UA Summit®
May 10 - 12, 2022 | New Orleans, LA
Hosted by Entergy
How Customer Analytics Can Help Reach Carbon Goals
Duke Energy | Arnie Richardson
5/11/2022

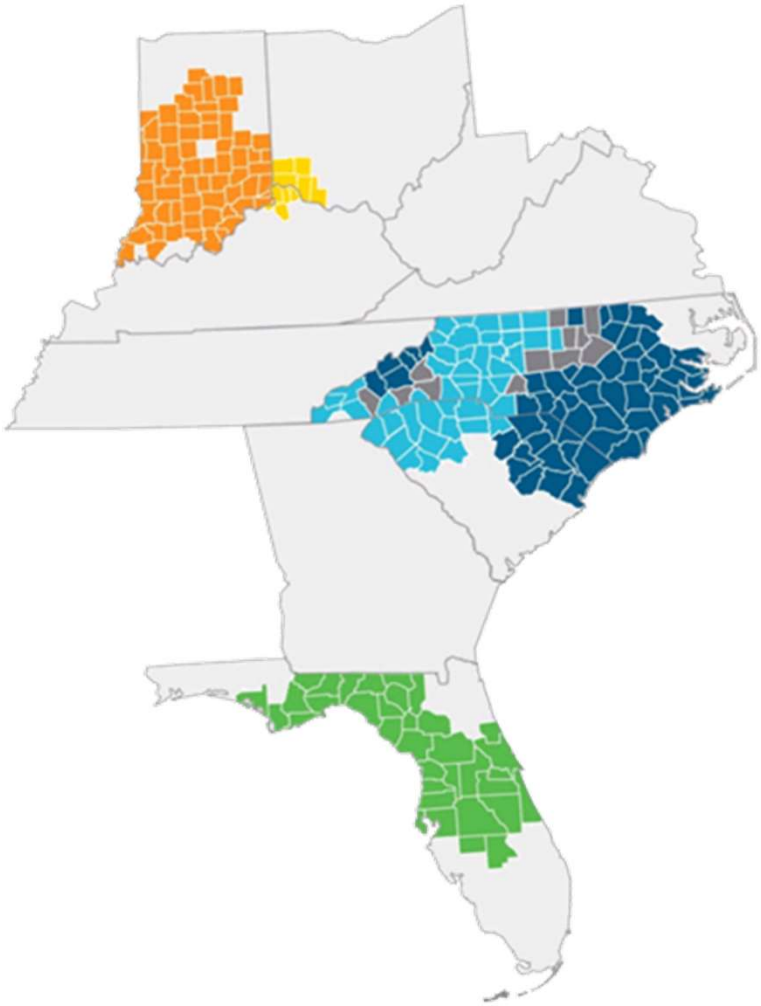
Introduction

Duke Energy

- 8.2MM Electric Customers across 6 states
- 50k Owned MW Capacity
- 150 Years of Business

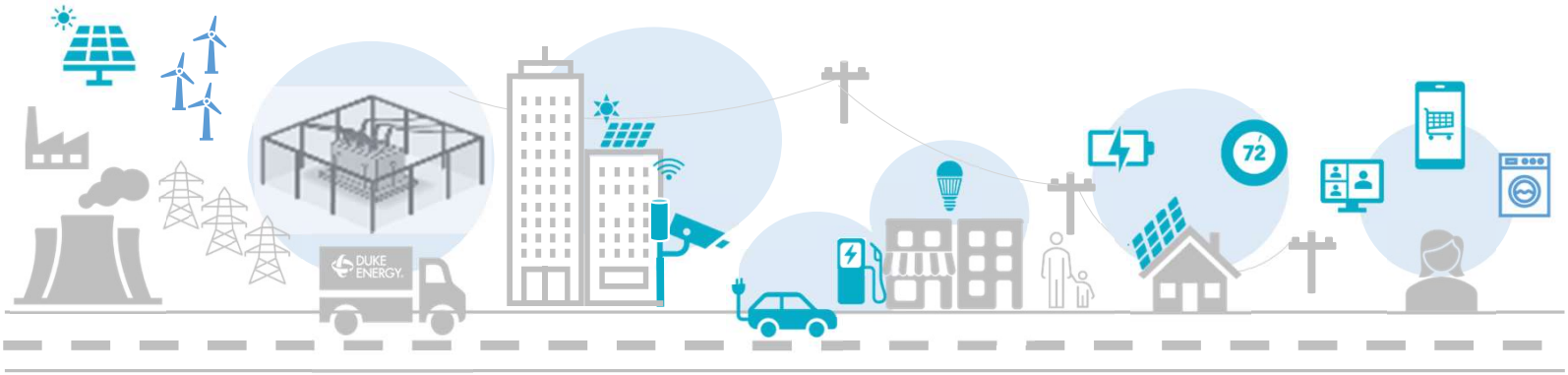
DUKE ENERGY®

BUILDING A **SMARTER** ENERGY FUTURE®



Arnie Richardson

- Managing Dir Strategic Solutions Analytics & Innovation
- 10 years analytics experience in the utility



