David Cardona-Vasquez

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Graz, Styria, Austria

OBJECTIVE

Ph.D. Candidate at the Graz University of Technology with degrees in computer engineering (B.Eng, M.Eng.) and economics (B.Sc.), specializing in energy systems modeling. My work focuses on electricity markets modeling, energy systems optimization, and applied machine learning. I have extensive professional experience in the energy utility sector and academic experience through participation in multiple projects and a demonstrated commitment to teaching and mentorship, including master's-level lectures and co-supervision of master's theses. I am currently seeking a postdoctoral or academic research position to contribute to the challenges of the energy transition.

EXPERIENCE

- **Graz University of Technology - Inst. of Electricity Economics and Energy Innovation [🌐]** *November 2021 -*
University Assistant — Graz, Austria
  - Research on applying machine learning to improve the tractability of large-scale energy system optimization models
  - Developed a ML-based methodology to disaggregate large-scale energy system optimization models in the presence of time-liking inequality constraints (i.e., ramping)
  - (Co-)Taught the following courses: Applied Energy Planning, Energy and Environment, Micro and Macroeconomics for Electrical Engineers, Special Problems in Electricity Economics

- **EDF Andes (Colombia) [🌐]** *May 2021 - November 2021*
Regulation and Market Analyst — Bogota, Colombia
  - Participated in the development of a proposal to consider rolling PPAs in the project finance assessment of new investment projects
  - Developed the initial set up of data storage and analysis tools for the market analysis at the Colombian branch of EDF Andes

- **XM S.A. (Colombia's ISO) [🌐]** *February 2021 - April 2021*
Data and Analytics Specialist — Medellin, Colombia
  - Lead data scientist position
  - Participated in the development of the initial strategy to use advanced analytics to improve business processes
  - Lead the implementation of the first version of the public API
  - Lead the modernization of the public BI portal (Sinergox)
  - Developed a prototype chatbot in C# that integrated with Teams and provided up-to-date market data

- **XM S.A. (Colombia's ISO) [🌐]** *November 2013 - January 2021*
Market Operations Analyst — Medellin, Colombia
  - Lead the implementation of multiple regulatory adjustments
  - Developed extensive analyses and reports about the wholesale electricity market
  - Coordinated the Market Settlements team
  - Provided training to market participants
  - Performed the daily and monthly market settlement processes

EDUCATION

- **Graz University of Technology** *March 2022 - October 2025 (expected)*
  Dr. der techn. Wissenschaften - Elektrotechnik Graz, Austria
  ∘ GPA: <1.5/5 (partial)

- **EAFIT University** *July 2015 - June 2020*
  B.Sc. in Economics Medellin, Colombia
  ∘ Grade: 4.0/5.0

- **National University of Colombia** *February 2009 - December 2010*
  M.Eng. in Systems Engineering Medellin, Colombia
  ∘ Grade: 4.7/5.0

- **National University of Colombia** *February 2004 - December 2008*
  B.Eng. in Computer and Systems Engineering Medellin, Colombia
  ∘ Grade: 4.0/5.0

PROJECTS

- **Netzero-OPT** *January 2024 -*
  Tools: [Python, Scikit-learn, Pyomo, Excel, Linux, Git] [⊕]
  Optimization and data aggregation for net-zero power systems
  ∘ Researched computational techniques to improve tractability of optimization models with time-linking constraints
  ∘ Developed and validated a machine-learning based approach to perform ex-ante model disaggregation

- **ÖSpeicher 2040** *July 2023 - September 2023*
  Tools: [GAMS, Excel, Python] [⊕]
  Medium- and long-term energy storage requirements in the Austrian electricity system 2040.
  ∘ Developed several scripts to extract data from the TYNDP
  ∘ Created the initial the dataset for GAMS model
  ∘ Developed multiple scripts to perform post-processing of the optimization model results

- **MILES** *October 2022 - March 2024*
  Tools: [GAMS, Excel, Python] [⊕]
  Medium- and long-term storage technologies on the way to 100% renewable energy in Austria
  ∘ Performed data preparation for the LEGO energy system optimization model
  ∘ Researched potential business cases for different storage technologies

