Comments on the "New York State Climate Action Council Draft Scoping Plan"

Jan 13th, 2022

Yueming (Lucy) Qiu [a, *] ([redacted]), Xingchi Shen [a], Parth Vaishnav ([redacted]) [b]

[a] School of Public Policy, University of Maryland at College Park

[b] School for Environment and Sustainability, University of Michigan

- Education and marketing programs to increase consumer awareness and acceptance of building electrification

The draft scoping plan mentions marketing efforts in local communities to promote the diffusion of heat pumps via increasing consumers' awareness of the benefits of heat pumps. We suggest that such marketing messages can include an additional benefit we have found in our Nature Energy paper (https://www.nature.com/articles/s41560-020-00706-4), namely the positive housing premium induced by air-source heat pumps. We found that residences with an air source heat pump enjoy a 4.3–7.1% (or US$10,400–17,000) price premium on average. However, New York was not in our analysis due to data constraints. Our analysis covers 23 states (AL, AR, AZ, CO, CT, DE, FL, GA, KY, MD, MI, MN, NC, NE, NV, OH, OK, OR, PA, SC, SD, VA, WA). We suggest that future studies need to be done to analyze the price premium in a colder climate such as NY, as well as for geothermal heat pumps. Such analyses can provide more precise information on the price premium induced by heat pump installation in NY.

- Making heat-pump adoption cost-effective

The draft scoping plan notes the need for public support and incentives (including a price on fossil fuel externalities). However, our research (https://iopscience.iop.org/article/10.1088/1748-9326/ac10dc) shows that it is unlikely that, at politically feasible levels, price signals alone will make widespread heat pump adoption economically viable. There should be a focus on technological innovation to make heat pumps more efficient. The State can create a market for the most efficient heat pumps by educating installers (see below) and setting efficiency standards, as outlined in the "scale up tech transfer" section of the plan.

Costs also need to come down, including the non-equipment installation costs, which can be substantial. In this context, the draft scoping plan notes the importance of building a skilled and knowledgeable workforce for building electrification. As part of this effort, the State should review licensing requirements to ensure that they do not pose unnecessary barriers to entry to the professions that need to grow to support electrification. Permitting and inspection requirements should also be reviewed to ensure that these do not add undue delays and costs to heat pump installations.

- Equity considerations in the form of incentives for heat pumps

The draft scoping plan mentions various forms of incentives provided for consumers to adopt heat pumps, including tax credits, rebates, and financing options. The draft plan also mentions the importance of providing low-cost financing to low-income and disadvantaged communities. We want to further emphasize the importance of the financing by highlighting an equity concern in the form of incentives for heat pumps. In one of our current projects using heat pump adoption data in North

Carolina (https://appam.confex.com/appam/2020/meetingapp.cgi/Paper/36860), we find that the positive effect of rebate in incentivizing heat pump adoption is smaller for households with the lowest income brackets (annual household income <20k, 20-30k, and 30-40k) compared to those with annual income between 40-50k and 50-60k. One possible reason could be that in order to qualify for a rebate, households need to have enough cash to afford the heat pump in the first place. Lower-income and disadvantaged consumers might have liquidity constraints to benefit from the rebate. As a result, having rebates and tax credits alone might generate equity concerns in the adoption of heat pumps.

- Grid impact of heat pumps

Empirical work, including ours, has found that estimates of energy savings derived from the engineering analysis done to support the Weatherization Assistance Program turned out to be very optimistic (https://academic.oup.com/qje/article-abstract/133/3/1597/4828342). Throughout the draft scoping plan, there is an implicit assumption that heat pumps are energy efficient. One of us has used building energy models to show that heat pump adoption would indeed reduce energy use in New York (https://pubs.acs.org/doi/abs/10.1021/acs.est.0c02705). However, in another recent paper (https://www.sciencedirect.com/science/article/pii/S2666784321000395), using smart meter data of a large sample of consumers who adopted heat pumps in Phoenix, Arizona, we find that compared to electric resistance heaters or regular air conditioners, heat pumps do not save electricity. We suggest that more empirical studies using actual consumers' electricity consumption data in NY are needed to evaluate the actual performance of heat pumps after they are installed, instead of purely relying on engineering studies. The section on the electricity grid does not explicitly mention the effect on the distribution system of building electrification: our work and that of others suggest that full electrification will likely sharply increase residential peak demand and change when this peak occurs (https://pubs.acs.org/doi/abs/10.1021/acs.est.0c02705; https://www.sciencedirect.com/science/article/pii/S2542435119305781).

