Seattle City Light

2016 IRP

PROCESS AND ASSUMPTIONS

IRP STAKEHOLDER

JUNE 17, 2015

THE NATION'S GREENEST UTILITY
SINCE 1905
SEATTLE CITY LIGHT

Agenda

- Introductions
- Stakeholder's Role in 2016 IRP
- Assumptions:
  - Demand Outlook
  - Conservation
  - New Resources
  - Environmental Impacts
  - Climate Change

2016 IRP Stakeholders

• Cameron Cossette	Nucor
• Christian Taylor	Boeing
• Jeremy Park	University of Washington
• Henry Luie	Seattle University
• Wesley Lauer	Seattle University
• Mike Ruby	Envirometrics, Inc.
• Steve Gelb	Emerald Cities Collaborative
• Rebecca Wolfe	Sierra Club
• Tom Eckman	Northwest Power & Conservation Council (NWPCC)
• Paul Munz	Bonneville Power Administration (BPA)

2016 IRP Group

- Resource Planning, Forecasting, & Analysis
- Environmental Affairs & Real Estate Division
- Conservation Resources Division
- Finance, Engineering and Office of Sustainability Divisions

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IRP PROCESS AND STAKEHOLDER ROLES

Integrated Resource Plan (IRP)

- An Integrated Resource Plan:
  - Identifies how much, when, and what kind of energy resources are needed
  - Treats conservation as equal to power generation
  - Includes public involvement
  - Is updated often (every 2 years)
  - Is required by state law (ESHB 1010)
- City Light Evaluates Resource Plans By:
  - Reliability, Cost, Financial Risk and Environmental Performance

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IRP Public Input Process

IRP Stakeholders	IRP Stakeholders	IRP Stakeholders	IRP Stakeholders
		Public Meetings Downtown, North & South Seattle	
City Council Energy Committee	City Council Energy Committee	City Council Energy Committee	City Council Energy Committee

Recommendations for 2016 IRP

- Continue to research long-term impacts of climate change on Seattle City Light's hydro resources
- Assess opportunities to increase the value of Seattle City Light's Conservation efforts
- Evaluate the impacts that EPA's rule on carbon dioxide emission might have on Seattle City Light
- Assess the impacts of growth in solar photovoltaic installations, electric vehicles, and the installation of a smart grid in Seattle in 2017
- Ensure the 2016 IRP is aligned with Seattle's Climate Action Plan
- Work to better understand the declining growth rate in electricity demand

