

CV: David Connolly, PhD, BEng

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Profile

Results-driven and determined with a passion for making the transition away from fossil fuels and towards sustainable energy a reality. Experienced in energy planning, modelling, policy, and markets. Self-driven, but also enjoy working in teams and involved in various projects at local, national, and European level. Enjoy converting research into action, so constantly involved in promoting my work to policymakers, industry, and academics across a range of formats including scientific articles, conferences, workshops, television, newspapers, websites, and social media. Proven track-record, exemplified by the crucial role of my research in developing Europe's first ever heat strategy.

Education

2011 to 2013: University Teaching Programme (10 ECTS), Aalborg University, Denmark

2007 to 2011: Doctor of Philosophy in Energy Planning, University of Limerick, Ireland

2009 to 2010: Advanced Certificate in Agriculture (Fetac Level 6), Teagasc, Ireland

2003 to 2007: B.Eng in Mechanical Engineering, University of Limerick: First-Class Honours and winner of the University Gold Medal 2007 (Average of 98%)

1998 to 2003: Irish Leaving Certificate: 545 points out of 600 (91%)

Job Experience

Associate Professor, Aalborg University, Copenhagen, Denmark

June 2014 to date

Research: Focused on energy planning related to energy efficiency and renewable energy

- Developed heating and cooling strategies for five EU Member States
- Wrote a 100% renewable energy strategy for Europe in collaboration with the European Commission
- Published Green Plan Ireland, which is the first 100% renewable energy strategy for Ireland

Research: Became a lead developer of the EnergyPLAN software (www.EnergyPLAN.eu)

- Involved in frontend and backend coding, as well as the overall development strategy for the software
- Responsible for the strategy and maintenance of the EnergyPLAN website, which tripled its monthly visitors from 700/month to 2000/month in one year

Project Management: Led numerous research applications, work packages, and projects.

- Main author and coordinator of the Heat Roadmap Europe series (www.heatroadmap.eu), which includes 20 organisations across 10 different countries
- Work package leader in the European project, STRATEGO, successfully meeting all deliverables on time
- Successfully led a consortium of 20 organisations in a Horizon 2020 application worth €2.2 million

Communication: Successfully influenced EU policymakers with my research

- Presented the results of Heat Roadmap Europe at numerous events including industry, government representatives, the European Parliament, and European Commission.
- Heat Roadmap Europe is now referenced in various communications from the European Commission and played a key role in developing the first ever EU 'heat strategy'.

Teaching: Regularly involved in teaching, supervision, and the administration of various university programmes

- Course coordinator and semester coordinator on the Sustainable Cities Master programme
- Teacher on the EnergyPLAN PhD course annually
- Supervisor of 5-10 Master student projects each year

Assistant Professor, Aalborg University, Copenhagen, Denmark

May 2011 to May 2014

Research:

- Created new energy balances and production pathways for fuels that allow renewable electricity to be consumed by heavy-duty transport. Formed part of a new 100% renewable energy strategy for Denmark, which was presented to the Danish Minister of Energy
- Developed local energy plans for regions such as Limerick, Clare, Ballerup, and Copenhagen.

Project Management: Became deeply involved in the administration of teaching activities

- Co-created a two-year Master programme called Sustainable Cities, which began in September 2012
- Internally coordinated numerous activities relating to personnel, content, timetables, and marketing
- Designed a new energy planning course for Bachelor students

Teaching: Improved by teaching skills and created new teaching content

- Taught classes in new areas such as sustainability, economy, and systems thinking
- Completed a 10 ECTS university teaching course on teaching style, learning, and assessments
- Introduced new teaching formats, such as role-playing and student voting, as well as new assessment methods, such as open-book exams and continuous assessment portfolios

PhD Candidate, University of Limerick, Limerick, Ireland

Sep 2007 - March 2011

- **Research:** Created the first hourly model of Ireland's energy system that included electricity, heating, and transport. Quantified the benefits of electricity storage and wind power in Ireland.
- **Communication:** Published six peer-reviewed journal articles and three conference proceedings
- **Business:** Commercialised software to identify suitable locations to build electricity storage.
- **Teaching:** Taught laboratory workshops, tutorials, and lectures in physics and energy.

Industrial Engineer, Boston Scientific Corporation, Galway, Ireland

June 2005 - Feb 2006

Worked in a team of 12 engineers, where my primary responsibility was to design custom components on the manufacturing line to improve quality and quantity. Completed over 50 designs during eight months, all completed on time.

Research Highlights

- Published 25 peer-reviewed journal articles, generating +1300 citations, as well as 20 conference proceedings, 4 book chapters, and 22 reports.
- Involved in projects worth over €25 million in research funding to date.
- Led a successful EU project under the Horizon 2020 framework worth €2.2 million.
- Coordinator of the Heat Roadmap Europe project, which includes 20 organisations across various universities, consultancies, and industry partners. This work played a central role in the creation of Europe's first ever 'heat strategy' and Paul Hodson, who is head of the Energy Efficiency Unit in DG Energy of the European Commission, officially referred to it as "the most advanced on the EU's heating and cooling sector as a whole".
- Extensive dissemination of my research around the world, which has included several government buildings, the European Parliament, and the European Commission.
- TV appearances on RTE's Eco Eye: [Season 13, Episode 6](#) and [Season 14, Episode 8](#).

Teaching Highlights

- Delivered approximately 10,000 student-hours of classroom teaching and carried out many different types of student exams/assessments.
- Supervised 25 Bachelor/Master student projects.
- Co-created a new two-year master programme, called [Sustainable Cities](#). Currently coordinate one of the four semesters and one of the six courses in this programme. Since it began, the course has doubled in size and now attracts approximately 35 students each year.

