Curriculum Vitae

Joakim Munkhammar

Contact information

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Doctoral degree

30/3/2015	**Doctor of Philosophy (Ph.D.) in Engineering Sciences** at Uppsala University 30 March 2015.

Appointment as docent

25/9/2018	**Docent in Engineering Science** at Uppsala University 25 September 2018.

Additional academic degrees

2012	**Licentiate of Philosophy in Engineering Sciences** at Uppsala University 2012.
2008	**Master of Science in Mathematics (1yr)** at Uppsala University 2008.
2007	**Master of Science in Physics (1yr)** at Uppsala University 2007. (Formally fetched 2015)
2005	**Bachelor of Science in Physics** at Uppsala University 2005. (Formally fetched 2015)
2004	**Bachelor of Science in Mathematics** at Uppsala University 2004. (Formally fetched 2015)

Current position

3/2021-	**Senior Lecturer/Associate professor**, Department of Civil and Industrial Engineering at Uppsala University. Full time employment, time for research: 40 percent.

Previous positions

11/2017-3/2021	**Assistant professor**, Department of Civil and Industrial Engineering at Uppsala University. Full time employment, time for research: 70 percent.

11/2015-11/2017	**Post-doc**, at the Department of Engineering Sciences at Uppsala University. Full time employment. Time for research: 80 percent.
3-11/2015	**Researcher**, at the Department of Engineering Sciences, Uppsala University. Full time employment. Time for research: 80 percent.
8/2010-3/2015	**Ph.D. student**, at the Department of Engineering Sciences at Uppsala University. Full time employment. Time for research: 90 percent.
8/2007-9/2007	**Research assistant**, at the Department of Mathematics, Uppsala University.

Current Ph.D. students

9/2023-	**Santiago Valencia Gonzalez**, assistant supervisor, Dalarna University, Ph.D. defense 2027.
2/2023-	**Mohamad Koubar**, principal supervisor, including recruting. Ph.D. defense 2027.
9/2022-	**Marieke Rynoson**, assistant supervisor, Dalarna University, Ph.D. defense 2026.
5/2020-	**Oskar Lindberg**, principal supervisor May 2020 - January 2021. Co-supervisor February 2021-. Ph.D. defense 2024.

Graduated Ph.D. students

10/2023	**Umar Hanif Ramadhani**, assistant supervisor since first day, including recruiting. Passed Ph.D. degree on 9 April 2021.
9/2023	**Fatemeh Johari**, assistant supervisor since first day. including recruiting. Passed Ph.D. defense 15 September 2023.
6/2023	**Reza Fachrizal**, principal supervisor since first day, including recrution. Passed Ph.D. on 2 June 2023.
1/2021	**Dennis van der Meer**, assistant supervisor since first day, including assisting in recruiting. Passed Ph.D. defense on 22 January 2021.
9/2020	**Mahmoud Shepero**, principal supervisor since first day, including recruiting. Ph.D. defense 22 September 2020.
11/2018	**Rasmus Luthander**, assistant supervisor since June 2015, including recrution. Passed Ph.D. on 29 November 2018.

Graduated Licentiate students

9/2022	**Oskar Lindberg**, principal supervisor May 2020 - January 2021. Assistant supervisor February 2021-. Passed licentiate on 16 September 2022.
4/2021	**Umar Hanif Ramadhani**, assistant supervisor since first day, including recruiting. Passed licentiate degree on 9 April 2021.
1/2021	**Fatemeh Johari**, assistant supervisor since first day, including recruiting. Passed licentiate 20 January 2021.

10/2020	**Reza Fachrizal**, principal supervisor since first day, including recruiting. Passed licentiate degree 15 October 2020.
11/2018	**Dennis van der Meer**, assistant supervisor since first day, including recruiting. Passed licentiate degree on 16 November 2018. .
10/2018	**Mahmoud Shepero**, principal supervisor since first day, including recruiting. Passed licentiate degree on 22 October 2018.
5/2016	**Rasmus Luthander**, assistant supervisor, including recruition. Passed licentiate degreee on May 20 2016.

Mentorship/supervision

2022	**Reina Kobayashi**, visiting master student working on road widening research, from Osaka Institute of Technology, Japan, co-mentor.
2022	**Kun Qian**, visiting Ph.D. student working on electric vehicle charging research, from Danish Southern University, Denmark, mentor.
2022	**Elia Odelbasi**, visiting Ph.D. student, working on bike sharing research, from Ege University, Turkey, mentor.
2021-2022	**Mahmoud Shepero**, postdoc mentor.
2021-2023	**Âzeddine Frimane**, postdoc mentor.
2018-2019	**Jon Liisberg**, visiting Ph.D. student from DTU, Denmark, working on electricity use modeling. (co-mentor)
2016	**Bilal Babar**, visiting Ph.D. student from the Arctic University in Tromsø, Norway, working modeling electric vehicle charging and solar energy use. (co-mentor)