The world has changed…

technology has removed barriers to competition but opened new opportunities for utilities

The utility as the integrator…

we deliver value for our customers through orchestration of a complex ecosystem of physical assets, real time management, customer offerings and customer communication

Build on success…

proven track record of customer-focused programs providing customer control and affordability, carbon reduction, and driving earnings growth

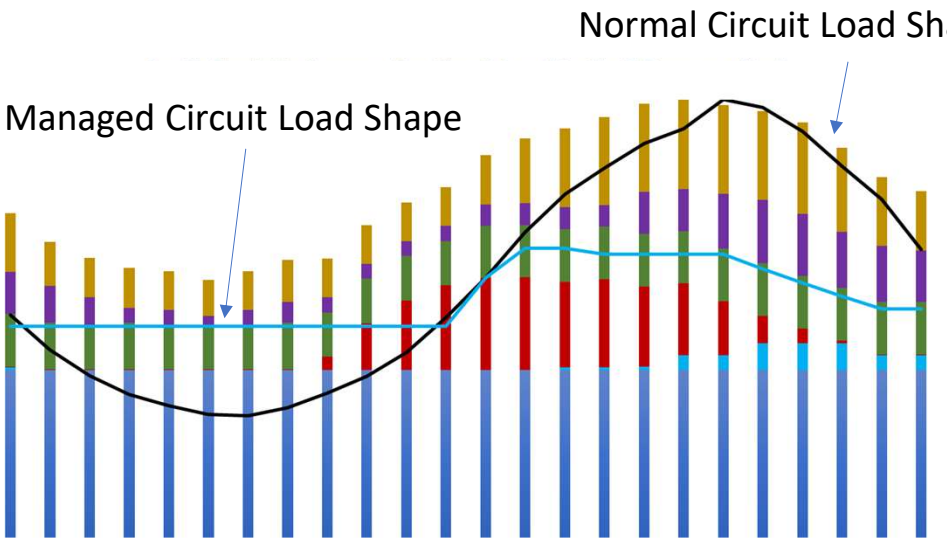
Customers and Utilities together…

we can realize our climate and community objectives with and through our customers

