Northwest **Power** and **Conservation** Council

May 9, 2017

MEMORANDUM

TO: **Council members**

FROM: **Shirley Lindstrom, Idaho State Staff**

SUBJECT: **Energy Imbalance Market (EIM)**

BACKGROUND:

Presenter: Tess Park, Vice President of Power Supply Idaho Power Company

Summary: Tess Park will update the Council on progress towards Idaho Power's participation in the Western Energy Imbalance Market in 2018.

Background: See press release and EIM FAQ attached

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Idaho Power News Release – April 2016

Company Agrees to Join Western EIM

Folsom, CA/Boise, ID – The California Independent System Operator (ISO) and Idaho Power have signed an agreement for the Idaho utility to participate in the western Energy Imbalance Market (EIM) beginning April 2018, contingent upon necessary regulatory approvals. Idaho Power is the sixth utility to announce its intention to join the western EIM. It serves nearly 525,000 customers in southern Idaho and a portion of eastern Oregon.

Based on the results of a benefits study, participation in the real-time energy market could result in efficiencies that translate into cost savings for Idaho Power's customers. Idaho Power and its customers are expected to see benefits from the market, including lower production costs, better visibility for system operations in the Western Interconnections, and improved integration of renewable resources. Idaho Power's decision is also expected to increase benefits for active EIM participants.

"We are looking forward to participating in the western EIM. We believe it will facilitate increased reliability for the electric system and anticipate economic savings to our customers through lower production costs," said Idaho Power Senior Vice President of Operations Lisa Grow.

Idaho Power is looking forward to working with the EIM Governing Body, currently being established through a nomination process. The board will emphasize a balanced governance structure that reflects the interests and perspectives of the broad range of regional participants in the market. The Regional Issues Forum and Body of State Regulators are additional, stakeholder-driven mechanisms allowing participating utilities and state representatives to actively and publicly engage in EIM-related decisions.

The western EIM rebalances supply and demand in a more timely and efficient manner than the one-hour blocks of energy that are traded today. This is especially important given the large amount of intermittent resources that exist on the system today and do not stay constant over an entire hour. By expanding the geographic and resource footprint, the western region can share generation resources, which drives cleaner, more affordable energy into the grid.

"We believe that Idaho Power joining the western EIM will prove to be a significantly positive move for the utility and its customers, along with current market participants," said Steve Berberich, CEO and president of the ISO. "The market already has proven itself to increase network efficiency, lower costs, and encourage cleaner energy into the power grid. With each new entrant, the market will only multiply those benefits."

The western EIM was launched by the ISO and Oregon-based PacifiCorp on Nov. 1, 2014. NV Energy began operation in the EIM on Dec. 1, 2015. The ISO's most recent quarterly report ending in 2015 shows combined benefits surpassed $45 million while improving integration of renewable resources.

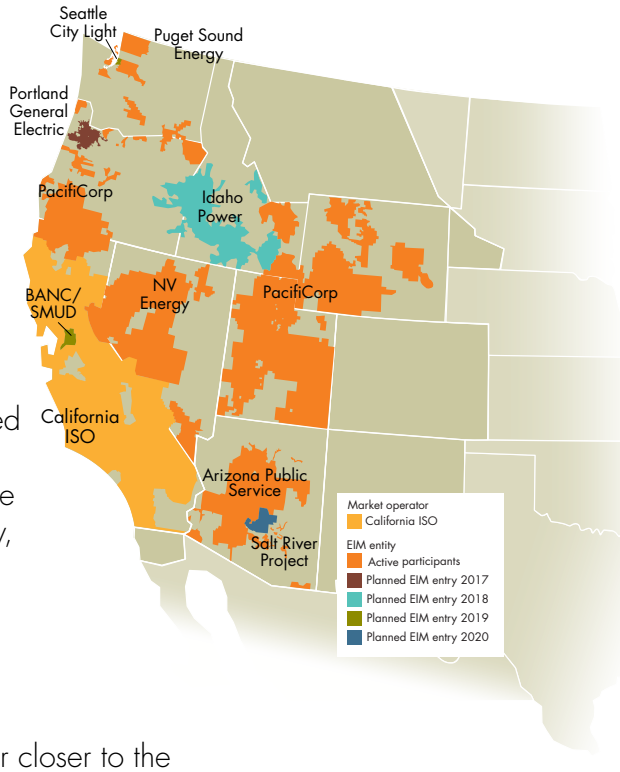
Currently, the EIM automatically dispatches least cost energy in real-time in California, Oregon, Washington, Nevada, Utah, Idaho and Wyoming. Puget Sound Energy of Washington state and Arizona Public Service are scheduled to begin operation in October 2016. Portland General Electric will begin operation in October 2017.