Appointments

2022	**Expert reviewer**, review panelist, Regionale Forskningsfond (RFF). Responsible for reviewing applications on traffic planning regarding electric vehicles.
2022-	**Expert** for "Citizen engagement initiative : Shaping the EU's climate future together" in "Horizon Europe Cluster 5 Climate, Energy and Mobility" for the Swedish ministry of infrastructure for the EU commission.
2022	**Expert reviewer**, Swiss National Science Foundation 2022. Responsible for reviewing an application in solar forecating for funding.
2022	**External reviewer**, Karlstad University, Sweden. Responsible for reviewing applications for the position as assistant professor in smart grids.
2021-2022	**Expert reviewer**, review panelist, Academy of Finland. Responsible for providing reviews to research applications on energy systems 2021 and 2022.
2020-2021	**Programme coordinator** of the international InnoEnergy-based Energy Technology Master Programme, Uppsala Univerity.
2018-2020	**Council member**, Energy Technology Master Programme, Uppsala University.

2019 **Faculty opponent** on Niklas Jakobsson's Ph.D. thesis defense (on electrification of private mobility) on November 4 2019 at Chalmers University of Technology, Gothenburg, Sweden.

2018-2021 **Degree project director** of the international InnoEnergy-based Energy Technology Master Programme, Uppsala Univerity.

2012-2015 **Consortium assistant** for the building consortium in the Programme Energy Systems research school. Responsible for co-organizing consortium meetings.

Awards, prizes and recognitions

2022-2023 **IVA's 100-list** prize for the research project SOLVE from the Royal Swedish Academy of Engineering Sciences 2022 and 2023. (Application assistant, collaborator, Ph.D. student supervisor and deputy theme leader)

2022 **Best course of the year award** for best course "Solar Energy Techhnology and Systems" on the Energy Systems Engineering programme 2021. Motivation: "Flawless course with teacher that care about their students", April 2022. (Presented to the course director Jonathan Scragg, I have responsibility for approximately half of the course and teach various parts)

2022 **Best course of the period award** for best course "Solar Energy Techhnology and Systems" on energy systems engineering programme fall 2021. Motivation: "It is precisely what a technology and systems course should be", March 2022. (Presented to the course director Jonathan Scragg, I have responsibility for approximately half of the course and teach various parts)

2019-2022 **Top 2 percent Stanford standardized science-wide citation indicator**, on yearly measure for four consecutive years 2019-2022. Placing position 2887 (2022), 4051 (2021), 3360 (2020) and 3773 (2019) in subfield "Energy". On career-long (all scientists all time) measure for 2022 with placing 5792 in subfield "Energy". (Ioannidis, John P.A. (202X), 202X data-update for "Updated science-wide author databases of standardized citation indicators", V2-6, doi: 10.17632/btchxktzyw.6)

2021 **Best poster award**, via my Ph.D. student Reza Fachrizal, for best project at SweGrids conference, Solna, Sweden, December 2021.

2020 **Front page featured article** at Journal of Renewable and Sustainable Energy in May 2020 (van der Meer D. W., Yang D., Widén J., Munkhammar J., Clear-sky index space-time trajectories from probabilistic solar forecasts: Comparing promising copulas).

2018 **Conference promotion prize**. A prize for best promoting the Solar Integration Workshop, Stockholm 2018.

2017 **Best paper award** from Solar Integration Workshop, Berlin October 2017.

2016 **Outstanding contribution in reviewing** from Elsevier Solar Energy 2016.

2014 **Ångström Academy Innovation prize and scholarship** (Prize) "for outstanding work in his Ph.D. project regarding self-consumption of photovoltaic power production in households as a means to increase the hosting capacity in the local distribution grid.", 2014.

2006 **MCS award**. Recognized for achievement in solving a problem-of-the-month for the academic year 2005/2006 as exchange student at CSUEB, Department Mathematics and Computer Science at CSUEB, San Francisco, USA, 2005.

