Joint Integrated Resource Plan (IRP) Stakeholder Presentation

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Indiana ENERGY Association

AEP INDIANA MICHIGAN POWER
A unit of American Electric Power

NIPSCO

ipl an AES company

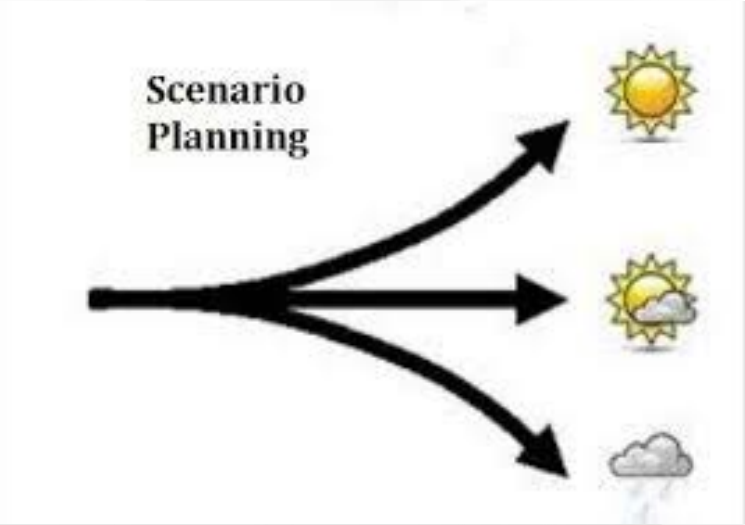
VECTREN Live Smart

DUKE ENERGY

6 SCENARIOS AND SENSITIVITIES (IPL)

Scenarios & Sensitivities

- IRPs include a multitude of options amidst a range of uncertainties given a 20+ year future view
- Consider risks and uncertainties through scenario planning
  - Examples:
    - Economic drivers
    - Environmental regulations
    - Technology advancements



