2022 JEA
IRP Stakeholder Engagement Meeting Series

IRP
INTEGRATED RESOURCE PLANNING

Welcome

Raynetta Curry Marshall

Chief Operating Officer

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IRP Stakeholder Meeting Agenda

1) **Welcome & Introductions**
   Raynetta Curry Marshall, Chief Operating Officer, JEA

2) **February 9 Stakeholder Meeting Recap**
   Laura Schepis, Chief External Affairs Officer, JEA

3) **Planning Elements: A Closer Look**
   - **JEA Load Forecast –** Melinda Fischer, Electric Generation Planning Manager, JEA
   - **Plug-In Electric Vehicles –** Felise Man, Black & Veatch Consultants
   - **JEA Demand-Side Management/Energy Efficiency Programs & Initiatives –** Brian Pippin, Strategic Segment Manager, JEA
   - **Future Demand-Side Management/Energy Efficiency/Customer-Sited Generation –** Jim Herndon, Black & Veatch Consultants

4) **Refine Proposed IRP Scenarios**
   Brad Kushner, Black & Veatch Consultants

5) **Open Discussion and Next Steps**
   Laura Schepis, Chief External Affairs Officer, JEA

February Stakeholder Meeting Recap

Laura Schepis

Chief External Affairs Officer

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Recap of February Stakeholders Meeting

Stakeholder Questions and Comments

- Customer input for JEA to consider when developing its load (peak demand and energy) forecast.
- Extent to which IRP will include strategies for increased energy efficiency and targets for sales reductions through increased efficiency.
- Consideration of future flood projections, and the need for/costs of potential upgrades to JEA's electric system (elevating assets, hardening grid, etc.). Other environmental regulations other than CO_2 that will affect fuel costs.
- How JEA may be able to help customers manage upfront capital cost for solar or unfavorable rates if using third party to build and buy power back. Replacement of the Northside Generating Station with a cost-effective, lower emission energy sources.

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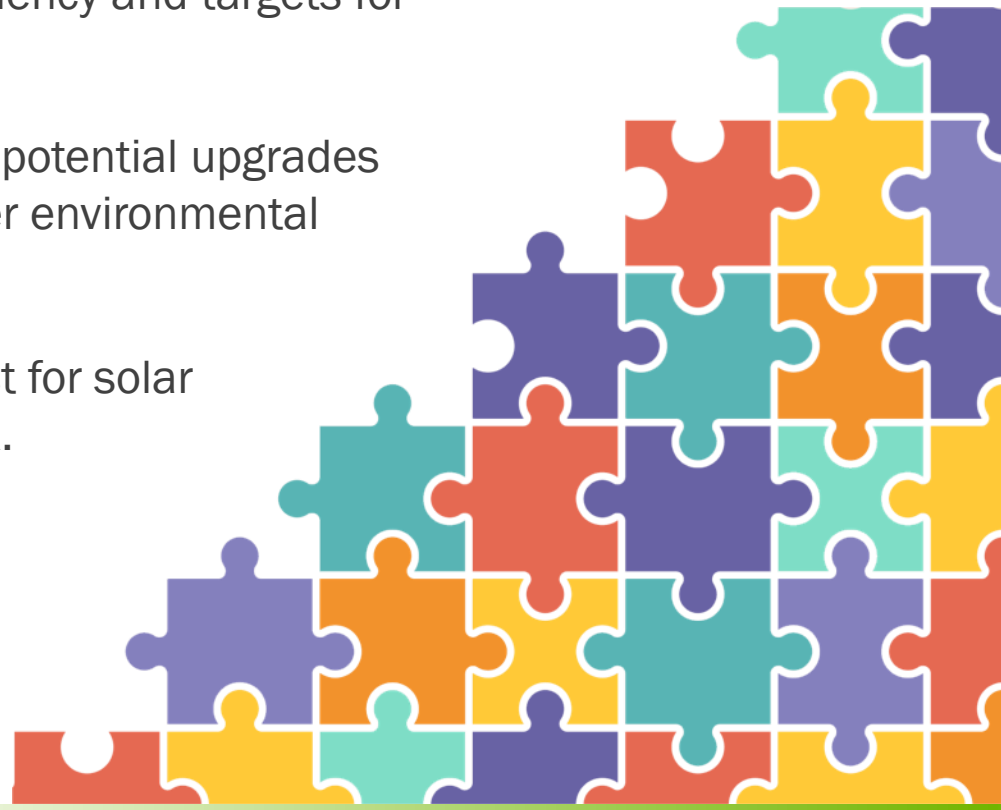
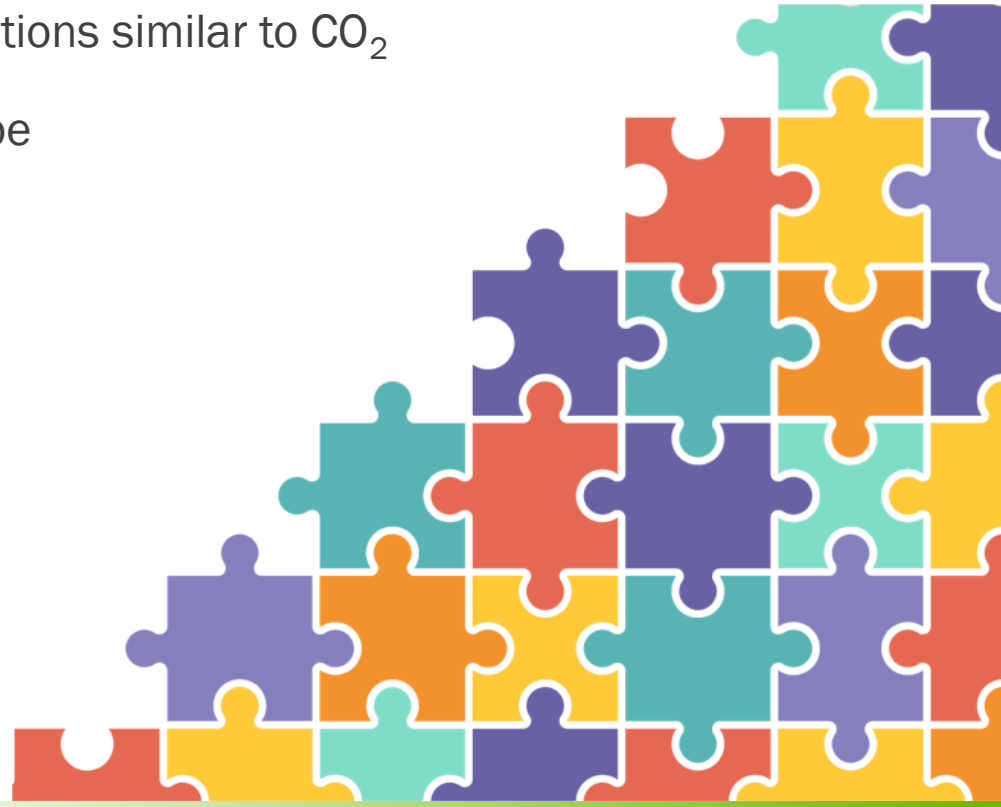


Recap of February Stakeholders Meeting

Stakeholder Questions and Comments

- Ancillary services from loads (sync reserve, 10 and 30 spin) associated with intermittent resources (DER or otherwise).
- Expansion of resiliency and reliability in the variables and considerations similar to CO_2
- Expansion of JEA's Neighborhood Energy Efficiency (NEE) Program be expanded/enhanced to include home weatherization.
- Increased adoption around customer generating and repayments to customers when generating electricity returns to the grid. JEA's position regarding customer solar.
- Avoiding "stranded assets" as new generation is added due to technology advancements?
- JEA's reporting of CO2 emissions.



JEA Load Forecast

Melinda Fischer
Electric Generation Planning Manager

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JEA Forecast Overview

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Forecast Divided into Different Classes

Econometric Forecasting Analysis Methodology

- Residential
- Commercial
- Industrial
- Electrification
- Demand-side Management/Energy Efficiency
- Other (Streetlights, Off-System Sales)

Data Sources

Historical Weather & Temperatures

Historical & Forecasted Economic Data

Total Inventory Space

Energy Sales and Number of Customers

Energy Forecast Calculation

Trend analysis performed on weather-normalized energy sales as well as historical and forecasted economic inputs

Economic Inputs:

Residential

Total population, number of households, number of housing starts, median household income

Commercial

Number of employments by Commercial classifications, total commercial square foot inventory, gross domestic product

Industrial

Number of employments by industrial classifications, gross domestic product

JEA Peak Demand Forecast Calculation

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Peak forecast using Load Factor methodology.

