

How MISO Studies Power Plant Retirements

**Minnesota Power Systems Conference
November 5, 2014**

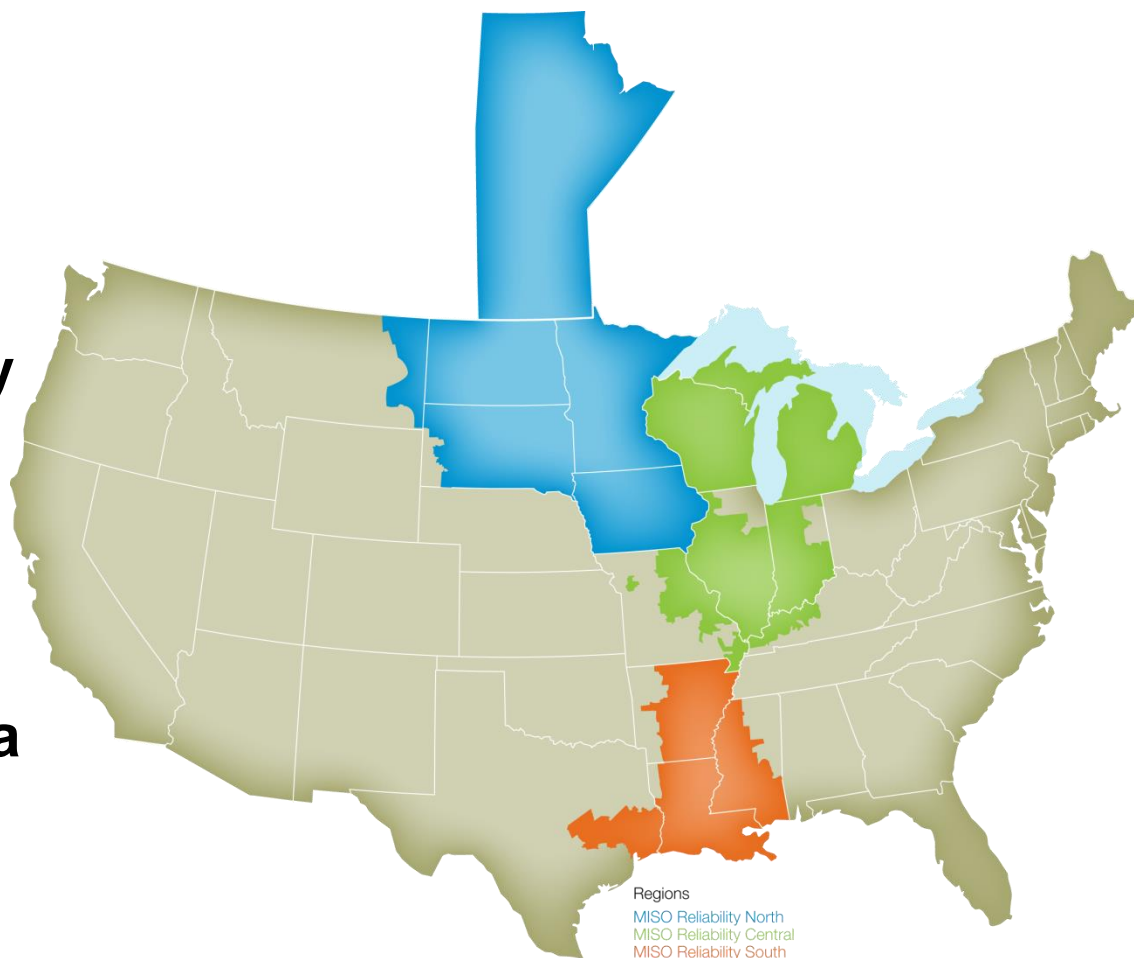
David Duebner

Outline

- **MISO Overview**
- **Power Plant Retirement Process**
 - **Process History**
 - **Process Example**
- **Other Studies**
- **Issues**

MISO Overview

- **Who We Are**
 - Independent, non-profit organization
- **Our Roles**
 - A service company that provides electric system reliability
 - Administer an energy market on a wholesale level
 - MISO does not generate or buy electricity