PUBLICATIONS J=JOURNAL

[J.1] D. Cardona-Vasquez, A. M. Konrad, Y. Werner, S. Wogrin (2025). **Disaggregation of Energy System Optimization Models Using Machine Learning for Identification of Active Constraints**. *Sustainable Energy, Grids and Networks (Accepted for publication)*, Vol. 43, 101772. DOI: 10.1016/j.segan.2025.101772

[J.2] D. Cardona-Vasquez, T. Klatzer, B. Klinz, S. Wogrin (2024). **Enhancing time series aggregation for power system optimization models: Incorporating network and ramping constraints**. *Electric Power Systems Research*, Vol. 230, 110267. DOI: 10.1016/j.epsr.2024.110267

[J.3] D. Cardona-Vasquez, J. Garcia-Rendon, A. Arango-Manrique (2024). **Effect of the intermittency of non-conventional renewable energy sources on the volatility of the Colombian spot price**. *Renewable Energy*, Vol. 232, 121073. DOI: 10.1016/j.renene.2024.121073

[J.4] D. Cardona-Vasquez, D. DiTondo, S. Wogrin (2022). **On the aggregation of input data for energy system models**. *e&i Elektrotechnik und Informationstechnik* , Vol. 139, pp. 673-681. DOI: 10.1007/s00502-022-01073-6

SKILLS

- **Specialized Area:** Time series analysis, econometrics, machine learning, economic modeling, energy systems optimization, forecasting
- **Programming Languages:** Python, R, VBA, Matlab, C#, Julia, Lisp
- **Web Technologies:** Dash, Django, Flask, RShiny
- **Database Systems:** SQL Server, Oracle, MySQL, MongoDB
- **Data Science & Machine Learning:** Python and R stacks (e.g., Scikit-learn, caret, e1071), Power BI
- **Cloud Technologies:** Azure
- **DevOps & Version Control:** Git

HONORS AND AWARDS

- **Fulbright Scholarship for Doctoral Studies in the USA - Awarded but declined** *July 2021*
  Fulbright Comission Fulbright Comission - Colombia[🌐]
  - Scholarship and allowance to pursue doctoral studies in a university in the USA
  - Highly regarded and provides wide recognition once the studies are finished

LEADERSHIP EXPERIENCE

- **Coordinator of the Analytics and Information Team** *January 2019 - April 2021*
  XM S.A. (Colombia's ISO)
- **Coordinator of the Market Settlements Team** *January 2016 - December 2018*
  XM S.A. (Colombia's ISO)

VOLUNTEER EXPERIENCE

- **Journal Reviewer** *January 2023 - Present*
  Elsevier
  - Regular reviewer for Elsevier journals related to energy systems modeling

PROFESSIONAL MEMBERSHIPS

- **INFORMS**, Membership ID: 1896474 *March 2022 - Present*

CERTIFICATIONS

- **Certifying Body: INFORMS** Certified Analytics Professional -Expert *December 2022*

ADDITIONAL INFORMATION

Languages: Spanish (Native), English (C1), German (B1)

REFERENCES

Contact information will be provided on request

1. **Juan C. Bedoya-Ceballos, Ph.D.**
   Director of Regulatory Affairs
   Colombian Ministry of Mines and Energy
   Relationship: Manager during time at Colombian ISO

2. **Dr. Robert Gaugl**
   Assistant Professor / Institute of Electricity Economics and Energy Innovation
   Graz University of Technology
   Relationship: Colleague during doctoral studies

3. **Dr. Diego A. Tejada-Arango**
   Research Scientist
   TNO
   Relationship: Colleague during time at Colombian ISO

4. **Univ.-Prof. Dipl.-Ing. Dr. Sonja Wogrin, M.Sc.**
   Institute Lead / Institute of Electricity Economics and Energy Innovation
   Graz University of Technology
   Relationship: Doctoral thesis supervisor