Awards

2010: Won the [Globe Forum](#) 'Early Career Research Award', which included PhD and postdoctoral researchers for my innovative research on sustainable energy.

2007: Won the University of Limerick Gold Medal for graduating with the highest academic results from the 2007 graduating class, which included approximately 2200 students.

2007: Awarded a PhD scholarship from The Irish Research Council for Science, Engineering and Technology (IRCSET) as well as The Advanced Scholars award from the University of Limerick.

Software Skills

General Office Admin	Energy Planning	Mechanical Engineering	Software Development
MS Office: advanced user	EnergyPLAN	LabVIEW	Delphi Pascal
Adobe Connect for webinars	energyPRO	GX Developer	MATLAB
WordPress	HOMER	ProMechanica	
Adobe Dreamweaver	LEAP	ProEngineer	
Adobe Photoshop		SolidWorks	

Other Interests

Sports enthusiast, especially Gaelic football. Chairperson of Copenhagen GAA in 2014, guiding the club to their first Nordic Championship. Voted Player of the Year in Copenhagen GAA in 2013. I also enjoy soccer, rugby, running, travelling, and current affairs.

List of Publications

Below is a list of my publications divided by the type including peer-reviewed journal articles (divided by first and co-authored articles), conference proceedings, key presentations, media activities, book chapters, patents, reports, brochures, and posters. In total, my peer-reviewed journal articles have received over 850 citations and I have a h-index of 12 (updated November 2015).

Journal Articles (First Author)

1. Connolly D, Lund H, Mathiesen BV, Leahy M. A review of computer tools for analysing the integration of renewable energy into various energy systems. *Applied Energy* **2010**;87(4):1059-1082.
2. Connolly D, MacLaughlin S, Leahy M. Development of a computer program to locate potential sites for pumped hydroelectric energy storage. *Energy* **2010**;35(1):375-381.
3. Connolly D, Lund H, Mathiesen BV, Leahy M. Modelling the existing Irish energy-system to identify future energy costs and the maximum wind penetration feasible. *Energy* **2010**;35(5):2164-2173.
4. Connolly D, Lund H, Mathiesen BV, Leahy M. The first step towards a 100% renewable energy-system for Ireland. *Applied Energy* **2011**;88(2):502-507.
5. Connolly D, Lund H, Finn P, Mathiesen BV, Leahy M. Practical operation strategies for pumped hydroelectric energy storage (PHES) utilising electricity price arbitrage. *Energy Policy* **2011**;39(7):4189-4196.
6. Connolly D, Lund H, Mathiesen BV, Pican E, Leahy M. The technical and economic implications of integrating fluctuating renewable energy using energy storage. *Renewable Energy* **2012**;43:47-60.
7. Connolly D, Lund H, Mathiesen BV, Werner S, Möller B, Persson U, Boermans T, Trier D, Østergaard PA, Nielsen S. Heat Roadmap Europe: Combining district heating with heat savings to decarbonise the EU energy system. *Energy Policy* **2014**;65:475–489.
8. Connolly D, Mathiesen BV. A technical and economic analysis of one potential pathway to a 100% renewable energy system. *International Journal of Sustainable Energy Planning and Management* **2014**;1.
9. Connolly D, Green Plan Ireland: our chance to become 100% renewable. *Engineers Journal* **2014**.
10. Connolly D, Mathiesen BV, Ridjan I. A comparison between renewable transport fuels that can supplement or replace biofuels in a 100% renewable energy system. *Energy* **2014**;73:110-125.
11. Connolly D, Lund H, Mathiesen BV. Smart Energy Europe: the technical and economic impact of one potential 100% renewable energy scenario for the European Union. *Renewable and Sustainable Energy Reviews* **2016**;60:1634-1653.

Journal Articles (Co-authored)

1. Finn P, Fitzpatrick C, Connolly D, Leahy M, Relihan L. Facilitation of Renewable Electricity using Price Based Appliance Control. *Energy* **2011**;36(5):2952-2960.
2. Finn P, Fitzpatrick C, Connolly D. Demand side management of electric car charging: Benefits for consumer and grid. *Energy* **2012**;42(1):358-363.
3. Lund H, Andersen AN, Østergaard PA, Mathiesen BV, Connolly D. From electricity smart grids to smart energy systems - A market operation based approach and understanding. *Energy* **2012**;42(1):96-102.
4. Mathiesen BV, Lund H, Connolly D. Limiting biomass consumption for heating in 100% renewable energy systems. *Energy* **2012**;48(1):160-168.