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2016 IRP ASSUMPTIONS

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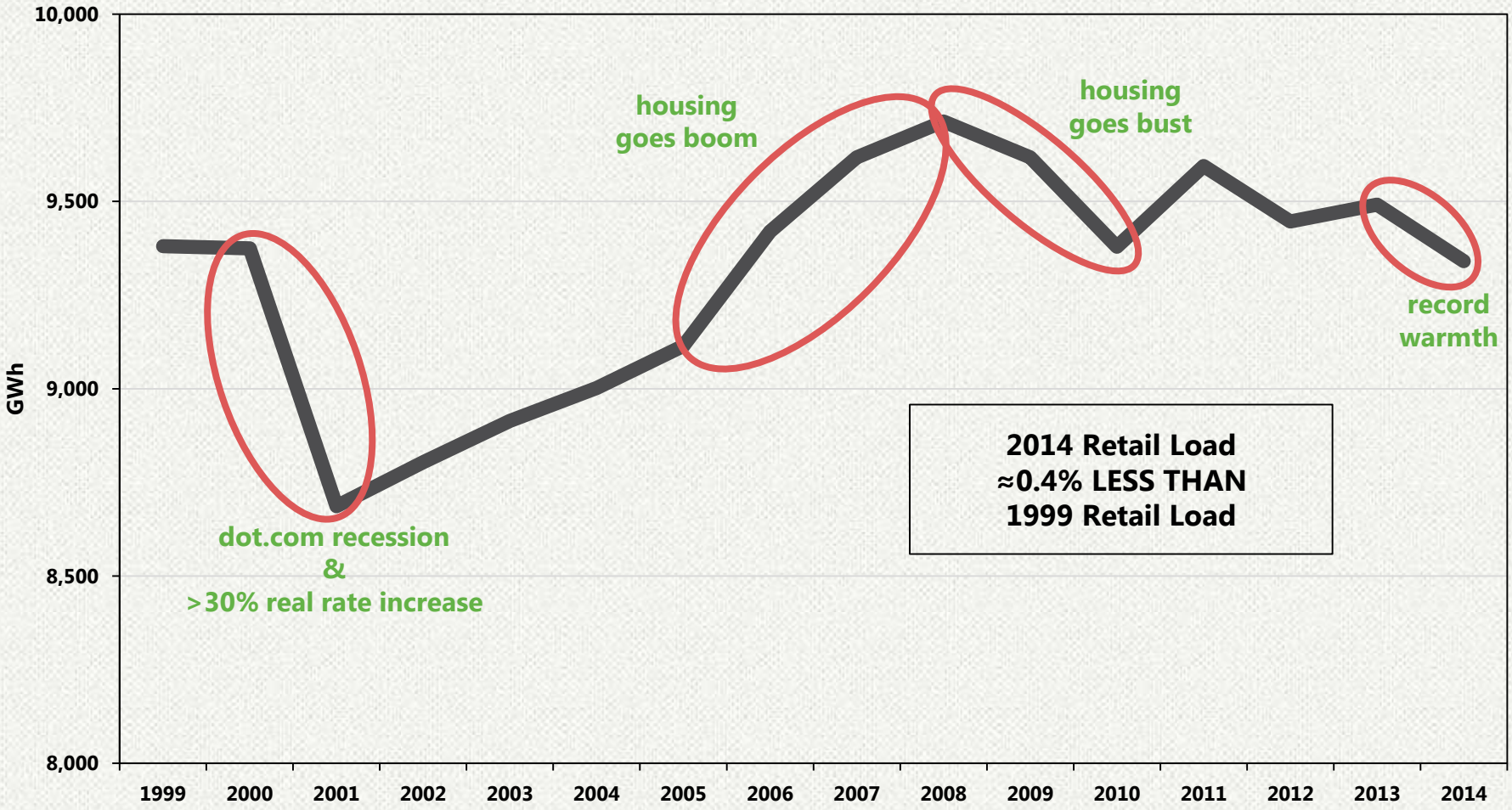
SYSTEM LOAD FORECAST