North Carolina Carbon Goal

70% Carbon Reduction by 2030; Net-Zero by 2050

~53 Million Tons by 2030

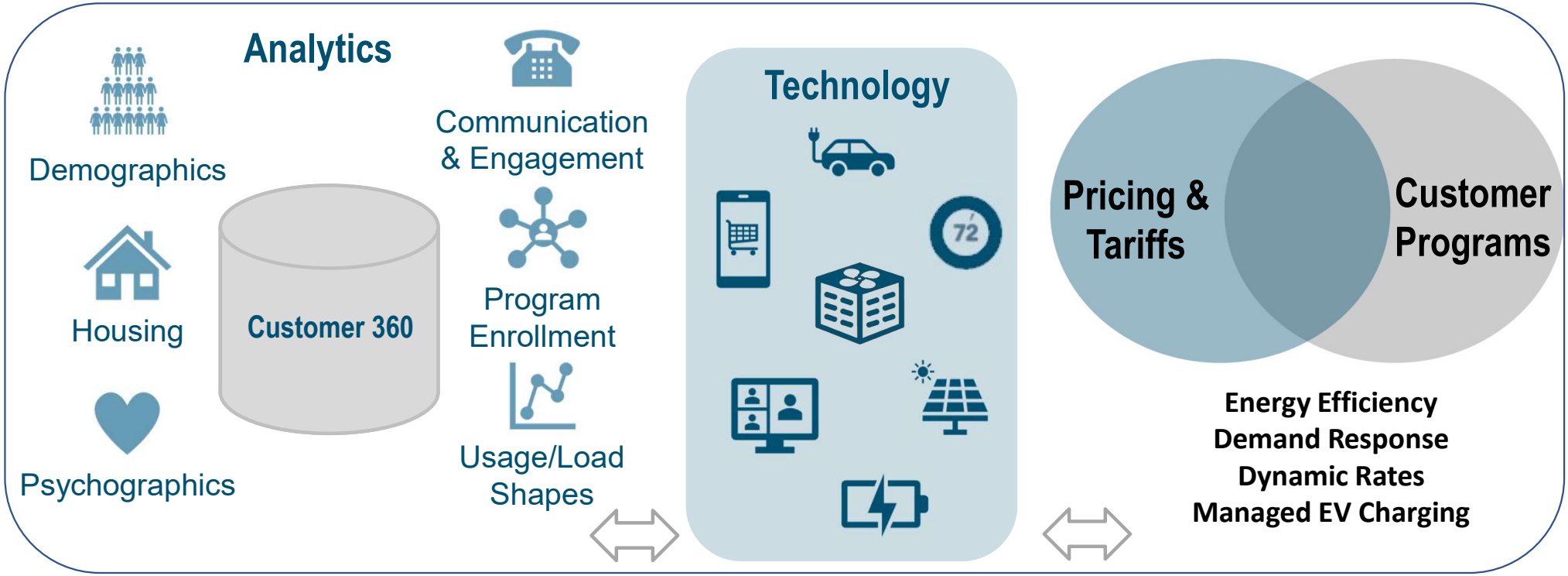


Illustrative

Shape load at the grid edge through programs, enabling investments and offers that allow for the reduction & management of load **prior to evaluating supply-side resources**

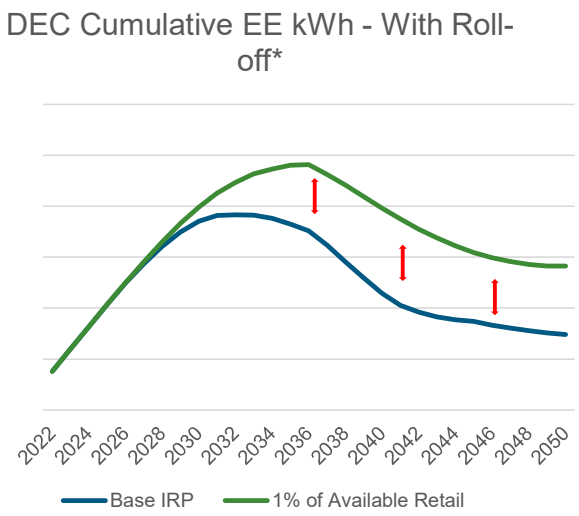
Empower Customers	Manage the Grid
Energy Efficiency, *Net Metering, Clean Energy Programs*	**Demand Response, Rate Design, Managed EV Charging**