5. Mathiesen BV, Sperling K, Hvelplund F, Lund H, Möller B, Nielsen S, Connolly D. Solceller i fremtidens danske energisystem. *Vedvarende energi og miljø* **2012**;6:10-11.
6. Ridjan I, Mathiesen BV, Connolly D, Duić N. The feasibility of synthetic fuels in renewable energy systems. *Energy* **2013**;57:76-84.
7. Lund H, Connolly D, Nielsen S, Möller B, Mathiesen BV, Østergaard PA. Heat Roadmap Europe II: Fjernvarme skaber job og hjælper Europas CO2-mål. *Fjernvarmen* **2013**;6:30-31.
8. Ridjan I, Mathiesen BV, Connolly D. Synthetic fuel production costs by means of solid oxide electrolysis cells. *Energy* **2014**;76:104-113.
9. Lund H, Mathiesen BV, Connolly D, Østergaard PA. Renewable Energy Systems - A Smart Energy Systems Approach to the Choice and Modelling of 100 % Renewable Solutions. *Chemical Engineering Transactions* **2014**;39.
10. Waenn A, Connolly D, Ó Gallachóir B. Investigating 100% renewable energy supply at regional level using scenario analysis. *International Journal of Sustainable Energy Planning and Management* **2014**;3:12.
11. Mathiesen BV, Lund H, Connolly D, Wenzel H, Østergaard PA, Möller B, Nielsen S, Ridjan I, Karnøe P, Sperling K, Hvelplund FK. Smart Energy Systems for coherent 100% renewable energy and transport solutions. *Applied Energy* **2015**;145:139-154.
12. Ridjan I, Mathiesen BV, Connolly D. Terminology used for renewable liquid and gaseous fuels based on the conversion of electricity: a review. *Journal of Cleaner Production* **2016**;112:3709-3720.
13. Hansen K, Connolly D, Lund H, Drysdale D, and Thellufsen JZ. Heat Roadmap Europe: Identifying the balance between saving heat and supplying heat. *Energy* **2016**;115:1663-1671.
14. Zakeri B, Virasjoki V, Syri S, Connolly D, Mathiesen BV, Welsch M. Impact of Germany's energy transition on the Nordic power market – A market-based multi-region energy system model. *Energy* **2016**;115:1640-1662.
15. Lund H, Østergaard PA, Connolly D, Ridjan I, Mathiesen BV, Hvelplund F, Thellufsen JZ, Sorknæs P. Energy Storage and Smart Energy Systems. *International Journal of Sustainable Energy Planning and Management*: **2016**;11:3-14.

Reviewer for the Following Journals

I am on the editorial board of the *International Journal of Sustainable Energy Planning and Management* and I am a reviewer for a variety of international journals, including:

1. ENERGY, The International Journal
2. Energy Policy
3. Energy Conversion & Management
4. Applied Energy
5. Energy Economics
6. IEEE Sustainable Energy
7. IEEE Power and Energy Society
8. Journal of Environment Development & Sustainability
9. Journal of Simulation Modelling Practice and Theory
10. International Journal of Electrical Power and Energy Systems
11. Energy Research and Social Science

Conference Proceedings

1. Connolly D, Lund H, Mathiesen BV, Leahy M. Developing a Model of the Irish Energy-System. In: Proceedings of the Joint Action on Climate Change, Aalborg, Denmark, 8-10 June **2009**.
2. Connolly D, Lund H, Mathiesen BV, Leahy M. Ireland's pathway towards a 100% renewable energy-system: The first step. In: Proceedings of the 5th Dubrovnik Conference for Sustainable Development of Energy, Water and Environment Systems, Dubrovnik, Croatia, 29 September – 3 October, **2009**.
3. Connolly D, MacLaughlin S, Leahy M. Locating Potential Sites for Pumped Hydroelectric Energy Storage. In: Proceedings of the Electrical Energy Storage Applications and Technologies (EESAT) Conference, Seattle, USA, 4-7 October **2009**.
4. Foley AM, Connolly D, Leahy PG, Mathiesen BV, Lund H, Leahy M, McKeogh EJ. Electrical Energy Storage & Smart Grid Technologies to Integrate the next generation of Renewable Power Systems. In: Proceedings of the SEEP2010. Bari, Italy, 29 June - 2 July, **2010**.
5. Connolly D, Lund H, Mathiesen BV, Finn P. Developing a regional energy plan for two counties in Ireland. In: Proceedings of the 6th Dubrovnik Conference for Sustainable Development of Energy, Water and Environment Systems. Dubrovnik, Croatia, 25-29 September, **2011**.
6. Mathiesen BV, Lund H, Connolly D. Heating technologies for limiting biomass consumption in 100% renewable energy systems. In: Proceedings of the 6th Dubrovnik Conference for Sustainable Development of Energy, Water and Environment Systems. Dubrovnik, Croatia, 25-29 September, **2011**.
7. Connolly D, MacLaughlin S. Locating Sites for Pumped Hydroelectric Energy Storage. In: Proceedings of the International Conference on Sustainable Energy Storage. Belfast, Northern Ireland, 21-24 February, **2011**.
8. Ridjan I, Mathiesen BV, Connolly D, Duić N. Feasibility of synthetic fuels in renewable energy systems. In: Proceedings of the poster session at the Austrian-Croatian-Hungarian Combustion Meeting. Zagreb, Croatia, **2012**.
9. Ridjan I, Mathiesen BV, Connolly D, Duić N. The feasibility of synthetic fuels in renewable energy systems. In: Proceedings of the 7th Conference on Sustainable Development of Energy, Water and Environment Systems. Ohrid, Macedonia, 1-7 July, **2012**.
10. Mathiesen BV, Lund H, Hvelplund F, Connolly D, Bentsen NS, Felby C, Morthorst PE, Astrup T, Tonini D, Meyer NI, Münster M, Hansen L-LP, Heussen K, Andersen F, Wenzel H, Hamelin L, Munksgaard J. Det intelligente energisystem (The Intelligent Energy System). In: Proceedings of the Robust and Sustainable Bioenergy. Fredericia, Denmark, 5 December 2012, **2012**.
11. Mathiesen BV, Connolly D, Henrik L, Nielsen MP, Schaltz E, Wenzel H, Bentsen NS, Felby C, Kaspersen P, Hansen K. Biomasse til transportsektoren (Biomass for the Transport Sector). In: Proceedings of the Robust and Sustainable Bioenergy. Fredericia, Denmark, 5 December 2012, **2012**.
12. Connolly D, Lund H, Mathiesen BV, Werner S, Möller B, Persson U, Trier D, Østergaard PA, Nielsen S. The role of district heating in decarbonising the EU energy system and a comparison with existing strategies. In: Proceedings of the 8th Dubrovnik Conference for Sustainable Development of Energy, Water and Environment Systems. Dubrovnik, Croatia, 22-27 September, **2013**.
13. Mathiesen BV, Lund H, Connolly D, Wenzel H, Østergaard PA, Möller B. The design of Smart Energy Systems for 100% renewable energy and transport solutions. In: Proceedings of the Proceedings of the 8th Dubrovnik Conference for Sustainable Development of Energy, Water and Environment Systems. Dubrovnik, Croatia, 22-27 September, **2013**.