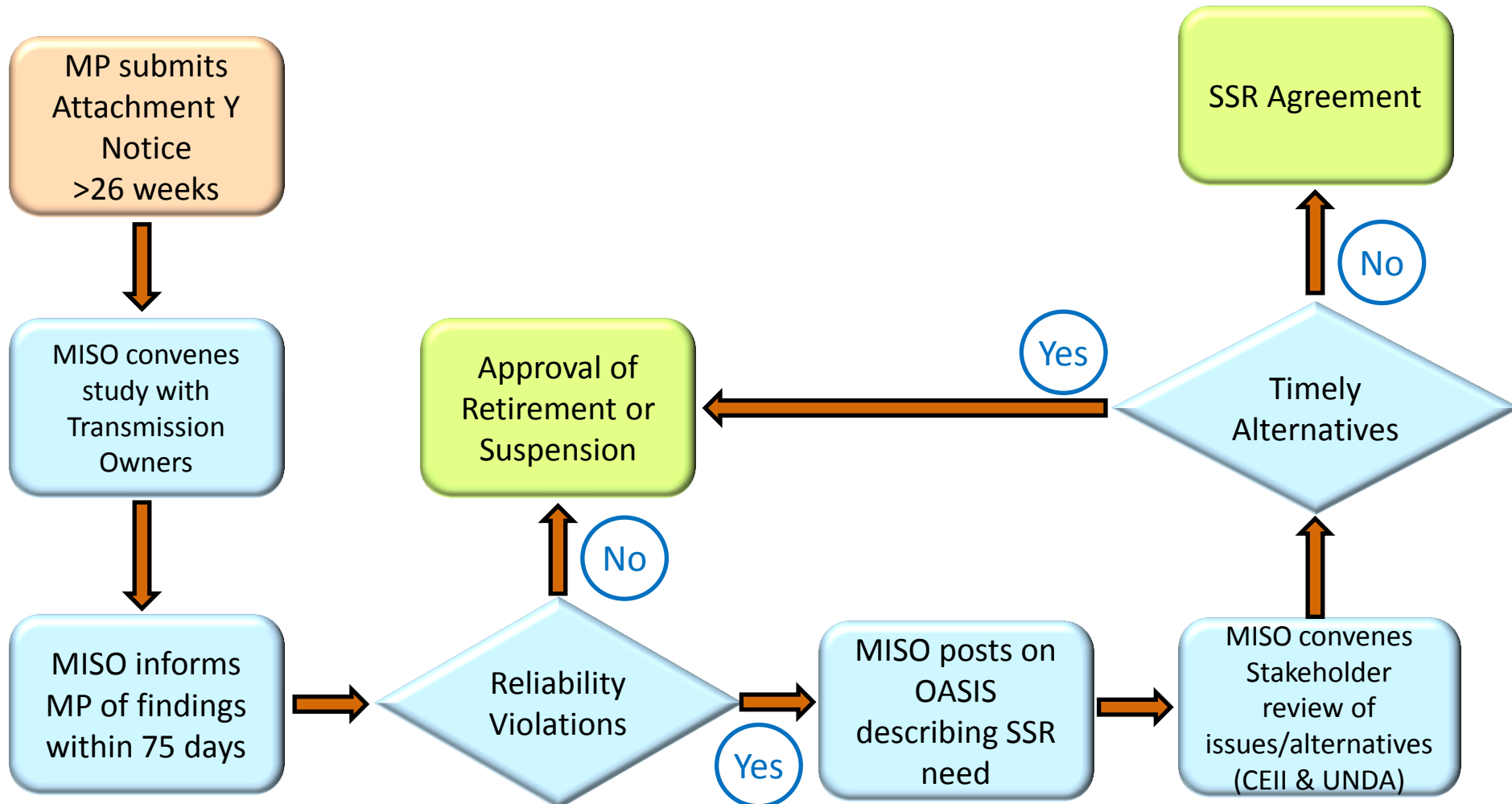
MISO Overview

- **What We Do**
 - **Monitor energy transfers on the high voltage transmission system**
 - **Schedule transmission service**
 - **Manage power congestion through security-constrained economic dispatch**
 - **Operate day-ahead and real-time energy and operating reserves markets**
 - **Regional transmission planning**
 - The annual MISO Transmission Expansion Plan typically contains over \$1 billion in new transmission investment
 - Power Plant retirement studies

