



Energy Technologies Area

Lawrence Berkeley National Laboratory

# **DOE/BPA Load Composition Analysis**

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September 18, 2020

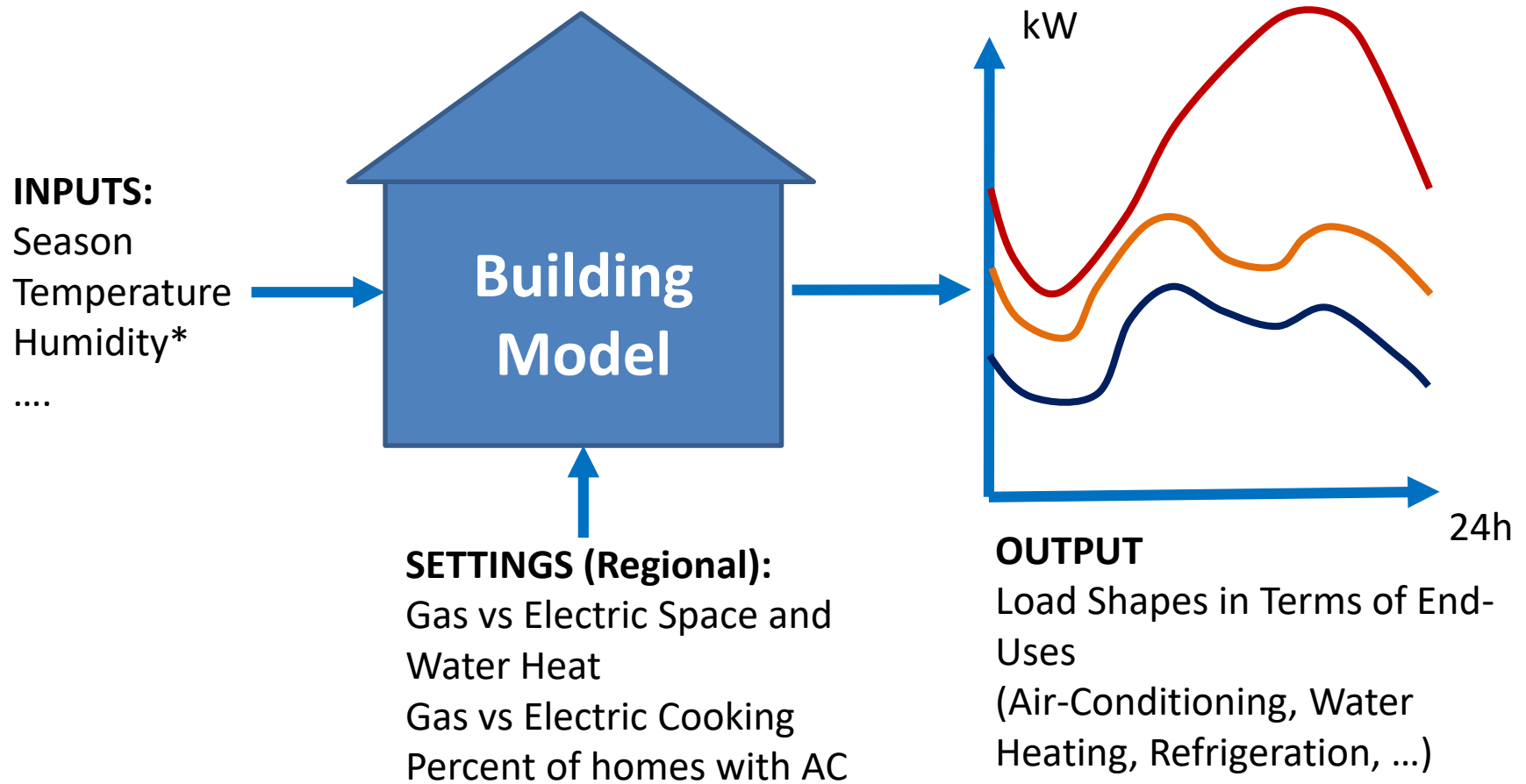
WECC Modeling and Validation Subcommittee Workshop

# Overview and Purpose of this Talk

- ◆ In support of the NERC LMTF field test of the composite load model, LBNL, BPA, and SLAC have collaborated to prepare non-industrial feeder models for all regions in the Eastern and Texas Interconnections
- ◆ This talk:
  - Summarizes the data, methods, and approaches we used to prepare composite load models for non-industrial feeders
  - Outlines next steps in the technical support we will be providing to NERC LMTF and WECC MVS