Summary of bibliographical data

Google scholar	See up-to-date data at: `https://scholar.google.com/citations?user=5Taof-QAAAAJ&hl=en`
Researchgate	See up-to-date data at: `https://www.researchgate.net/profile/Joakim-Munkhammar-2`

Received grants

2023 **Extrication of grid capacity and flexibility based on simulated aggregated solar power production that considers the orientation of individual systems**, from the Swedish Energy Agency. Project leader: Johan Lindahl (Becquerel Sweden). Project leader for UU: Joakim Munkhammar. Project duration: 2023-2025. Total budget: 2 600 669 SEK. Received funding: 2 066 459 SEK. Recieved funding (UU): 845 085 SEK. (Co-applicant)

2023 **IEA Task 16: Solar resource for high penetration and large scale application**, funding for participation in the task in two fields: solar resource assesment (SMHI) and PV parks (UU). Project leader for UU: Joakim Munkhammar. Project duration: 2023-2026. Totalt budget: 285 ksek. (Co-applicant)

2023 **Solar parks as a flexible resource in space and time**, from Åforsk. Project leader: Joakim Munkhammar. Project duration: 1 September 2023 - 31 December 2025. Total budget: 1 897 729 SEK plus inkind, received funding: 1 897 729 SEK. My roles: principal investigator, PhD student supervisor, researcher. (Main applicant)

2021 **Smart charging strategies and optimal PV-EV sizing to increase the combined PV-EV hosting capacity in the distribution grid** from Swedish Centre for Smart Grids and Energy Storage (SweGrids). Project leader: Joakim Munkhammar, Uppsala University, with project for PhD student Reza Fachrizal. Project duration: 7/2021-12/2021. Total budget: 475 000 SEK, received funding: 450 000 SEK. My roles: principal investigator, PhD student supervisor, researcher. (Main applicant)

2021 **Virtuell testbädd för strategisk stads- och energiplanering genom integrerade digitala modeller**, from Formas smart built. Project leader Joakim Widén, Uppsala university. Project duration: 12/2021-11/2025. Total budget: 4 449 948 SEK, received funding: 2 224 974 SEK. My roles: reseacher, PhD student supervisor. (Co-applicant)

2020 **Dynamic Mobility Nudge: Shaping sustainable urban mobility behaviour with real-time, user-generated and public open data**, from JPI Urban Europe. Project leader Europe Veronika Hornung-Prähauser (Salzburg Research), project leader Sweden Mahmoud Shepero (3/2021-9/2022), Joakim Munkhammar (10/2022-4/2024). Project duration: 2021-April 2024. The project received a grant of 10 183 029 SEK. My roles: researcher, postdoc mentor and eventually Swedish project leader. (Co-applicant)

2018 **Probabilistic Forecasting for Battery Management**, from the Swedish Energy Agency SamspEl programme with project leader Patric Ollas (RISE). The project received a grant of 3 559 175 SEK. Project duration: 1/2019-12/2020. My roles: researcher, PhD student supervisor. (Co-applicant)

2018 **Activity-Based Urban Building and Mobility Energy Modeling (UBMEM) for Planning of Future Cities**, from Viable Cities strategic innovation programme with project leader Joakim Widén (Uppsala University). The project received a grant of 4 387 349 SEK. Duraction: 9/2018-12/2021. My roles: researcher, PhD student supervisor. (Co-applicant)

2017 **Modeling and implementation of smart-charging using the Annex D standard: Initial study**, from the Swedish Electromobility Centre with project leader Joakim Munkhammar (Uppsala University). The project received a grant of 1 000 000 SEK. Duration: 1/2018-6/2019. My roles: Principal investigator, researcher, PhD student supervisor. (Main applicant)

2016 **Energy storages for regional and local integration of heat and power systems**, from the Swedish Energy Agency SamspEl program. Project leader: Magnus Åberg (Uppsala University). The project received a grant of 2 732 947 SEK. Duration: 1/2017-12/2018. My role: researcher. (Co-applicant)

2016 **Development and evaluation of forecasting models for solar power and electricity use over space and time**, from Swedish Energy Agency SamspEl program. The project received a grant of 4 055 173 SEK. Project duration: 1/2017-12/2020. Project leader: Joakim Munkhammar (Uppsala University). My roles: principal investigator, researcher and PhD student supervisor. (Main applicant)

2015 **Increased Self Consumption of Photovoltaic Power for Electric Vehicle Charging in Virtual Networks**, a EU-ERA.NET Smart Grids plus project, with project leader Per Wickman (Solelia Greentech AB). Swedish research leader Joakim Munkhammar (Uppsala University). The project received a grant of 3 724 505 SEK. Project duration: 4/2016-4/2018. Main roles: Principal investigator in Sweden, researcher, PhD student supervisor. (Main applicant from a Swedish university)

2015 **Evaluation of technological solutions for managing extensive connection of photovoltaic systems in electricity distribution grids** from the Swedish Energy Agency program "El och bränsle från solen", with project leader Joakim Widén (Uppsala University). The project received a grant of 1 083 467 SEK. Project duration: 7/2015-1/2017. My role: researcher. (Co-applicant)

2015 **Developing holistic business models and IT services for prosumers** from Swedish Energy Agency program E2B2. Project leader: Cajsa Bartusch (Uppsala University). The project received a grant of 2 310 840 sek. Project duration: 7/2015-6/2018. My role: researcher. (Co-applicant)

