Toshihiro Mukai

Contact information

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Current appointments

2024-present Senior Research Scientist, Socio-Economic Research Center, CRIEPI

Previous appointments & visiting positions

2016-2017 Visiting Scholar, Precourt Energy Efficiency Center, Stanford University

2013-2024 Research Scientist, Socio-Economic Research Center, CRIEPI

2011 Academic Visitor, Institute for Manufacturing, Cambridge University

Education

2013 Doctor of Engineering in International Development and Engineering, Tokyo Institute of Technology

2010 Master of Engineering in International Development and Engineering, Tokyo Institute of Technology

2008 Bachelor of Engineering in Physical System Engineering, Tokyo University of Agriculture and Technology

Publications

Journal articles

1. Toshihiro Mukai, Ken-ichiro Nishio, Hidenori Komatsu, Masanobu Sasaki (2021). "What effect does feedback have on energy conservation? Comparing previous household usage, neighbourhood usage, and social norms in Japan," *Energy Research & Social Science* 86, 102430.
2. Hyun Bae Kim, Toshiya Iwamatsu, Ken-ichiro Nishio, Hidenori Komatsu, Toshihiro Mukai, Yoko Odate, Masanobu Sasaki (2020). “Field experiment of smartphone-based energy efficiency services for households: Impact of advice through push notifications,” *Energy and Buildings* 223, 110151,
3. Osamu Kimura, Hidenori Komatsu, Ken-ichiro Nishio, Toshihiro Mukai (2018). “A prototype tool for automatically generating energy-saving advice based on smart meter data,” *Energy Efficiency* 11, 1247-1264.
4. Toshihiro Mukai, Ken-ichiro Nishio, Hidenori Komatsu, Teppei Uchida, and Kyoko Ishida (2016). "Evaluating a behavioral demand response trial in Japan: Evidence from the Summer of 2013," *Energy Efficiency*, 9, 911-924.
5. Toshihiro Mukai, Maurizio Tamasella, Ajith K. Parlikad, Naoya Abe, and Yuzuru Ueda (2014) "The competitiveness of condition monitoring of residential PV systems: A model and insights from the Japanese market," *IEEE Transactions on Sustainable Energy*, 5(4), 1176-1183.
6. Toshihiro Mukai, Shishin Kawamoto, Yuzuru Ueda, Miki Saijo and Naoya Abe (2013). "Residential PV system users' perception of profitability, reliability and failure risk: An empirical survey in a local Japanese municipality," *Energy Policy*, 39, 5440-5448.

Journal articles (in Japanese)

7. Kazuyoshi Nakano, Ken-ichiro Nishio, Toshihiro Mukai, Yoko Odate, Masanobu Sasaki (2021) “Field Experiment of Smartphone-based Energy Efficiency Services for Households: A Proposal of Personalization Method for Neighborhood Comparison,” *Journal of Japan Society of Energy and Resources* 42 (1), 18-29. (in Japanese)
   中野一慶、西尾健一郎、向井登志広、大舘陽子、佐々木正信（2021）スマートフォンを活用した家庭向け省エネサービスの実証研究:他世帯比較のパーソナライズ手法の提案、エネルギー・資源学会論文誌 42 巻 1 号 18-29.
8. Toshihiro Mukai, Takuro Tanaka (2020). “Classifying appliance ownership status using Residential CO2 Emission Survey data,” *Journal of Japan Society of Energy and Resources* 41 (6), 328-335. (in Japanese)
   向井登志広、田中拓朗（2020）家庭 CO2 統計を用いた機器保有状況の分類手法に関する検証、エネルギー・資源学会論文誌 41 巻 6 号 328-335.
9. Ken-ichiro Nishio, Toshihiro Mukai, Hidenori Komatsu, Masanobu Sasaki, Yoko Odate, Wataru Maeki (2020). “Field Experiment of Smartphone-based Energy Efficiency Services for Households: Methodology and Results of Hourly Electricity Usage Alert,” *IEEJ Transactions on Power and Energy* 140 (2), 78-85. (in Japanese)
   西尾健一郎、向井登志広、小松秀徳、佐々木正信、大舘陽子、前木和（2020）スマートフォンを活用した家庭向け省エネサービスの実証研究 : 1 時間使用量アラートの自動生成手法と運用実績、電気学会論文誌Ｂ（電力・エネルギー部門誌）、140 巻 2 号 78-85.
10. Toshihiro Mukai, Ken-ichiro Nishio, Hidenori Komatsu, Kazuyuki Kobayashi, Masanobu Sasaki, Wataru Maeki (2020). Smart Meter-based Home Energy Report: Design and Operation of Automatic Generation System of Hourly Usage Indication Message, *IEEJ Transactions on Electronics Information and Systems* 140(7):835-845. (in Japanese)
    向井登志広、西尾健一郎、小松秀徳、小林和幸、佐々木正信、前木和（2020）スマートメータ版ホームエナジーレポートの実証研究 : 時間帯指摘文章の自動生成手法と運用実績、電気学会論文誌Ｃ（電子・情報・システム部門誌）、140 巻 7 号 835-845.
11. Hidenori Komatsu, Toshihiro Mukai, Ken-ichiro Nishio, Katsumasa Ihara, Masanobu Sasaki, Takashi Ogawa, Satoko Otani, Chika Ito, Yoko Odate (2019) “Empirical Experiments for Smartphone App Energy Conservation Services Targeting Residential Sectors: The Energy Conservation Effect in Winter 2017,” *Journal of Japan Society of Energy and Resources* 40 (3), 39-48. (in Japanese)
    小松秀徳、向井登志広、西尾健一郎、伊原克将、佐々木正信、小川崇、大谷智子、伊藤千加、大舘陽子（2019）スマートフォンを活用した家庭向け省エネサービスの実証研究： 2017 年度冬期の省エネ効果、エネルギー・資源学会論文誌 40 巻 3 号 39-48.
12. Ken-ichiro Nishio, Toshihiro Mukai (2016). “Behavior changes in use of home appliances effected by Time-Of-Use tariff: Bias-adjusted questionnaire data analysis based on propensity score,” *Journal of Environmental Engineering*, 81 (729), 1025-1034. (in Japanese)
    西尾健一郎、向井登志広（2016）時間帯別料金による家電利用行動の変化 : 傾向スコアでバイアス補正をしたアンケートデータ分析、日本建築学会環境系論文集 81 巻 729 号 1025-1034.
13. Toshihiro Mukai, Ken-ichiro Nishio, Hidenori Komatsu, Teppei Uchida, and Kyoko Ishida (2015). "Peak Demand Management on High-Voltage Power Receiving Condominium II: Evidence of Peak Savings’ Temporal Change