14. Wänn A, Connolly D, Ó'Gallachóir B. Moving from national to regional energy planning using EnergyPLAN. In: Proceedings of the Proceedings of the 8th Dubrovnik Conference for Sustainable Development of Energy, Water and Environment Systems. Dubrovnik, Croatia, 22-27 September, **2013**.
15. Grandal RD, Wenzel H, Mathiesen BV, Connolly D. One million ton of hydrogen is the key piece in the Danish renewable energy puzzle. In: Proceedings of the Proceedings of the 8th Dubrovnik Conference for Sustainable Development of Energy, Water and Environment Systems. Dubrovnik, Croatia, 22-27 September, **2013**.
16. Ridjan I, Mathiesen BV, Connolly D. Energy system analysis of Solid Oxide Electrolysis Cells for fuel production. In: Proceedings of the Proceedings of the 8th Dubrovnik Conference for Sustainable Development of Energy, Water and Environment Systems. Dubrovnik, Croatia, 22-27 September, **2013**.
17. Connolly D, Mathiesen BV, Lund H. A 100% renewable energy scenario for Europe using a Smart Energy System approach. In: Proceedings of the 10th Dubrovnik Conference for Sustainable Development of Energy, Water and Environment Systems. Dubrovnik, Croatia, 27 September - 2 October, **2015**.
18. Zakeri B, Syri S, Connolly D, Mathiesen BV, Welsch M. Impact of Energy Transition in Germany on the Nordic Power Market – A Blessing or Curse? In: Proceedings of the 10th Dubrovnik Conference for Sustainable Development of Energy, Water and Environment Systems. Dubrovnik, Croatia, 27 September - 2 October, 2015.
19. Connolly D, Drysdale D, Hansen K, Novosel, T. Creating hourly distributions at national level for various energy demands and renewable energy supplies. In: Proceedings of the 10th Dubrovnik Conference for Sustainable Development of Energy, Water and Environment Systems. Dubrovnik, Croatia, 27 September - 2 October, **2015**.
20. Hansen K, Connolly D, Lund H, Drysdale D, Thellufsen, JZ. Heat Roadmap Europe: Balancing heat supply and heat savings for various European countries. In: Proceedings of the 10th Dubrovnik Conference for Sustainable Development of Energy, Water and Environment Systems. Dubrovnik, Croatia, 27 September - 2 October, **2015**.

Presentations

1. Energy Storage Techniques, Danish Society of Engineers, Aalborg, Denmark, 11th February **2009**.
2. Developing a Model of the Irish Energy-System. Joint Action on Climate Change. Aalborg, Denmark, 8-10 June, **2009**.
3. Ireland's pathway towards a 100% renewable energy-system: The first step. 5th Dubrovnik Conference for Sustainable Development of Energy, Water and Environment Systems. Dubrovnik, Croatia, 29 September - 3 October, **2009**.
4. Locating Potential Sites for Pumped Hydroelectric Energy Storage. Electrical Energy Storage Applications and Technologies (EESAT) Conference. Seattle, USA, 4-7 October, **2009**.
5. Ireland's pathway towards a 100% renewable energy-system: The first step. Zero Carbon Society, Dublin, Ireland, 4th November **2009**.
6. The Integration of Fluctuating Renewable Energy in Ireland Using Energy Storage, Charles Parsons Initiative Conference, 10th September **2010**.
7. Locating Sites for Pumped Hydroelectric Energy Storage. International Conference on Sustainable Energy Storage. Belfast, Northern Ireland, 21-24 February, **2011**.
8. The Integration of Fluctuating Renewable Energy Using Energy Storage. This presentation was made to numerous institutions in Ireland upon completion of my PhD including:

- Sustainable Energy Authority of Ireland, 17th February **2011**
 - Spirit of Ireland Seminar, 8th March **2011**
 - University College Cork, 22nd March **2011**
 - ESB International 24th March **2011**
 - Irish Grid Solutions, 4th April **2011**
9. Locating Sites for Pumped Hydroelectric Energy Storage, Meitheal Na Gaoithe Annual Conference, Galway, Ireland, 6th May **2011**.
 10. Local Energy Planning: Status and Opportunity, Dáil Éireann, Dublin, Ireland, 19th July **2011**.
 11. Developing a regional energy plan for two counties in Ireland. 6th Dubrovnik Conference for Sustainable Development of Energy, Water and Environment Systems. Dubrovnik, Croatia, 25-29 September, **2011**.
 12. Locating Sites for Pumped Hydroelectric Energy Storage, Joint Research Centre Symposium, Petten, The Netherlands, 2nd April **2012**.
 13. Heat Roadmap Europe: Pre-Study 1, 4th Generation of District Heating Research Seminar, Aalborg, Denmark, 3rd Oct **2012**.
 14. The Dispatch of Electricity Storage on Deregulated Electricity Markets, International Research Energy Storage Conference, Berlin, Germany, 13th November **2012**.
 15. Heat Roadmap Europe: Pre-Study 2, Euroheat & Power Board Meeting, Brussels, Belgium, 9th January **2013**.
 16. Heat Roadmap Europe: Pre-Study 2, Euroheat & Power Board Meeting, Brussels, Belgium, 19th March **2013**.
 17. Heat Roadmap Europe 2050, Decarbonising the European heating and cooling markets, Joint Research Centre Symposium, Petten, The Netherlands, 11th April **2013**.
 18. Heat Roadmap Europe 2050, Decarbonising the European heating and cooling markets, Annual Conference for the European Technology Platform: Renewable Heating & Cooling, Dublin, Ireland, 22nd April **2013**.
 19. Heat Roadmap Europe 2050, DG Energy of the European Commission, Brussels, Belgium, 30th May 2013.
 20. Heat Roadmap Europe and its Role in EU Energy Policy. South Korea District Heating Association. Seoul, South Korea. 1st-5th July **2013**.
 21. The role of district heating in decarbonising the EU energy system and a comparison with existing strategies. 8th Dubrovnik Conference for Sustainable Development of Energy, Water and Environment Systems. Dubrovnik, Croatia, 22-27 September, **2013**.
 22. Heat Roadmap Europe: A Complete Heating Strategy for the EU. EU Parliament Dinner Debate. Brussels, Belgium. 4th December **2013**.
 23. Heat Roadmap Europe. Research Exchange Workshop. International Energy Agency, Paris, France. 4th February **2014**.
 24. EU Energy Round Table. Invited Speaker at the Knowledge 4 Innovation seminar in the European Parliament. The seminar was hosted by Jerzy Buzek, MEP and former President of the European Parliament. The seminar was attended by the European Commissioner for Energy, Günther H. Oettinger, the Director General of DG Energy Dominique Ristori, the Dep. Director General of DG Research & Innovation Rudolf Strohmeier, and the Director of Energy at DG Research & Innovation Andrés Siegler. 19th March **2014**.

25. District Heating in Ireland, Invited by Codema to present the potential role and feasibility of district heating in Ireland to key stakeholders across policy, industry, and research, Dublin, 21 May **2014**.
26. Heat Roadmap Europe, Invited to the Estonian district heating association annual conference to present the findings of the Heat Roadmap Europe project, 10 April **2014**.
27. Green Plan Ireland, Invited to the National University of Ireland Galway to present the Green Plan Ireland study and its findings, which highlight how Ireland can become 100% renewable, 13 October **2014**.
28. District Heating Potential in Europe, Invited by the European Commission to speak at the Concerted Action meeting about the Energy Efficiency Directive, Milan, 16 October **2014**.
29. Smart Energy Systems and 100% Renewable Energy, Invited by the Department of Communications, Energy, and Natural Resources to discuss the future energy system in Ireland and the ongoing energy Green Paper consultation, 2 December **2014**.
30. Smart Energy Systems and the potential for 100% renewable energy in Europe, Invited by the European Climate Foundation to present to a range of NGOs working in Brussels on renewable energy, 3 February **2015**.
31. Heat Days Conference, Invited by the European Commission to present at the high-level conference on heating and cooling in Europe (www.heating-and-cooling-in-europe.eu), 27 February **2015**.
32. European Union Sustainable Energy Week (EUSEW), Invited to three separate events organised by a variety of organisations including the European Commission, United Nations, and Euroheat & Power, 18 June **2015**.

Media Activities

1. Western People, Newspaper, Ireland. "Green Plan Ireland", November **2013**.
2. EurActiv, Online Newspaper, Brussels. "Heat Roadmap Europe", April **2014**.
3. RTÉ One, Radio, Ireland. Marian Finucane Show, "Comparing Copenhagen to Dublin", January **2015**.
4. RTÉ One, Television, Ireland. EcoEye 13, Episode 6 "Green Electricity", February **2015**. (<https://www.youtube.com/watch?v=svzDvqoYEWU>).
5. RTÉ One, Television, Ireland. The Consumer Show, "Renting Accommodation in Copenhagen", March **2015**.
6. RTÉ One, Television, Ireland. EcoEye 14, Episode 8 "Path to Zero Carbon", February **2016**. (<https://www.youtube.com/watch?v=INMOfOaQhYg>).
7. Keynote Speaker at International Conference about Smart Energy Systems, September 2016: Article published by Nordjyske ([Danish Newspaper](#)), Energy Supply ([Online News Agency](#)), AAU ([Press Release](#)), and Danish District Heating Association ([Website](#)).
8. Interview for the European Commission's SETIS Magazine, November **2016**. (<https://setis.ec.europa.eu/publications/setis-magazine/energy-systems-modeling/david-connolly-coordinator-of-h2020-project-heat>)

PhD

- Connolly D. The Integration of Fluctuating Renewable Energy Using Energy Storage. Department of Physics and Energy, University of Limerick, Limerick, **2010**. Available from: <http://www.dconnolly.net/>.

Book Chapters

1. Leahy MJ, Connolly D, Buckley DN, Wind Energy storage Technologies, in Wind Power Generation and Wind Turbine Design, W Tong (ed.). **2009**, WIT Press.
2. Connolly, D and Mathiesen, BV, Renewable Energy Transportation Fuel Pathways: in Renewable Energy Systems: A Smart Energy Systems Approach to the Choice and Modeling of 100% Renewable Solutions, 2nd Edition, H. Lund. Academic Press, Elsevier, Burlington, Massachusetts, USA, **2014**.
3. Hvelplund F, Østergaard P, Möller B, Mathiesen BV, Connolly D, Andersen AN. Analysis : Smart Energy Systems and Infrastructures: in Renewable Energy Systems: A Smart Energy Systems Approach to the Choice and Modeling of 100% Renewable Solutions, 2nd Edition, H. Lund. Academic Press, Elsevier, Burlington, Massachusetts, USA, **2014**.
4. Connolly D, Lund H, Mathiesen BV. Modeling and Simulation of Renewable Energy Systems, in Handbook of Clean Energy Systems, J Yan, **2015**, Wiley.

