

Airaj Sadeq

Energy Engineer

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ABOUT ME

Energy engineer specializing in building energy performance and retrofit decision making, from calibrating building energy models against real utility and measurement data to identifying priority retrofit interventions. Background spans academic research through to on the ground program delivery, including multi megawatt solar feasibility studies and stakeholder facing program management.

WORK HISTORY

- 2025–present **Research Fellow**, Betalab, University of Padova, Padova
- Analyzed electricity and gas consumption across the University of Padova’s non-residential building stock (utility bills and simulations, current-state and retrofit scenarios), defining technical-economic KPIs to prioritize retrofit interventions.
 - Built the building energy model in OpenStudio for a prototype timber building under the VALORLEGNO regional research project, running thermal-bridge and surface-condensation analysis alongside in-situ thermal measurements.
- 2019–2022 **Program Manager**, FourCorner Consulting, Kabul
- Stabilized a portfolio of at-risk contracts by introducing a new stakeholder-management framework, earning promotion from Assistant Project Manager to Program Manager within three years.
 - Delivered feasibility studies covering 12.3 MW of combined solar capacity across two government-commissioned projects: 2.3 MW (Kabul Polytechnic University) and 10 MW (Mazar-i-Sharif).
 - Assessed environmental and social risk for a proposed floating solar installation on the Naghlu Dam.
 - Managed the team delivering eight campaign videos and a full event-branding package for a GIZ-funded national energy-awareness campaign (Afghanistan Sustainable Energy Week).

PROJECTS

- 2025 **MasterB** — decision-support tool for building-portfolio retrofit planning
- Took an internal research script — a physics-based building-energy-simulation engine with no interface — and turned it into a full layered web application (frontend, API, service layer, database), making it usable by non-technical portfolio managers.
 - Rebuilt the simulation/calibration pipeline into a modular architecture and designed a scenario builder covering envelope, HVAC, distribution, lighting, ventilation, and solar retrofit options.
 - Built the data-driven cost-calculation engine and heat-pump model that power the tool’s investment-comparison output, and validated the economic model against real reference numbers.

- 2026 **Valorlegno — Building Energy Model**
- Built a detailed whole-building energy model in OpenStudio covering geometry/zoning, envelope construction, climate data, internal loads/schedules, and a fully parameterized Air Handling Unit with heating/cooling coils and control logic.
 - Sized the AHU using dynamic load calculations and validated system performance, confirming comfort setpoints were maintained across all occupied zones, even under extreme weather conditions.
 - Produced an annual energy-use breakdown by end use (heating, cooling, fans, lighting, equipment) to identify major energy drivers and optimization opportunities.
- 2026 **Valorlegno — Thermal Bridge Analysis**
- Performed 2D finite-element thermal bridge analysis on 14 key envelope junctions (roof-to-wall, floor-to-wall, attic slabs, door heads/sills, corners, internal intersections) per UNI EN ISO 10211.
 - Calculated linear thermal transmittance (Ψ -value) and minimum internal surface temperatures for each junction, confirming all points met regulatory limits with no condensation risk under design conditions.
- 2026 **Valorlegno — Interstitial Condensation Analysis**
- Assessed two wall envelope assemblies for interstitial condensation risk per UNI EN ISO 13788 (Glaser method), modeling each layer's thermal conductivity and vapor resistance.
 - Confirmed both assemblies stayed well within the regulatory condensate threshold, verifying long-term moisture durability of the chosen construction solutions.

EDUCATION

- 2022–2025 **MSc Energy Engineering**, University of Padova
 Thesis: “Energy performance simulation of non-residential buildings: the case study of the University of Padova.” Developed a multi-stage calibration methodology for Urban Building Energy Models (UBEM) on the University of Padova's non-residential building stock using the EURECA simulation platform, cutting simulation error from 284% to 11% (gas) and 383% to 34% (electricity). Used the calibrated models to assess retrofit scenarios.
- 2016–2019 **BSc Energy Engineering**, Kabul University
 Thesis: “Role of micro-hydropower plants in socio-economic development of rural Afghanistan.” Evaluated the feasibility and socio-economic impact of micro-hydropower installations in Afghanistan's mountainous, off-grid regions — a case study in Parwan province combining resident interviews and on-site data collection, assessing alignment with UN Sustainable Development Goals 7 (energy access) and 8 (economic growth).

SKILLS

- **Technical:** EnergyPlus, OpenStudio, QGIS, Python, MATLAB, CAD, Revit, FEMM, L^AT_EX.
- **Other:** Stakeholder & team management, program/project delivery, cross-disciplinary research collaboration.

LANGUAGES

Farsi (native), English (C2), Italian (B1).