2014 **Characterization of extensive photovoltaic power generation on city level** from Solelprogrammet, financed by the Swedish Energy Agency. Project leader Joakim Widén (Uppsala University). The project received a grant of 680 305 sek. Project duration: 1/2015-3/2017. My role: researcher. (Co-applicant)

Scholarships

2015 **Lundström-Åmans scholarship**, at Uppsala University, for mathematical investigations of polynomial approximation methods in probability theory with applications to power systems research. The research project scholarship received a grant of 50 ksek. It resulted in publication (Munkhammar et al. PLoS ONE 2017, see pub. list.). (Main applicant, principal investigator)

2015 **Liljewalchs travel scholarship**, Uppsala University, for conference visit PVSEC, Germany 2015. A grant of 15 ksek was received. (Main applicant)

2013 **Liljewalchs travel scholarship**, Uppsala University, for conference visit to ECEEE summer study, France 2013. A grant of 15 ksek was received. (Main applicant)

2012 **Formas grant**, Research presentation and conference visit to WREF, USA 2012. A grant of 20 ksek was received. (Co-applicant)

2012 **Håkanssons travel scholarship** for research visits to Cambridge University for a research collaboration and stay. A grant of 32 ksek was received. (Main applicant)

2001-2007 **Stiftelsen Elvira och Erik Ljungbergs minne scholarship**, a student scholarship based on origin and academic excellence, awarded each year on achievement basis, awarded seven consecutive years as an undergraduate student, 7-11 ksek per year. (Main applicant)

Additional project participation

2023-2024 **Churches as flexibility resources in the future power system** from Swedish Energy Agency 2022-2024. Project leader: Johannes Wikström, Church of Sweden. Researcher, responsible for simulations in work packages 1 and X with budget of approximately 500 ksek.

2021-2026 **SOLVE - Solelforskningscentrum (Solar Elecctricity Research Center Sweden)** from Swedish Energy Agency 2021-2026. Project leader: Jonathan Scragg. My roles in the center: Application assistant, collaborator, Ph.D. student supervisor and deputy theme leader.

2020-2023 **Flexibility and energy efficiency in buildings with PV and EV charging** from Swedish Energy Agency 2020-2023. Project leader: Patrik Ollas (RISE). I was collaborator and postdoc mentor.

2020-2023 **Increased utilisation of the grid with combined solar- and wind power parks** from the Swedish Energy Agency 2020-2023. Project leader: David Lingfors (Uppsala university). My role was collaborator abd Ph.D. student supervisor.

2020-2023 **Automatic mapping of solar panels and generation of solar forecasts through aerial imagery and machine learning**, from Swedish Energy Agency, 2020-2023. Project leader: Johan Lindahl (Becquerel Sweden). My role was collaborator and postodoc mentor.

Other scientific merits

Selected talks

2018 ”Forskningsresultat SolarCharge2020”, Swedish solar fair (Solelmässan), 27 November 2018. (Invited)

2018 ”Electric vehicle charging in space and time”, presentation for Uppsala society of technology, Ångström laboratory, Uppsala 18 October 2018. (Invited)

2018 ”Electric vehicle charging in space and time”, Docent lecture 5 September 2018.

2017 "Forskningsläget i projektet. Hur kan resultaten från projektet tillämpas i stor skala?" at the SolarCharge2020 public event "Ladda bilen med solel - smart och ekonomiskt!", Norrland Nation, Uppsala, 28 september 2017. (Invited)

2011- 1-2 research presentations at international conferences and research visits per year.

Software development

MCMForecasting, Matlab code for generating Uniform and Empirical Probability Density Distribution (EPDF) MCM forecasts, Github 2023.

MCMScenarios, Matlab code for MCM scenario forecasting, Github 2023.

N2Downscaling, was developed in Matlab and published at Github (as N2) in 2022.

MultiComponentMarkov, was developed in Matlab and published at Github in 2021.

MCM model for forecasting, was developed in Python and submitted to GitHub in 2019.

PolyDist, a complete package for the polynomial probability distribution method (published in 2017), was developed in Matlab and published at MathWorks filexchange, and was also developed in Python and published at Github.

Electric vehicle home-charging, I developed user-friendly (with GUI) software for the EV home-charging model published in 2013. This was available for free download from the division homepage, and has been used in multiple student thesis and research projects. This was programmed using Matlabs special GUI environment.

Solar irradiance variability, I developed user-friendly (with Matlabs GUI environment) software of the N-state, two-state and copula-based models for generating synthetic solar irradiance. This was programmed using Matlab.

Scientific editorial work

2021 **Book proposal reviewer** for Elsevier 2021.

2020 **Guest editor** for Energies special edition "Electric vehicle charging modeling".

2019 **Recognized reviewer** status achieved for Elsevier Applied Energy 2019.

