Memorandum

To: Maddie Koewler – NASEO (mkoewler@naseo.org)
From: Hal Nelson, Ph.D. – Res-Intel (Hal.Nelson@Res-Intel.com). 909.660.0109
Date: 18 May 2023
Subject: NASEO Request for Information (RFI) – Implementation Options for Home Energy Performance-Based Whole-House Rebate Program and High-Efficiency Electric Home Rebate Program

1. Res-Intel's DEIA Initiatives

Residential Energy and Water Intelligence (Res-Intel) an energy-equity software company based in Portland, Oregon. The goal of our work is to help enable access to affordable and clean energy to all individuals, regardless of their socioeconomic background, race, gender, or physical abilities. Our work started with the underserved multifamily (MF) sector which is the most housing and energy insecure (Drehobl et al., 2020). Our analytics (undergoing peer-review at *Energy Efficiency*)[1] have provided a first-ever look at energy-use in MF naturally occurring affordable housing. Using a sample of 62,000 MF complexes across California, we find the energy-use intensity (kBTU/sqft) of the lowest-income MF properties are up to 50% greater than higher-income MF properties. These low-income properties have the highest share of tenant-metered electricity configurations, and tend to be older, low-rise (1-3 story) developments.

- If you subscribe to the *Measure->Manage->Mitigate* truism, then it is only after we understand and have measured energy equity gaps can we then manage and mitigate them. Otherwise, unintended consequences and/or ineffective programs will be the result.

Res-Intel's mission cannot succeed without the input of diverse voices; and our approach of utilizing mass-scale analytics to help reduce carbon emissions and lower energy burdens only works with participation from the communities most affected. Dr. Hal T. Nelson, Res-Intel's CEO, is pushing the boundaries of energy equity with his survey research on tenant displacement from building energy retrofits[2] as well as his survey research to Households of Color on what energy services they value.[3] Dr. Nelson, in his role as a professor at Portland State University includes his Anti-Racist Policy Professional module in his classes. This module identifies institutional racism and provides managerial tools to mitigate it.

While we are a white-owned company currently, we are committed to growing our diversity, equity, inclusion and accessibility initiatives. The Res-Intel team recognizes the importance of using our position and privilege to uplift historically disenfranchised groups as a matter of practice. Res-Intel crafts job advertisements with inclusive, language encouraging members of under-represented groups to apply. We recruit on platforms such as Handshake, which caters to students of more than 1,000 colleges and universities, including Historically Black Colleges and Universities. All of Res-Intel employees work remotely, which allows employees the flexibility of working when and where they are able. Senior managers understand the value of diverse voices in operations, and have open channels of

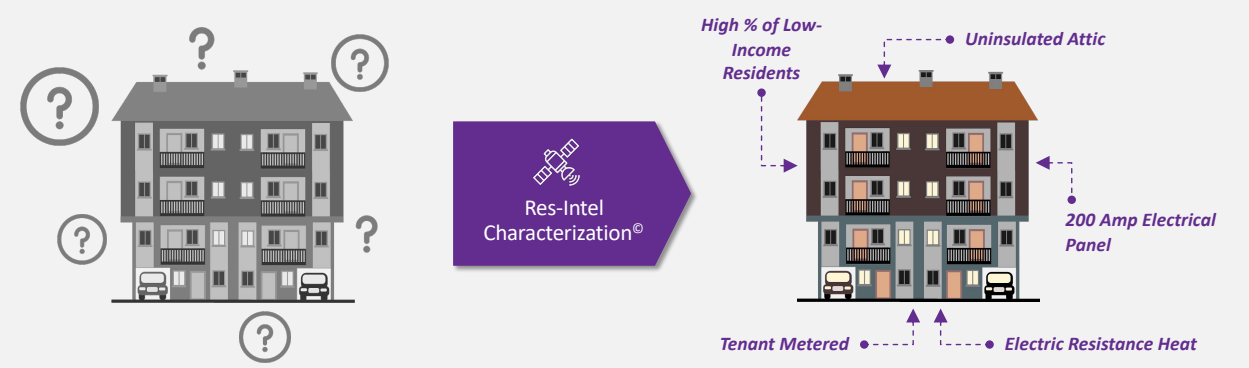
[1] https://bit.ly/Res-Intel_MF_EE
[2] Nelson, H., Brey, A., Ahrens, P. (2022). Nothing For Us Without Us: Affordability Covenants and Resident Preferences for Energy Efficiency Retrofit Programs. Paper presented at the 2022 Summer Study on Energy Efficiency in Buildings. 21-26 Aug. ACEEE. https://bit.ly/Tenant_Dispalcement
[3] https://bit.ly/Households_of_color

communication with all employees via the messaging platform Slack. Virtual meetings utilize software that can generate closed captions, and Res-Intel seeks to provide accessibility options whenever possible.

2. Multifamily Whole Building Retrofit Program Planning and Implementation in California

This year, Res-Intel will benchmark more MF properties (~100,000) than the EPA's Portfolio Manager. We are able to do this because Res-Intel is currently working with all electric investor-owned utilities (IOUs) in California to improve the effectiveness and efficiency of their new Multifamily Whole Building (MFWB) retrofit program.[4] The program offers "end-to-end treatment of the entire building by developing treatment plans that combine in-unit, common area, and whole building measures". The program offers a range of energy-saving measures, such as weatherization, insulation, lighting upgrades, appliance replacements, and HVAC replacements.