Find more information on the western EIM. Learn more about Idaho Power.

California ISO

WESTERN EIM FAQ

Expanding regional energy partnerships



WHAT IS THE ENERGY IMBALANCE MARKET?

The ISO's Energy Imbalance Market (EIM) is a real-time bulk power trading market, the first of its kind in the western United States. EIM's advanced market systems automatically find the lowest-cost energy to serve real-time customer demand across a wide geographic area. Since launching in 2014, the western EIM has enhanced grid reliability and generated cost savings for its participants. Besides its economic advantages, the EIM improves the integration of renewable energy, which leads to a cleaner, greener grid.

HOW DOES THE EIM WORK?

The EIM allows participants to buy and sell power closer to the time electricity is consumed, and gives system operators real-time visibility across neighboring grids. The result is improved balance between supply and demand at a lower cost. The EIM software balances fluctuations in supply and demand by automatically finding lower-cost resources from across a larger region to meet immediate power needs. EIM also manages congestion on transmission lines to maintain grid reliability and supports integration of renewable resources. The real-time market also allows oversupply of renewable energy to be absorbed at low cost by participating systems.

WHO ARE THE CURRENT PARTICIPANTS IN EIM?

The ISO launched the western EIM on Nov. 1, 2014 with its first utility participant, Oregon-based PacifiCorp. EIM was later joined by Las Vegas-based NV Energy on Dec. 1, 2015, Puget Sound Energy of Bellevue, Washington, and Arizona Public Service of Phoenix, Arizona, on Oct. 1, 2016. EIM is now providing cost savings for consumers in eight western states.

WHAT ARE THE BENEFITS OF PARTICIPATING IN THE EIM?

Significant benefits from increased regional coordination for energy generation and delivery are in three main areas:

- **Reduced costs for utility customers and ISO market participants.** This is the result of less need for costly reserves, and better planning and efficient use of the regional high-voltage transmission system.
- **Reduced carbon emissions and more efficient use and integration of renewable energy.** For instance, when one utility area is generating excess hydroelectric, solar, or wind power, the ISO can use the output to serve customers in California or in one of the other EIM participant service territories. Likewise, when California is experiencing oversupply situations, excess solar energy can help meet demand in the states served by EIM that otherwise would be met by more expensive coal or gas generation.
- **Enhanced reliability.** By increasing visibility across electricity grids, improving transmission planning, and enhancing management of congestion across a wider expanse of the high-voltage transmission system.

WHAT ARE THE BENEFITS TO THE ISO?

Improved coordination and integration of renewable resources in the EIM provides a more cost-effective and accessible platform for California and other western states to gain real-time access to low-cost energy resources over the entire western region.

WHAT ARE THE OTHER BENEFITS TO PARTICIPATION IN THE EIM?

Easy and economical entry and exit

Studies indicate that the benefits to all customers in the eight-state EIM footprint outweigh the costs of participating in the EIM. In addition, an EIM participant can choose to leave the market at any time with no exit fees — it is a voluntary and more efficient way to manage the grid for the benefit of consumers.

Preserving autonomy

EIM participants maintain operational control over their generating resources, retain all their obligations as a balancing area, and must still comply with all regional and national reliability standards. For example, obligations to provide reliability compliance, ancillary services, physical scheduling rights and bilateral trades do not change with EIM.

WHAT IS THE EIM GOVERNANCE STRUCTURE?

In May 2014 the ISO Board of Governors appointed the EIM Transitional Committee to develop a long-term independent governance structure. Upon holding several open meetings throughout the West in 2015, the Committee completed a long-term governance proposal, which was approved by the ISO Board of Governors on Dec. 18, 2015. The ISO Board seated a permanent EIM Governing Body in June 2016. Future members will be approved by the EIM Governing Body. Continued stakeholder involvement will be critical to the success of the EIM by offering valuable input and support to expand a market that can be leveraged to more effectively use resources in the West. See the EIM enhancements initiative page for the current status of activity.

HOW CAN I LEARN MORE?