and Factors from the Winter of FY2013," *Journal of Japan Society of Energy and Resources* 36 (4), 1-11. (in Japanese)

向井登志広、西尾健一郎、小松秀徳、内田鉄平、石田恭子（2015）高圧一括受電マンションにおける電力ピーク抑制策の実証研究(その 2)：2013 年度冬の効果経時変化と要因検証、エネルギー・資源学会論文誌 36 巻 4 号 1-11.

14. Toshihiro Mukai, Ken-ichiro Nishio, Hidenori Komatsu, Teppei Uchida, and Kyoko Ishida (2014) "Peak Demand Management on High-Voltage Power Receiving Condominium: Experimental Evidence of Peak Reduction and Consciousness Transformation from the Summer of 2013," *Journal of Japan Society of Energy and Resources* 35 (4), 7-17. (in Japanese)

    向井登志広、西尾健一郎、小松秀徳、内田鉄平、石田恭子（2014）高圧一括受電マンションにおける電力ピーク抑制策の実証研究：2013 年夏のピーク抑制・意識変容効果の検証、エネルギー・資源学会論文誌 35 巻 4 号 7-17.

15. Toshihiro Mukai, Ken-ichiro Nishio, Hidenori Komatsu, Teppei Uchida, and Kyoko Ishida (2014). "Peak Demand Management on High-Voltage Power Receiving Condominium: Experimental Evidence of Peak Reduction and Consciousness Transformation from the Summer of 2013," *Journal of Japan Society of Energy and Resources* 35 (4), 7-17. (in Japanese)

    向井登志広、西尾健一郎、小松秀徳、内田鉄平、石田恭子（2014）高圧一括受電マンションにおける電力ピーク抑制策の実証研究：2013 年夏のピーク抑制・意識変容効果の検証、エネルギー・資源学会論文誌 35 巻 4 号 7-17.

16. Hidenori Komatsu, Ken-ichiro Nishio, Toshihiro Mukai, Yasushi Shinohara (2014) "Automatic generating system for reports on energy conservation tips based on electricity demand data," *IEEJ Transactions on Electronics, Information and Systems* 134(9), 1394-1405. (in Japanese)

    小松秀徳、西尾健一郎、向井登志広、篠原靖志（2014）電力消費量データを活用した省エネルギーアドバイスレポートの自動生成システム、電気学会論文誌Ｃ（電子・情報・システム部門誌)、134 巻 9 号、1394-1405.

17. Toshihiro Mukai, Naoya Abe, Toshiya Morizumi (2014) "The Influence of Failure Risk Information on Residential PV System Customers: Empirical Evidence of Preference Change Using a Latent Class Model," Review of Environmental Economics and Policy Studies 7(2), 50-62. (in Japanese)

    向井登志広、阿部直也、森住俊哉（2014）住宅用太陽光発電システムにおける不具合リスク情報の効果検証：潜在クラスモデルによる選好変容の実証研究、環境経済・政策研究 7 巻 2 号 50-62.