Resource Planning, Forecasting, & Analysis

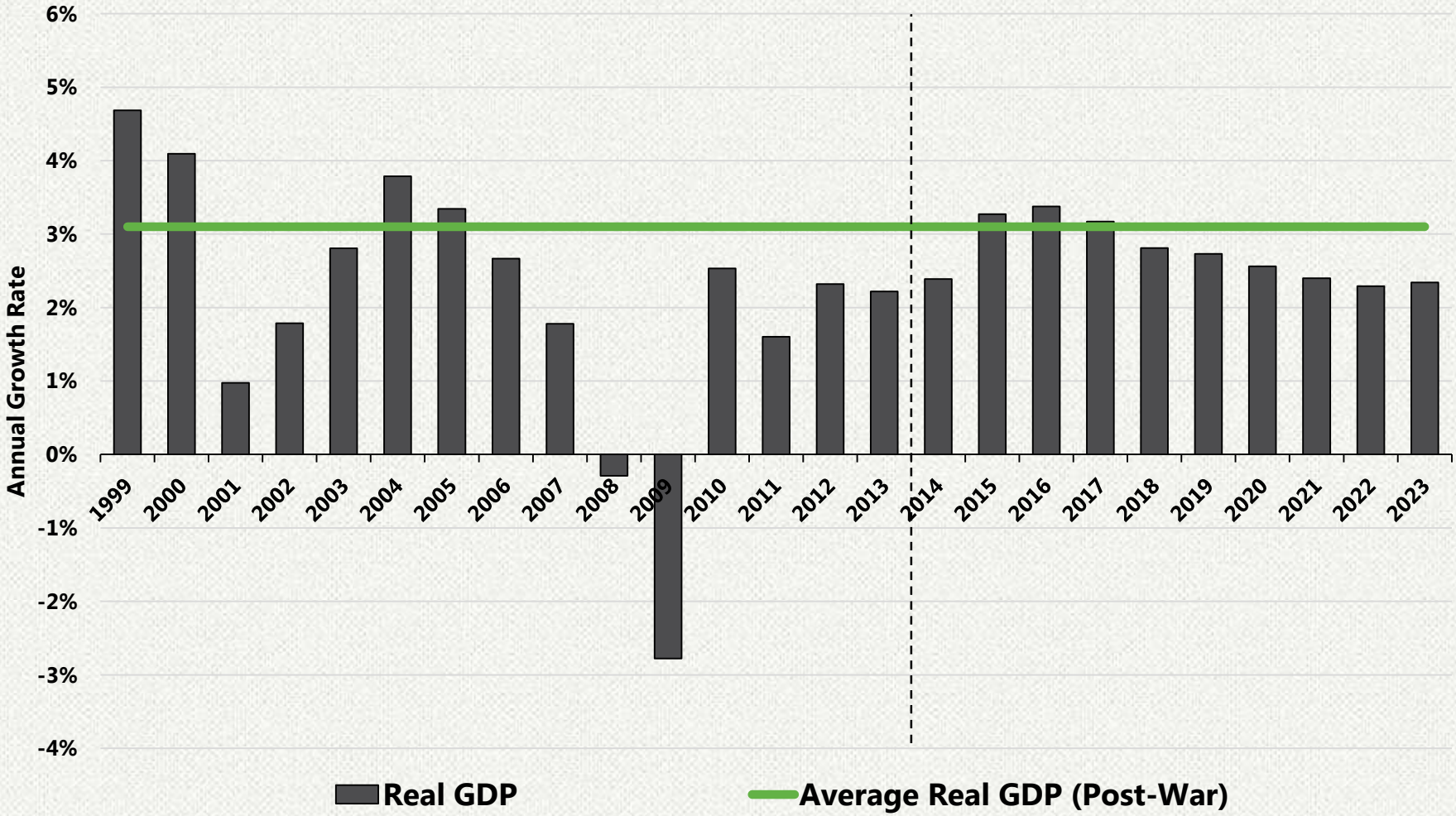
Overview

- Few changes to economic outlook – similar load forecast in near-term to previous load forecasts
- Customer rates set to 2014 Strategic Plan and 3% thereafter – slightly higher long-term load growth
- Forecasts are based on "normal weather"