The ISO has a webpage dedicated to EIM activities, with links to quarterly benefit studies, stakeholder meetings, Governing Body meetings and other important information. Please visit the EIM page here.

Western EIM Participants

PacifiCorp

Serves: 1.8 million customers across 136,000 sq. miles in six Western states (Oregon, Washington, California, Utah, Wyoming and Idaho)

Employees: 6,000

Headquarters: Portland, Oregon

Generation capacity: 10,595 megawatts

Transmission: Over 16,300 miles of transmission lines

Over 62,930 miles of distribution lines

PacifiCorp is a wholly-owned subsidiary of Berkshire Hathaway Energy and regulated by the public services commissions in the six states it serves.

NV Energy

Serves: 1.3 million customers (40 million tourists annually)

Employees: 3,000

Headquarters: Las Vegas, NV

Generation capacity: 6,100 megawatts

Transmission: controls over 3,800 miles of transmission lines

NV Energy is a wholly-owned subsidiary of Berkshire Hathaway Energy and regulated by the Public Utilities Commission of Nevada.

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Serves: 1.2 million customers across 11 of 15 Arizona counties)

Employees: 6,366

Headquarters: Phoenix, Arizona

Generation capacity: 6,500 megawatts

Transmission: About 5,900 miles of transmission lines

About 29,000 miles of distribution lines

Arizona Public Service is a wholly-owned subsidiary of Pinnacle West Capital Corporation and regulated by Arizona Corporation Commission.

PSE Puget Sound Energy

Serves: 1.1 million customers

Employees: 2,700

Headquarters: Bellevue, Washington

Generation capacity: 3,000 megawatts

Transmission: 13,000 miles of transmission and distribution lines

PSE is a subsidiary of Puget Energy and is regulated by the Washington Utilities and Transportation Commission.

Portland General Electric (pending)

Serves: 852,000 customers
Employees: 2,600
Headquarters: Portland, Oregon
Generation capacity: 3,414 megawatts
Transmission: 17,500 miles of transmission and distribution lines

PGE is an investor-owned utility regulated by the Public Utility Commission of Oregon.

Seattle City Light (pending)

Serves: 422,810 customers
Employees: 1,872
Headquarters: Seattle, Washington
Generation capacity: 2,014 megawatts
Transmission: 656 miles of transmission lines; 2,336 miles of distribution lines

Seattle City Light, a department of the city of Seattle, is one of the nation's largest publically owned utilities in terms of the number of customers served.

Idaho Power (pending)

An IDACORP Company

Serves: 525,000 customers
Employees: 2,000
Headquarters: Boise, Idaho
Generation capacity: 3,595 megawatts
Transmission: 4,860 miles of transmission lines; 27,092 miles of distribution lines

Idaho Power is a wholly-owned subsidiary of IDACORP, an independent, publicly traded company. Idaho Power is regulated by public utilities commissions in Idaho and Oregon.

SRP (pending)

Serves: 1 million customers
Employees: 5,230
Headquarters: Tempe, Arizona
Generation capacity: 9,525 megawatts
Transmission: 3,309 miles of transmission lines; 19,965 miles of distribution lines