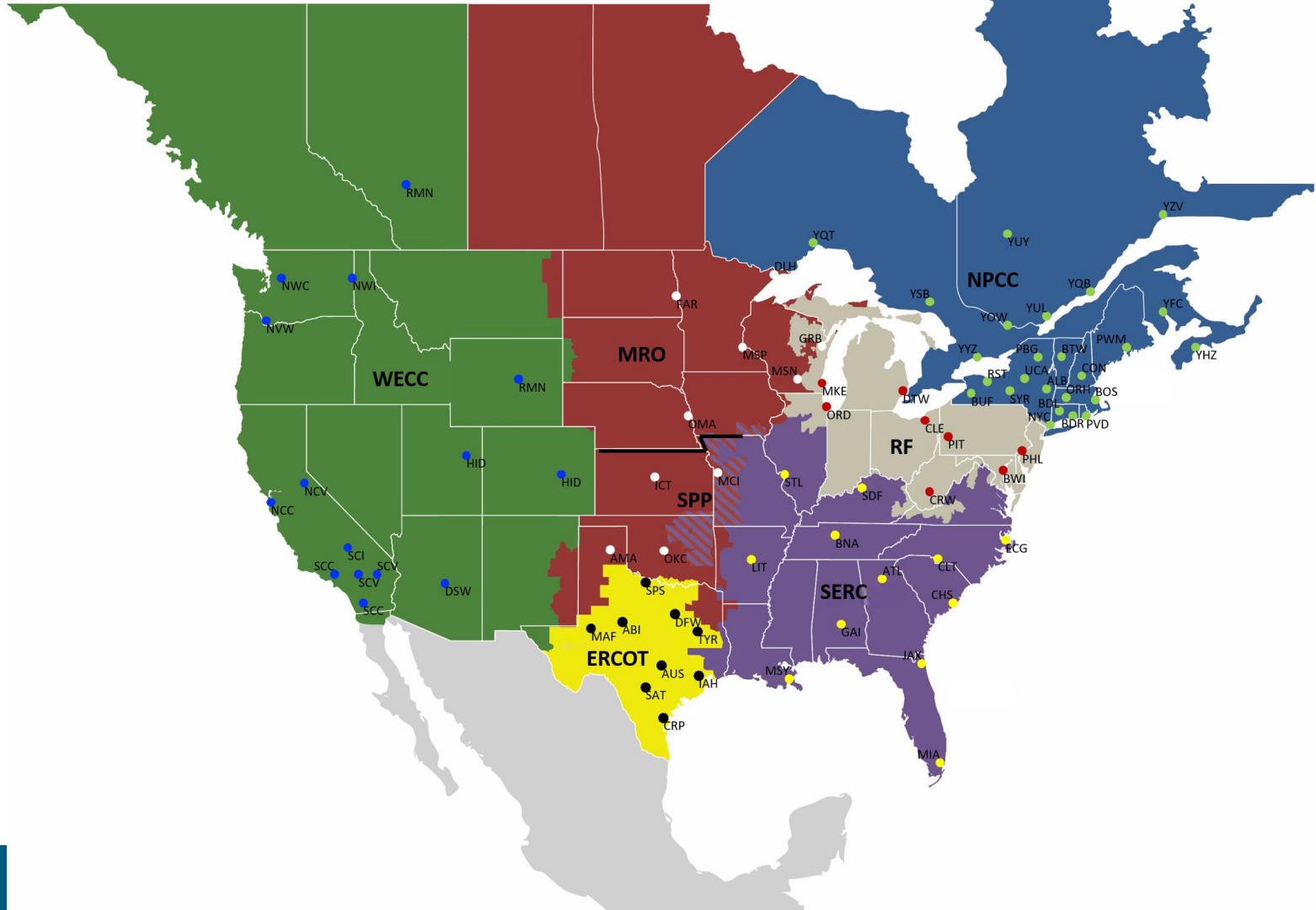
# Load Composition Analysis - I

**Step 1 - We start by developing building models**



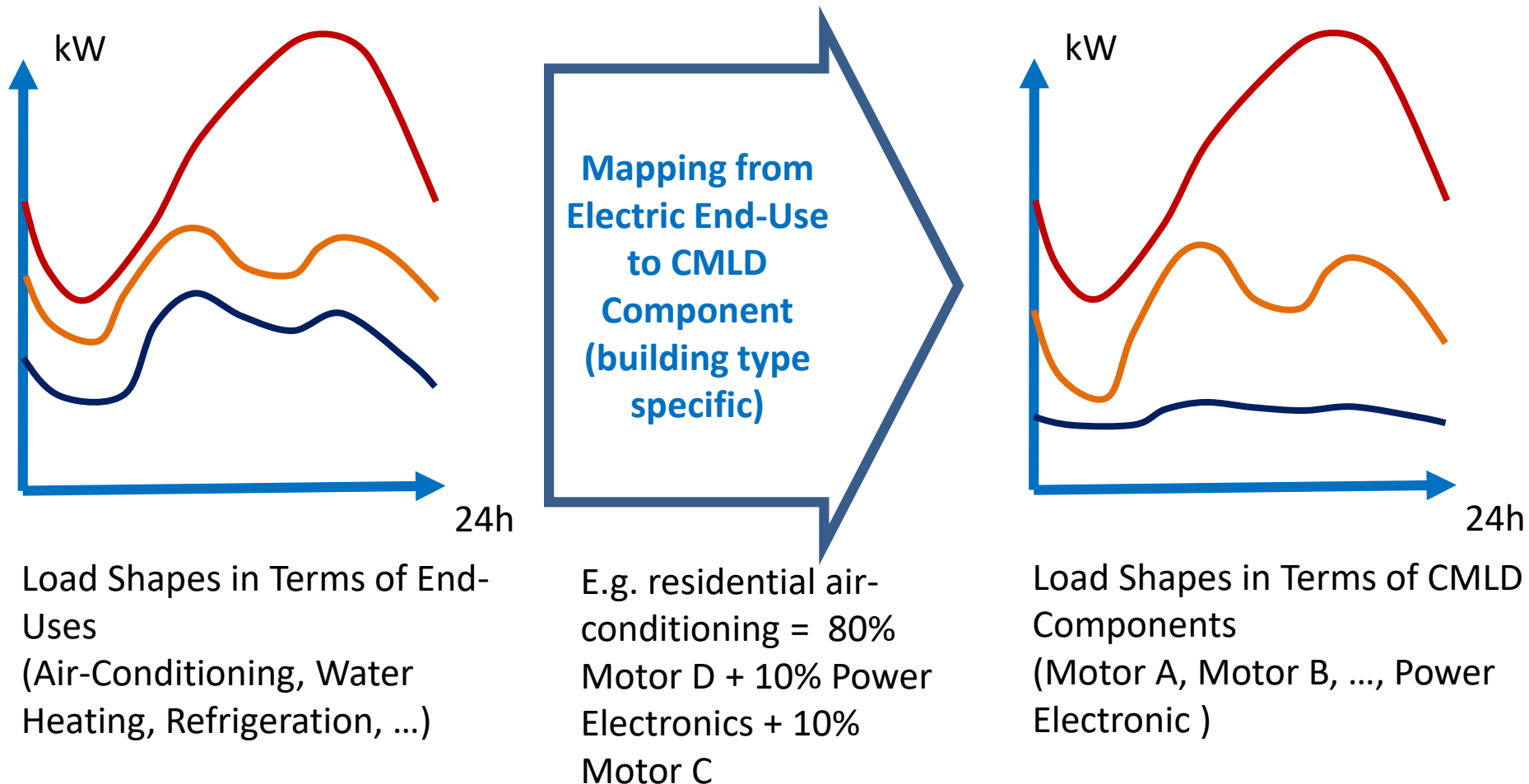
# Load Composition Analysis – II

Step 2 – Estimate Heating and Cooling Loads Separately for Multiple Weather Sites within each Region