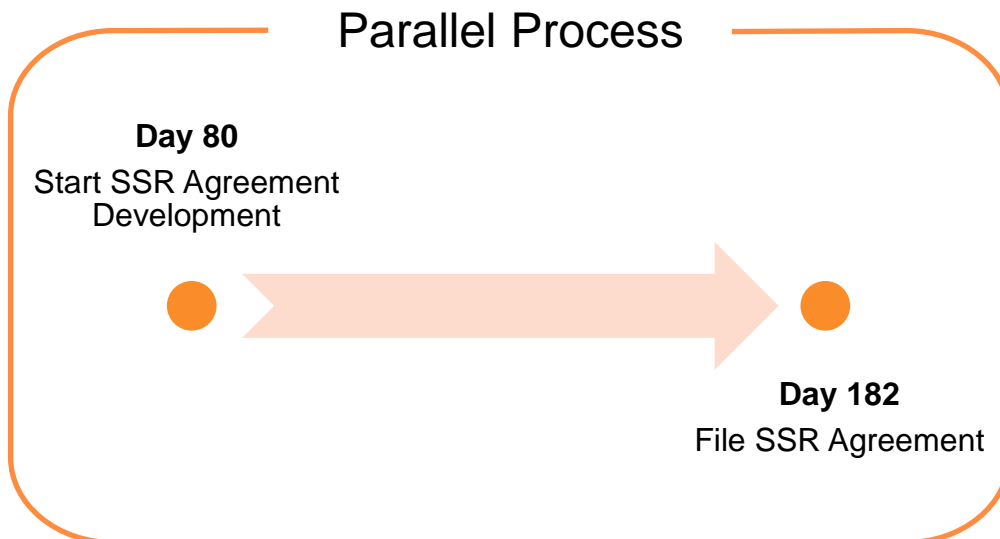
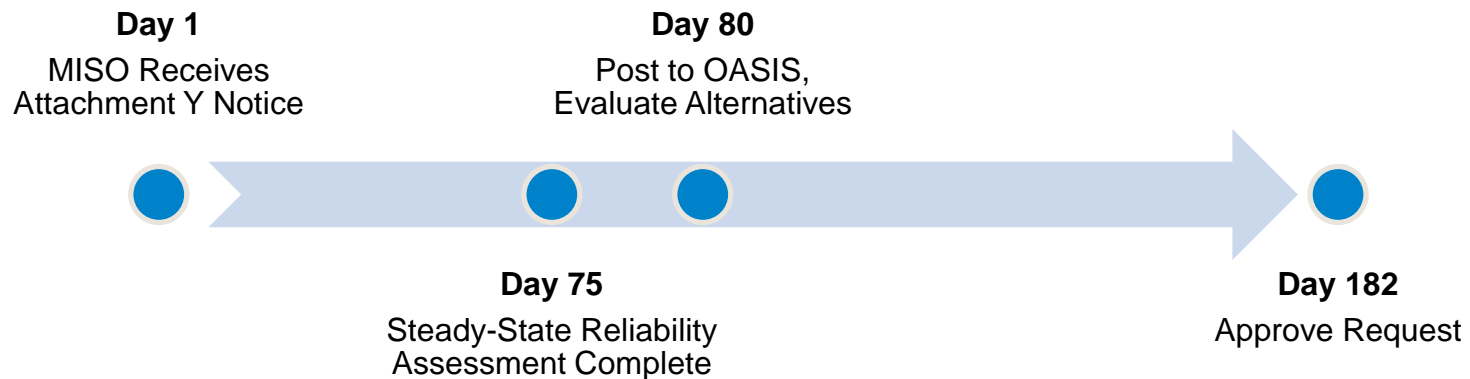
Tariff History

- **Section 38.2.7 of MISO Tariff describes the power plant retirement and suspension process**
- **Original purpose was to preserve electric reliability for changes in unit economics**
 - **Cost uplift until transmission reinforcements are built**
 - **Decisions today are still economic, but there are other factors**

MISO Generation Retirement Process



MISO Generation Retirement Process



For Example...

- **Perpetual Power Machines, a hypothetical Market Participant, would like to retire unit #1**
 - **Submit Attachment Y to MISO on 11/5/2014**
 - **Received > 26 weeks from desired retirement date of May 6, 2015**
 - **Request remains confidential, unless reliability issues are found and alternatives are necessary**
- **Ineligible units for 38.2.7**
 - **Units in forced outage, units in planned outage, behind the meter generators, black start units**