Patents

1. David Gerard Connolly & Robert Pius Lilly, A Dolly, Irish Short-Term Patent Application No. S2011/0226.

Reports

1. Connolly D, Leahy M. A Review of Energy Storage Technologies: For the integration of fluctuating renewable energy. University of Limerick, **2009**. See also: <http://www.dconnolly.net/publications.html>.
2. Connolly D, Lund H, Mathiesen BV. Modelling the Irish Energy-System: Data Required for the EnergyPLAN Tool. University of Limerick, **2009**. See also: <http://www.dconnolly.net/publications.html>.
3. Connolly D, Lund H, Mathiesen BV. A User's Guide to EnergyPLAN. Aalborg University, University of Limerick, **2010**. See also: <http://energy.plan.aau.dk/manual.php>.
4. Connolly D. The Global Energy Challenge: A Contextual Framework. University of Limerick, **2011**. Available from: <http://www.dconnolly.net/>.
5. Hansen K, Mathiesen BV, Connolly D. Technology and implementation of electric vehicles and plug-in hybrid electric vehicles. Department of Development and Planning, Aalborg University, **2011**. Available from: <http://vbn.aau.dk>.
6. Mathiesen BV, Blarke MB, Hansen K, Connolly D. The role of large-scale heat pumps for short term integration of renewable energy. Department of Development and Planning, Aalborg University, **2011**. Available from: <http://vbn.aau.dk>.
7. Hansen K, Mathiesen BV, Connolly D. Framework conditions and public regulation for wind turbines in the Øresund Region. Department of Development and Planning, Aalborg University, **2011**. Available from: <http://vbn.aau.dk>.
8. Connolly D, Mathiesen BV, Dubuisson X, Hansen K, Lund H, Finn P, Hodgins J. Limerick Clare Energy Plan: Energy and Emissions Balance. Aalborg University and Limerick Clare Energy Agency, **2012**. Available from: <http://www.lcea.ie/>.
9. Connolly D, Mathiesen BV, Dubuisson X, Lund H, Ridjan I, Finn P, Hodgins J. Limerick Clare Energy Plan: Climate Change Strategy. Aalborg University and Limerick Clare Energy Agency, **2012**. Available from: <http://www.lcea.ie/>.

10. Connolly D, Mathiesen BV, Østergaard PA, Möller B, Nielsen S, Lund H, Trier D, Persson U, Nilsson D, Werner S. Heat Roadmap Europe: First pre-study for EU27. Aalborg University, Halmstad University, and Euroheat & Power, **2012**. Available from: <http://vbn.aau.dk/>.
11. Connolly D, Mathiesen BV, Østergaard PA, Möller B, Nielsen S, Lund H, Persson U, Werner S, Grözinger J, Boermans T, Bosquet M, Trier D. Heat Roadmap Europe: Second pre-study. Aalborg University, Halmstad University, Ecofys Germany GmbH, PlanEnergi, and Euroheat & Power, **2013**. Available from: <http://vbn.aau.dk/>.
12. Ridjan I, Mathiesen BV, Connolly D. SOEC pathways for the production of synthetic fuels : The transport case. Aalborg University, **2013**. Available from: <http://vbn.aau.dk/>.
13. Mathiesen BV, Ridjan I, Connolly D, Nielsen MP, Hendriksen PV, Mogensen MB, Jensen SH, Ebbesen SD. Technology data for high temperature solid oxide electrolyser cells, alkali and PEM electrolysers. Aalborg University, **2013**. Available from: <http://vbn.aau.dk/>.
14. Ridjan I, Mathiesen BV, Connolly D. A review of biomass gasification technologies in Denmark and Sweden. Aalborg University, **2013**. Available from: <http://vbn.aau.dk/>.
15. Lund RS, Sperling K, Mathiesen BV, Connolly D. Strategic Energy Planning in the Öresund Region. Aalborg University, 2013. Available from: <http://vbn.aau.dk/>.
16. Mathiesen BV, Connolly D, Lund H, Nielsen MP, Schaltz E, Wenzel H, Bentsen NS, Felby C, Kaspersen P, Hansen K. CEESA 100% Renewable Energy Transport Scenarios towards 2050. Aalborg University, **2014**. Available from: <http://www.ceesa.plan.aau.dk/>.
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2. Ridjan I, Mathiesen BV; Connolly D. Comparison of fuel production costs for future transportation. In: Poster session presented at NextSTEPS Research Symposium, Davis, United States, **2014**.
3. Connolly D, Mathiesen BV, Lund H, Werner S. 4DH Research in A European Context. In: Poster session at Energy and Environment for the Future, Copenhagen, Denmark, **2014**.
4. Mathiesen BV, Lund H, Connolly D. The CEESA Smart Energy Systems Approach for Denmark and Europe. In: Poster session presented at Energy and Environment for the Future, Copenhagen, Denmark, **2014**.
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Websites

1. EnergyPLAN (www.EnergyPLAN.eu): designed, implemented, and maintain the EnergyPLAN website since the start of 2013. I have introduced a range of new features including a new layout, a member's map, forum, online videos, and performance analytics. Since I began coordinating the website activities the number of visitors has increased almost threefold, from 900/month to over 2400/month in mid-2015. It continues to grow since.
2. Heat Roadmap Europe (www.heatroadmap.eu): I created, designed, and maintain the Heat Roadmap Europe website which currently receives over 1000 unique visitors per month.
3. Personal Homepage (www.dconnolly.net): I maintain a personal homepage to maximise the dissemination of my research and teaching activities. It currently receives approximately 1000 unique visitors/month.