Definitions

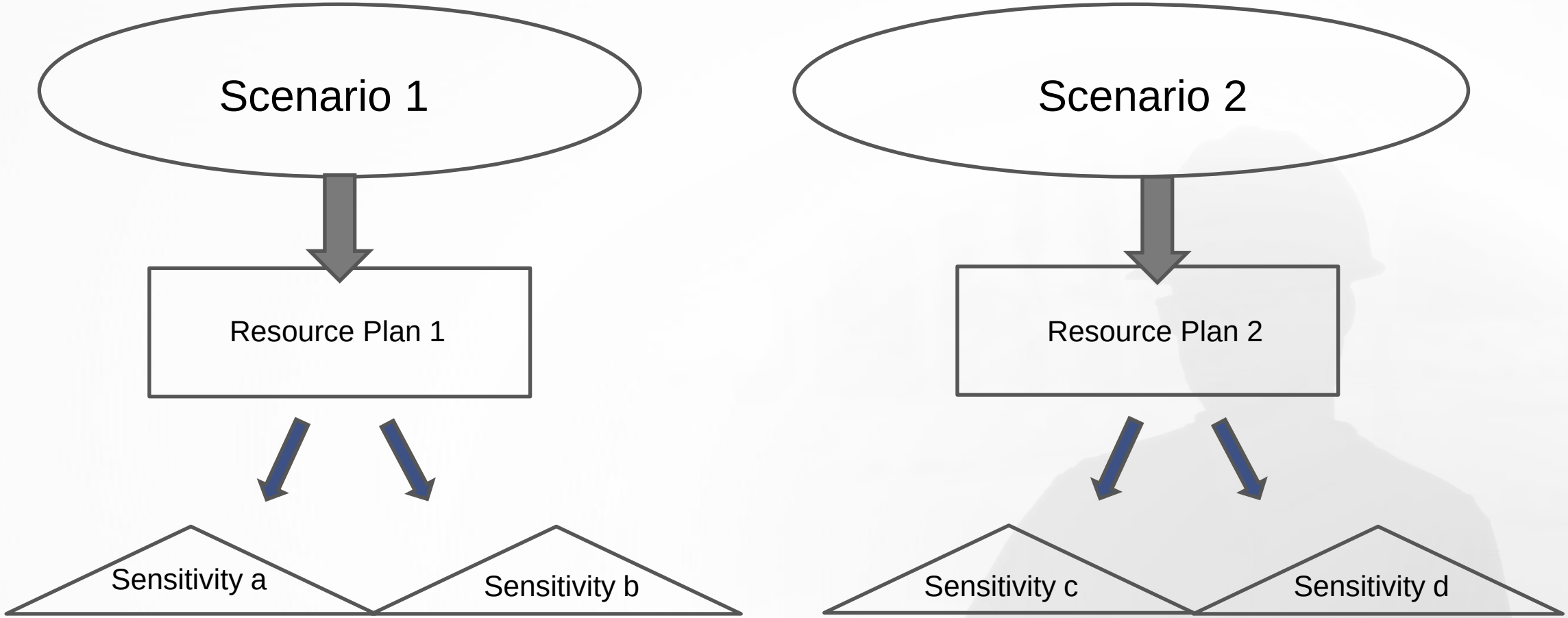
- Risk – the variance from expected outcome due to a change in one or more assumptions.
- Uncertainty – the potential range of possibilities that a particular variable or assumption may vary
- *Base Case Scenario – "The base case [scenario] should describe the utility's best judgment (with input from stakeholders) as to what the world might look like in 20 years if the status quo would continue without any unduly speculative and significant changes to resources or laws/policies affecting customer use and resources."
- Driver – a specific variable that if changed results in a significantly different outcome
- Resource Plan – a utility plan for meeting forecasted annual peak and energy demand, plus some established reserve margin, through a combination of supply side and demand side resources over a specified future period
- *Scenario – "A scenario is a simulation of a future world technical, regulatory and load environment."
- Sensitivity– A sensitivity measures how a resource plan performs across a range of possibilities for a specific driver or variable

*2015 IURC Director's Report

Scenario Planning vs. Sensitivity Analysis

- Scenario Planning
  - Example potential future world outcomes
    - Strong Economy
    - Weak Economy
    - Public Policy focus on energy independence
    - Public policy focus on environmental impact
    - Technology enabling extensive Distributed Generation
- Sensitivity Analysis
  - Example assumptions tested
    - Load Forecast
    - Commodity Prices : Locational Marginal Pricing (LMPs), Natural Gas (NG), Coal
    - CO_2 Costs
    - Capacity Prices

Scenarios and Sensitivities



Scenario Planning

- Characteristics
  - Starts with understanding major factors / drivers (external) that move potential future world outcomes in different directions.
    - Intuitive
    - Inclusive
  - Then develop different plausible potential future world outcomes
  - Each scenario incorporates multiple uncertainties over multiple time periods
  - Lays foundation for modeling and developing Resource Plans

Sensitivity Analysis

- Characteristics
  - Identifies key assumptions
    - Assumptions to which our plan results are most and least sensitive
  - Identifies Resource Plans that are most robust to the most key assumptions
  - Identifies Resource Plans that are most sensitive to the most key assumptions (i.e. least robust)
  - Helps prioritize risks and uncertainties

Probabilistic Analysis

- Characteristics
  - Varying intensity
  - Various methods - Monte Carlo simulation, probabilistic decision tree, other
  - May be in IRP and/or specific project/certificate of need analysis
- Quantitative
  - Assign specific percentage probability based on statistics or even educated estimates
    - Commodity prices lend themselves to quantitative analysis because you have histories, forwards markets, and fundamental forecasts
- Qualitative
  - Assign range of probability (low vs. high vs. intermediate) based on educated estimates
    - Future policy decisions lend themselves to qualitative analysis because of the lack of data and objective analysis.