As a result of our collaboration with California utilities, Res-Intel has developed the Residential Characterization Tool with Artificial Intelligence to help the IOU's plan and implement their programs in underserved communities. The Characterization Tool integrates public property data with utility energy data to automate energy analytics at the property-level. The Tool enables low-income programs to "get to know" every residential property in a city/county/state, revealing information that is otherwise nearly impossible to obtain:



The Tool is part of Res-Intel's Benchmark.AI software, which integrates building footprint, satellite imagery, and Light Detection & Ranging (LiDAR) data to model missing property attributes that are necessary for building energy benchmarking, energy disaggregation, and customized energy efficiency (EE) recommendations. These recommendations are used to identify and target high-priority properties for resilience, electrification, and EE retrofits. We use utility billing data to estimate actual energy-use (preferred), or if that is not available, then we can use public ResStock end-use load profiles to generate predicted energy use for each property based on its use-code, size, and energy consuming devices.[5] Res-Intel is integrating the CPUC's "Need States" indicators into its Tool. These include: medical baseline customers, "hard-to-reach", disadvantaged, rural, tribal areas, high wildfire risk areas, and others.

3. Program Elements

We strongly recommend that the NASEO programs' scope includes:

- The HOMES program should include MF sector in addition to the single-family sector. Single family is easy to analyze (single meter, single property) and has been the focus of historical utility programs meaning the MF sector is hugely underserved.

[4] https://mcp.customerapplication.com/
[5] https://resstock.nrel.gov/

- Both programs should focus on naturally occurring affordable housing (NOAH): Deed-restricted low-income housing is newer, more efficient, and has existing retrofit programs.[6]

We strongly recommend that the NASEO programs' planning includes:

- The HEERA program planning funding should support jurisdictional development of building energy benchmarking ordinances and building performance standards for MF properties, as well as Time of Sale home energy ratings for single family properties. These ordinances are proliferating across the country and most local governments have limited staff and capacity to perform due diligence and stakeholder outreach. The minimum covered building size is being reduced to 20,000 square feet in many cases and compliance by landlords takes 8-10 labor hours ($800 fully loaded labor cost).
    - As part of their planning efforts, NASEO programs can support the development of tools like mass-scale building energy benchmarking that can be used for low-cost compliance with these programs by NOAH property owners.
- Funding MF property and building inventories as part of program planning efforts. Due to flaws in the US Census methodology[7] (and duplicative CoStar and county assessor property records), no one knows how many MF properties are in any given jurisdiction. Occupied building inventories using building footprints are further needed to accurately stratify MF properties for EE stock assessments (NYSERDA has done this for their 5+ unit MF sector).
- Planning needs to include whole property energy-use estimates using either utility meter matching (preferred) where 95%-98% of utility meters are matched to properties, or building stock (ResStock) energy estimates.
    - Analytics need to include: 1) Energy disaggregation into heating, cooling, and baseload energy use, 2) Annual rooftop solar photovoltaic kWh generation potential for Net-Zero property retrofits, 3) Predictions of electrical panel size (amps), 4) locations where electrical panel upgrade deferrals are possible using EE retrofits and solar PV, 5) Predictions of existing equipment such as central air conditioning, attic insulation, electric vs natural fuel type for gas space and water heat, and other energy end-uses. 6) Customized EE, electrification, resilience, and demand response measures for each residential property.
- Integrate across silos: We also suggest that the program planning integrate opportunities for low-cost electrical vehicle charger installations. Properties with existing electrical space or water heat that electrify with heat pump technologies are likely to have unused electrical panel capacity that can be utilized for Level 2 EV chargers. Weatherization and EE can also reduce HVAC equipment sizing to enable EV chargers.

We strongly recommend that the NASEO programs' implementation includes:

- Nearly every EE rebate program in history has been first-come, first-serve; they relied on property owners to self-select into them. Given the landlord tenant market failure, this is why many whole-building MF programs have failed. Uptake for SF programs has been slow in most jurisdictions due to information asymmetries and other barriers and failures.

[6] https://bit.ly/Res-Intel_MF_EE

[7] https://www.census.gov/content/dam/Census/programs-surveys/ahs/tech-documentation/2017/AHS_2017_Structure_Type_Estimates.pdf

  - The first-come, first-serve model is an equity failure as well: rich white and Asian households have been responsible for most heat pump technology purchases and income and education are strong predictors of EE program participation.
- For HEERA and HOME to do better, a new implementation model is required. This model includes:
  - Funding deep engagement with community-based organizations. *Community-Based Social Marketing* is low-cost and it works: In fact, it might be the only outreach tool that will work to scale up EE retrofits.[8] The organizations need funding to build capacity and engage residents.
  - Organizations need to disseminate outdoor media that demonstrate household participation in the EE programs. Solar PV and electric vehicle sales have been shown to increase as neighbors buy them (neighbor effects), something that EE rebate programs need to emulate. See Professor Nelson's research paper (under review at *Energy Policy*)[9]
  - A program administration and implementation dashboard is required that visualizes all of the above planning data for program stakeholders to perform remote audits on residential properties without having to roll a truck.
    - Such a toolset can reduce program planning and implementation costs by 10x compared to current practices.
  - A public dashboard without any personally identifiable information to be used by community-based organizations and contractors to reach out to the highest energy users in disadvantaged communities. In addition to property benchmark score and retrofit measures, the dashboard should include:
    - Best customer contact information gleaned from property databases in order to reach the right decisionmaker
    - Lead lists of properties that are in need of electrification weatherization and other measures that can be disseminated to trade allies
    - Inclusion of urban heat islands, wildfire risk, flooding, and other risk zones

4. RFP and Contract Language

We recommend the above language on program elements be included in the RFP as possible.

Res-Intel authorizes NASEO to publish and distribute this response to the NASEO RFI on its website and through other means to the states and general public. We have included no confidential or proprietary information in our response. Thank you for considering our comments.

Hal T. Nelson
CEO of Res-Intel
18 May 2023

[8] https://bit.ly/Community_Social_Marketing
[9] https://bit.ly/Energize_paper