IPC's Energy Imbalance Market Participation

IDAHO POWER®
An IDACORP Company

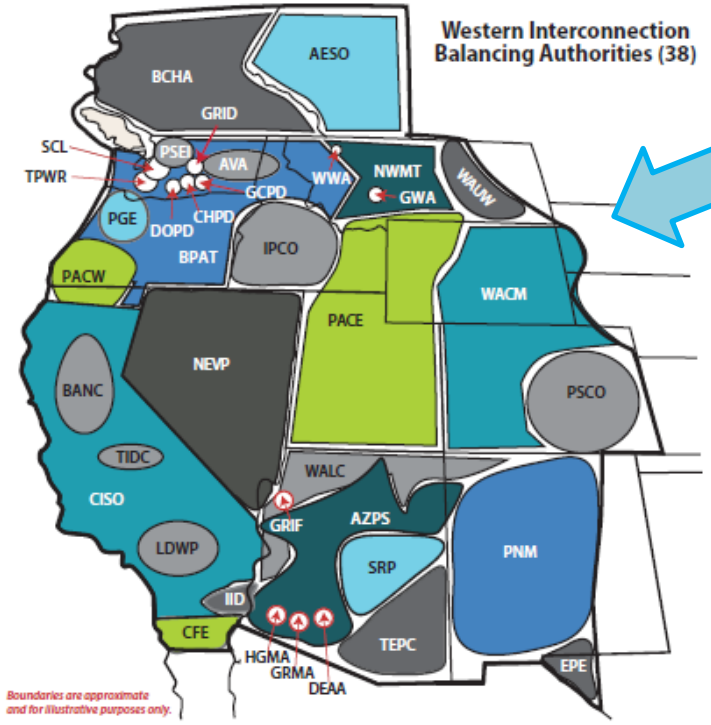
February 2017

Agenda

- EIM Overview
  - Who is participating
  - Why is IPC joining
  - Key Functionality
- EIM Project & Impact Overview
  - Project Structure
  - Impacts to Group
  - Schedule
  - Additional Resources

Opportunity for Grid Efficiencies

Western Balancing Authorities



Existing Organized Markets

What is an EIM?

An EIM is a real-time market that **economically dispatches low cost power** to balance fluctuations in generation and load.

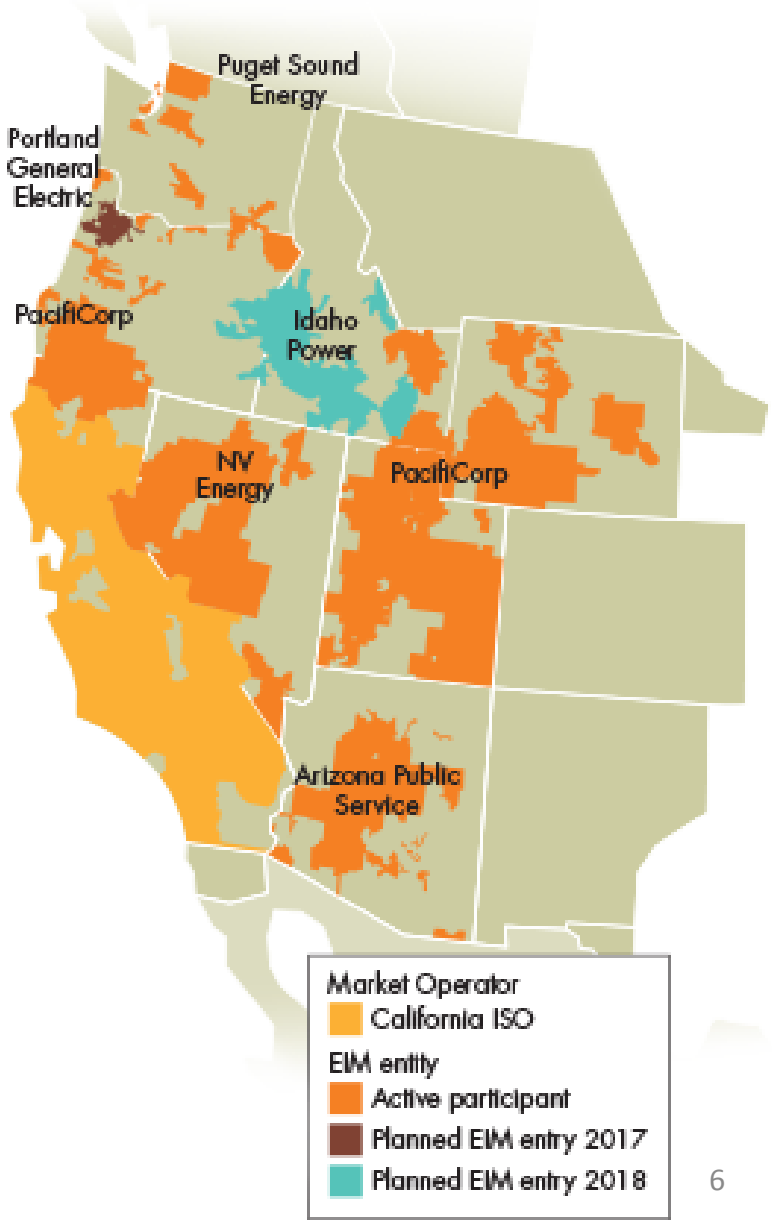
An EIM efficiently resolves imbalances **in real-time** through an automated five minute dispatch across multiple balancing areas.

Generation resources are bid into the market on a **voluntary** basis.