Forecasted Load Factor based on 10 years average load factor calculated from normalized historical energy and peaks.

The peak forecasts are done by seasons.
Summer: June to August
Winter: December to February

Forecasts for electrification and energy efficiency are done separately.

Plug-In Electric Vehicles

Felise Man

Black & Veatch Consultants

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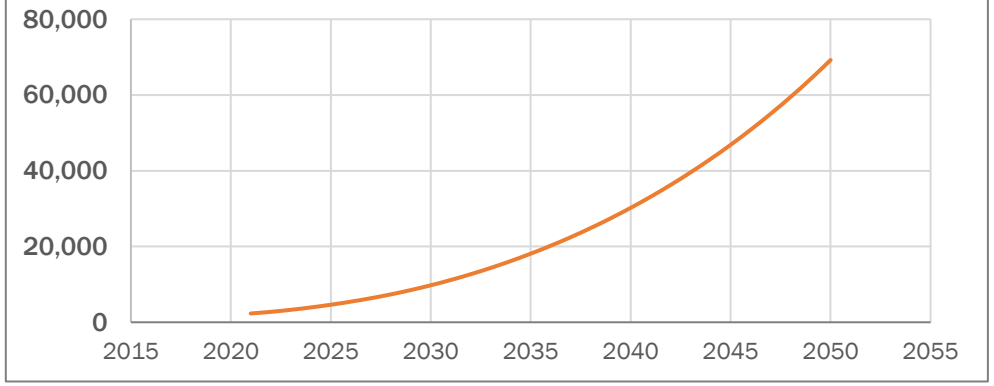
JEA Plug-In Electric Vehicle (PEV) – Current Outlook Scenario

PEV adoption and impact to electric forecasts are incorporated into JEA's IRP load forecast

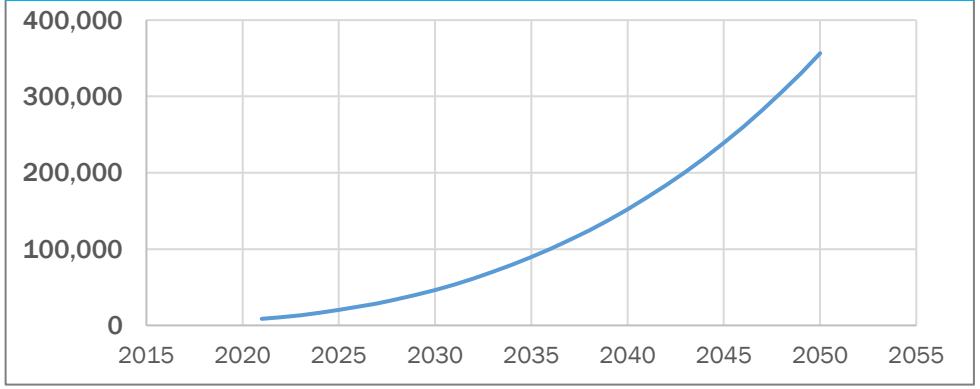
Key Observations – JEA Service Territory

- PEV vehicle growth forecasted to 12% annually
- By 2050, PEVs add 2.2% to Net Energy Load and 6.2% to Summer Peak
- Winter Peak shifted from historic evening hours to afternoon

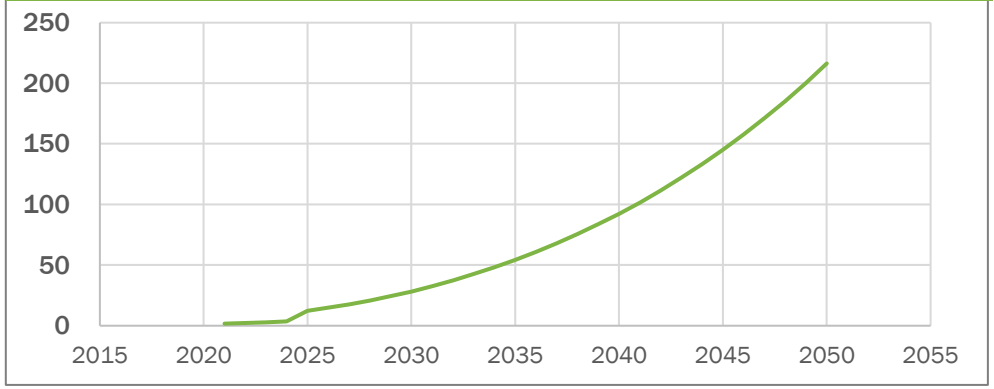
PEV Vehicle Count



PEV Contribution to Net Energy Load (MWh)



PEV Contribution to Summer Peak (MW)



Plug-In Electric Vehicle (PEV) Forecast

Current light-duty vehicle outlook informed by anticipated population growth, disposable income, and historical adoption rates

Inputs & Assumptions

Historical Vehicle Registration
- Registered Vehicles Duval County
- Existing PEVs

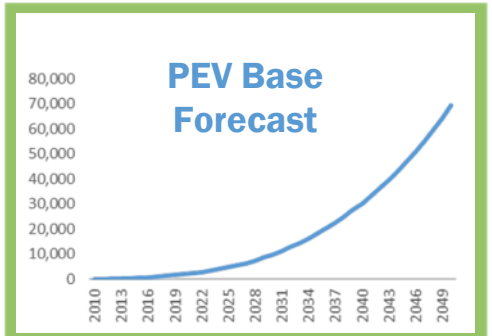
Economic Forecast
- Population Growth
- Median Income

Forecast Energy Costs
- Vehicle Efficiency
- Vehicle Miles Traveled
- Residential Electric Rate
- Gasoline Price Forecasts

PEV Growth
Regression Analysis

Impact to Energy Forecasts

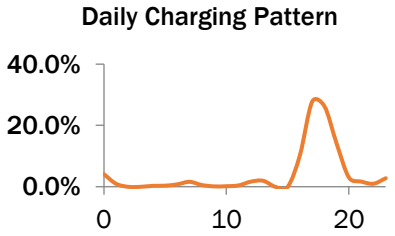
Results



Energy Forecasts
- Impact to Energy Load (MWh)
- Impact to Peak Demand (MW)

Inputs & Assumptions

Charging Assumptions
- PEV Vehicle Types and Battery Capacity
- Daily Charge Pattern (US Census 2013)
- On Board Charge Rate



Additional PEV Forecasts

Different outlooks for PEV adoption and impacts will be developed and applied to meet scenario intents

	Current Outlook Passenger	High Adoption Passenger	Commercial & Industrial (C&I) Electrification
Vehicle Type	Passenger Light Duty Vehicles	Passenger Light Duty Vehicles	Commercial & Industrial Light, Medium and Heavy-Duty Vehicles
Economic Inputs	Population Growth Disposable Income	Population Growth Disposable Income	Commercial Growth
Key Adoption Drivers	Historic Adoption	"Stock Rollover" Share of PEV Sales driven by policy targets/ manufacturer projections	"Stock Rollover" Vehicle Availability Customer Economics