List of Research Projects

I have been directly involved in research projects which involved the analysis of smart energy systems at local, national, and international level. I primarily focus on modelling the technical and economic consequences of the following:

- The integration of intermittent renewable energy such as wind, wave, tidal, and solar
- District heating, in particular 4th generation low-temperature district heating
- Producing synthetic fuels for trucks, ships, and aeroplanes
- Developing holistic energy plans with long-term recommendations and targets

Below is a complete list of the research projects which I have been involved in to date. In total, I have been responsible for attracting approximately €1 million in research funds as a project or work package leader within these projects.

European Energy Plans

Heat Roadmap Europe 4 (Horizon 2020) [2016-2019]: I led a consortium of 20 organisations including universities, consultancies, and industry in a successful Horizon 2020 application for a three-year project, which starts in 2016. This is a continuation of the Heat Roadmap Europe work (www.heatroadmap.eu), where the team will develop thermal strategies and atlases for the 14 largest EU Member States. The project also has a strong emphasis on dissemination and communication to ensure that key stakeholders are informed about the new results, tools, and methodologies available due to the project.

Smart Energy Europe [2015]: I created the first 100% renewable energy strategy for the European Union that accounts for the hourly balancing of intermittent renewable resources across electricity, heat, cooling, and transport. I was the lead author on this work, which was carried out in collaboration with the European Commission, and illustrated the type and scale of solutions required to fully decarbonise the European energy system.

Solar Heat and Energy Economics (IEA Task 52) [2014-2017]: Still ongoing and involves the analysis of the heating sector in four different EU member states including Germany, Italy, Austria, and Denmark. The context of this analysis is a 100% renewable energy system, thus distinguishing it from the context of the work carried out in the STRATEGO project. The work is ongoing and to date, I have primarily been involved in the development of an hourly model of the Germany energy system, in collaboration with Fraunhofer.

STRATEGO (Heat Roadmap Europe 3) [2014-2016]: The pan-EU district heating scenarios developed in Heat Roadmap Europe were refined in the STRATEGO project by moving from a pan-EU level to an individual member state level. To do so, district heating roadmaps were created for 5 different EU member states: Italy, Czech Republic, Croatia, the UK, and Romania. I was the main contact point on behalf of Aalborg University for this project, which included coordinating one of the work packages.

Heat Roadmap Europe 1&2 [2012 & 2013]: The objective in both of these projects was to develop a new heating strategy for the EU27 for the years 2030 and 2050. The project included partners from Denmark, Sweden, and Germany, as well as numerous inputs from DG Energy of the European Commission. The results highlight the potential for district heating in the EU27 and the importance of individual heat pumps as more renewables are introduced.

National Energy Plans

4DH Research Centre [2012-2017]: A 5-year research project, which began in 2012. This project investigates the role of 4th generation district heating in future renewable energy systems. There is a technology, planning, and regulation focus in the project. My main contribution is on the development of new 100% renewable energy strategies for Denmark, which includes 4th generation district heating.

SOEC 1&2 [2012-2015]: Building on the CEESA project, the two Solid Oxide Electrolyser Cell (SOEC) projects were carried out to develop more precise energy and economic flow diagrams for future synthetic fuels, which can combine electricity from wind turbines and carbon dioxide to produce new energy dense liquid and gaseous fuels.

CEESA 100% Renewable Energy Scenarios for Denmark [2007-2013]: In this project, I help to develop a 100% renewable energy strategy for Denmark, where the focus was on profiling the transport sector and developing new technical alternatives for the production of alternatives fuels for the transport sector. The project primarily focused on electric vehicles, public transportation, and the potential for new synthetic fuels.

Electricity Storage in Ireland [2007-2011]: This was the core focus of my PhD project, which was funded by a scholarship I obtained from the Irish Research Council for Science, Engineering, and Technology. I quantified the benefits of electricity storage on the Irish energy system by analysing how it could increase the penetration of wind energy in Ireland. I developed the first hourly model of the Irish energy system, commercialised a new software tool to identify locations for electricity storage, and concluded that electricity storage is too expensive in the short-term to utilise for the integration of wind power.

Local Energy Plans

Copenhagen Energy Plan [2013-2014]: The city of Copenhagen has a target to be carbon neutral by 2025, but this will be due to the over production of some renewable electricity and heat, to compensate for the lack of renewable energy in transport. This project was carried out in collaboration with the municipality of Copenhagen to demonstrate how the city can go from being carbon neutral, to becoming 100% renewable by the year 2050. I was involved in the modelling and reporting of this work.

Kerry's Sustainable Energy Community Roadmap [2013]: Acted as an advisor to this project, in which an action plan outlines how County Kerry could transition to a 100% renewable energy supply.

Energi Øresund [2012-2013]: A collaboration between Danish and Swedish municipalities in the Øresund region, where I contributed as an author on three reports investigating wind power regulations, the technical potential of heat pumps, and a current state-of-the-art database for electric vehicles.

Limerick Clare Energy Plan [2012]: Development of a 100% renewable energy strategy for the counties of Limerick and Clare, which included a short-term strategy for the year 2020 and a long-term strategy for 2050. The key research focus was the interaction between local rural and urban zones, when designing a 100% renewable energy system.