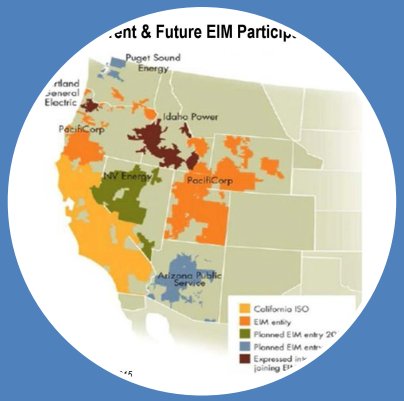
It provides forward-looking **transmission congestion management**.

Western EIM Today

- A **Real-Time Market** for participating Balancing Authority Areas in the West
- CAISO is the non-profit market operator
- Future EIM Entities may include:
  - Balancing Authority of Northern California
  - CENACE, Baja, CA
  - Los Angeles Department of Water & Power
  - Seattle City Light



Why join the EIM?



Maintains excellent reliability

It strengthens reliability through improved real-time grid visibility and coordinated dispatch of resources to avoid congestion.

Maximizes low-cost regional resources

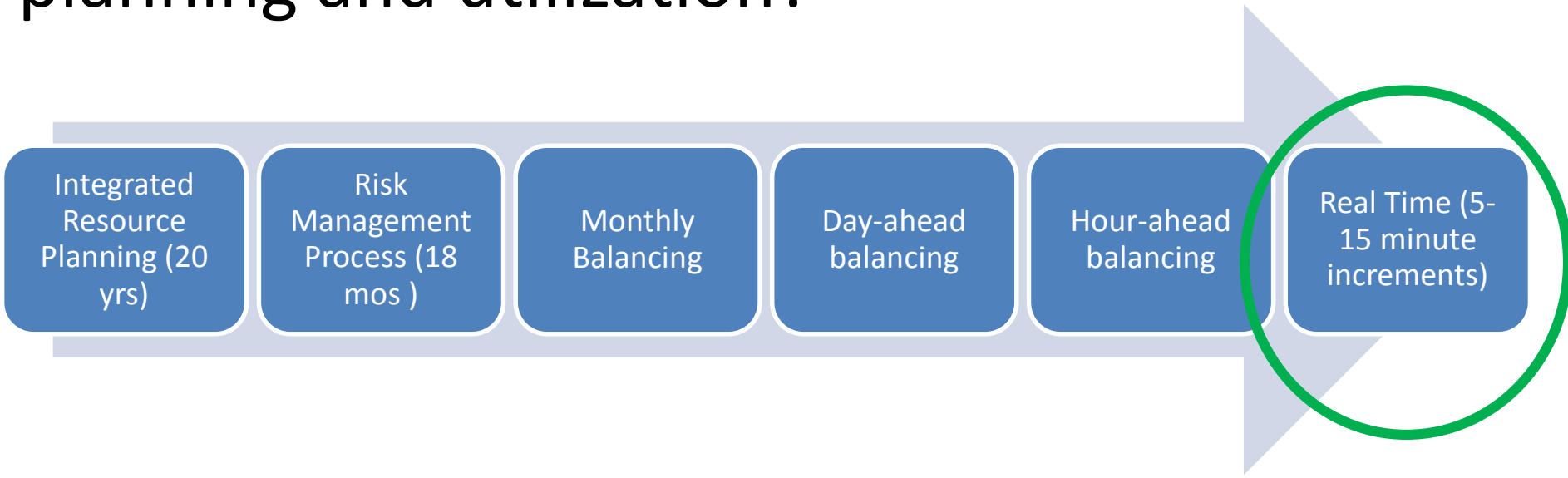
Lowest cost resources in the EIM are dispatched first (greater footprint = more resource/load variation = lower costs)

Improves Renewable Integration

Greater resource and load diversity eases balancing the variability of renewable resources