JEA's Existing Demand-Side Management/Energy Efficiency Programs and Initiatives

Brian Pippin

Strategic Segment Manager, Customer Solutions and Market Development

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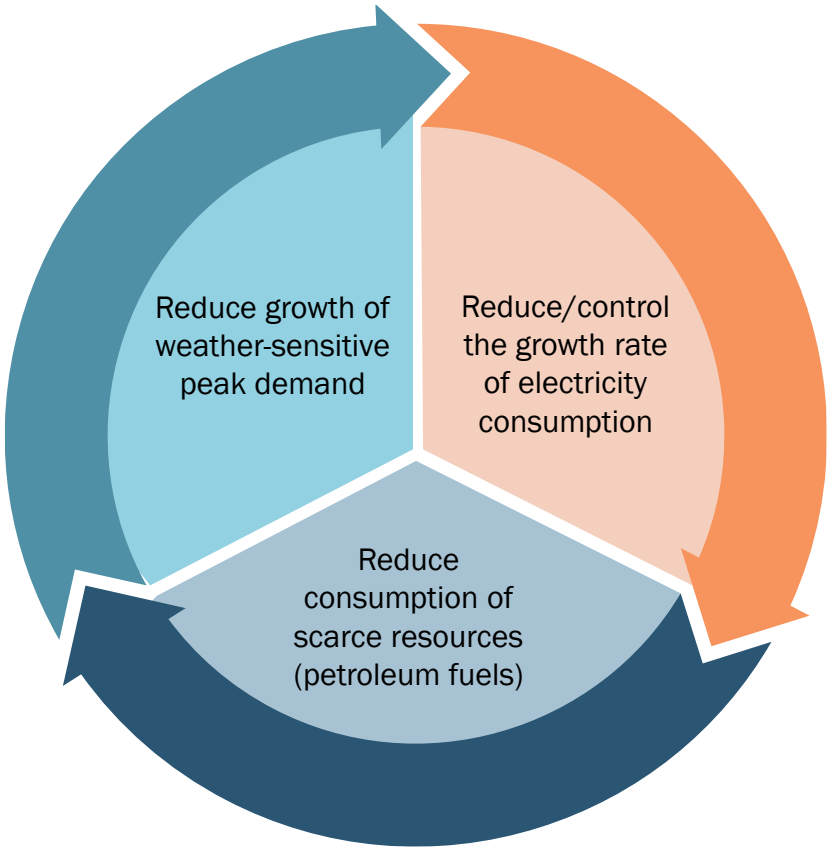
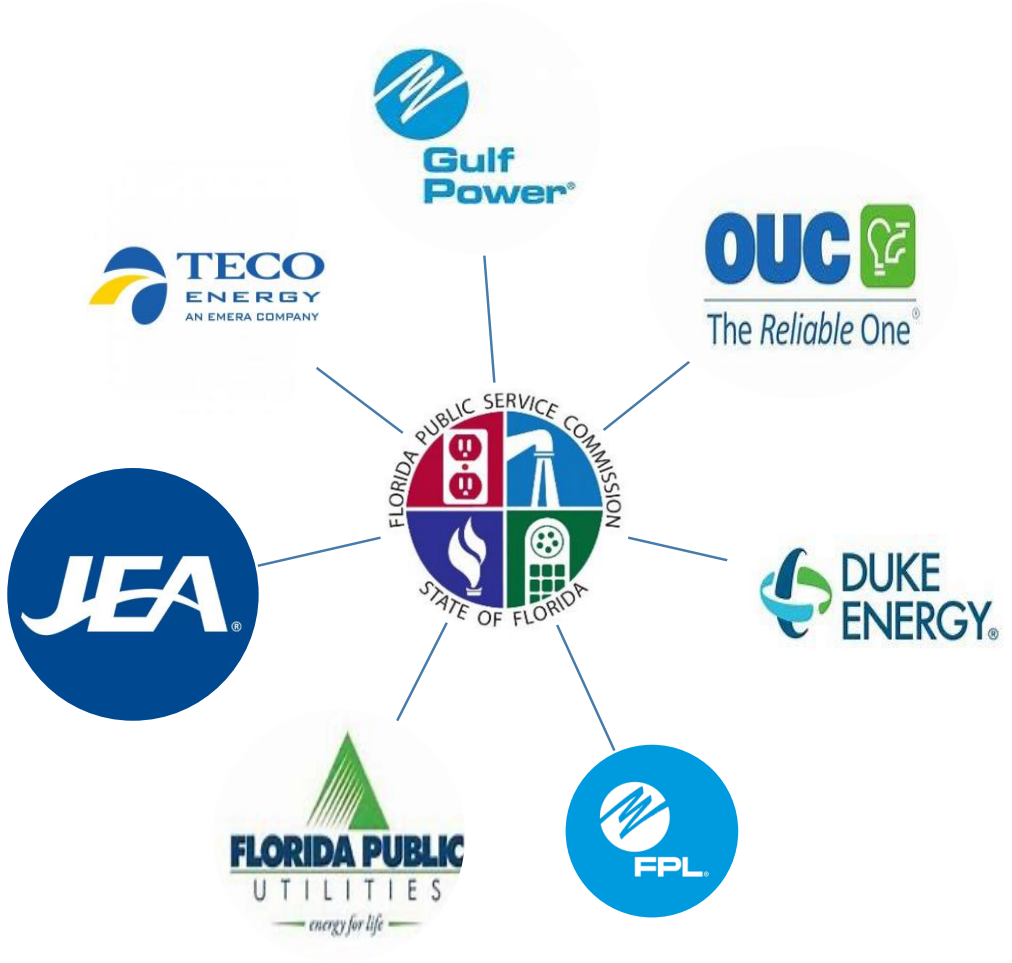
Regulated vs. Non-Regulated Programs

Florida Energy Efficiency & Conservation Act (FEECA)





JEA's Electric Demand-Side Management Portfolio

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Residential
Energy Upgrades

Residential
Energy Efficient Products

Commercial
Prescriptive (non-lighting)

Commercial
Custom

Commercial
Small Business Direct Install

Residential
Energy & Water Assessments

Residential
Solar Water Heating

Residential
Home Energy Efficiency

Commercial
Energy & Water Assessments

Commercial
Prescriptive Lighting

Potential Future Demand-Side Management/Energy Efficiency/ Customer-Sited Generation

Jim Herndon
Black & Veatch Consultants

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Demand Side Management (DSM)

Demand Side Management (DSM) analysis includes forecasting the market potential for the following:

Energy Efficiency

Reduce overall energy usage through upgrades to higher efficiency equipment, controls, other energy-saving measures.

Demand Response

Short term reduction in participants' demand for electricity when JEA's system demand for electricity is at its highest.

Rooftop Solar and Battery Storage

Installation of customer-sited rooftop solar and battery storage systems by JEA's residential and commercial customers

DSM Market Potential Study

DSM Energy Efficiency Forecast

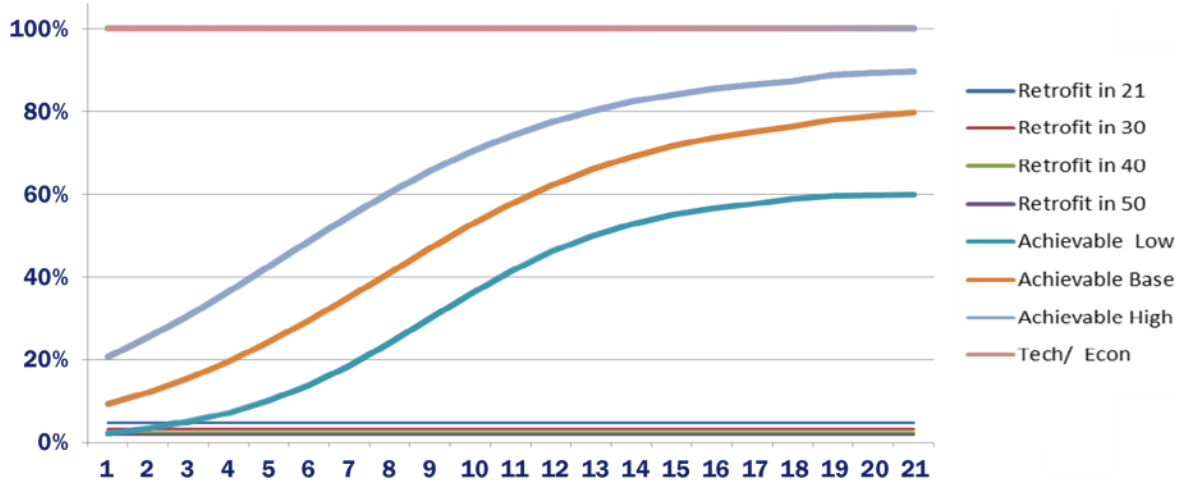
Estimate Technical Potential

Technical Potential of Efficient Measures = Total Number of Households × Base Case Equipment Energy Use Intensity (therms/unit) × Saturation Share × Remaining Factor × Applicability Factor × Savings Factor

Estimate Economic Potential

Screen Measures for Cost-Effectiveness and Report Associated Potential

Estimate Achievable Potential



DSM Demand Response Forecast

Based on curtailable load from eligible sources during system peak hour for each season