2016 **Outstanding contribution in reviewing** from Elsevier Solar Energy 2016.

2016 **Recongized reviewer** from Elsevier Solar Energy 2016.

2011- **Scientific journal reviewer** for in particular journals Applied Energy (Elsevier), Solar Energy (Elsevier), Energies (MDPI), Journal of Renewable and Sustainable Energy (AIP) and Scientific Reports (Nature).

Administrative merits

2022-	**Visiting master student mentorship** for visiting master student.
2022	**Visiting Ph.D. student mentorship** for two international Ph.D. students visitor for my group at Uppsala University.
2021-	**Postdoc mentorship** for two postdocs at Uppsala University, including recruitment.
2020-2021	**Programme coordinator** for the international Master Programme in Energy Technology (KIC InnoEnergy MSc Entech) 1/2020 - 1/2021.
2018-2020	**Council member**, Energy Technology Master programme 2018-2020.
2016-	**Budget responsibility** for all of the research projects for which I have been principal investigator since 2016.
2012-2015	**Consortium assistant** for the building consortium in the Programme Energy Systems research school. Responsible for co-organizing consortium meetings.

Decision-making and leadership

2020-2021	**Programme coordinator** for the international Master Programme in Energy Technology (KIC InnoEnergy MSc Entech) January 2020 - January 2021.
2016-	**Group leader** for the transport part of the larger Built Environment Systems Group, including Ph.D. students, postdocs and visitors, since 2016.

Administrative documents

Here is a list of produced administrative documents.

2021	**J. Munkhammar**, A. Mihranyan, Verksamhetsrapport masterprogrammet i energiteknik, Uppsala University, report 2021.
2020	**J. Munkhammar**, Self-evaluation of the Master Programme i Energy Technology, Uppsala University, report 2020.
2020	J. Widén, **J. Munkhammar**, Verksamhetsrapport masterprogrammet i energiteknik, Uppsala University, report 2020.

Experience outside the university environment

2023	**Jury member**, Uppsala Sustainability Hackathon, May 2023.
2017-	**IEA task 16**, national collaborator from Sweden, including international meetings and publications.
2012-	**Co-founder, board member and technical director** of the Johnny Munkhammar memorial foundation. Selecting a recipient of a yearly award and co-organizing one major public seminar in Stockholm each year.

Collaboration with other universities and the surrounding community

Here i list collaborations at universities, with national and international partners.

National university research collaborations

2020-	**Department of Earth Sciences** and Uppsala University, on combined wind and solar park research.
2015-2017	**Mathematics department** at Uppsala University, on the development of our statistical models for solar irradiance variability and electric vehicle charging. Also collaborations on the PolyDist model both published as paper and as code in both Matlab and Python.
2016-	**IT department** at Uppsala University, on machine learning forecasting modeling, and on teaching "Project in infrastructure systems".
2019-	**Dalarna University**, collaborations on the research project "Activity-Based Urban Building and Mobility Energy Modeling (UBMEM) for Planning of Future Cities", and since 2022 collaborations and assistant supervisionship within the Solar Electricity Research Centre (SOLVE).
2010-2015	**Royal Institute of Technology**, collaborations on electric vehicle charging research.
2015-2017	**Nordita**, collaborations on statistical modeling for the PolyDist model both published as paper and as code in both Matlab and Python.

Industry and municipal collaborations

The industry and municipal collaborations have been present in the research projects and in the student thesis work on various courses. I have collaborated with the following industrial and municipal partners:

2022-	**Ellevio**, collaboration regarding a Ph.D. student project via co-supervisionship.
2021-	**Varberg Energi**, collaborations on the solar-wind hybrid park and city-wide energy measurements.
2020-	**Becquerel Sweden**, collaborations on research projects, mentorship of Post-doc and supervision of master students.
2018-	**RISE**, collaborations on the research projects "Probabilistic Forecasting for Battery Management" and "Flexibility and energy efficiency in buildings with PV and EV charging".
2018-	**Vattenfall RnD AB**, in particular collaborations on the research project "Modeling and implementation of smart-charging using the Annex D standard: Initial study" and on grid-impact research.
2017-2018	**China Euro Vehicle Technology AB**, in particular collaborations on the research project "Modeling and implementation of smart-charging using the Annex D standard: Initial study".
2015-2020	**Uppsala Parkerings AB**, collaboration on the SolarCharge2020 research project. Also collaborations on teaching, in particular "Independent projects in sociotechnical systems".

2015- **WSP**, collaborations on the research project "Activity-Based Urban Building and Mobility Energy Modeling (UBMEM) for Planning of Future Cities" and master thesis work.

2015-2020 **Solelia Greentech AB**, collaborations on the SolarCharge2020 research project. Also collaborations on teaching, in particular "Independent projects in sociotechnical systems". Also collaboration on thesis projects.