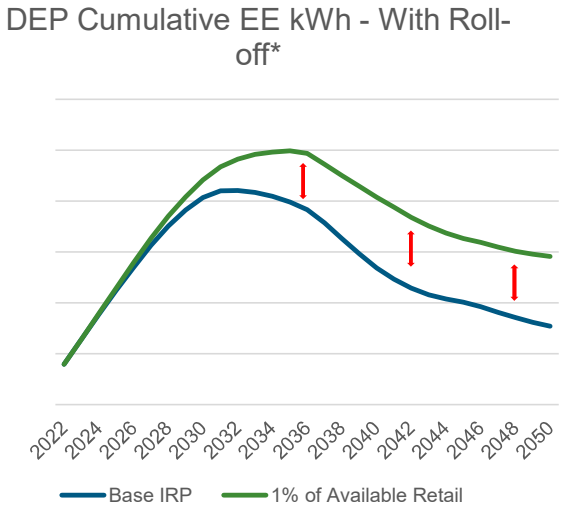
Analytics Enabling Customer Solutions

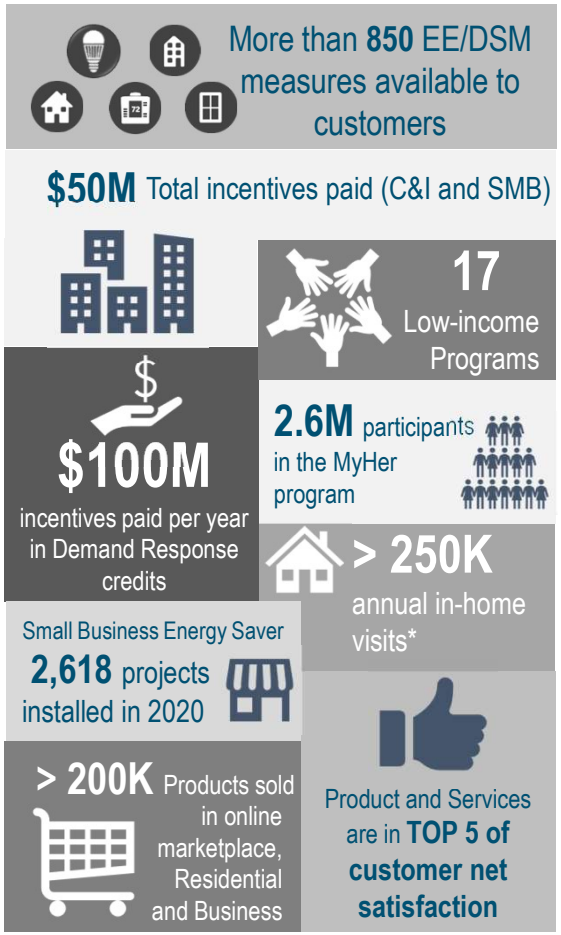


Energy Efficiency

Goal: Achieve 1% EE reduction of eligible retail load through our EE Programs



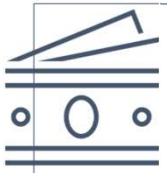




DSM Leaders in the Southeast

Insights into Struggling Customers

Logistic Models were created to understand affordability challenges across our customers



50% of the effect on meeting the arrears definition comes from Age, Electric burden (% of income towards electricity bill) and winter kWh

Renters of a multi-family Condo are 59% more likely to end up in arrears than an owner of a single-family home

Energy intensity (kWh/square foot) is higher for low-income and vulnerable customers across all demographics & housing

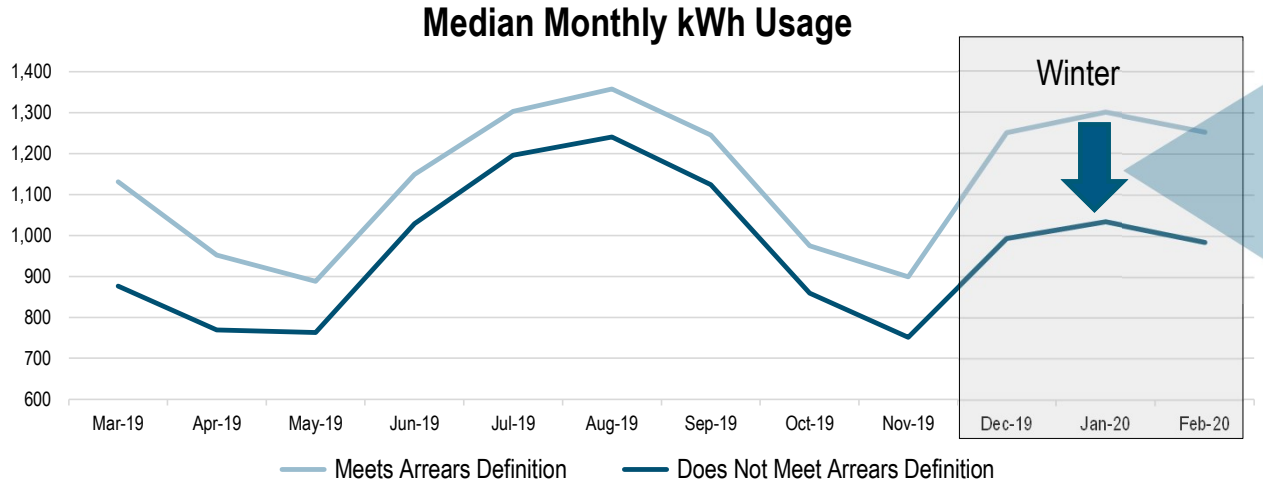
Over 40% of ‘super callers’ are stuck in arrears

Correlation between different variables indicates that wealth/cash reserves is also a major underlying driving factor