Residential

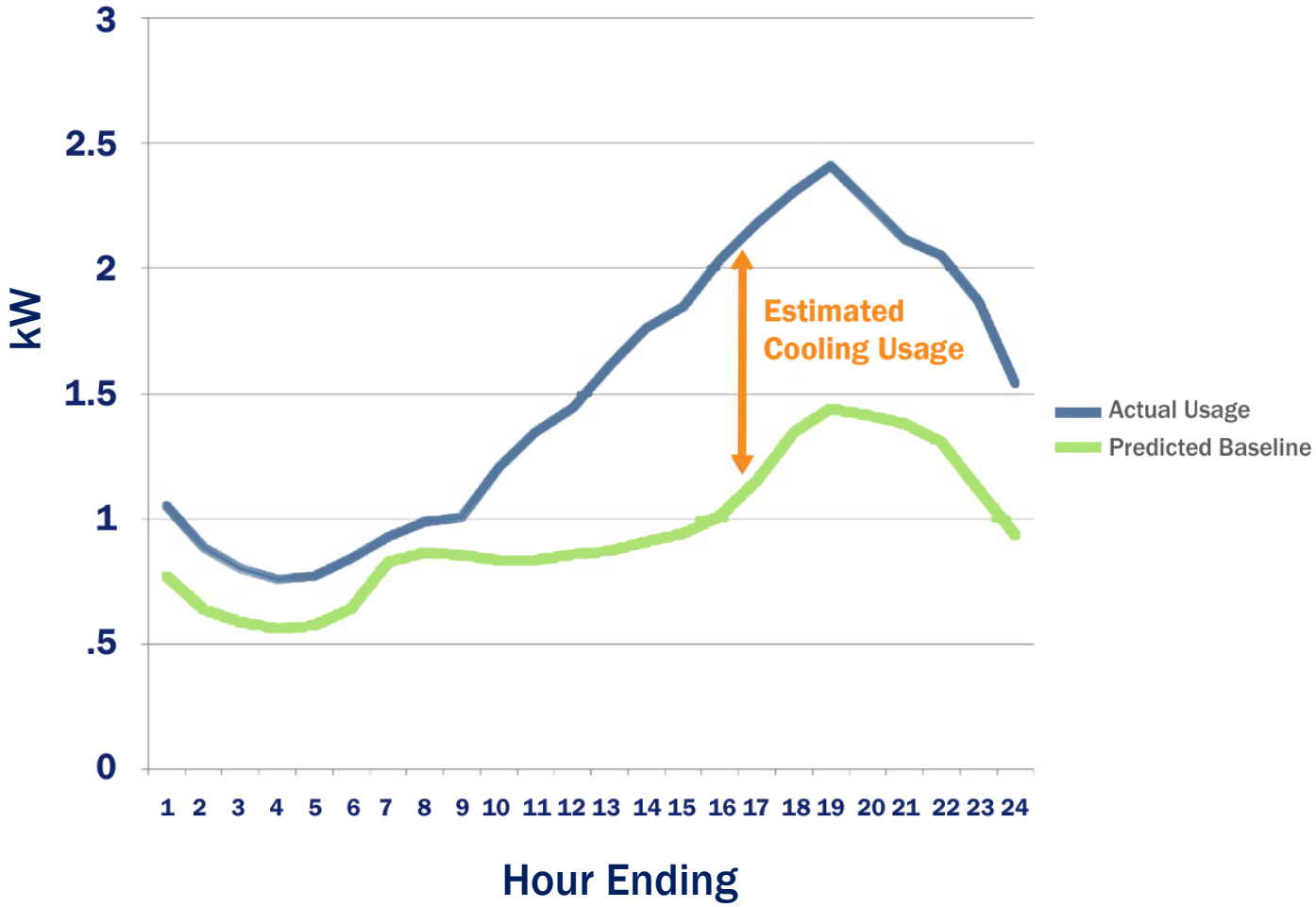
- Air conditioning (Summer)
- Heating (Winter)
- Water Heaters (Year round)
- Pool Pumps (Summer)

Small/Medium Business

- Air conditioning (Summer)
- Heating (Winter)

Large Commercial and Industrial

- Total load (based on assumption that these customers will shed all load if you are willing to pay them enough)



DSM Rooftop Solar and Storage Forecast

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Key Inputs

- Technology costs
- Performance characteristics
- Building stocks, roof area estimates
- Load and generation shapes
- Electric rates
- Tax credits and incentives

Key Outputs

- Adoption forecast by sector (Residential, Non-residential)
- MW installed, MWh generated, Peak MW impacts
- Hourly energy and peak demand impacts (hourly)
- Optimal storage dispatch

Refine Proposed IRP Scenarios

Bradley Kushner
Black & Veatch Consultants

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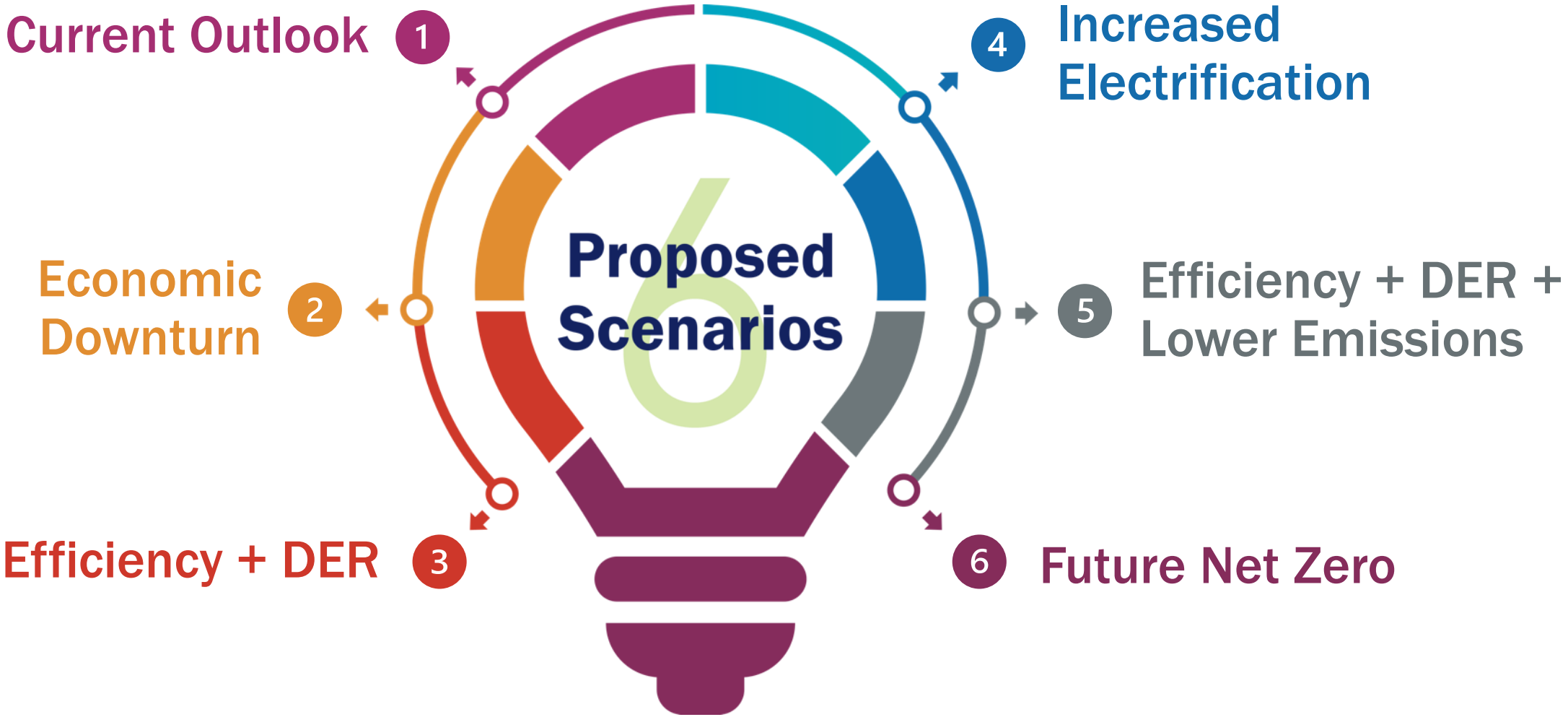
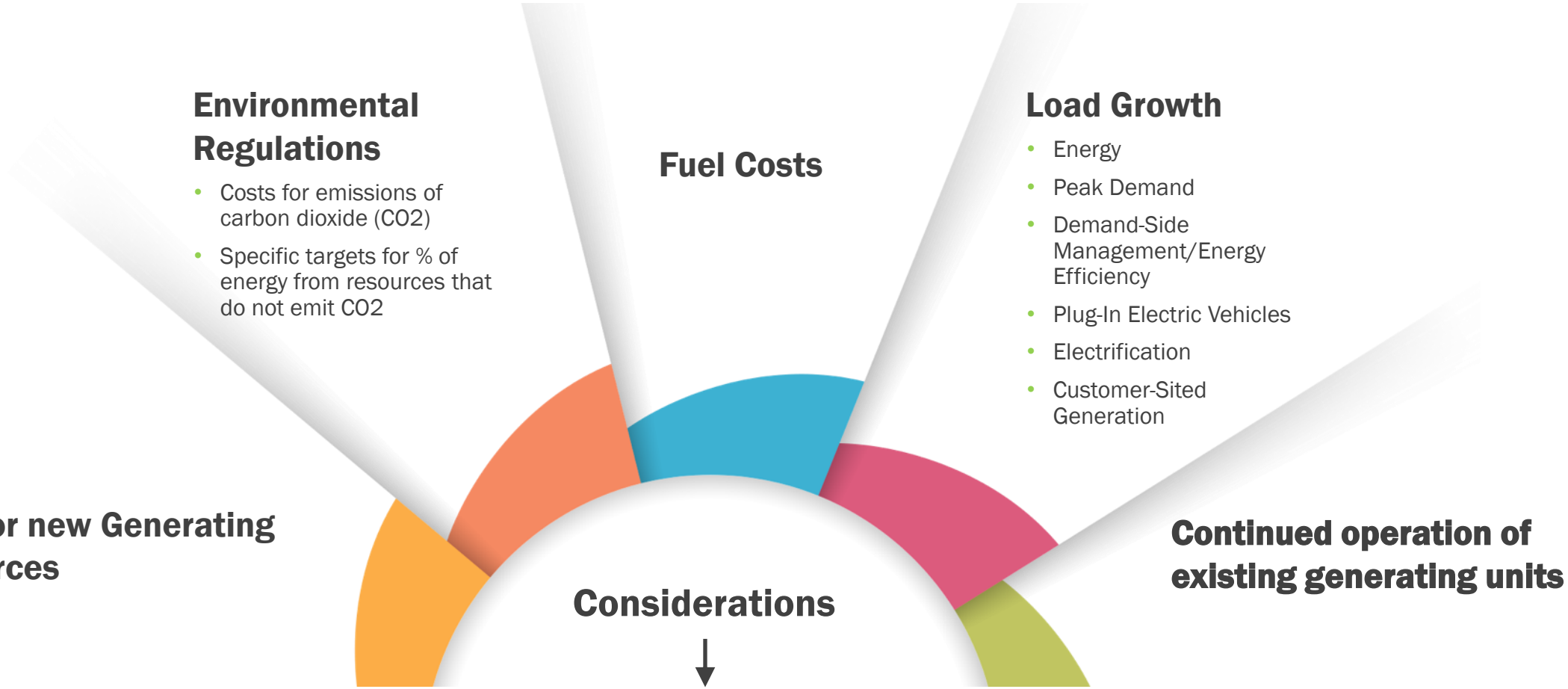
Proposed IRP Scenarios

