- Intro:
    - Electricity markets team lead at argon
    - Mostly works on modeling and analyzing economics of power systems, issues around equity and energy justice.
- What do you do at Argon?
    - Analyses of power systems in different contexts, like wholesale markets. Look at interactions of market rules and policies, how participants choose to participate in these markets.
    - How to integrate renewables into the system, what technologies are needed
    - Use electricity analysis framework - set of model tools for reliability assessment.
        - Use aurora for modeling
- Does Argon have any examples of publicly available tools?
    - A-leaf - not publicly available, but there are ways of providing institutional access
    - Viz tools -
        - energy zones mapping tool https://ezmt.anl.gov/
        - Argon greet - life cycle analysis tool for transportation sector
- Rural community and energy
    - Worked with Erin Baker on centralized vs decentralized grids - when does it make sense to expand grid / work on off-grid projects
    - Less applicable on US since most of the population has grid access.
    - It's not just a cost question - there are benefits with providing rural populations with short bursts of electricity quickly as this can propel development in the short term
        - This can lead to better integration in the future
- Your specialties lie in modeling interactions in energy markets, and you mentioned you also have a strong interest in international energy development and decentrification. One of the case studies we looked at during our preliminary study was the Texas blackout in February 2020, which had significant impact on minority groups and in neighboring international markets as well. Is there a way to "disconnect" these markets such that catastrophic failure in one does not crash other markets, without necessarily removing any benefits from these interactions?
    - Texas case was more the other way around - some of the issues were caused due to lack of interconnection since it has an isolated grid. System issues in texas where more due to similar weather issues rather than direct interaction with texas.
    - There are benefits of sharing at a global level, but at the local level it is better for there to be some isolation to avoid a systemic cascading failure.
    - In practice, these segmentations and planned brownouts are not "equitable"
        - Need to define equity. A brownout in one area might have greater effects in one area than in another, even for the same amount of time.
        - Critical infrastructures such as hospitals for example
    - Market issues where separate in Texas.
- One of the core concepts of iCons is to "identify the gap in knowledge", and then use every member's interdisciplinary background to fill those gaps in. Based on your work in

the Argonne National Lab, what would you believe is a crucial “gap of knowledge” that needs filling in order to achieve what our problem statement entails?
    - Data. We have a lot of models that can address these issues but they aren’t useful without access to the right data.
    - Data on disadvantaged communities, where they are, how vulnerable they are.
    - There are a lot of reactive solutions but they aren’t included in the planning stages.
- How would the MEA model from your paper about changing the benefit maximization approach when creating electricity plans consider increasing proportions of renewables as a goal, as well as maximizing overall reliability as a subset of equity? Would a multi-year temporal analysis of rebuilding a system post natural disaster take the pain points of the reliability distribution into account?
    - Background: Traditional planning models in US seek to minimize cost of serving demand. However, this objective is not realistic to serve all demand, specifically latent demand (demand that would exist with better infrastructure)
    - Rather, seek to maximize impact of budget
    - Didn’t look at policy benefits of renewables, but could definitely look into reducing emissions / increasing renewables as goals to maximize for.
        - Look at the socioeconomic benefits of electrification
- In the event of a natural disaster or inclement weather impacting power grids in an area, is there a key factor in the way that electricity exchanges work such that some areas have more outages than others?
    - Extreme weather conditions increase difficulty of energy generation - reduced supply
    - Reduced supply feeds into wholesale market, which can’t clear demand - shortfalls
    - When a shortfall happens, the cost is set to the administrative maximum
    - Brownouts come in to shut down some stations to prevent collapse of whole systems.
    - Need more information for better decision making in these scenarios
- I’ve heard of microgrids (controllable cluster groups of interconnected loads and distributed generation sources that can attach to the grid at large but also operate independently) being proposed to resolve issues with the grid and to modernize them. How would such modernizations affect the way that we think about energy interchange currently and what sort of policies would you foresee about these?
    - The logic behind a microgrid is that in an emergency condition each one can operate independently. Prevents cascading issues
    - In theory you could design a grid like this, but would lose benefits of economies of scale.
    - Also requires huge transmission systems
    - Market is changing - these economies of scale could be replaced for cheaper, more reliable localized sources of energy with renewables through utility models
    - Cost of infrastructure means there is no incentive to change it overnight, but could be a slow transition depending on the benefits.

- What paradigms of design do you see being the most necessary for a digital product in energy equity
    - Have a framework that provides insights into impacts of managing the system.
    - Create equity by helping the development of microgrids by identifying populations in need. Would hand risk management over to communities instead of having them depend on power providers.
- Increase equity of rolling brownouts
    - Push to have better sensors on distribution infrastructure
    - Look at the length of a potential outage, time of day and other conditions. 4 1-hour outages are different from 1 4-hour outage.