Low-income customers use more energy in the winter

Customers in arrears use more energy all year

Low-Income EE Opportunity



Carolinas Winter Peak Reduction Opportunity

~700 MW

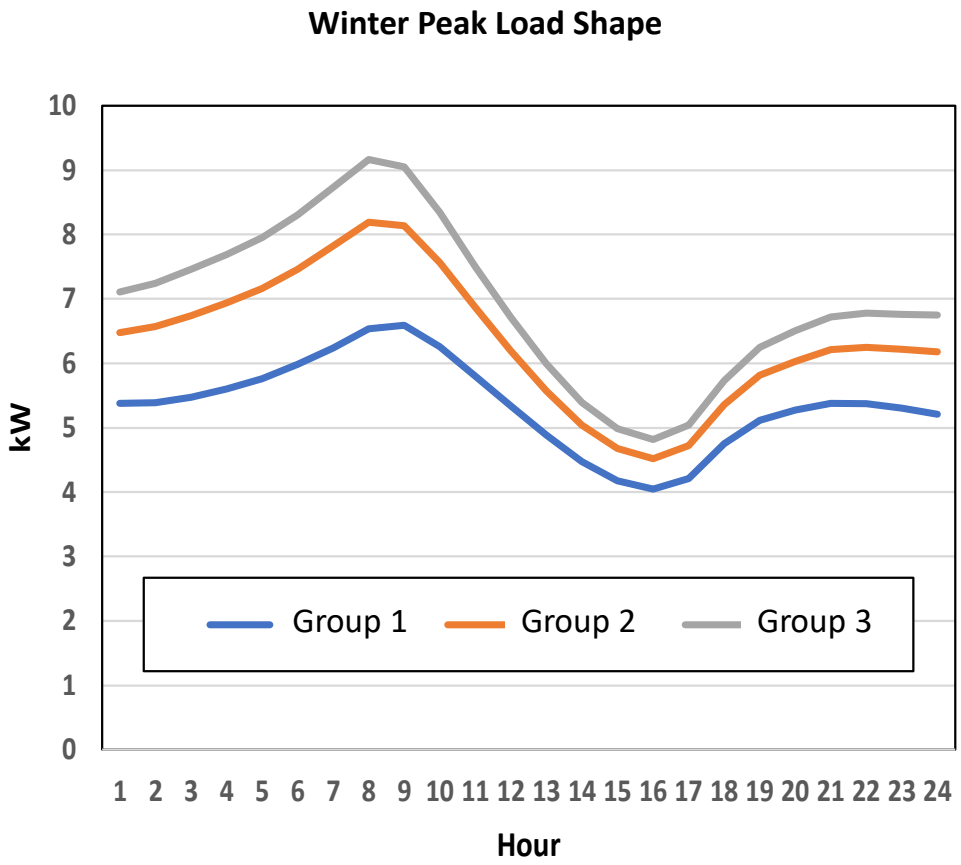
***~15%** of Carolinas customers*

Illustrative One Measure Example

HVAC Retrofit for Customers Struggling with Arrears ~ 350 MW

- ~2800 kWh savings/unit/year with **350 total MW savings during Winter Peak** (~289K units)
- Carbon reduction equivalent to the emissions of **~44,000 cars**
- **Reduce Customer Energy Costs by 14%** → Reduce Customer Write offs annually
- Capital Deployment Opportunity
- Real Community and Customer Benefits

Identifying High Use Customers



270,000 residential customers in NC

Group 1:
Annual kWh > 3rd quartile, kWh/sqft > median, single family homes

Group 2:
Annual kWh > 3rd quartile, kWh/sqft > median, winter peak > 3rd quartile, single family homes

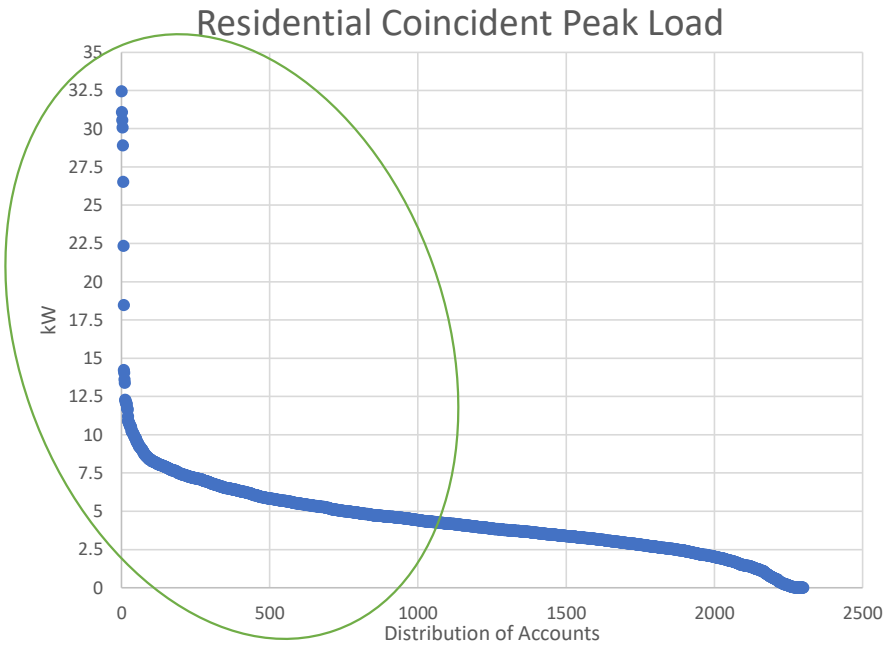
Group 3:
Annual kWh > 3rd quartile, kWh/sqft > median, top 10% contributors to winter peak, single family homes

Could an on-tariff financing option provide EE savings without increasing a customer's bill?