(as Presented on 2/9/2022)



Variables and Considerations Influence Scenarios

The following variables and considerations may differ when comparing one Scenario to another:



Affordability • Maintain system reliability • Environmental justice • Economic development • CO_2 emissions reductions

Example Scenario Comparison

Scenarios are developed to analyze resource decisions under various potential futures

- Each scenario looks at different areas and considers changes to variables relative to the current outlook
- Variables in current outlook are noted as "Base" or "None"
- Variables for other scenarios are shown relative to the Current Outlook variables:

High = lead to higher/larger outcome than the base

Low = lead to lower/smaller outcome than the base

This Chart illustrates the Current Outlook and Efficiency + DER + Lower Emissions scenarios

Area	Variable	Current Outlook	Efficiency + DER + Lower Emissions
Load Growth	Energy	Base	Low
	Peak Demand	Base	Low
	Demand-Side Management/Energy Efficiency (DSM/EE)	Base	High
	Plug-In Electric Vehicles (PEV)	Base	High
	Electrification	Base	High
	Customer-Sited Renewables	Base	High
Fuel Costs	Natural Gas and Fuel Oil	Base	High
	Solid Fuel	Base	Low
Env. Reg.	Costs for Carbon Dioxide (CO_2) Emissions	None	High
	% Energy from Non-CO_2 Resources	None	High
Other	Construction Cost	Base	High
	Unit Retirements	Base	Base

Scenario: Natural Gas Price Projections

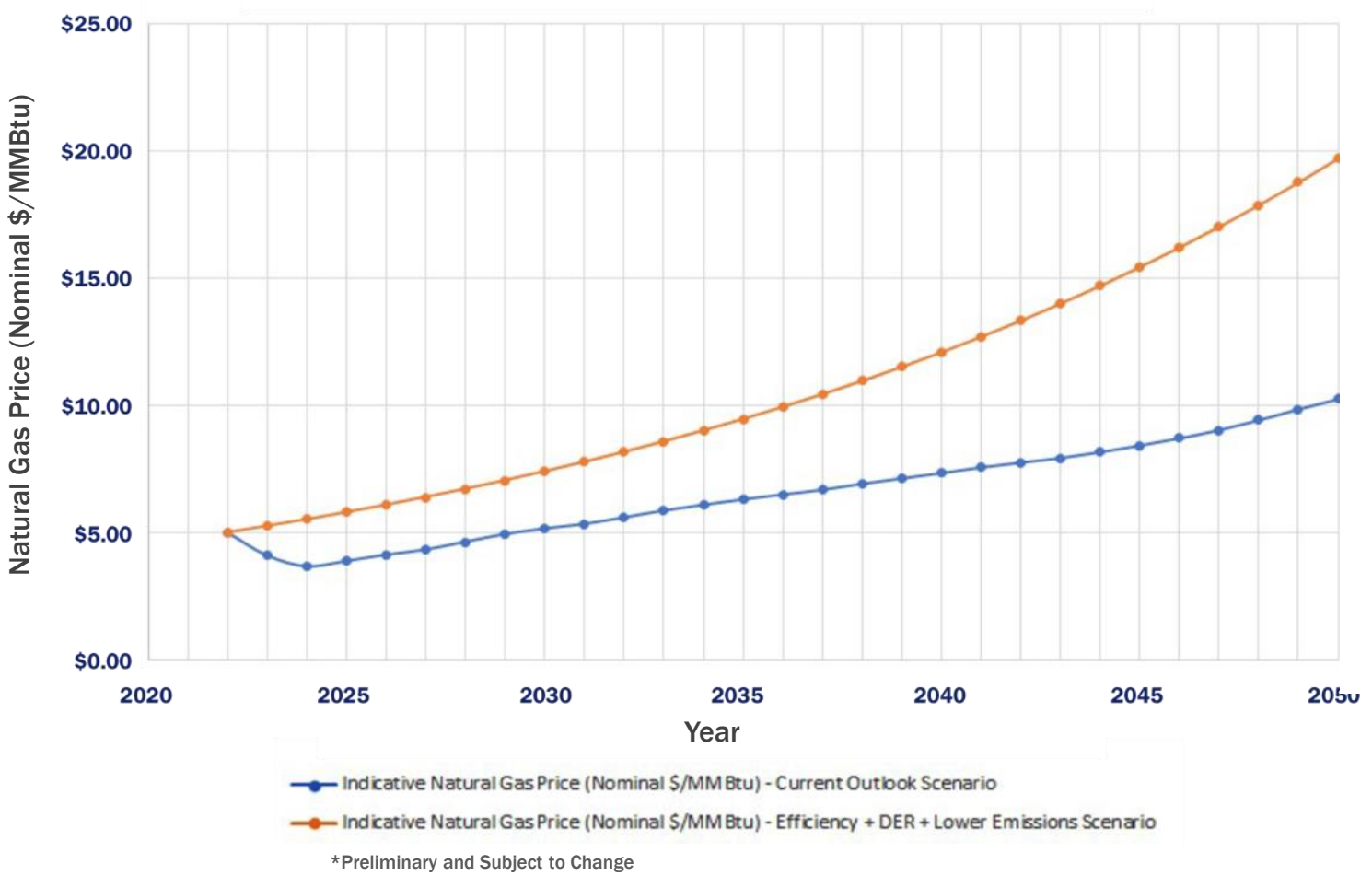
Reflect near-term and longer-term assumptions

- Near-term prices based on NYMEX futures
- Longer-term prices based on escalation factors included in US Energy Information Administration (EIA) Annual Energy Outlook (AEO)