EIM is good for Customers, Reliability, & Renewables

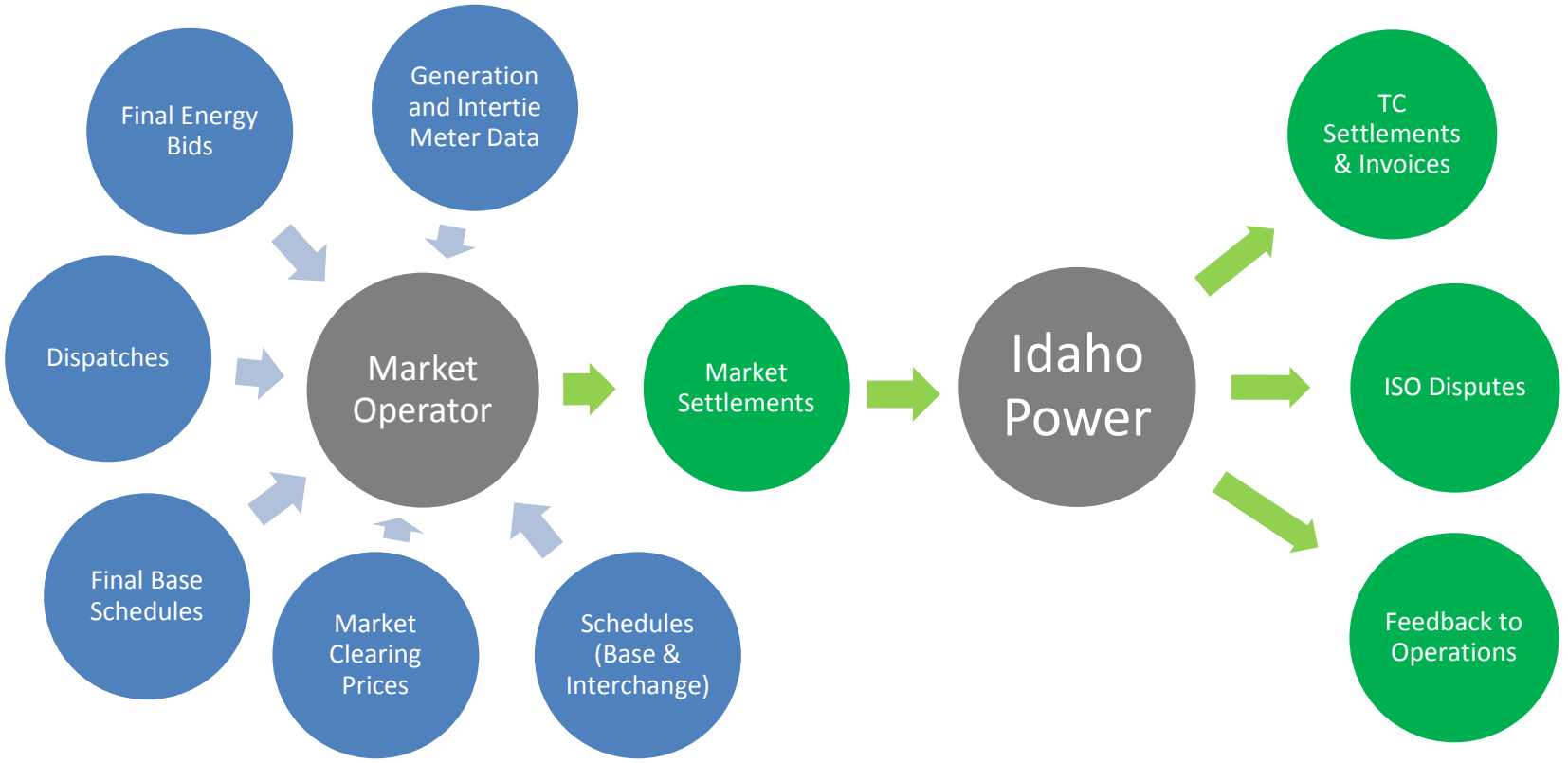
What changes resource planning and utilization?