2014-2019 **Herrljunga elektriska**, collaborations on research projects, in particular "Evaluation of technological solutions for managing extensive connection of photovoltaic systems in electricity distribution grids" and "Flexibility and energy efficiency in buildings with PV and EV charging".

2014- **Vasakronan AB**, collaborations on the research project "Characterization of extensive photovoltaic power generation on city level" and SOLVE. Also collaborations on teaching, in particular "Independent projects in sociotechnical systems" and the solar energy courses.

2013-2014 **Sweco**, collaborations on thesis workers and on two reports on the impact of electric vehicle charging on the electricity grid (2013-2014).

2013 **STRI**, collaboration on demand-response and the electricity grid (with EV charging), resulting in an Elforsk report 2013.

2012- **Uppsala Municipality**, collaborations on research projects, in particular the SolarCharge2020 project and more recently the Formas project on city modeling. Also collaborations on teaching, in particular "Independent projects in sociotechnical systems" and other thesis work.

2012- **STUNS Energi**, collaborations on research projects, in particular on the project "Development and evaluation of forecasting models for solar power and electricity use over space and time". Also collaborations on teaching, in particular "Independent projects in sociotechnical systems" and other thesis work.

International research collaborations

2022- **Hong Kong City University**, Hong Kong, collaborating on smart charging research.

2022- **Aalto University**, Finland, collaborating on smart charging research.

2022- **Salzburg research**, Austria, collaborating regarding research on transportation modeling in cities (in DyMoN project).

2021- **MINES ParisTech - PSL University, Centre for processes, renewable energies and energy systems (PERSEE)**, France, collaborations on forecasting and smart charging research via the Smart4Res research project.

2019- **UC San Diego**, USA, collaborations on battery management system research.

2019-2021 **Singapore Institute of Manufacturing Technology**, Singapore, collaborations on probabilisitc solar forecasting research.

2018- **Denmark Technical University**, Denmark, collaborative research on Markov and machine learning models for household electricity use.

2018-2020 **ANU College of Science**, Australia. Collaborative research on solar irradiance variability and electric vehicle charging in space and time.

2017	**University of Washington**, USA, collaborative research on solar irradiance variability in space.
2015-2020	**The Arctic University of Tromsø**, Norway. Collaborative research on electric vehicle charging and solar energy on city scale.
2013-2017	**Cambridge University (Energy Efficient Cities Initiative)**, United Kingdom. Collaborative research on electric vehicle charging in cities.

International research visits and stays

2022	**Salzburg Research**, Salzburg, Austria, on site research visit 2022.
2019	**UC San Diego**, San Diego, USA, on site research visit 2019.
2018	**IEA task meeting Task 16**, Rapperswil, Switzerland, research meeting.
2016	**Fraunhofer ISE**, Karlsruhe, Germany, on site research visit 2016.
2014	**Arctic University**, Tromsø, Norway, on site research visit 2014.
2013-2014	**University of Cambridge**, intermittent stays at Cambridge, UK, working on in particular selected paper X.
2013	**Oxford University**, Oxford, UK, research visit.
2012	**National Renewable Energy Laboratory (NREL)**, Golden, USA, research visit.
2011-	**Scientific conferences**, on site visits to in total 18 international scientific conferences. Conferences have included ECEEE summer study (France), Grid integration workshops (Germany, Austria, Sweden, Ireland, Netherlands), IEEE electric vehicle conference (Italy), IEEE PVSC (USA), WREF (USA), EU-PVSEC (Germany, Sweden), EEVC (Switzerland) and PVPMC (Germany).

Engagements regarding the third task

I have published 17 popular scientific papers and books, I have also published 4 press releases on scientific projects and scientific achievements:

Press releases (4)

2020	”New solar forecasting model performs best”, Uppsala University news June 2020. (This then appeared in Swedish, English, Turkish, Arabic and Chinese news)
2018	”Nytt samarbete ska utveckla smart elbilsladdning”, press release for the Swedish Electromobility Centre project ”Modeling and implementation of smart-charging using the Annex D standard: Initial study”, 2018.
2017	”Stabil solel behöver pålitliga prognoser”, Press release for the Energy Agency funded project ”Development and evaluation of forecasting models for solar power and electricity use over space and time” 2017.
2015	”Elbilar och solel påverkar framtidens elnät”, press release for my Ph.D. defense at Uppsala University.