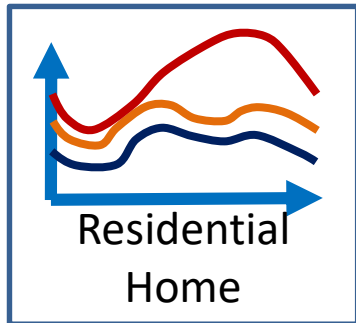
# Load Composition Analysis – III

## Step 3 – Map end-uses to CMLD model components for each building type

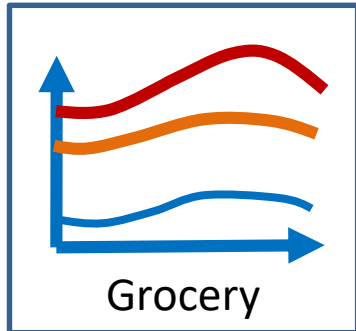


# Load Composition Analysis – IV

## Step 4 – Create substation load composition



$X$  % Residential

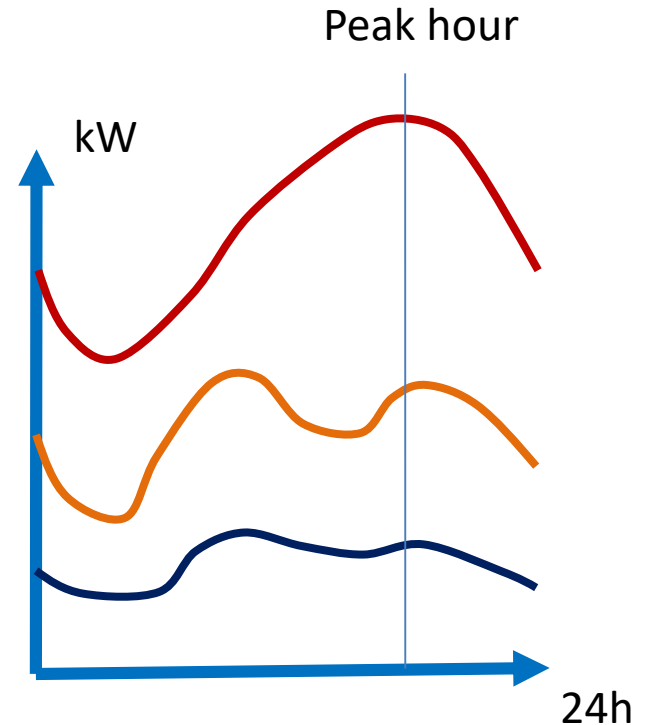


$X$  % Grocery

...



$X$  % Office



# Four Non-Industrial Feeder Types Developed for Each Weather Site within Each Region

Each feeder is comprised of mixes of different building types to represent different “economic” activities/uses

RES - suburban



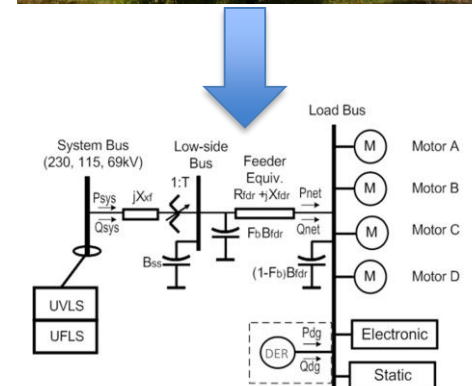
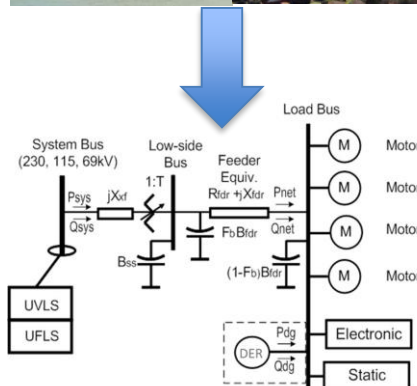
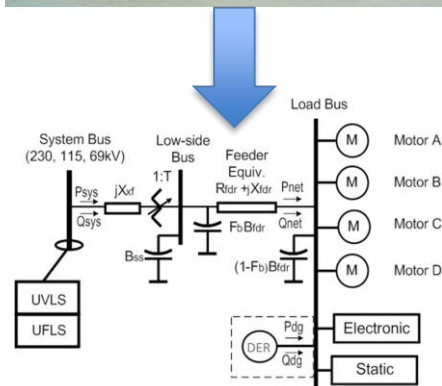
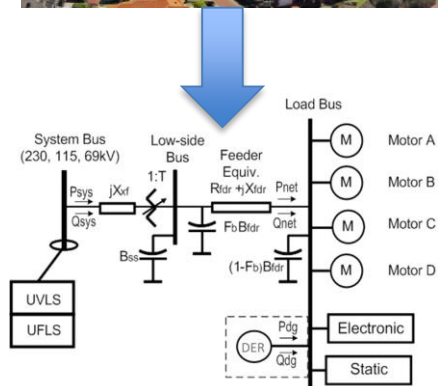
COM - urban