Demand Response -> Flexible Demand Mgt

Today we are…	In the future we will also be…
Peak Shaving	Load Shaping and Economic Dispatch
System Level	Distribution Level
Generation Avoidance	T&D Investment Avoidance / Deferral
Earnings on Capability	Earnings on T&D Investment Avoidance / Deferral
Occasional Usage	Frequent Usage

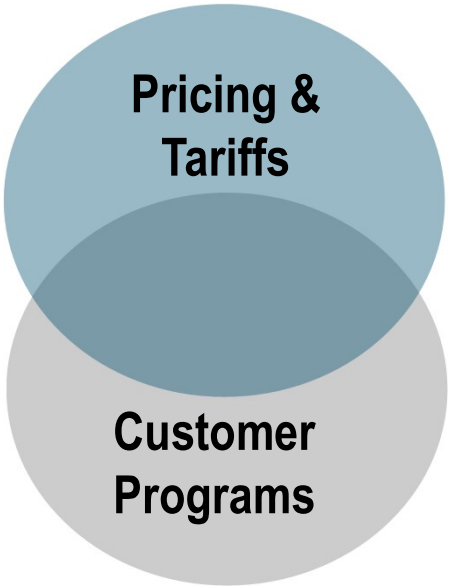
Winter Peak Analysis – Demand Response



1. Targeting High Value Customers based on Load Shape and Customer 360

2. Match customer segments to appropriate program (Switches, BDR, BYOT, PTR, etc.)

3. Near Real Time Evaluation of Events for Portfolio Optimization



Rate Design: Commission Orders

Load Research

- Transition from a sample methodology (0.2% of the population) to near population (99%+)
- 10% increase in accuracy of system peak, even more accuracy on 8760s
- Added flexibility in customer segmentation (i.e., NAICS)

Rate Design Study

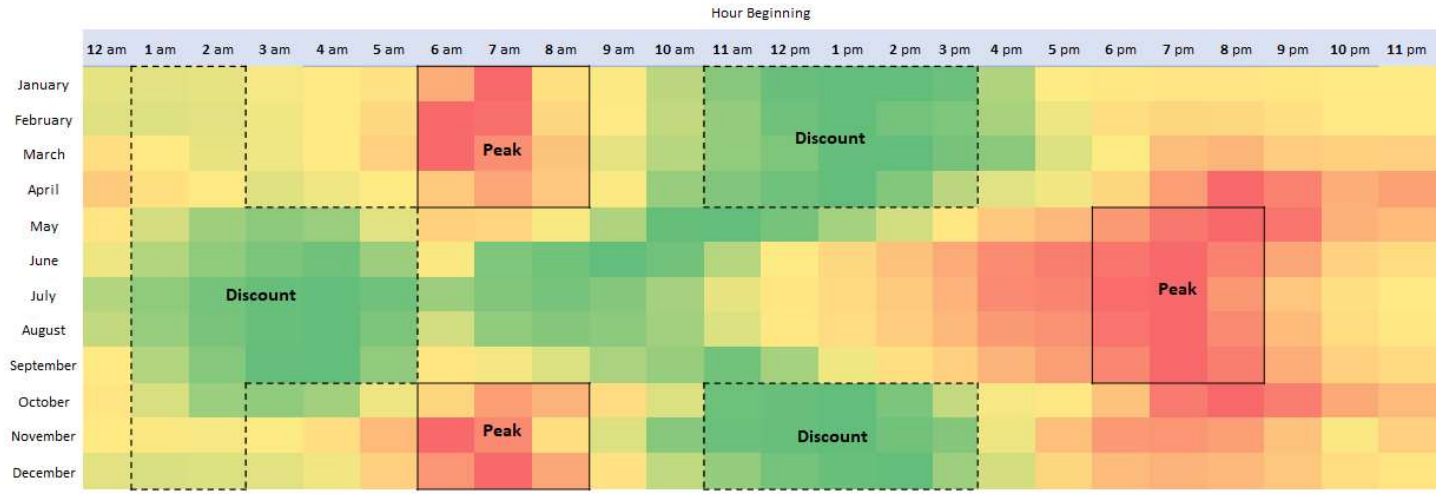
- Include an analysis of each existing rate schedule to determine weather the schedule remains pertinent to current utility service
- Address potential for new schedules
- Provide more rate choice
- Outcome: Rate design "roadmap"