Include consideration of differential in prices for natural gas to be delivered to JEA's generating units

- Price projections for natural gas at Henry Hub
- Additional costs for delivery to JEA

Indicative Natural Gas Price Projections for Current outlook and Efficiency + DER + Lower Emissions Scenarios*



*Preliminary and Subject to Change

Open Discussion and Next Steps

Laura Schepis

Chief External Affairs Officer

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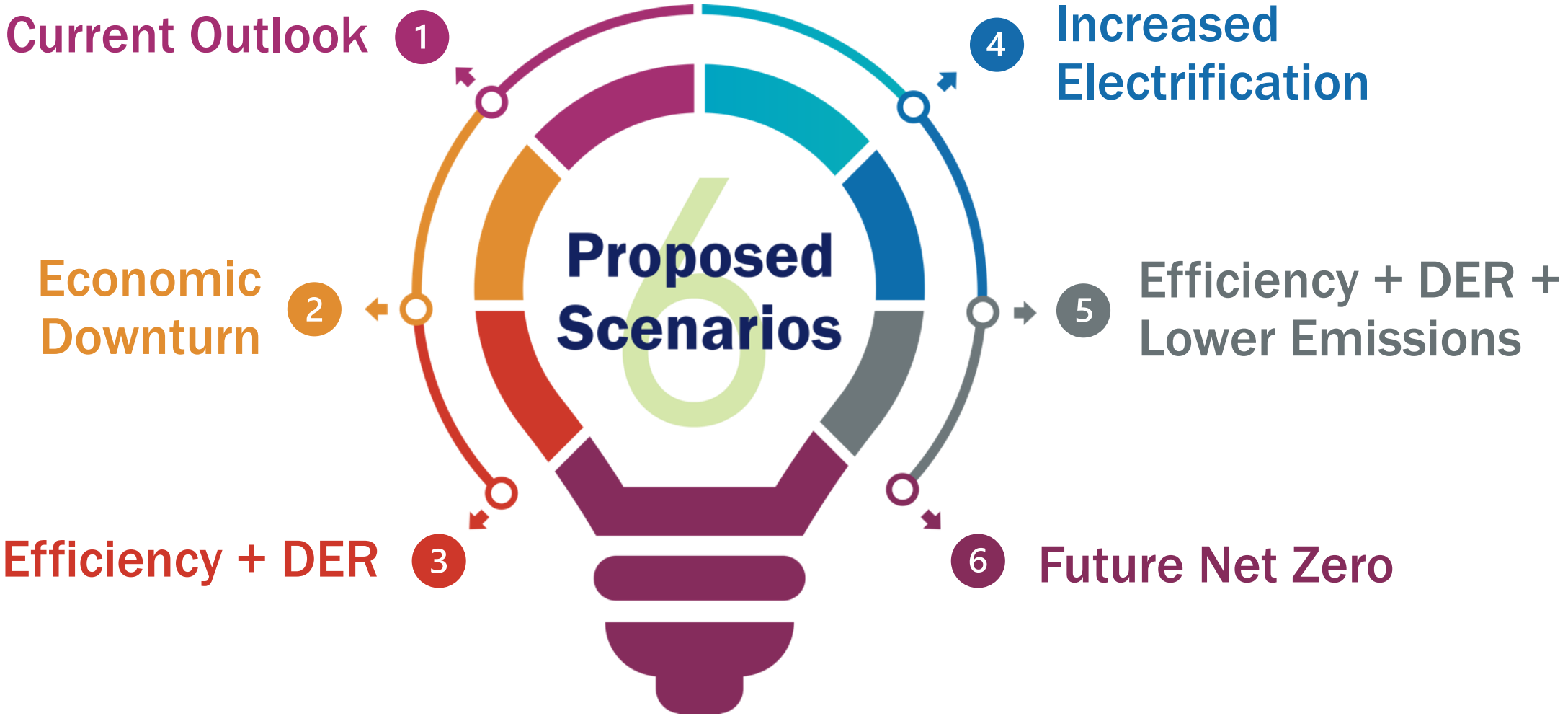
Proposed IRP Scenarios

(as Presented on 2/9/2022)



Open Discussion

What is Important to You?

- What would Stakeholders like to see at upcoming Stakeholder meetings?
- Is there anything related to the electric industry you'd like to learn more about?
- Can we improve this experience for you in any way?

Next Steps

Mid-May report delivered on scenarios

Next Stakeholder Meeting

- Next Meeting: June 9, 2022 starting at 12:00 PM
- Topic of Discussion:
  Present Supply Side Options and DSM Potential
- Engage with Stakeholder Members & JEA Team
- We want your ideas…Share your thoughts and Opinions
- WE APPRECIATE YOU!

Appendix

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IRP Stakeholder Participants

Reginald Caldwell
Bethel Baptist Institutional Church

Kimberly Cobb-Ray
NE Florida Community Action Agency (NFCAA)

Anne Coglianese
City of Jacksonville (COJ)

Gloria Crawford
COJ, Senior Services Division

Logan Cross
Sierra Club

Sam Dean
Baptist Medical Center

Greer Gillis
Jacksonville Transportation Authority

Jacob Gordon
Downtown Vision

Diana Greene
Duval County Public Schools

John Hale
University of North Florida

David Jones
Jacksonville Aviation Authority

Christina Kelcourse
North Florida Green Chamber of Commerce

Mari Kuraishi
Jesse Ball DuPont Fund

Linda Levin
Elder Source

Jeanne Miller
Jacksonville Civic Council

David Millinor
Mayport Naval Base

Charles Moreland
COJ, Mayor's office

Lake Ray
First Coast Manufacturers Association

Lisa Rinaman
St Johns River Keeper

John Sapora
Local Initiative Support Corporation (LISC)

Lucinda Sonnenberg
Jacksonville University

Jessie Spradley
Northeast Florida Builders Association (NEFBA)

Jeff Winkler
United Way of Northeast Florida

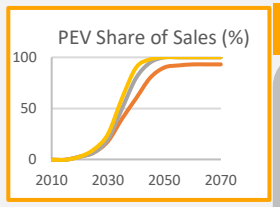
Shamika Wright
JAX Chamber

Mark Zimmerman
CMC

JEA PEV High Adoption Forecast

More aggressive forecast will be used in select IRP Scenarios and leverage a stock rollover rather than a historical adoption approach

"Stock rollover" model informed by population growth, vehicle turnover rate, and PEV sales targeted by policy and/or manufacturer projections



Inputs & Assumptions

Share of PEV Sales
- Policy targets (e.g. Electric Vehicle Action Plan)
- Manufacturer Sales Offering

Inputs & Assumptions

Historical Data
- Registered Vehicles Duval County
- Existing PEVs (Florida Department of Highway Safety and Motor Vehicles)

Economic Forecast Data
- Population Growth (Moody's)

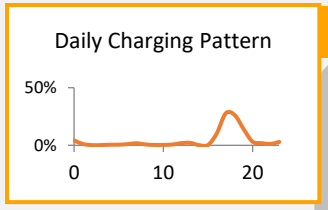
Vehicle Growth Forecast
Stock Rollover Model

Impact to Energy Forecasts

Results

PEV Growth Forecast

Energy Forecasts
- Impact to Energy Load (MWh)
- Impact to Peak Demand (MW)



Inputs & Assumptions

Charging Assumptions
- PEV Vehicle Types and Battery Capacity Daily Charge Pattern (US Census 2013)
- On Board Charge Rate

C&I Electrification Incentive Program

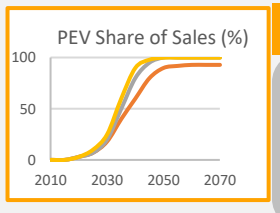
Commercial electrification informed by commercial growth, vehicle turnover rate, and PEV sales by economics and vehicle availability

"Stock rollover" model informed by commercial growth, vehicle turnover rate, and PEV sales by economics and vehicle availability

Inputs & Assumptions

Historical Data
- Registered Vehicles Duval County
- Existing PEVs (FL Dept of Highway Safety and Motor Vehicles)
- Program participation rates

Economic Forecast
- Commercial Growth

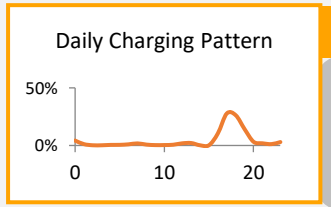


Turnover Assumptions

Share of PEV Sales
- Economics and vehicle available by economics, vehicle availability