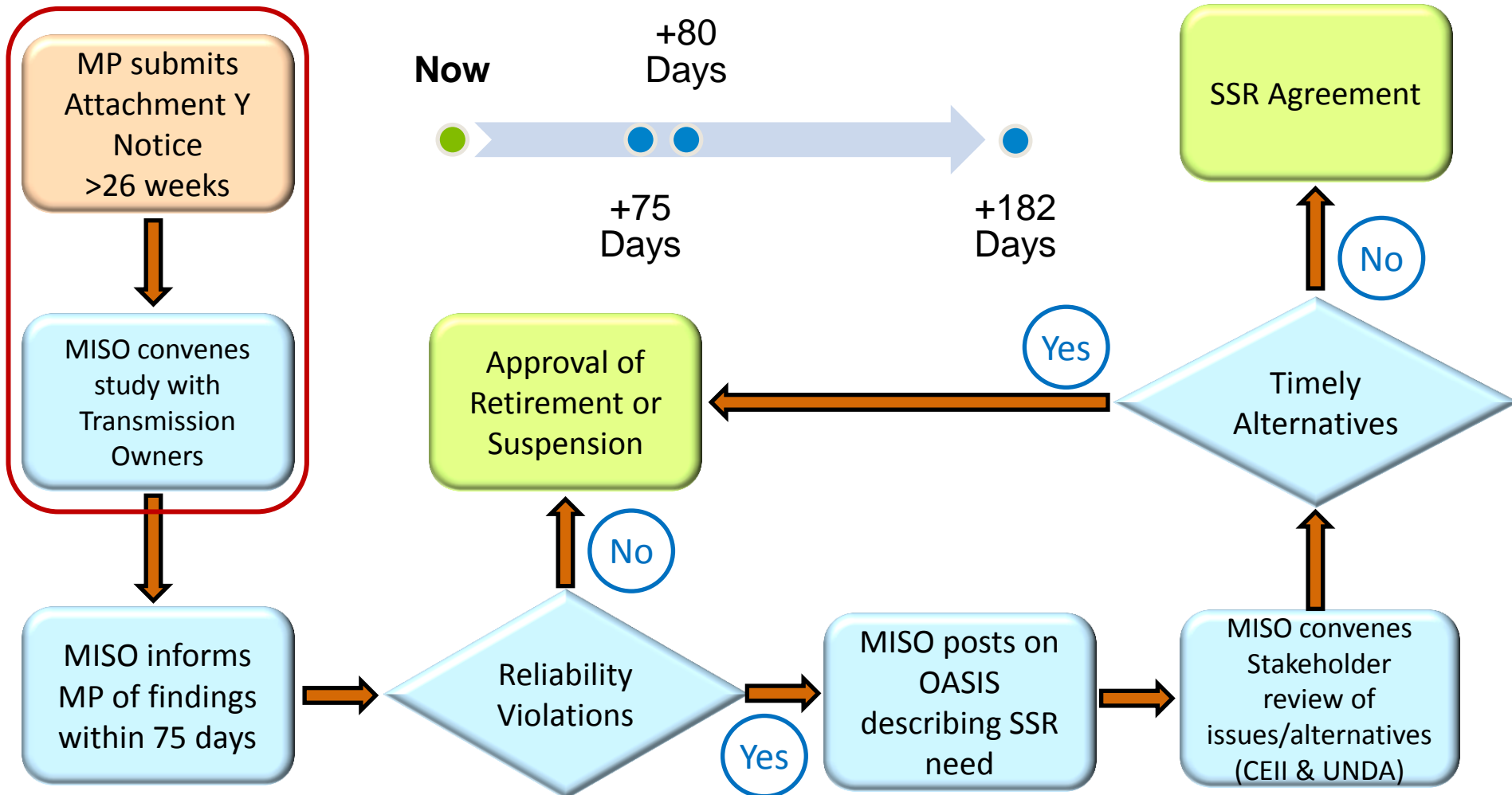
Attachment Y Overview

- **MISO Reliability Study**
 - **Steady State**
 - NERC Reliability Standards
 - Participation with affected Transmission Owners
 - Application of TO Planning Criteria
- **Perpetual Power Machines is notified if reliability issues will delay unit retirement**
 - **Post notice on MISO OASIS**
 - **Use stakeholder process to develop alternatives**

Attachment Y Overview

- **MISO may require a generator to remain available to mitigate reliability concerns**
 - **A last resort and temporary measure, until a permanent solution can be implemented**
 - **MISO and Market Participant would enter into System Support Resource (SSR) Agreement**
 - SSR agreements are reviewed for need on an annual basis

MISO Generation Retirement Process



Reliability Study

- **Perpetual Power Machines wants to retire unit #1**
- **MISO scopes the retirement study with the Transmission Owner**
 - **Power Flow model selection is tied to change of status date**
 - Near term models: (Summer Peak and Shoulder)
 - Mid term model: (Summer Peak)
 - **Before and After scenarios are studied**
 - Before retirement models have PPM unit #1 on
 - After retirement model have PPM unit #1 off and balancing area generation dispatched to cover
 - **Contingencies are run on the cases**

