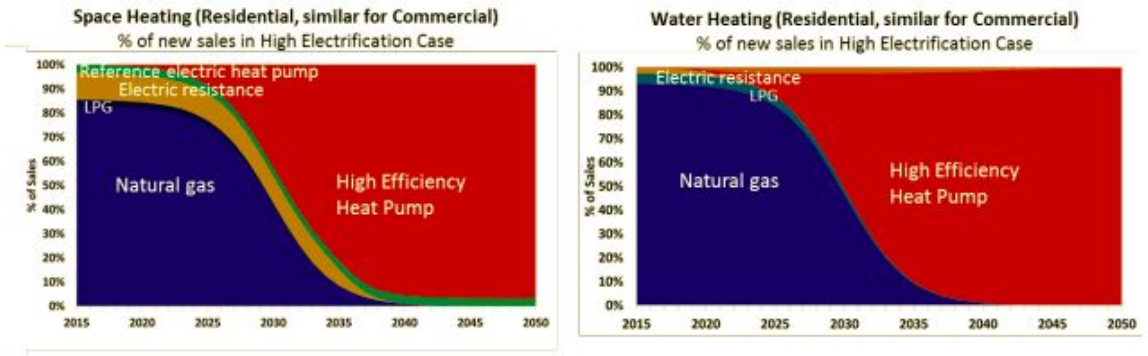
Roadmap Outline

1) Intro:
    a) Why Building Decarbonization?
        i) Customers
            (1) Costs
            (2) well -being
        ii) Carbon
            (1) Statewide emissions 2018 vs 2050
                (a) Scenarios
            (2) Sector emissions
            (3) Building stock
                (a) Fuel mix
            (4) 1-3 suggests California needs market transformation at an ambitious scale, quickly, as captured by E3's figure 8.

Figure 8: Percent of New Sales by Technology Type for Residential Space Heating and Water Heating in the High Electrification Case (2015–2050)



Source: E3

        iii) Jobs
        iv) Grid
        v) Other environmental benefits (criteria air pollution, water, pipeline/storage leaks, etc)
        vi) Overall impact of achieving decarbonization of buildings
    b) Why roadmap now?
        i) New admin
        ii) Urgency of carbon/GWP of methane
        iii) Benefit - cost looking good
        iv) Technology & markets ripe
    c) What's next?
        i) Identification of low-hanging fruit & plan to harvest
        ii) Identification of milestones
        iii) Tiered plan to march through milestones
2) Barriers to achieving goal?

a) Literature Review suggests the following barriers:
    i) Entry: outdated modeling assumptions about power supply creates uncertainty about carbon intensity of energy at point of use
    ii) Experience: lack of familiarity and experience with heat pump technologies among contractors, retailers, and customers.
    iii) Costs: transaction, equipment and installation, and operations and maintenance costs of electric appliances are higher than natural gas alternatives.
    iv) Long-term Plans: lack of field data on infrastructure needs, equipment operation, and costs and benefits introduces uncertainty into long-term energy management plans.
b) Coalition agrees/adds/amends as follows:
    i) X
    ii) Y
    iii) Z

3) How to Lead Change?
    a) Roles and Responsibilities
        i) government
            (1) GO
            (2) cpuc
            (3) cec
            (4) carb
            (5) Caiso
            (6) Workforce Agencies
            (7) Other State Agencies
            (8) Local Governments
            (9) National labs
        ii) Industry
            (1) AMEP Design Community
            (2) Manufacturers
            (3) Workforce
            (4) Educational Providers
        iii) Academia
            (1) Cal, Davis, Stanford, others? Groups within?
        iv) Public interest orgs
    b) High-level Intro to Levers to Address Barriers
        i) Levers categorized (e.g., CPUC Policies, Needed R&D) and assigned to actors (fed, state/local, mfg, retail)
            (1) Near-term
            (2) Long-term
    c) Levers in depth, organized by category
4) Ideas in Practice (case studies)
5) Conclusion (leveraging this analysis)

a) How to get started, including recommendations for:
    i) Policy Makers
    ii) Market Actors
    iii) NGOs and Philanthropy
b) Priorities and timeline
c) Industry participants & partners needed