In terms of further media outreach interaction have also participated in 6 interviews regarding the research that I have conducted:

Interviews (7)

2023	"Energisystemforskning vid Uppsala universitet med internationellt genomslag", Uppsala University news 3 March 2023.
2020	"Hur fem miljoner elbilar ska laddas", Solcellskollen April 2020.
2018	"Faktiskt oklart om samhället kommer förlora 150 miljarder per år", Radio Sweden (Sveriges Radio), interviewed among several experts on electric vehicle charging, 2018.
2018	"Algoritmer ger snabbare och effektivare elbilsladdning", Swedish Electromobility Centre website 2018.
2018	"Smart laddning gör att elnätet står pall", OM (Sollentuna municipal magazine) no. 4, 2018. (On smart charging)
2018	"Så ska elsystemet klara elbilsrevolutionen", NyTeknik Nr. 4, 2018. (On electric vehicle charging in Sweden)
2016	"Uppsala i EU-projekt om solcellsladdning", Elbilen Sverige No. 5, 2016. (On the EU ERA.NET SolarCharge 2020-project)

Teaching courses

2023-	**Introduction to construction engineering**, 5hp, 1st cycle. Seminar leader, course assistant. Language: Swedish. Extent: 40 hours. Number of students: 72.
2022	**Writing scientific applications**, 2hp, 3rd cycle. Lecturing, leading seminars and examiner. Language: English. Extent: 20 hours. Number of students: 2.
2022	**Introductory course for the master programme in physics**, 5 hp, 2nd cycle. Supervising a student project. Language: English. Extent: 5 hours. Number of students: 1.
2021-	**Presenting scientific results**, 2hp, 3rd cycle. Establising, organizing and supervising. Language: English. Extent: 4 hours. Number of students: 3.
2020-	**District heating systems**, 5hp, 2nd cycle. Reading and grading reports. Language: Swedish. Extent: 8h per year, 24 hours in total. Number of students: 16 per year.
2019-2020	**Advanced solar radiation theory**, 3 hp. 3rd cycle Ph.D. course. Establishing, organizing, lecturing and project supervision. Language: English. Extent: 60 hours. Number of students: 3.
2020-	**Projects in infrastructure systems**, 5 hp, 2nd cycle. Course manager, seminar leader. Language: English. Extent: 340 hours. Number of students: 20-30.
2019-	**Solar thermal technologies**, 5 hp, 2nd cycle. Secondary examiner. Language: English. Extent: 4 hours. Number of students: 2 per year.
2018-2019	**Projects in infrastructure systems**, 5 hp, 2nd cycle. Assistant course manager, seminar leader. Language: English. Extent: 60 hours. Number of students: 20-30 per year.
2016-2017	**Grid connection of variable energy sources**, 5 hp, 2nd cycle. Lecturer. Language: English. Extent: 10 hours per year, 20 hours cumulative. Number of students: 20-30 per year.

2015-2017	**Presentation techniques**, 5 hp, 1st cycle. Commenting and grading student presentations and written reports. Language: Swedish. Extent: 40 hours per year, 120 hours cumulative. Number of students: 30 per year.
2014	**Perspectives on energy systems (POES)**, 7.5 hp. 3rd cycle, Ph.D. course commissioned by the Swedish Energy Agency. Guest lecturer 2014. Language: English. Extent: 10 hours. Number of students: 30.
2013-2015	**Renewable energy technology**, 5 hp, 1st cycle. Computer lab assistant. Extent: 15 hours per year, 45 hours cumulative. Language: English. Number of students: 10-30 per year.
2012-	**Independent project in sociotechnical systems sngineering**, 15 hp, 1st cycle. Course assistant, seminar leader and project supervisor for 2-9 students (1-3 projects) per year 2012-2020. Second examiner 2019-2022. Extent: 60 hours per year 2012-2020, cumulative 540 hours. Language: English. Number of students: 20-40 per year.
2011-2020	**Energy efficiency in buildings**, 5 hp, 1st cycle. Commenting and grading reports, assisting in seminars. Extent: 20 hours per year, cumulative 180 hours. Language: Swedish. Number of students: 30 per year.
2011-	**Solar energy - technology and systems**, 10 hp, 2nd cycle. Lecturer, course assistant, exam designer and lab assistant. Director of solar irradiance part since 2017. Extent: 60 hours per year 2011-2017. 110 hours per year for 2018-2021 and 200 hours for 2022: cumulative 1110 hours. Language: English. Number of students per year: 30-50.
2011-	**Solar energy technologies for electricity production**, 5 hp, 2nd cycle. Lecturer, course assistant, exam designer and lab assistant. Director of solar irradiance part since 2014. Extent: co-teaching with Solar Energy - Technology and Systems. Language: English. Extent: included in "Solar Energy - Technology and Systems". Number of students per year: 10-20.

Bachelor and master student supervision

I have been supervisor/subject reader for over 50 master thesis students, and over 40 bachelor thesis students. Ihave also been examiner for 16 master students.

Pedagogical Education

2018	**Pedagogical project course**. (Three weeks full time)
2017	**Academic Teacher Training Course**. (Five weeks full time)
2017	**Supervising Ph.D. students**. (Three weeks full time)
2015	**Doctoral Supervisor Training Course within Science and Technology**. (Two days full time)

Total number of weeks full time pedagogical course work: **11.5** (17 hp).

