems, community energy systems, and microgrids, as evidenced by his numerous invited papers, visiting appointments, and requests to speak at prestigious conferences and events.

Pierluigi has also worked closely with industry on various projects and activities that he has led in the United Kingdom, Europe, and internationally, with the aim and vision of translating his research into practical impact.

He recently developed an innovative framework and relevant tools for planning of smart distribution networks considering demand response from customer participation which are now being used by Electricity North West, the local distribution network operator in the region of Greater Manchester

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Professor Pierluigi Mancarella

"As an engineer, I believe my role is to make an impact on society and by working with industry we have a clearer pathway towards that impact"

in England, to plan their network expansion and to price contracts for demand response.

He is also leading, amongst others, a large UK project on energy storage with several industry partners aiming to develop disruptive business cases for storage technologies.

Pierluigi has a strong track record of collaborations with industry and translation of research into products, which represents an important opportunity to increase the links between the University of Melbourne and the energy industry.

He has already garnered clear interest in collaboration from various local companies as well as a number of smart grid technology manufacturers with whom he has ongoing collaborations in Europe and who also have activities in Victoria.

Through his role as former Chair of the Energy Working Group of the IEEE European Public Policy Initiative, Pierluigi was also in a unique position to actively interact with European policy makers and drive innovation in energy systems and technologies.

He has also recently provided input into Australia's Chief Scientist's *Independent Review into the Future Security of the National Electricity Market*, leading the Melbourne Energy Institute's power system security assessment studies for the Finkel Review.

Professor Mancarella is the new Chair of Electrical Power Systems at The University of Melbourne within the Electrical and Electronic Engineering Department.

other innovation fellowship recipients:

Professor Andrew Holmes AC PresAA FRS FTSE AAAS
Professor Marcus Pandy
Adjunct Assoc. Professor Gareth Forde
Associate Professor Alyssa Barry
Professor Michael Cowley FTSE
Professor Sarah Hosking
Professor Ygal Haupt
Associate Professor Ross Dickins
Dr Mark Shackleton
Professor Edwin van Leeuwen FTSE
Associate Professor Matthew Call
Associate Professor Christopher McNeill
Associate Professor Seth Masters
Professor Tiffany Walsh
Professor Cameron Simmons
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Professor Colette McKay
Dr Ethan Goddard-Borger
Professor Mark Dawson
Professor Kenneth Crozier
Associate Professor Roger Pocock
Professor Richard Sandberg
Professor Colby Zaph
Professor N. Jon Shah
Dr Vihandha Wickramasinghe

background information

veski delivers a range of Victoria's most prestigious science and innovation programs including the **veski** innovation fellowships which bring world-leading scientists and researchers back to Victoria.

Since 2004, 26 **veski** innovation fellows have returned to Victoria. Active innovation fellows have secured more than $68m in research income to date delivering an 18.4:1 economic return on investment. Their research covers semiconductors, epigenetics, audiology, optics and nanotechnology, enzymes, dengue, malaria, cancer, inflammatory diseases, musculoskeletal health, geothermal energy, obesity, computational fluid dynamics and bio-medical imaging.

veski is supported by the State Government of Victoria.

further information

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VICTORIA State Government

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