IRP 101

This reference compiles sources, information, supplemental links, and a high-level summary for acronyms and topics commonly used in integrated resource planning (IRP). This list includes a variety of resources such as PNM materials and other sources (CAISO, DOE, etc.).

Acronyms

Capacity Expansion Models (CEM)

High level summary:

Capacity expansion models are long-term planning tools that use optimization to identify the least-cost mix of generation and storage resources needed to meet future demand, policy goals, and reliability standards. They simulate how the power system evolves over decades, considering factors like fuel costs, emissions limits, and transmission constraints to develop candidate portfolios for integrated resource planning

Links:

Internal (Page 117 (125)): pnm-2023-irp-final-pdf

External (Page 10): Power Sector Modeling 101

Demand Response (DR)

High level summary:

Demand Response refers to programs that encourage customers to reduce or shift electricity use during periods of high demand. This is typically achieved through price signals, time-of-use rates, or financial incentives. In terms of planning, DR helps lower peak load, improve grid reliability, and reduce the need for additional generation capacity.

Links:

Internal (Appendix B: B-2): pnm-2023-irp-appendices-volume-1-pdf

External (Page 1): Potential Roles for Demand Response in High-Growth Electric Systems with Increasing Shares of Renewable Generation

Effective Load Carrying Capability (ELCC)

High level summary:

ELCC measures the dependable capacity a resource provides during the system's highest-risk periods. It reflects how much that resource helps maintain reliability compared to an ideal generator, considering factors like variability, duration, and overall system conditions.

Links:

Internal (Appendix B: B-3): pnm-2023-irp-appendices-volume-1-pdf
External: ELCC Explained: the Critical Renewable Energy Concept You've Never Heard Of - Union of Concerned Scientists

Energy Efficiency (EE)

High level summary:

Energy Efficiency means using less energy to deliver the same service or output. For example, an LED bulb provides the same brightness as an incandescent bulb but consumes far less electricity. In planning terms, EE reduces overall energy demand and peak load, helping utilities lower costs and improve reliability without sacrificing comfort or performance.

Links:

Internal (Appendix B: B-3): pnm-2023-irp-appendices-volume-1-pdf

External: Take Five: What Is Energy Efficiency? | Department of Energy

Energy Imbalance Market (EIM)

High level summary:

The Energy Imbalance Market is a real-time electricity market that operates across the Western Interconnection to balance supply and demand every 5–15 minutes. It enables sub-hourly dispatch to correct deviations from day-ahead schedules, improving efficiency and reliability by sharing resources among participating utilities.

Links:

Internal (Page 55): pnm-2023-irp-final-pdf

External: EnergyImbalanceMarketEntityReadinessCriteria.pdf

Extended Day Ahead Market (EDAM)

High level summary:

The Extended Day-Ahead Market is a voluntary electricity market operated by CAISO that enables utilities across the Western U.S. to coordinate and optimize energy dispatch for the next day. Building on the success of the real-time Energy Imbalance Market, EDAM improves efficiency, reliability, and cost-effectiveness by allowing participants to share resources and plan ahead under a unified market framework.

Links:

Internal: pnm-officially-joins-caiso-edam-regional-energy-market

External: extended-day-ahead-market-edam-fact-sheet.pdf

Integrated Resource Plan (IRP)

High level summary:

An Integrated Resource Plan is a utility's comprehensive, long-term roadmap for meeting customer electricity needs in a reliable, affordable, and sustainable way. It identifies the optimal mix of resources—generation, storage, and demand-side programs—over a planning horizon (often 20 years) while considering policy requirements, reliability standards, and cost-effectiveness.

Links:

Internal: Planning for the Future - pnmprod - pnm.com

External: Utility IRPs Explained

Installed Capacity (ICAP) vs Unforced Capacity (UCAP)

High level summary:

Installed Capacity is the nameplate rating of a resource—its theoretical maximum output. Unforced Capacity adjusts that rating for expected availability, accounting for outages and performance variability. UCAP is used in planning and reliability studies because it reflects the dependable capacity the system can count on under real-world conditions.

Links:

Internal (Appendix B: B-5 and page 167 (175)): pnm-2023-irp-appendices-volume-1-pdf and pnm-2023-irp-final-pdf

External (Page 2): https://www.aeso.ca/assets/Uploads/20170704-Eligibility-Session-3-UCAP-ICAP-Comparison-Presentation.pdf

Load Forecasting

High level summary:

Load Forecasting is the process of predicting future electricity demand using data such as weather patterns, customer growth, economic trends, and the impact of energy-saving programs. Accurate forecasts help utilities plan generation, transmission, and resource adequacy to ensure reliable and cost-effective service.

Links:

Internal (Appendix B: B-5): pnm-2023-irp-appendices-volume-1-pdf

External: What Is Load Forecasting? | IBM

Loss of Load Expectation (LOLE)

High level summary:

Loss of Load Expectation is a probabilistic measure of reliability that estimates how often the system might experience insufficient capacity to meet demand. It's typically expressed as days per year (e.g., 0.1 days/year means one day in ten years). Lower LOLE indicates a more reliable system with fewer expected shortfall events.