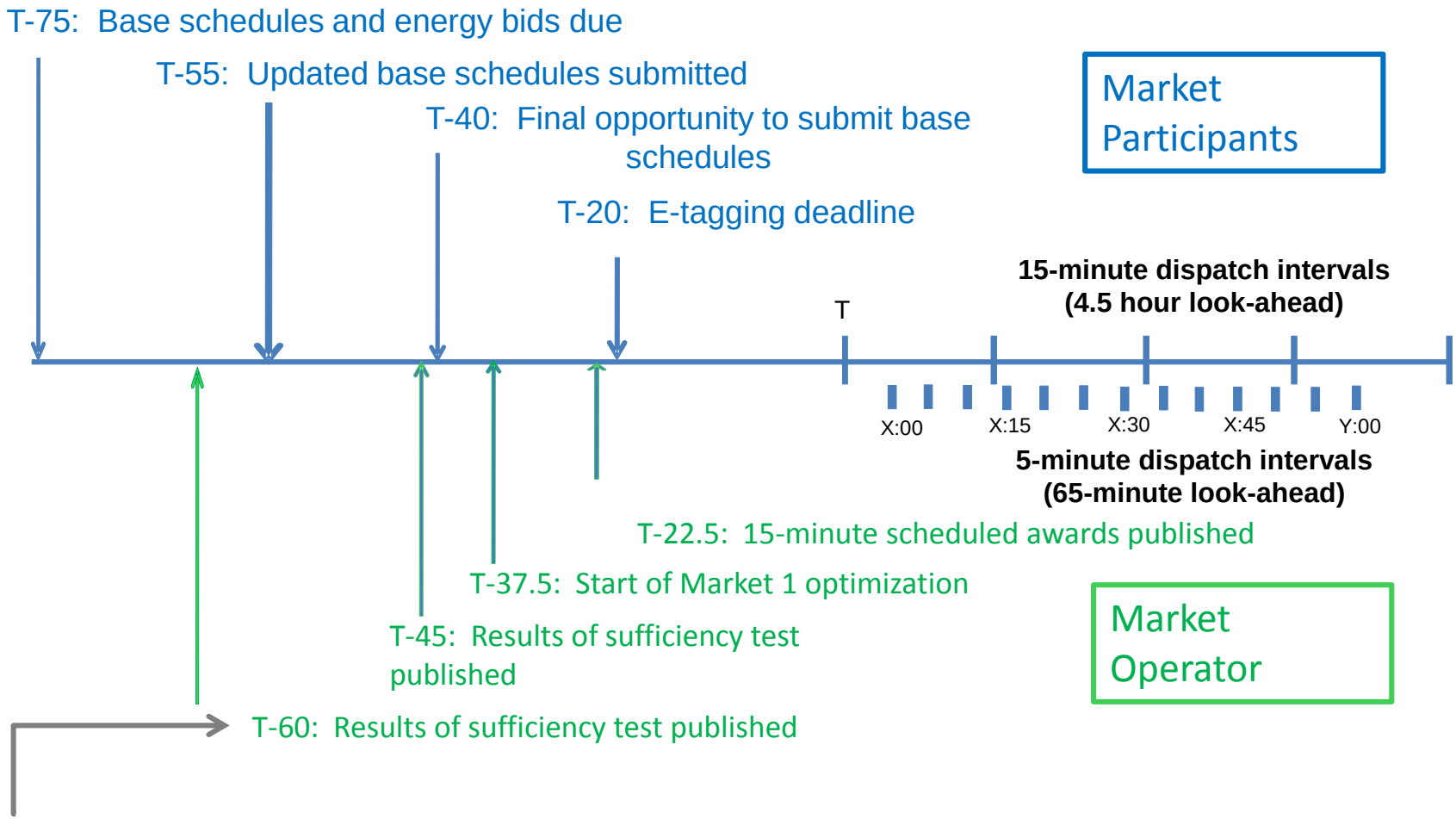
- Key change is to real time, intra-hour scheduling and dispatches
- Additional software and processes changes to support Real-Time Operations
  - Infrastructure changes to implement appropriate equipment for EIM
  - Integrating physical changes to the Network and SCADA models and RDT
  - Strategies for bilateral market participation
  - Tariff administration, metering and settlement for Transmission Customers