Vehicle Growth Forecast
Turnover Analysis

Impact to Energy Forecasts



Inputs & Assumptions

Charging Assumptions
- Daily Charge Pattern

Results

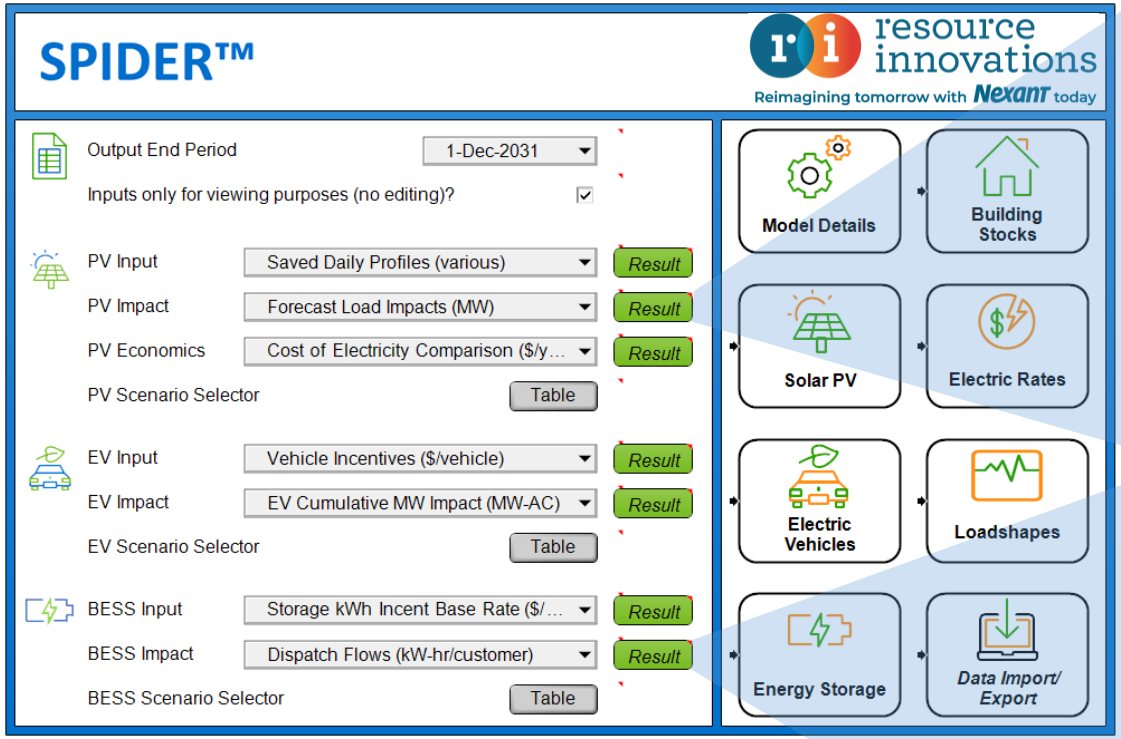
PEV Growth Forecast

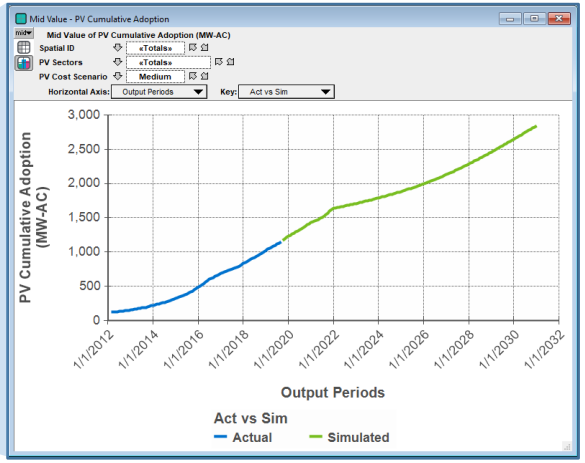
Energy Forecasts
- Impact to Energy Load (MWh)
- Impact to Peak Demand (MW)

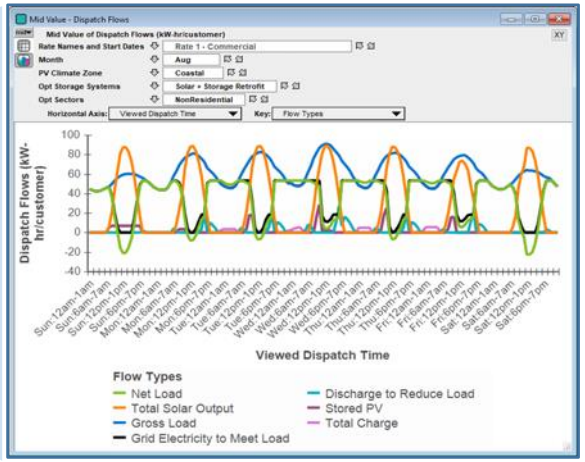
Demand Side Management

Rooftop Solar and Storage: SPIDER™ Model

(Spatial Penetration & Integration of Distributed Energy Resources)







Demand Side Management

Analyze load forecast to determine how the system load shape is expected to change over the study horizon

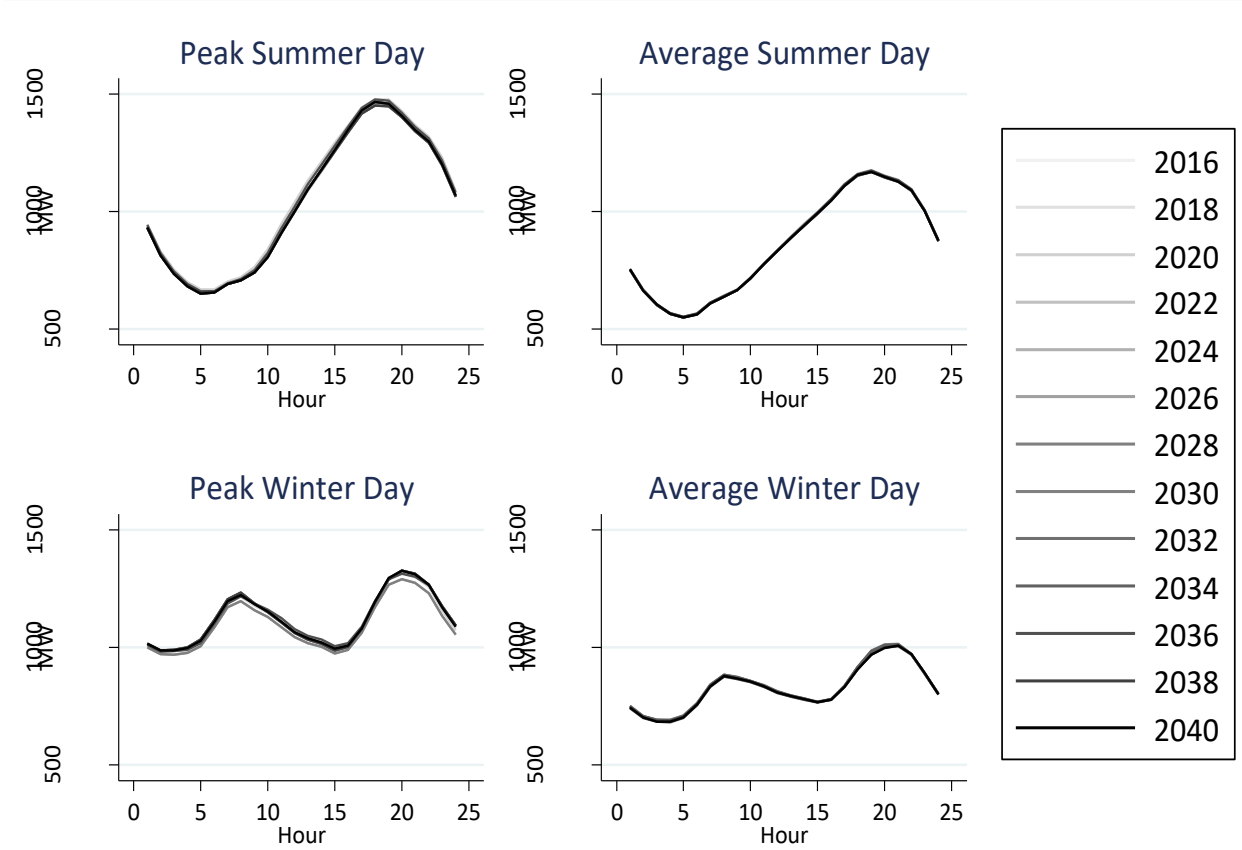
Potential shifts include:

- Change in peak hour
- Change in peak season (e.g. summer to winter)

Assessing Potential:

- Which loads and customers can be curtailed to achieve system benefits?
- What options and strategies exist for making those reductions?
- Which customers are likely to be cost effective for the selected strategies?
- What induces customers to participate and offer curtailment services?