Links:

Internal (Appendix B: B-5): pnm-2023-irp-appendices-volume-1-pdf

External: https://www.youtube.com/watch?v=Ds968-NI3wc

Planning Reserve Margin (PRM)

High level summary:

PRM is the additional dependable capacity a utility plans to have above their forecasted peak demand to maintain reliability. It accounts for uncertainties such as generator outages, and variable resource performance. PRM reflects how much additional capacity is needed to meet reliability standards under real-world conditions.

Links:

Internal (Appendix B: B-6): pnm-2023-irp-appendices-volume-1-pdf
External: https://www.osti.gov/servlets/purl/1482896

Production Cost Models (PCM)

High level summary:

A Production Cost Model is a detailed simulation tool that replicates the electric grid's hour-by-hour operations to estimate system costs and evaluate how different resource mixes perform under realistic conditions. It accounts for fuel costs, generator constraints, transmission limits, and market interactions, helping planners test portfolios for reliability and economics.

Links:

Internal (Page 117 (125)): pnm-2023-irp-final-pdf

External (Page 20): Power Sector Modeling 101

Reliability

High level summary:

Reliability is the ability of the electric grid to supply power to customers whenever it's needed, even when facing routine challenges like equipment outages or forecast errors. In planning terms, reliability is quantified using metrics such as Loss of Load Expectation ensuring the system can meet demand under normal operating conditions.

Links:

Internal (Appendix B: B-7): pnm-2023-irp-appendices-volume-1-pdf

External: What Is Power Grid Reliability Explained Simply? - Your Utilities Hub

Resilience

High level summary:

Resilience is the ability of the electric system to withstand and quickly recover from severe, low-probability events such as hurricanes, wildfires, cyberattacks, or extreme weather. Unlike reliability, which addresses routine conditions, resilience focuses on preparing for and adapting to major disruptions.

Links:

Internal (Appendix B: B-7): pnm-2023-irp-appendices-volume-1-pdf

External: What Is Grid Resilience And Why Is It Important For Power? - Your Utilities Hub

Time-of-Use (TOU)

High level summary:

Time-of-Use rates are a pricing structure where electricity costs vary by time of day. Customers pay higher rates during peak demand periods and lower rates during off-peak hours. TOU pricing sends signals that encourage shifting energy use to times when the grid is less stressed, helping improve reliability and reduce overall system costs.

Links:

Internal (Page 80 (88)): pnm-2023-irp-final-pdf

External: Interpreting Utility Bills—Rate Data | REopt | NLR

Virtual Power Plant (VPP)

High level summary:

A Virtual Power Plant is a network of distributed energy resources (DERs)—such as rooftop solar, battery storage, electric vehicles, and flexible loads—coordinated through advanced software to operate collectively like a traditional power plant. It uses digital platforms to optimize and dispatch these resources in real time.

Links:

Internal: N/A

External (Page 3): Virtual Power Plants and Distributed Energy Resource Management Systems

Utility 101

Grid-Scale battery storage

High level summary:

This video explains how battery storage allows utilities to store energy and discharge it later to support grid reliability and flexibility. A Battery Energy Storage System charges from the grid or a power plant and provides electricity or grid services when needed. While several chemistries exist—such as lithium-ion, lead-acid, and flow batteries—lithium-ion dominates due to rapid cost declines and technological improvements.

Links:

External: Grid-Scale Battery Storage: Frequently Asked Questions

How the power grid works

High level summary:

This video provides a clear overview of how the electric power grid operates, explaining how electricity is generated, transmitted, and delivered to customers. It covers the key components of the grid and how they work together to maintain reliable service.

Links:

External: How Does the Power Grid Work?

How electricity generation really works

High level summary:

This video explains the fundamentals of how electricity generators convert energy into electrical power. It covers the basic principles of electromagnetic induction, the role of turbines, and how different fuel sources—such as natural gas, coal, wind, and water—drive generators to produce electricity for the grid.

Links:

External: How Electricity Generation Really Works

How electric transmission lines work

High level summary:

This video explains how electric transmission lines carry high-voltage electricity over long distances from power plants to substations. It covers why transmission lines use high voltage, how they minimize energy losses, and the role of towers, conductors, and insulation in maintaining safe and reliable power delivery.

Links:

External: How do Electric Transmission Lines Work?

Renewable challenges

High level summary:

This video explains challenges of integrating renewables into the grid, including intermittency, grid stability, and storage needs. It highlights solutions such as advanced energy storage, flexible operations, and supportive policy frameworks to enable reliable and sustainable power systems.

Links:

External: Renewable Integration Into Power Systems Challenges and Solutions

Solar Resource challenges

High level summary:

This video explains challenges of integrating solar into the grid. It highlights solutions like advanced inverter controls and storage integration to improve reliability as renewables grow.

Links:

External: Connecting Solar to the Grid is Harder Than You Think - YouTube

For additional definitions and terminology, please refer to **Appendix B: Glossary of Terms** in the document: pnm-2023-irp-appendices-volume-1-pdf