<table>
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<tr>
<th><strong>Docket Number:</strong></th>
<th>16-OIR-01</th>
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<tbody>
<tr>
<td><strong>Project Title:</strong></td>
<td>General Rulemaking Proceeding for Developing Regulations, Guidelines and Policies for Implementing SB 350 and AB 802</td>
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<tr>
<td><strong>TN #:</strong></td>
<td>211102</td>
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<tr>
<td><strong>Document Title:</strong></td>
<td>Presentation - Los Angeles Department Water &amp; Power - 2015 Power Integrated Resource Plan</td>
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<tr>
<td><strong>Description:</strong></td>
<td>LADWP's SB 350-Required Integrated Resource Plan Workshop of April 18, 2016.</td>
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<td><strong>Filer:</strong></td>
<td>Marc Pryor</td>
</tr>
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<td><strong>Organization:</strong></td>
<td>Los Angeles Department of Water &amp; Power</td>
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<tr>
<td><strong>Submitter Role:</strong></td>
<td>Public Agency</td>
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<td><strong>Submission Date:</strong></td>
<td>4/17/2016 10:16:20 AM</td>
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<td><strong>Docketed Date:</strong></td>
<td>4/18/2016</td>
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LADWP’s Resource Stack (2015)

- **1,956 MW Hydro**
- **3,978 MW Nat Gas**
- **1,679 MW Coal**
- **54 MW Biogas**
- **387 MW Nuclear**
- **996 MW Wind**
- **375 MW Solar**
- **69 MW Geothermal**
IRP Key Strategic Initiatives

- Eliminate Coal from LADWP’s Power Supply
- Reach 33% RPS by 2020 and 50% by 2030
- Achieve 15% Energy Efficiency by 2020
- Once-through Cooling Repowering
- Invest in Power System Reliability Program
- Support Electric Vehicle Expansion
GHG Reduction Strategy

Energy Efficiency

Navajo: 477 MW

IPP: 875-1200 MW

Solar

Wind

Geothermal

Combined Cycle Natural Gas

Electrification of the Transportation Sector
Meeting SB 350 Targets (2030)

Over the next 15 years, LADWP will replace over 70% of its generation infrastructure used to reliably deliver power to its customers.

Coal is eliminated and natural gas levels decrease with increased renewables.
IRP Public Outreach Process

• IRP Updated Annually
• Public Outreach every 2 years
  o Extensive Stakeholder Outreach
  o IRP Advisory Committee
  o IRP Public Workshops
    with Website and Online Forums
  o Address concerns and goals
  o Incorporate feedback

www.ladwp.com/powerIRP
LADWP’s IRP Development Process:

1. **Gather Stakeholder Input**
2. **Establish Clear Goals and Objectives**
3. **Review Key Assumptions and Load Forecast**
4. **Establish Strategic Case Alternatives**
5. **Approve Key Assumptions**
6. **Evaluate Resource Adequacy and Reliability**
7. **Conduct Computer Modeling of Cases**
8. **Present Preliminary Findings**
9. **Public Outreach**
10. **Recommend and Approve a Preferred Case**
11. **Publish IRP**
Dependable Capacity

Case #2 Navajo 2015, IPP 2025, 50% RPS, Adv EE, 800 MW Local Solar, High EV

- Navajo Coal
- IPP Coal
- Existing Renewable
- New Renewable
- IPP Replacement CC
- Out-of-basin Thermal
- In-Basin Thermal
- Palo Verde
- Large Hydro