Demand Response Determines System Peak

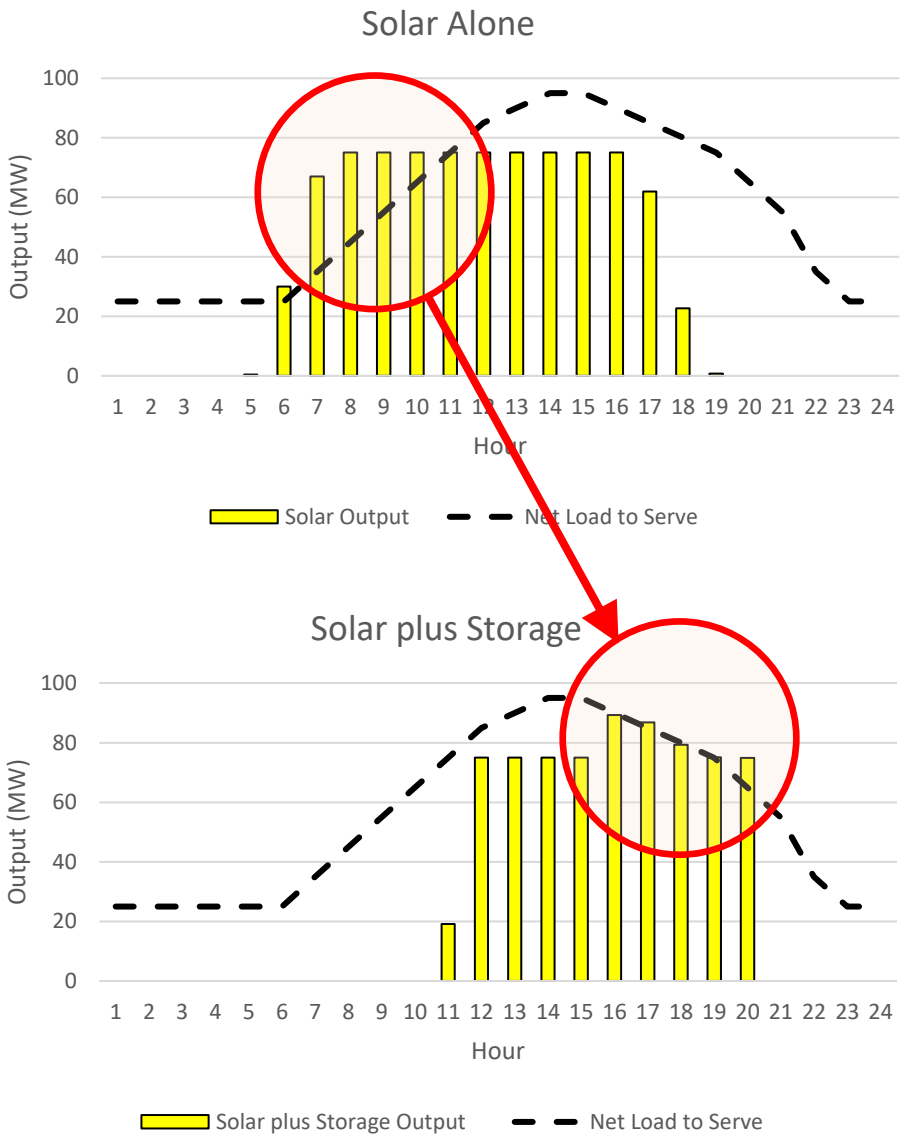


Emerging Technologies - Energy Storage

Solar energy results in carbon emission reduction benefits.

However, customer net load increases late in the day when the sun is setting.

Adding energy storage is a key solution, allowing us to take and store solar energy in the morning and discharge it later to serve load.



Emerging Technologies - Energy Storage

Battery energy storage is the leading technology

- Broadest application range and most proven

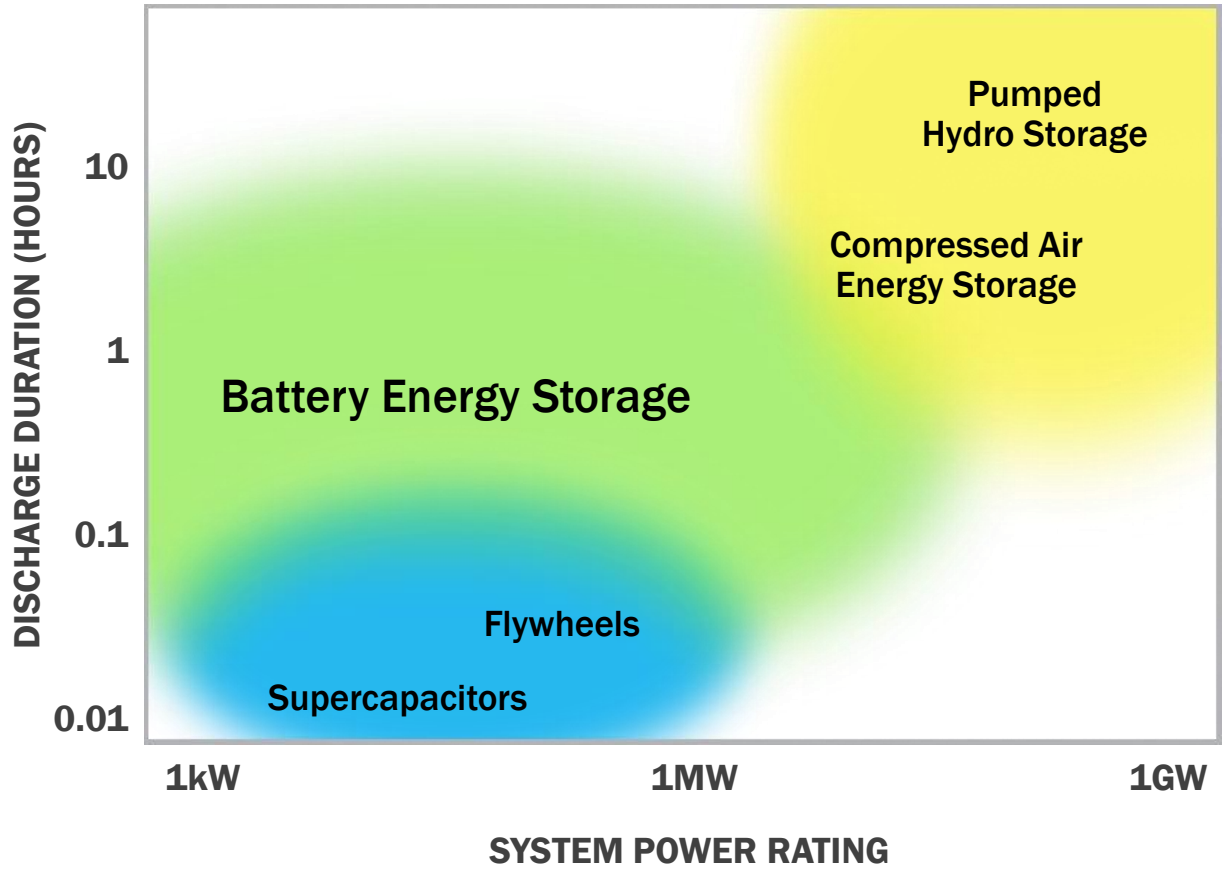
Lithium Ion is leading battery storage chemistry

- Lowest cost, highest modularity
- Leveraging electric vehicle supply chain

Asian companies are leading manufacturers

- BYD (China)
- LG (South Korea)
- Panasonic (Japan)

Power & Energy Applications for Energy Storage



Emerging Technologies - Energy Storage

Potential Storage Options

- 25 MW capacity x 1-hour duration (=25 MWh)
- 50 MW capacity x 4-hour duration (=200 MWh)
- Multiples of each option can be combined into a larger plant
- Individual containers or housed in single building
- Integrated with adjacent solar plant or stand-alone

50 MWh Tesla Battery at a Solar Farm In Australia