Reliability Study

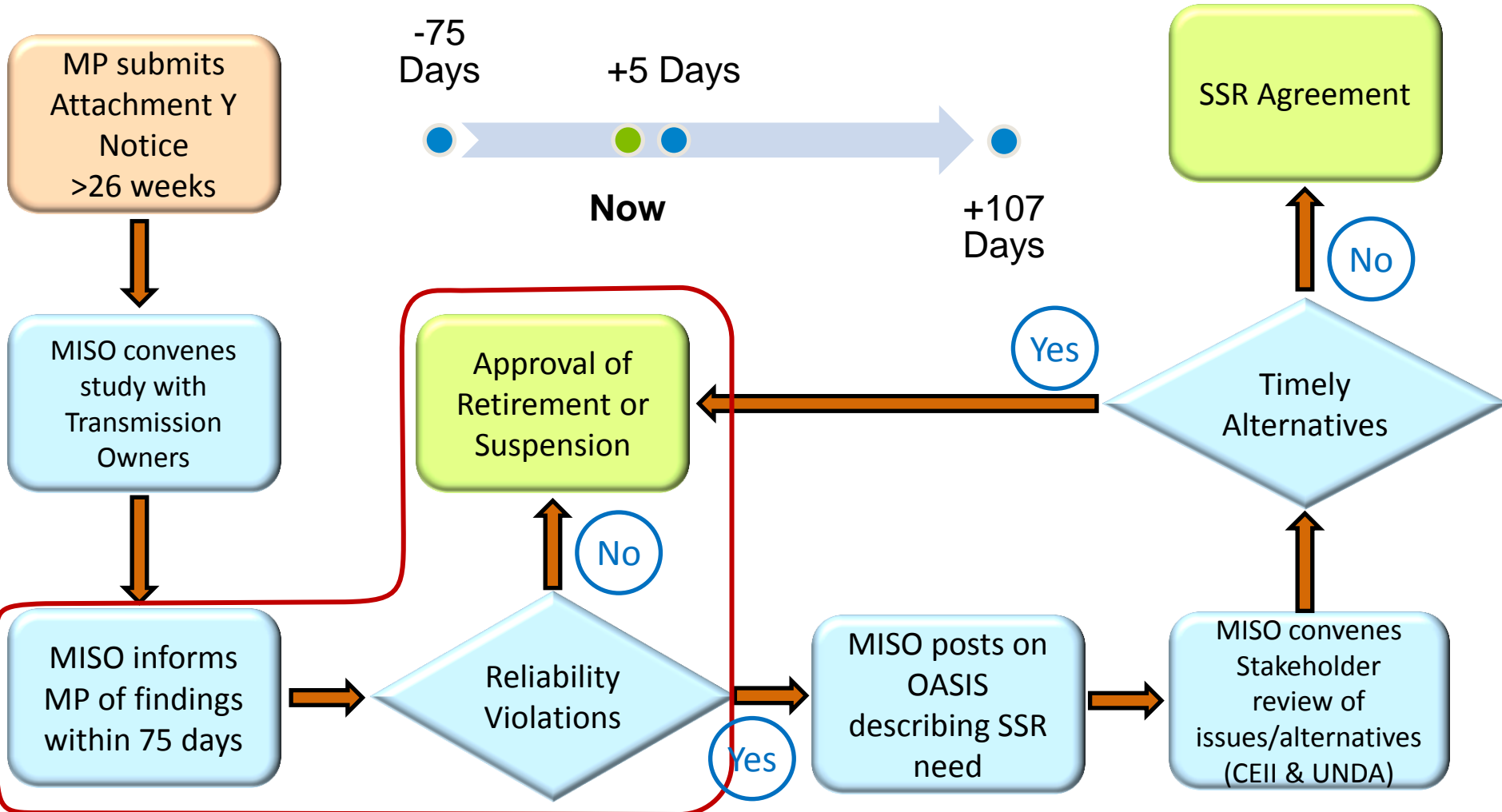
- **Evaluating the impact to system reliability**
 - **Planning standards and criteria used**
 - NERC Transmission Planning Standards TPL-001, TPL-002 and TPL-003
 - Regional, State, and MISO transmission owner planning criteria
 - **Inclusion Criteria for Thermal Violations**
 - 5% Power Transfer Distribution Factor (PTDF) for base violation compared with before retirement case
 - Category A – System Intact
 - 3% Outage Transfer Distribution Factor (OTDF) for contingency violation compared with before retirement case
 - Category B & Category C contingencies

Reliability Study

– Inclusion Criteria for Voltage Violations

- Pre-contingency limitation is between 1.0 and 1.07 per unit for 500 kV and above buses and 0.95 to 1.05 per unit for buses below 500 kV
- Post-contingency limitation is between 0.9 to 1.1 per unit kV if not specified
- 1% voltage change for Category A, B and C contingencies compared to before retirement voltage