- Time-of-use pricing and heat pumps

The draft scoping plan mentions using the time-of-use (TOU) rate to help flatten the load curves. Also in our above paper in Phoenix AZ, we find that when consumers switch from natural gas furnaces to heating using heat pumps, during the winter the peak in electricity consumption increases happens between 7am-9am. Of course, the actual hours of peak increase may be different in NY. We suggest that for low-income and disadvantaged consumers, a winter time-of-use (TOU) electricity pricing that has higher electricity prices during these hours might give them a higher energy burden if they switch to heat pumps from natural gas furnaces. Indeed, recent work on the distributional impacts of TOU rates suggests that these disproportionately increase bills for vulnerable populations and may contribute to adverse health outcomes (https://www.nature.com/articles/s41560-019-0515-y). Regulators and utilities need to be careful when promoting TOU pricing as a demand-side management practice among those communities.

Direct load control strategies controls should account for both the equity impacts on vulnerable populations (e.g., the disabled, those with kids, those with conditions that are sensitive to extreme heat or cold), as well as the possibility that users can over-ride direct controls, which may, in turn, deliver smaller benefits than their designers anticipate (see: https://www.sciencedirect.com/science/article/pii/S0301421521001592).

- Power resilience and adoption of electrification

The draft scoping plan emphasizes the importance to improve resilience during power outages, especially given the increased frequency of extreme weather events. We want to further add evidence to support the investment in improving power infrastructure reliance and reducing power outages. In one of our work-in-progress papers, we use nationwide data in China and find that power outages can deter the adoption of electric vehicles. A stable power supply is a key to promoting electrification.

The draft scoping plan is right to mention electric vehicle (EV) batteries as a source of building and grid resilience. However, even if they are not connected to the grid, vehicle-to-building connections have the potential to promote building electrification. First, given time of use pricing, they might assist customers to reduce the cost of electric heating or cooling by shifting demand. Second, they may insure single-fuel (i.e., electric) homes against outages by providing a reliable backup, particularly if they are paired with solar PV systems that are capable of islanding themselves in the event of a grid outage. As such, there is the potential for the value proposition of electric vehicles, distributed power generation, and building electrification to be mutually self-reinforcing. However, this benefit will only be realized if standards are put in place to make the relevant systems interoperable, training is provided to the contractor community, and marketing efforts across sectors join up in ways that they currently do not (e.g., auto manufacturers and dealers should actively promote the role of EVs in supporting resilience).

- Natural gas leakage

The scoping plan mentions the importance of addressing natural gas leakage. We want to bring your attention to one of our working papers (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3908392) which finds that unrepaired urban gas leakage can reduce the nearby housing transaction prices, using data from Massachusetts. We find that gas leaks significantly reduce nearby house prices by 2.61% ($11,700) on average in MA. We suggest that similar studies be done in NY. The negative impact on housing prices can be thought of as willingness-to-pay for repairing gas leakage. Such estimation of willingness-to-pay can serve as a benchmark for policymakers to find ways to finance the costs of gas leakage repairs, such as through surcharges of gas ratepayers. In addition, our finding of the negative impact on housing price can be thought of as another co-benefit of repairing gas leakage.

- Equity concerns of the natural gas stranded assets in the electrification process

The draft scoping plan mentions the problem of natural gas stranded assets that can increase rate pressures. In particular, if the electrification process happens in the wealthier neighborhood first, then low-income and disadvantaged communities need to pay increased natural gas prices due to the need for gas utilities to recover capital costs. We recommend that policymakers provide subsidized natural gas rates for those communities, or—preferably—subsidize these communities to transition to full electrification.