Market Inputs & Outputs

After-the-Fact Inputs & Outputs



Continual Information Exchange



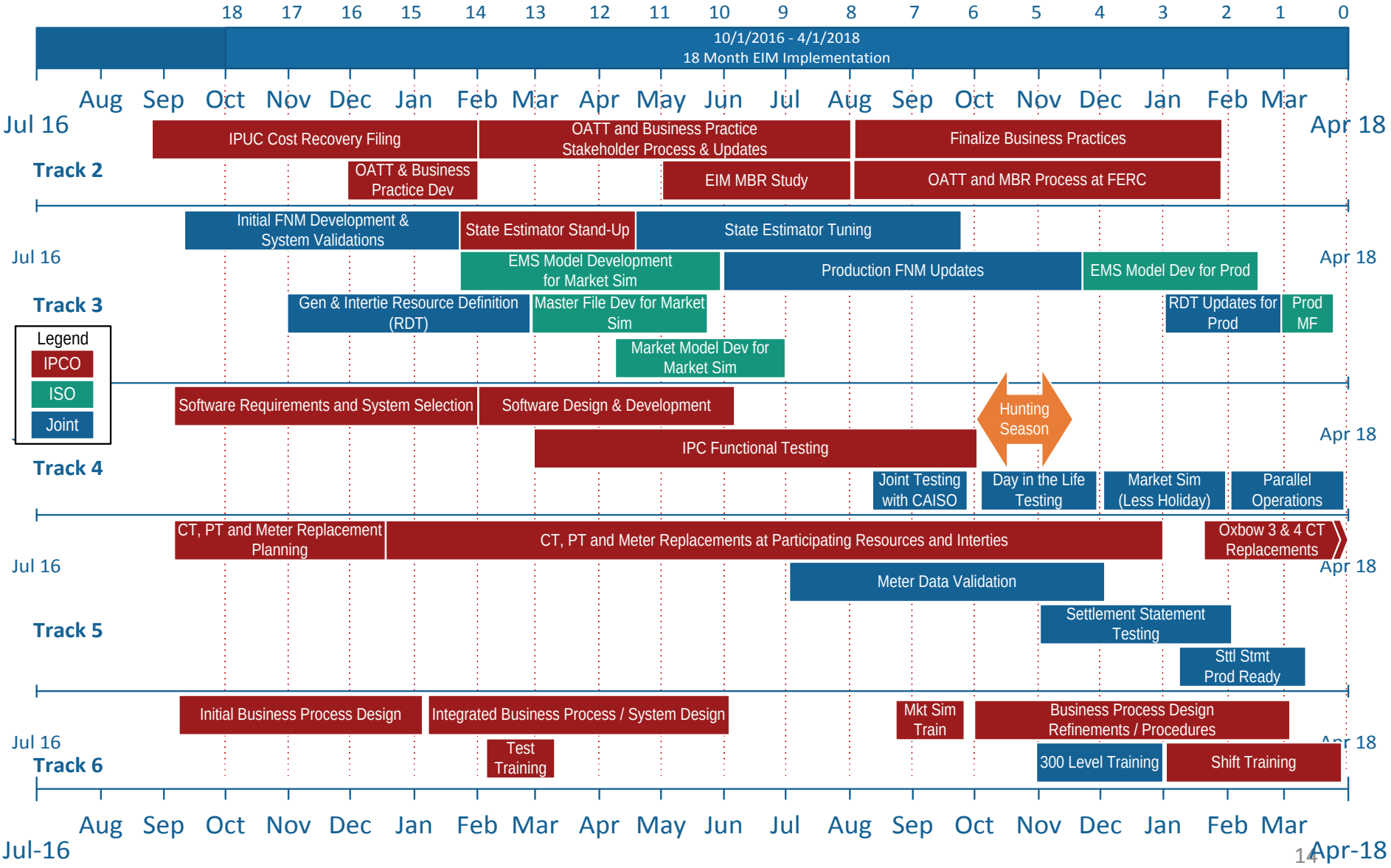
Resource sufficiency tests:
Balanced load and generation?
Free of congestion?
Sufficient ramping capability?

(T = start of the hour)

Project Organization

- CAISO organizes EIM Integration into six Tracks
  - Track 1 – Project Management
  - Track 2 – Registration & Regulatory
  - Track 3 – Resource Modeling
    - Transmission, Generation, SCADA
  - Track 4 – Software Systems & Integration
    - Outages, Forecasting, Scheduling, Dispatch, Metering, Settlements
  - Track 5 – Metering & Settlements
    - Physical Upgrades, Data Submission, Charge Validation
  - Track 6 – Training & Readiness

High-Level Project Schedule



Additional Resources

- IPC SharePoint Site – Several EIM related documents, announcements, open questions, status reports and related materials – contact Brian Holmes (Contractor) or Kathy Anderson for access
  - http://spillway/lso/EngImbMkt/default.aspx

- CAISO EIM Computer-based training (CBT)
  - Several courses are available - from overviews to detailed subject courses
  - Contact Brian Reich (Transmission / Undesignated) or Greg Johnson (Merchant) for access

- CAISO site for EIM participation
  - http://www.caiso.com/participate/Pages/EnergyImbalanceMarket/Default.aspx

- EIM Business Practice Manuals
  - https://bpmcm.caiso.com/Pages/BPMLibrary.aspx