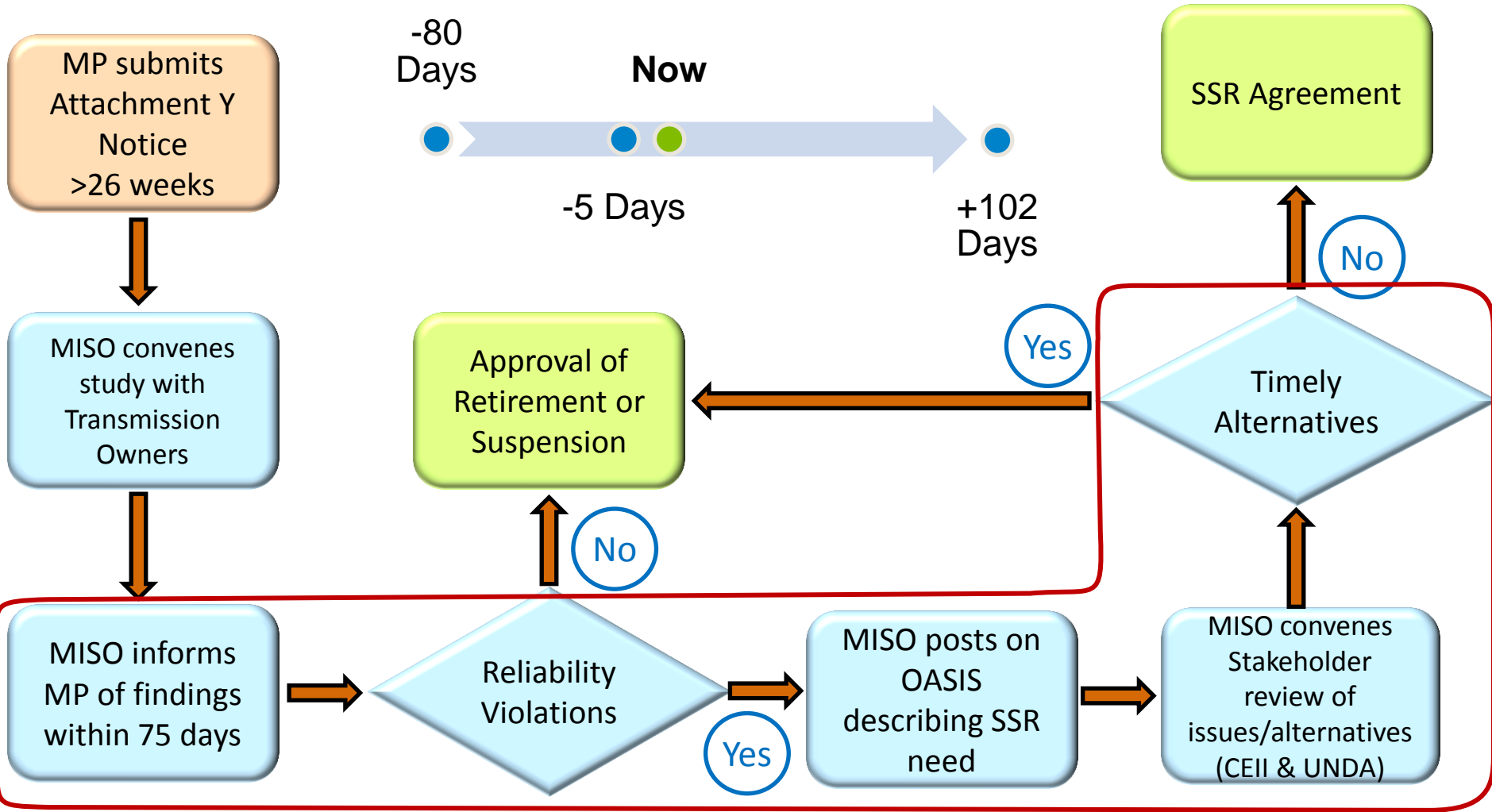
MISO Generation Retirement Process



Communicate Reliability Results

- **A Market Participant (MP) has the right to cancel their request at this point in process**
 - **MISO communicates a right to rescind**
- **If Perpetual Power Machines wants the process to continue, MISO will provide the results**
 - **If no reliability issues, then the retirement request is approved.**
 - Retirement request remains confidential
 - **If there are reliability issues, MISO will proceed along parallel paths of alternatives analysis and SSR agreement negotiations**
 - Retirement request will now be public