Capacity Shortfall
# 2015 IRP Recommended Case

<table>
<thead>
<tr>
<th>Program/Initiative</th>
<th>Case</th>
<th>Year</th>
<th>Drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal Replacement</td>
<td>Navajo early divestiture</td>
<td>2016</td>
<td>SB1368, AB32, public feedback, core objective (environment)</td>
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<tr>
<td></td>
<td>IPP early replacement</td>
<td>2025</td>
<td></td>
</tr>
<tr>
<td>Energy Efficiency</td>
<td>15 percent less electricity usage than FY 2010; &quot;advanced&quot;</td>
<td>2020</td>
<td>AB2021, AB32, SB350, Mayor's pLAn, public feedback</td>
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<tr>
<td>RPS</td>
<td>25 percent of retail electricity sales</td>
<td>2016</td>
<td>SB2, AB32, SB350, Mayor's pLAn, public feedback, core objective (environment)</td>
</tr>
<tr>
<td></td>
<td>33 percent of retail electricity sales</td>
<td>2020</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40 percent of retail electricity sales</td>
<td>2024</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50 percent of retail electricity sales</td>
<td>2030</td>
<td></td>
</tr>
<tr>
<td>Local Solar</td>
<td>800 MW</td>
<td>2023</td>
<td>SB1, SB1332, Mayor's pLAn, public feedback</td>
</tr>
<tr>
<td>Transportation Electrification</td>
<td>2,344 GWh for 580,000 electric vehicles; &quot;high&quot;</td>
<td>2030</td>
<td>SB350, Mayor's pLAn, public feedback</td>
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<tr>
<td>Demand Response</td>
<td>200 to 500 MW</td>
<td>2026</td>
<td>SB1037, CEC</td>
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<tr>
<td>Energy Storage</td>
<td>Evaluate 154 MW for technical and economic viability</td>
<td>2021</td>
<td>AB2514, Mayor's pLAn, public feedback</td>
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</tbody>
</table>
Achieving 50% RPS by 2030

- **33% by 2020**
  - 7,800 GWh

- **50% by 2030**
  - 14,000 GWh

Assumes 2,344 GWh of Electrification is Achieved
Energy Efficiency Programs

Commercial, Industrial, and Institutional
- Energy Efficiency Technical Assistance Program (EETAP)
- Commercial Lighting Incentive Program (CLIP)
- Custom Performance Program (CPP)
- Custom Express Program
- Retrocommissioning (RCx) Program
- Savings By Design (SBD)
- New Construction Incentive Program
- Food Service Program
- Commercial Direct Install (CDI) Program
- Commercial Heating, Ventilation, Air Conditioning (HVAC) Program

Mass Market Programs (Residential)
- Home Energy Improvement Program (HEIP)*
- Refrigerator Exchange Program (REP)*
- Appliance Recycling Program (ARP)*
- Consumer Rebate Program (CRP)*
- Solar Incentive Program (SIP)*
- Charge Up LA! – Home, Work and On the Go*
- Energy Upgrade California (EUCA)*
- Green Power for a Green LA Program (Green Power Program)*
- City Plants (CP)*
- California Advanced Homes (CAHP)
- LAUSD Direct Install Program (LDIP)
- Behavior-Based Energy Efficiency Program*
- Residential Lighting Efficiency Program*
- Air Conditioning Tune-Up Program*

*Available to disadvantaged communities
Red text denotes programs targeted towards disadvantaged communities
Electric Vehicle (EV) Goals

Cumulative Number of EVs in Los Angeles

- **Base Case Transportation Electrification (IEPR)**
- **High Case Transportation Electrification (Double IEPR Forecast)**

- **145,000 EVs by 2020**
- **580,000 EVs by 2030 = 2,344 GWh**

- 100,000 EVs by 2020
- 200,000 EVs by 2023
- 300,000 EVs by 2026
- 400,000 EVs by 2029
- 500,000 EVs by 2032
- 600,000 EVs by 2035

Graph showing the cumulative number of EVs from 2015 to 2035.
GHG Emission Goals

Electrification of the transportation sector will significantly reduce overall GHG emissions.

Early IPP Replacement results in 5.32 MMT GHG reduction.

60% GHG Reduction below 1990 levels.

80% below 1990 Emissions Level (3.6 MMT).

Case #6 - 50% RPS, 800 MW Local Solar, High EV

Case #6 after CO2 credit from Electrification/Fuel Switching.
POWER SYSTEM RELIABILITY

**Generation**
- Transformers
- Major Inspections

**Transmission**
- 138kV UG Cables
- 138kV Stop Joints
- Maintenance Holes
- Restraints

**Substations**
- Transformers
- Circuit Breakers
- Battery Banks

**Distribution**
- Poles
- Crossarms
- Lead and Synthetic Cables
- Transformers
- Substructures
LADWP must replace 9 generating units at 3 Coastal Power Plants. No unit can be taken off-line until its replacement is ready.
Fuel Carbon Intensity

Gasoline is 4 times more polluting than LADWP’s future resource mix

Savings from Fuel Switching

LADWP 2016 IRP Timeline

Kick-Off Meeting

AC Mtg. 1 May 2016

AC Mtg. 2 Jun 2016

AC Mtg. 3 Aug 2016

Public Outreach Sep 2016

Develop Updated Assumptions

Define Model Runs

Preliminary Results

Close Public Comment Period

Final model runs, issue Draft IRP for internal review

Prepare final document, rate impact, internal review

Update IRP Narrative

Issue Final IRP