MIX



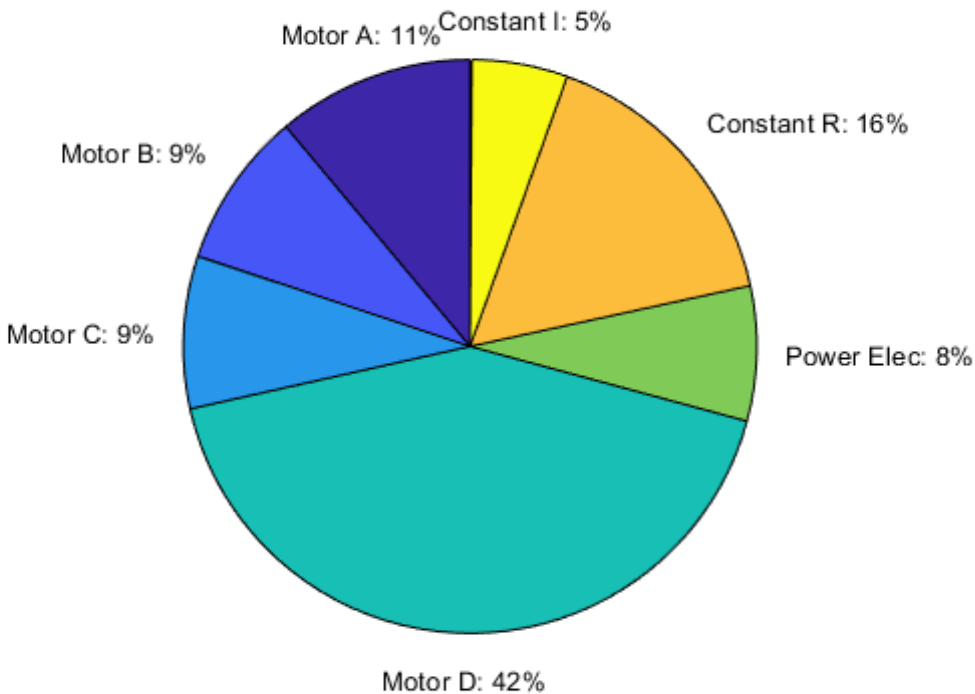
RAG - rural



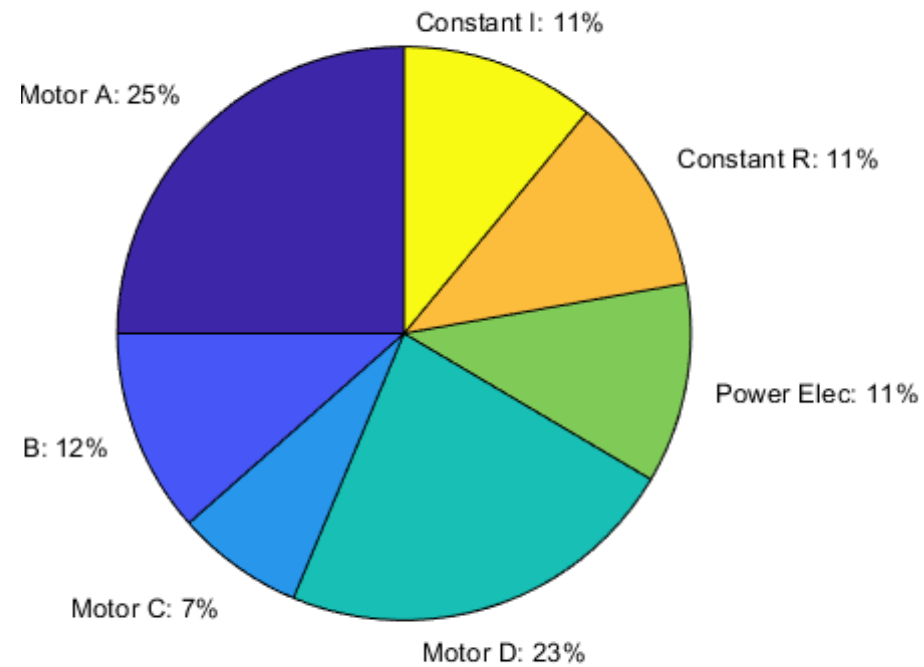


# Phoenix – Summer Peak

Load Composition: PHX\_RES - Summer 4:00 pm



Load Composition: PHX\_MIX - Summer 4:00 pm





# Technical Documentation



Electricity Markets & Policy  
Energy Analysis & Environmental Impacts Division  
Lawrence Berkeley National Laboratory

## Load Composition Analysis in Support of the NERC Load Modeling Task Force 2019-2020 Field Test of the Composite Load Model

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# Where we are going next

1. We will continue to support NERC LMTF and utilities by maintaining the default data sets released last Fall, including preparation of a technical report documenting every aspect of the analysis
2. We will support WECC MVS by developing new default data sets for weather locations across the Western Interconnection
3. We will work with interested utilities to explore utility-specific needs – e.g., side-by-side comparisons of simulations conducted using both the default data set and more detailed, utility-specific feeder models
5. We will conduct research to further improve specific aspects of the default data set – e.g., residential electric heating (resistance vs. heat pumps – see example on next slide); utilization of feeder-specific information on customers served
6. We will also conduct research to incorporate growing future changes in loads, such as VFDs, EV chargers, PV, storage, etc.
7. We will incorporate findings from research into future updates to the default data set

**Thank You**