Interval Data Efforts

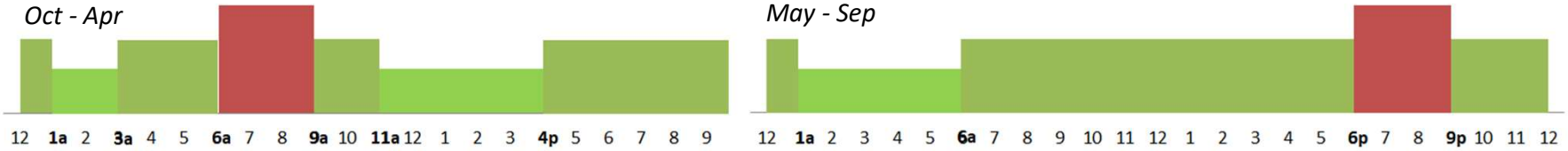
- Combined 3 systems - MDM, MV90, IEE
- Over 1B rows of usage data every 2 days across 8MM meters
- Efficient Data Architecture
- Automated Data Quality Checks

Time of Use Design

New three-tier TOU periods based on 2030 system challenges

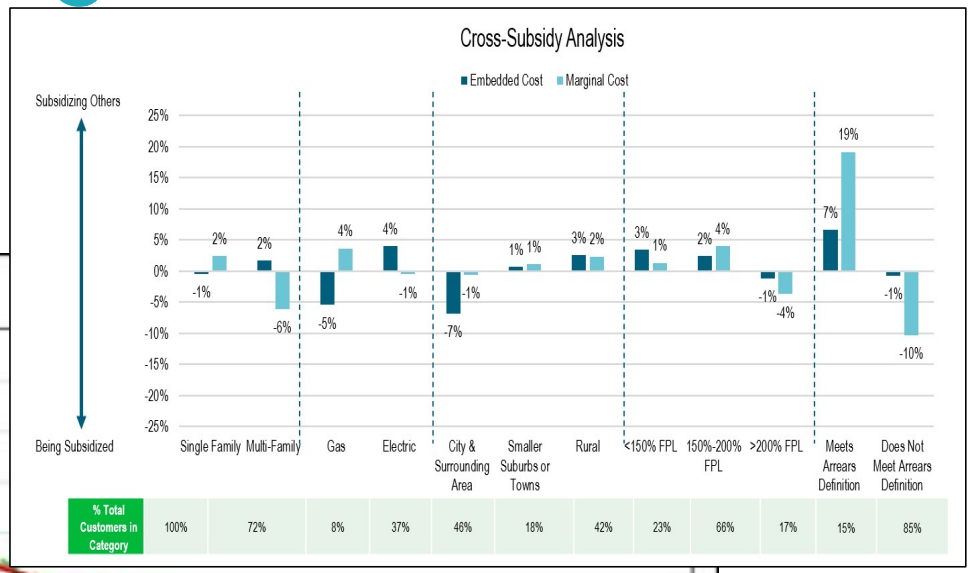


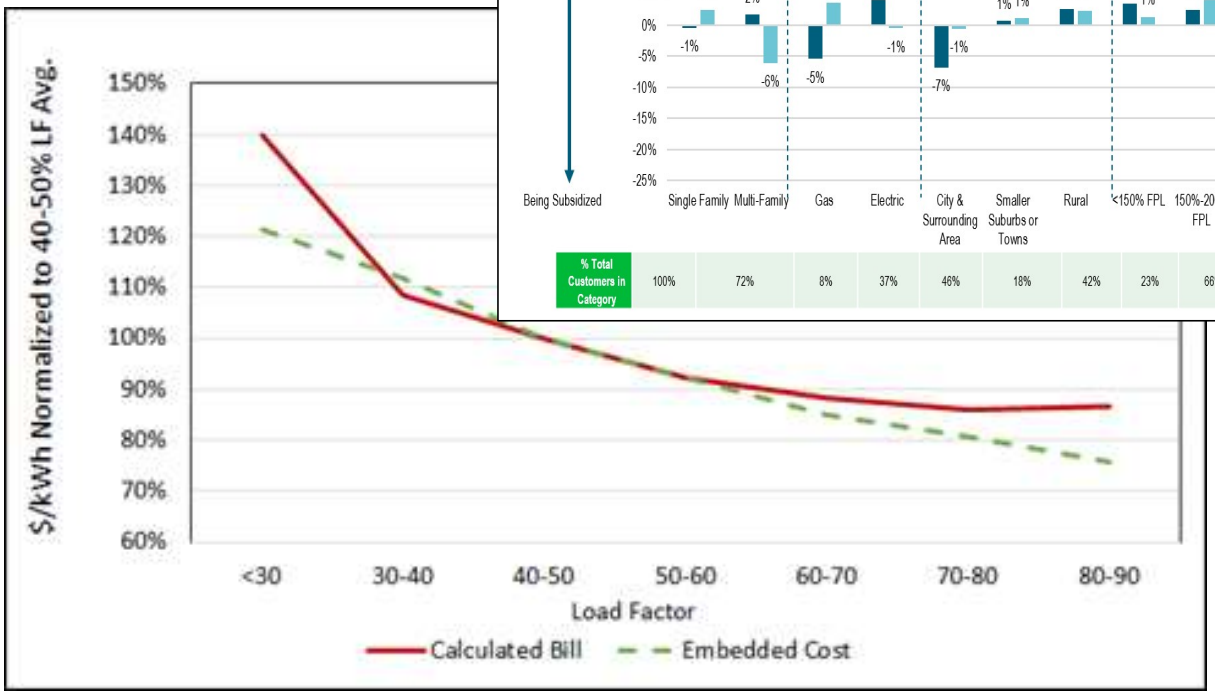
New TOU Periods



Deeper Customer Insights

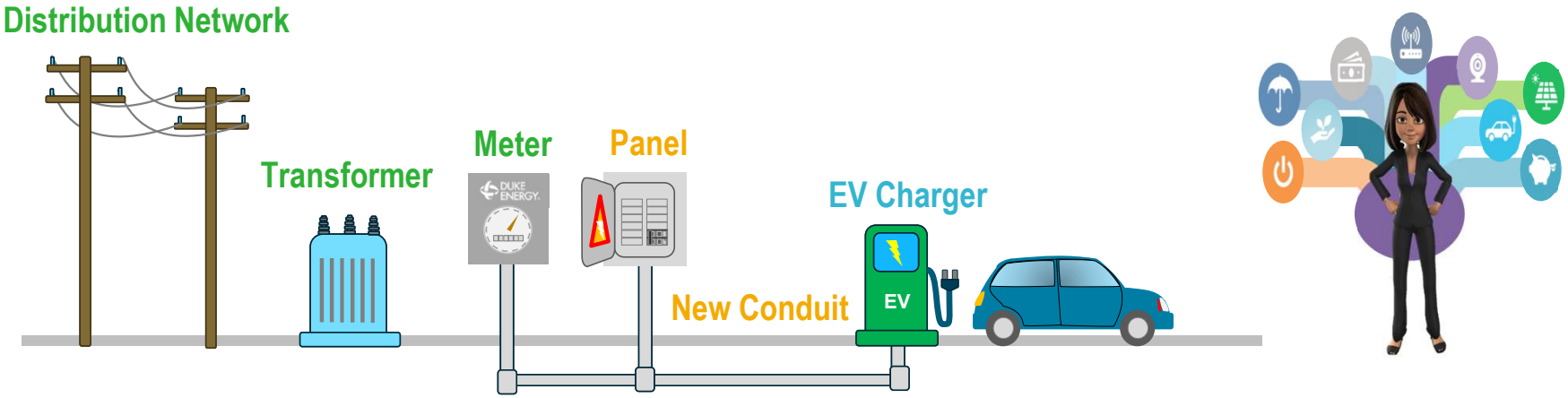
- Investigate questions in ways not formerly possible
- Challenge or Confirm stakeholder and Duke preconceived notions
- Example: What cross-subsidies exist within the Residential class between single-family and multi-family dwellings?
- Example: Does pricing reflect non-





RA3

EV Strategy



Distribution Assets	Make-Ready	Charging	Customer Offerings

VISION

To enable our customers in their electric vehicle transition, driving beyond adoption and increased electric sales with scalable solutions that support electric vehicles while also preparing for an integrated grid future.

Slide 15

RA3 Read Pressley's deck for EV stats

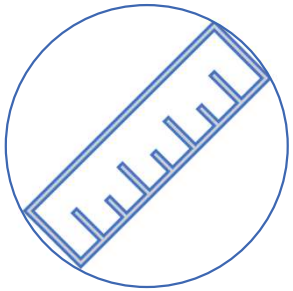
Richardson, Arnie, 4/28/2022

RA6

Analytics Enabling Managed Charging

Identify EV Charging

- Targeted marketing for managed charging programs
- Understand customer behavior of when people are charging to drive strategy
- Training data for propensity modeling



Measure EV Load

- Understand impact of our EV programs
- Understand customer load shapes to drive strategy

Propensities to purchase EVs

- Targeted Marketing for enabler programs and managed charging programs
- Story telling for those on the fence – how to convince people to buy an EV

Slide 16

RA6 Switchs these around to match talking points?
Richardson, Arnie, 4/28/2022

THANKS FOR ATTENDING

Please fill out an evaluation form and drop it in the collection basket located at the back of the room.

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