Ballerup Energy Plan [2012]: Design and analysis of a 100% renewable energy system for Ballerup Municipality (near Copenhagen) from a technical and socio-economic perspective. The key research focus in this project was the role of an urban area in the context of a 100% renewable energy system for all of Denmark.

List of Teaching Experiences

Project Supervision

I have supervised a variety of different projects during my career including single-person projects, group projects, and off campus projects. In total, I have supervised approximately 25 Bachelor and Master students. The highlight of my supervision so far was in 2015, when one of the Master students I supervised won the [International DHC+ Student Award](#) based on her thesis.

A typical Bachelor/Master project has consisted of between 1-4 people and takes place over a single semester, which lasts approximately 5 months. I have supervised off-campus projects while students have been completing their internships. The topics usually relate to various aspects of smart energy systems, including electricity markets, electrofuel production, solar power, district heating, and complete energy plans. The focus has varied between technical, social, and economical, depending on the student's interests. As a supervisor, I have learned how to delegate time, manage expectations, communicate responsibilities, and monitor the progress of my student.

External Teaching

I have taught on a variety of courses as a visiting lecturer, including a full-day course at the South Danish University in Odense, Denmark, a summer school between Danish and American students in Copenhagen, and an energy-planning workshop about electric vehicles at a PhD course in the University of Dubrovnik, Croatia. I have also given guest lectures on energy planning at University College Cork and the National University of Ireland Galway.

Administration of Teaching Activities

I became much more involved in the administrative side of teaching outside the classroom after I completed my PhD in 2011. Soon after my arrival at Aalborg University, I co-developed a new Master of Science program entitled [Sustainable Cities](#), so I had to coordinate many internal planning activities in terms of personnel, timetables, content, and promotion. I am still heavily involved in the administration of this programme due to my role in the early stages of its creation. I am the course coordinator for one of the six programmes and I am semester coordinator for one of the four semesters.

PhD Courses

I have co-designed and taught a 5-day PhD course about energy planning to students at Aalborg University, Denmark for over 5 years. This required a new approach to my teaching as the course was subdivided between various other lecturers and participants, so the content was shared. In addition, the course included theory, technical exercises, and computer laboratories. Therefore, organisation and teamwork was essential during the teaching of this course.

Master Programmes

I regularly teach on two Master courses at Aalborg University entitled [Sustainable Cities](#) and [Sustainable Energy Planning and Management](#). Typically, the students I teach on these courses are in their mid-20's and a very wide variety of backgrounds such as engineering, geography, economics, and planning. These courses involve both classroom and video teaching and I also use a variety of formats within the classroom itself, such as role-playing, workshops, tutorials, voting, and traditional podium teaching. The assessments

are also in various formats such as the traditional written exam, continuous assessment portfolio, and a full-day open book question.

To date, I have had approximately 200 hours of teaching in these programmes, with the majority of the content relating to energy planning and modelling. I provide courses on energy software tools for planning at different geographical levels, an introduction to energy technologies, and some extensive courses on the [EnergyPLAN](#) tool, which is a national energy planning software. I also teach some classes on sustainability, which cover topics such as systems thinking, city systems, synergies across city systems, and a variety of case studies.

Undergraduate Programmes

I taught three separate modules in Physics at the University of Limerick, relating to mechanics, heat, light, waves, and modern physics. My primary role was as a laboratory assistant or a teaching assistant. Typically, my classes ranged in size from 20 to 50 students while each class took 1-2 hours. The students were aged between 17 and 21 years old and their backgrounds varied from sports science to applied physics. Considering the variety of topics and students, effective preparation and communication was essential for each of these classes.

I have also designed and taught a module on advanced energy systems analysis for approximately 100 students undertaking the Bachelor of Buildings, Energy, and the Environment at Aalborg University. This course introduced the students to the concept and role of energy planning, while also dealing with a variety of different perspectives such as technical alternatives, public regulation, energy markets, and feasibility studies. Many of the classes in this course were taught simultaneously in Aalborg and Copenhagen, so I had to teach students that were both present onsite and also those that were joining via video link.

Teaching Children (8-12 Years)

In 2007 and 2008, I taught two courses for The Centre for Talented Youth in Ireland (<http://www.dcu.ie/ctyi/>) to children aged between 8 and 12 years old. These courses were taught for 3 hours on Saturday mornings over a total of 8 weeks. My primary objective was to educate the participants on the role of a Mechanical Engineer. Teaching an advanced program like this to young children required excellent communication and patience. I also had to continuously assess the children's progress, which was fed back to parents at the end of the course during the parent-teacher meetings.

Positive Student Feedback in Official Teaching Evaluations

Aalborg University carries out official evaluations of each semester with the students at the end of the term. To date, I have not experienced any negative comments about my teaching methods and below are some positive extracts from these evaluations about my teaching.

2016:

- "The first 2-3 modules with David were very satisfying. He elaborated on systems theory, and quantification of systems. Very good mix of individual tasks and class lectures"
- "[the] stand out lectures were the Energy lectures and... they were excellent lectures"
- "The courses about the energy sector were really good because we had time to go into depth with the system and it was the most technical course"

- “Energy: Amazing lectures, good equilibrium between technical stuff and general picture of the field between engineering and design I would say. I loved that there was quantitative stuff.”
- “The lectures of David were excellent with a lot of structure and different types of teaching methods e.g. PowerPoint, blackboard, exercises that made one understand the subject and keep focus/concentration”.
- “I enjoyed David’s lectures”
- “David’s classes on energy were really good”

2014: “David Connolly is the best teacher this semester with a lot of interesting facts during lectures and good at explaining of everything about energy”.

2013: “Especially David Connolly is really good. Good preparation, very interesting and relevant information presented in a very good way - and very open to questions”