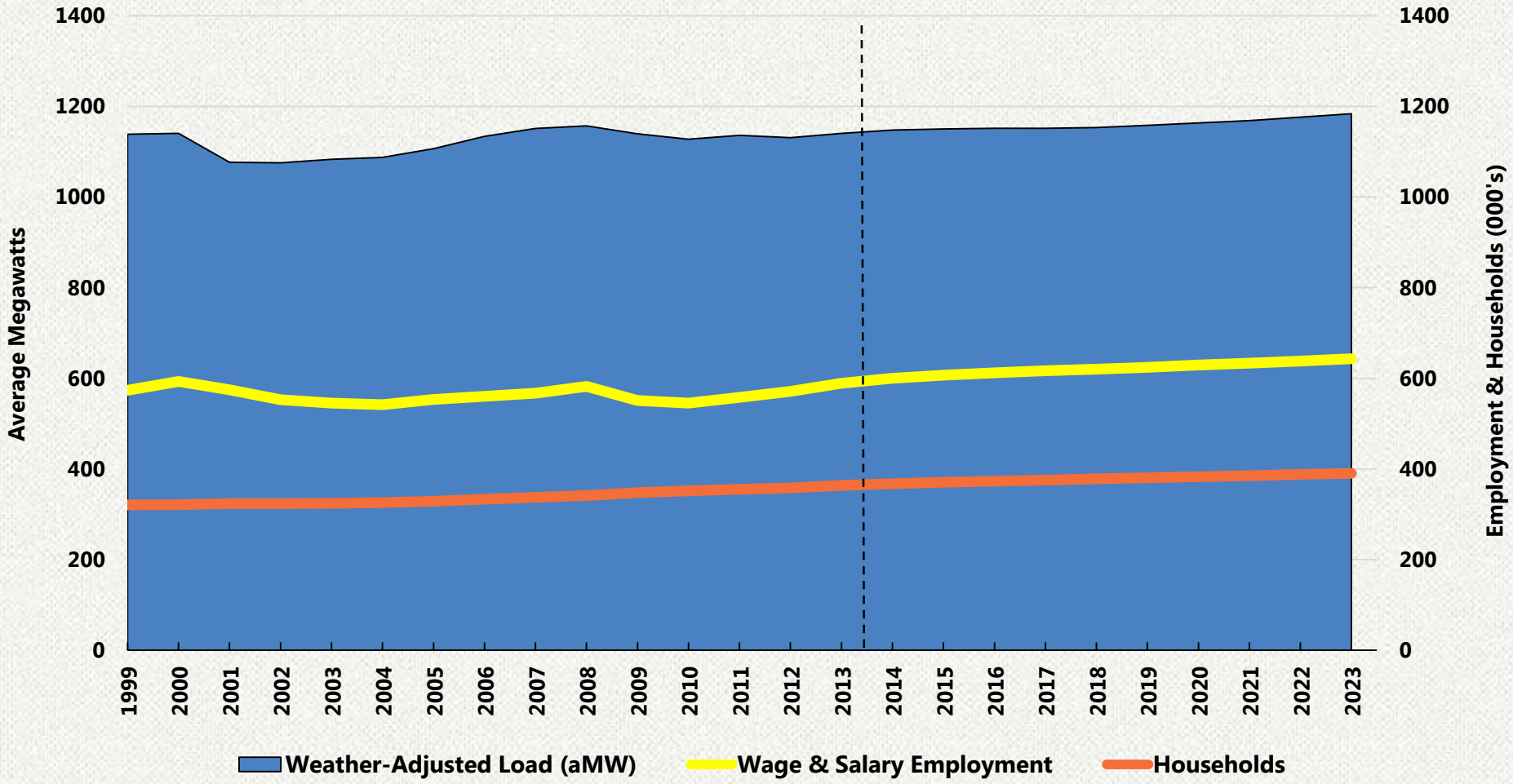
Seattle City Light Retail Load History



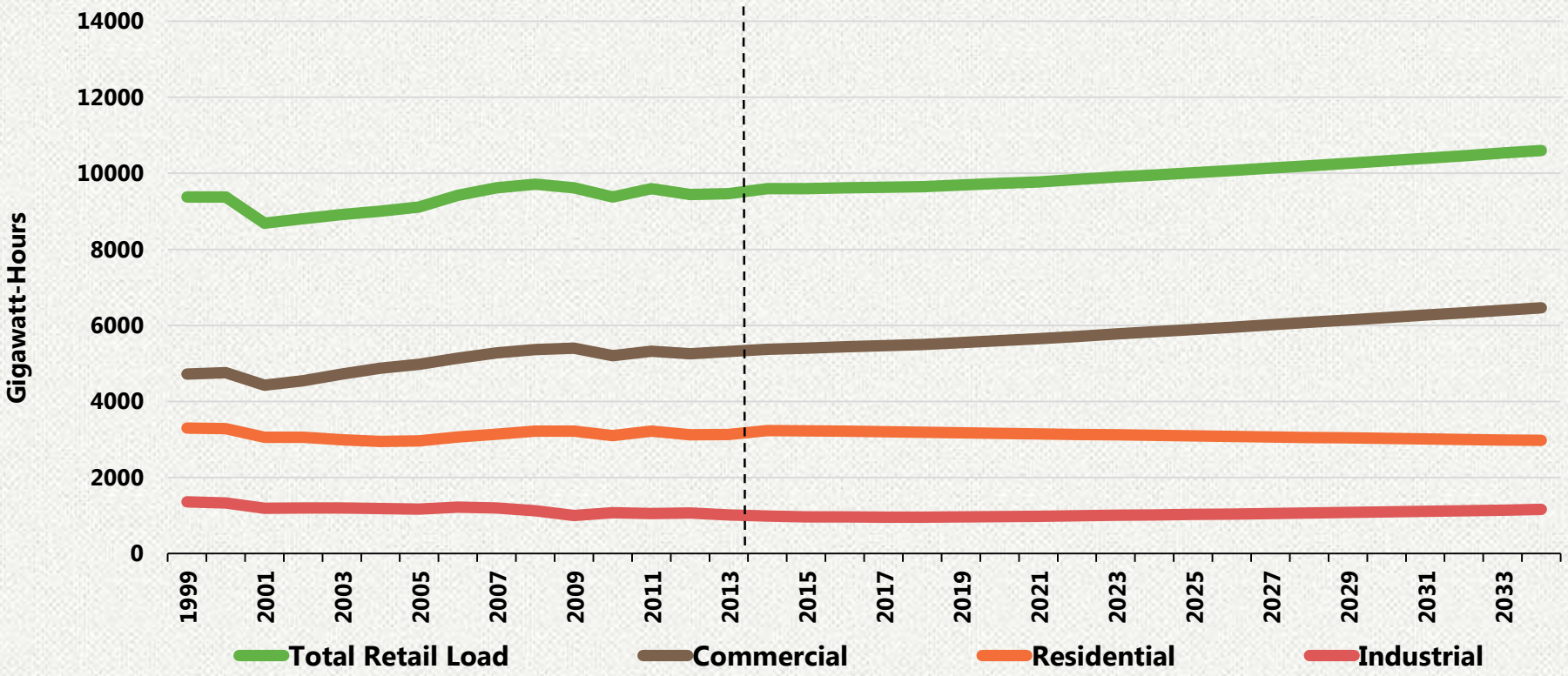
"New Normal" of Moderate Economic Growth?