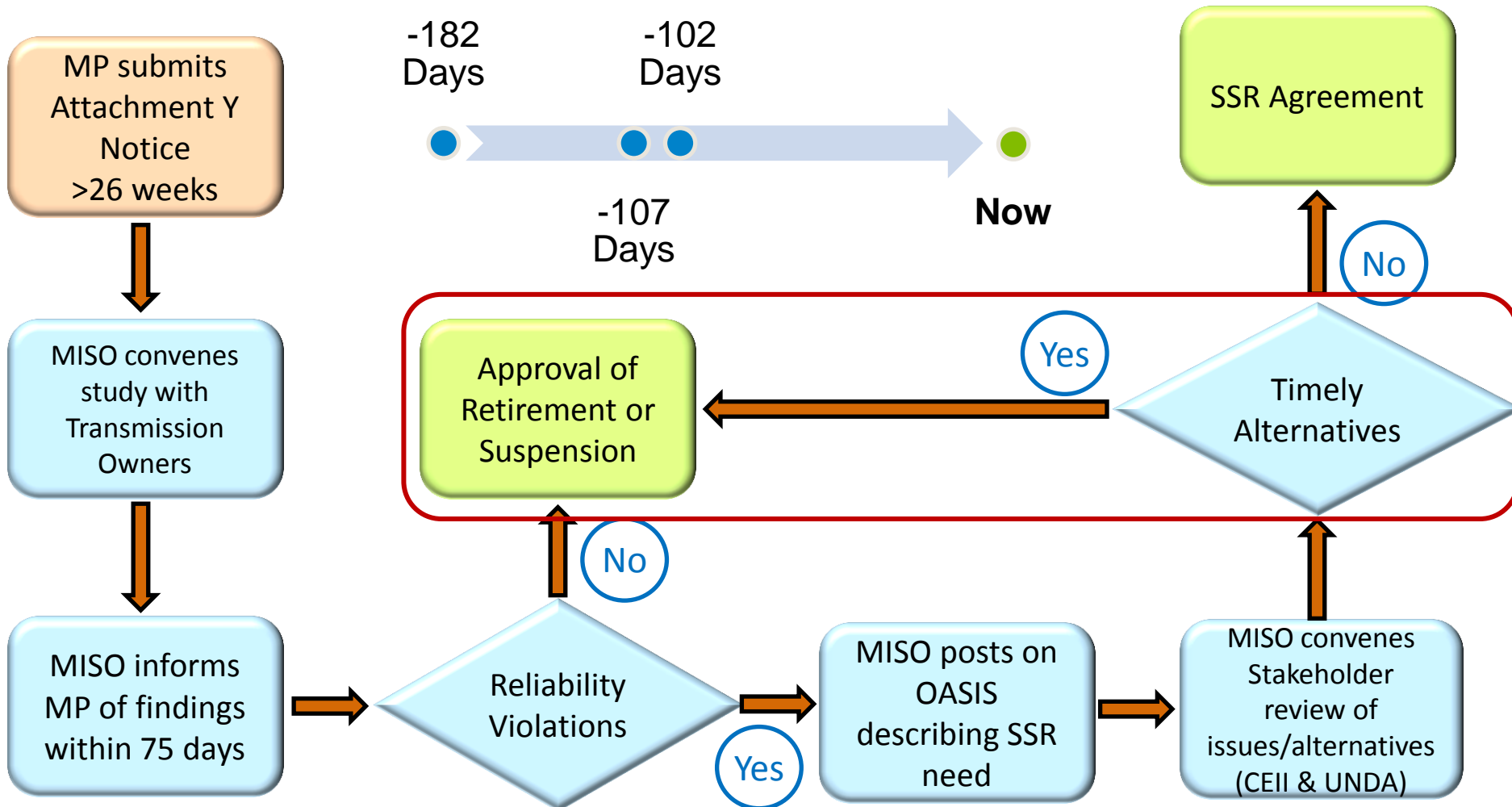
MISO Generation Retirement Process



Alternatives Analysis

- **Perpetual Power Machines has indicated they will proceed and there were reliability issues**
- **Alternatives evaluated to avoid SSR contract:**
 - **Generation Redispatch**
 - **Reconfiguration or Special Protection Scheme**
 - **Demand Response**
 - **Generator alternatives**
 - **Transmission expansion**
 - In our example, a transmission line can be rebuilt to allow Perpetual Power Machines to retire unit #1. Upgrade can be completed by May 1, 2016