Conference papers

18. Takenobu Kaida, Toshihiro Mukai, Tsuyoshi Hamayashiki (2023). "Industrial heat pumps in Japan: Current status and Future Prospects," *14th IEA Heat Pump Conference*, Chicago, May 15-18.
19. Toshihiro Mukai, Ken-ichiro Nishio, Hidenori Komatsu, Toshiya Iwamatsu, Kim Hyunbae, Kazuyoshi Nakano, Masanobu Sasaki, Takashi Ogawa, Satoko Otani, Chika Ito, Yoko Odate, Wataru Maeki (2019) "Comparing matching methods in behavioral programs: An evaluation of smartphone energy management app," *International Energy Program Evaluation Conference*, Colorado, August 20-22.

20. Toshihiro Mukai, Ken-ichiro Nishio, Hidenori Komatsu, Teppei Uchida, and Kyoko Ishida (2015). "Evaluating a Behavioral Demand Response Trial in Japan: Evidence from a One-year Experiment" *International Energy Policies and Programmes Evaluation Conference*, Berlin, August 11-13.
21. Toshihiro Mukai, Naoya Abe, and Yuzuru Ueda (2011). "Development of reliability model for residential solar photovoltaic energy systems using MCMC". *26th European Photovoltaic Solar Energy Conference and Exhibition*, Hamburg, September 5-6.

CRIEPI's reports and papers (in Japanese)

22. Toshihiro Mukai (2025) "Preferences to industrial Heat Pump Subsidies: Evidence from a conjoint survey," CRIEPI Report SE24005. (in Japanese)
向井登志広（2025）産業用ヒートポンプ補助事業の検討―コンジョイント調査に基づく分析―、電力中央研究所報告 SE24005.
23. Ken-ichiro Nishio, Nanami Yoshioka, Toshihiro Mukai (2025) The state of electricity savings in homes and firms in the summer of 2024, CRIEPI Report SE24003. (in Japanese)
西尾健一郎、吉岡七海、向井登志広（2025）家庭と事業所における 2024 年夏の節電の実態、電力中央研究所報告 SE24003.
24. Toshihiro Mukai (2023). "Barriers and opportunities for industrial electrification: Survey to manufacturing industry in Japan," Review of Electricity Economics 69, 118-129. (in Japanese)
向井登志広（2023）産業部門における電化バリアと課題―国内製造業を対象としたアンケート調査―、電力経済研究 No.69.
25. Toshihiro Mukai (2022) "Policy recommendations on achieving transport decarbonization by local governments: A review of leading local governments in the US and EU," CRIEPI Report SE21005. (in Japanese)
向井登志広（2022）運輸脱炭素化に向けた取組の検討－欧米の自治体の先進事例とわが国への示唆－、電力中央研究所報告 SE21005.
26. Toshihiro Mukai, Ayako Yasuoka (2020) "Productivity benefits of electrified heating technologies in industry: Current status of challenges," CRIEPI Research Document Y19505. (in Japanese)
向井登志広、安岡絢子（2020）産業部門における電気加熱の生産性便益―評価方法の現状と課題―、電力中央研究所研究資料 Y19505.
27. Ken-ichiro Nishio, Toshihiro Mukai, Yu Nagai, Kenta Ofuji (2018) "Interpretation issues on decoupling between economic growth and environmental burden," Review of Electricity Economics 65, 45-54. (in Japanese)
西尾健一郎、向井登志広、永井雄宇、大藤建太（2018）経済成長と環境負荷のデカップリングの解釈をめぐる課題、電力経済研究 No.65.
28. Ken-ichiro Nishio, Toshihiro Mukai (2016). "Challenges of design and evaluation of pilot studies on energy efficiency and demand response," CRIEPI Report Y15009. (in Japanese)
西尾健一郎、向井登志広（2016）省エネルギー・デマンドレスポンスの実証研究における実験計画や効果検証のあり方、電力中央研究所報告 Y15009.
29. Hidenori Komatsu, Osamu Kimura, Ken-ichiro Nishio, Toshihiro Mukai (2015). "An automated energy report generation tool based on smart meter data -A conceptual design aiming at information services for commercial

customers-," CRIEPI Report Y15004. (in Japanese)
小松秀徳、木村宰、西尾健一郎、向井登志広（2016）スマートメータデータを活用した省エネルギーアドバイス自動生成ツール －中小事業所向けサービスのための基本設計－、電力中央研究所報告 Y15004.

30. Toshihiro Mukai, Ken-ichiro Nishio, Hidenori Komatsu, Teppei Uchida, Kyoko Ishida (2015). "Information feedback and behavior change using smart meter data: Evidence of peak saving and energy conservation with residential sector," CRIEPI Report, Y15002. (in Japanese)
向井登志広、西尾健一郎、小松秀徳、内田鉄平、石田恭子（2015）スマートメータデータを活用した情報提供と行動変容－集合住宅におけるピーク抑制・省エネ実証事例－、電力中央研究所報告 Y15002.

Awards

2021 Kaya Award, Japan Society of Energy and Resources（エネルギー・資源学会 茅賞）

2011 Student Award, 26th European Photovoltaic Solar Energy Conference and Exhibition (EU PVSEC)