Pedagogical development

Development of new educational programme year

2020-2021 **Energy Technology Master Programme.** As a continuation from previous programme responsible for the Energy Technology Programme, I led the process for extending the master programme in Uppsala by adding year 1 (in addition to only year 2 previously) to Uppsala University, which was then eventually enacted in fall 2021.

Development of new courses

2022 **Writing scientific applications**, 2hp, 3rd cycle. Lecturing, seminar leader and examiner.

2021 **Presenting scientific results**, 2hp, 3rd cycle. Establising, organizing and supervising.

2019 **Advanced solar radiation theory**, 2hp, 3rd cycle course, including planning lecture series and supervision.

2019 **Ph.D. student seminar series**, 3hp, 3rd cycle course.

Improvements of existing courses

Projects in infrastructure systems, 2rd cycle course. Revising the history seminar, and course design, adding lecture, course compendium and completely making the course online 2021 and 2022. Updating seminars and re-fitting for completely on-site 2023.

Solar Energy - Technology and Systems, 10 hp, 2nd cycle. Revising lecture, exam questions, developing course compendium, later published as book. Completely making the course-components online 2020. Updating the lecture for 2022 on-site course.

Solar Energy Technologies for Electricity Production, 5 hp, 1st cycle. Revising lecture, exam questions, developing course compendium, later published as book. Completely making the course-components online 2020. Updating the lecture for 2022 on-site course.

Perspectives On Energy Systems (POES), adding a research-based lecture on the synergies between electric vehicle charging and solar power to the course.

Grid Connection of Variable Energy Sources, adding a research-based solar variability lecture to the course.

Course material development

2022 **Infrastructure systems course compendium** was developed for the 2nd cycle "Project in infrastructure systems" course.

2019 **Solar Radiation Theory**, development of course book for 2nd cycle courses "Solar Energy - Technology and Systems", "Solar Energy Technologies for Electricity Production", co-written with prof. Joakim Widén.

Software development for teaching

2021 **MCM model package** for Python, published on Github. It was used for bachelor thesis work 2021 and by Ph.D. students in research projects.

2016 **Electric vehicle home-charging**, I developed user-friendly (with GUI) software based on the EV home-charging model published in 2013, the in the literature commonly called "Grahn-Munkhammar model". This is available for free download from the department website, and has been used in multiple student thesis and research projects. The paper has been cited 127 times in the literature. The model itself has at least been explicitly used in 3 journal publications, 2 conference publications, 3 Ph.Lic. and Ph.D. thesis, 5 student thesis project and 2 reports by both our own group and by other Uppsala University and Gävle University and companies, e.g. STRI and Sweco.

Pedagogical leadership

In terms of pedagogical leadership it should be emphasized that teaching on courses "Presentation techniques" and "Presenting scientific results" in essence has implied teaching pedagogical aspects associated with engineering and science.

Course director and leadership

Projects in infrastructure systems, 5 hp, 2nd cycle. Assistant course director 2019, course director 2020-.

Degree project director and examiner, 30 hp, 2nd cycle. Energy Technology Master programme 2018-2020.

Council member, Energy Technology Master programme 2018-2020.

Independent Project in Sociotechnical Systems Engineering, 15 hp, 2nd cycle. Second examiner 2019-2022.

Solar Energy - Technology and Systems, 2nd cycle, 10 hp. Director of part of the course (manager of approximately half of the course) since 2017.

Solar Energy Technologies for Electricity Production, 5 hp, 1st cycle. Director of part of the course (manager of approximately half of the course) since 2017.

Educational coordination roles

2020-2021 **Programme coordinator** for the international Master Programme in Energy Technology (KIC InnoEnergy MSc Entech) January 2020-January 2021.
Responsibilities: Leading the programme, chairing the programme council, reporting to the faculty board of teaching, informing and keeping dialogue with programme students and assisting in student admissions. Also leading programme development, including self-evaluation of the programme, which was finished 2020. I also led the process for extending the master programme in Uppsala by adding year 1 (in addition to only year 2 previously) to Uppsala University, which was then enacted in fall 2021.

Pedagogical study and dissemination of pedagogical knowledge

2020 **Engineering pedagogical publication**. Based on peer-reviewed work on the extra-curricular course "pedagogical project course", I published a report on the use of open problems in engineering sciences: Munkhammar J., Enhancing creative and critical thinking with open problems in engineering sciences: an example from solar energy, pedagogical report Uppsala University (DIVA) 2020.

Popular and other pedagogical work

I have published 17 popular scientific papers and books, see my list of publications on my website at Uppsala University, Google scholar and ResearchGate.