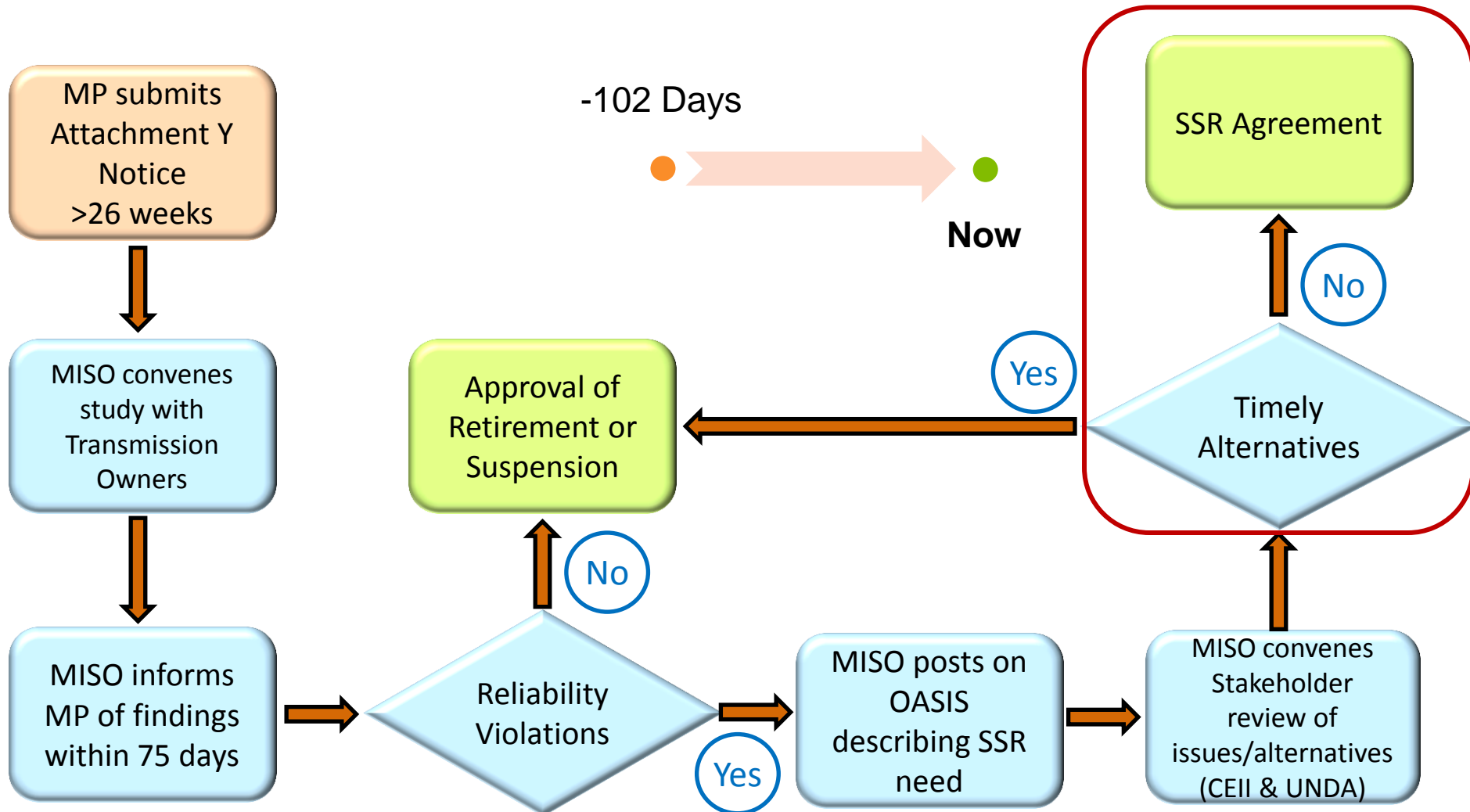
MISO Generation Retirement Process



Approval of Retirement Request

- **If no reliability issues are found, it is approved**
- **If reliability issues are found and alternatives are expected to be in place before retirement**
 - **Conditional approval**
- **The plant owner may defer retirement until a alternative is implemented**
- **In our example, Perpetual Power Machines request is not approved and must go to SSR agreement**
 - Request to retire in May, 2015
 - Upgrade to address reliability issue done May, 2016

MISO Generation Retirement Process



Attachment Y-1: SSR Agreement

- **No alternatives are available in time**
- **The terms of the pro-forma System Support Resource (SSR) agreement are negotiated with Perpetual Power Machines**
 - **Compensation can be determined through negotiation or Market Participant may file separately with FERC**
- **MISO files the SSR Agreement with FERC for approval**
 - **Generally for a term of 1 year or less**

Attachment Y-1: SSR Agreement

- **SSR agreement need is reviewed annually**
- **If the agreement is expected to renew, MISO would notify Perpetual Power Machines 90 days prior to the existing contract end date**
- **Restated agreements are filed at FERC to continue SSR service**
- **In this example, the required upgraded is completed on time and renewal of SSR agreement is not required**

Cost Allocation of SSR unit(s)

- **The operating costs of SSR units are allocated to load serving entities “which require the operation of the SSR unit for reliability purposes”**
 - **An optimal load shed methodology is used to determine MISO Local Balancing Areas (LBA) that benefit from the SSR unit(s)**
 - Optimal power flow identifies the load shed amounts for each contingency which results in a reliability issue
 - Relative load shed amounts for each impacted LBA are determined to apportion costs amongst impacted LBAs
 - Load Serving Entities within impacted LBA areas are assessed charges based on Actual Energy Peak withdrawal

Retirement Process Key Points

- **MISO has a process to maintain system reliability when power plants want to retire**
- **SSR Agreements are a measure of last resort to address an underlying reliability issue**
- **Before entering into SSR agreement MISO shall assess feasible alternatives in an open and transparent planning process**

Other Studies

- **MISO Resource Adequacy Construct**
 - **Planning Reserve Requirement: 1 day in 10 LOLE**
 - **Local Clearing Requirement for minimum reserves in Local Resource Zones**
- **MISO has been assessing environmental polices since 2008 in interest of ensuring an informed stakeholder body**
 - **EPA Impact Analysis in 2011**
 - Transmission reliability cost impact for 2900 MW and 12650 MW of generation retirement scenarios
 - **Carbon Analysis in 2014 for Clean Power Plan 111(d) draft**

Generator Retirement Planning Issues

- **Market Participants don't request early because**
 - **Public policy is fluid**
 - **Employee communications on plant closure**
- **Reliability plans assume generation is there until retirement is officially approved**
 - **Can't build in anticipation of potential retirement. Market Participant could choose to retrofit**
 - **We need generators' plans to plan transmission**
- **Time to implement public policy**

Questions?