Load, Employment, and Households



Load History & Forecast by Customer Class



Forecasted 20-year Average Growth Rates

Total Retail: 0.5% Commercial: 0.9%

Residential: -0.2% Industrial: 0.6%

Summary

- Economic growth forecasted below historical trend
- Average load growth approximately 0.25% for early years
- Faster load growth forecasted in later years partially due to expected lower real rate increases
- 20-year average annual growth rate of 0.48%

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CONSERVATION POTENTIAL ASSESSMENT

Conservation Context

- Energy conservation is SCL's first priority resource, and has been since 1976
  - Least cost
  - Least environmental impact
  - Least risk
- Longest continually operated energy conservation program in country
- 189 aMW of conservation in place
  - 10%+ of City Light's retail load

Conservation Context

- Set and exceeded aggressive goals
- Beginning in 2008, City Light has doubled targets and budgets
  - Strategic Plan goal of 14 aMW annually
  - 16 aMW per year achieved over the past five years
  - $46.6 Million Conservation Resources Budget
- Energy savings are split 50/50 between residential and commercial-industrial

Conservation Potential Assessment (CPA)

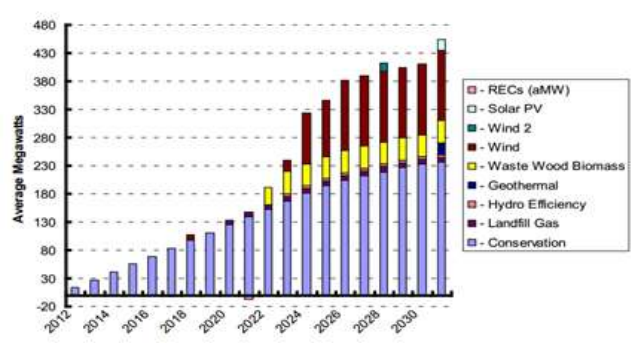
- Establish conservation targets that are cost effective
  - Quantify amount, timing, and cost of conservation resources

Meet I-937 Requirements

Department of Commerce
Innovation is in our nature.

Business Driven:

IRP Development
CRD Program Planning
Load Impacts



I-937

- In 2006, Washington voters approve Initiative 937
- Applicable to electric utilities that serve more than 25,000 customers (84% of state load)
  - 15% of their electricity from new renewable resources by 2020
  - Undertake all conservation that is cost-effective
- SCL must achieve "all available conservation that is cost-effective" on two year cycles using a CPA consistent with NWPCC methodology
  - 2012-13, 2014-15, etc.

Cost Effectiveness Definition

- The cost per unit of energy conserved must be less that the cost per unit of energy produced by the next least costly new energy resources which the City could acquire to meet future demand

Develop conservation targets on equal footing compared to the cost of new generation resources

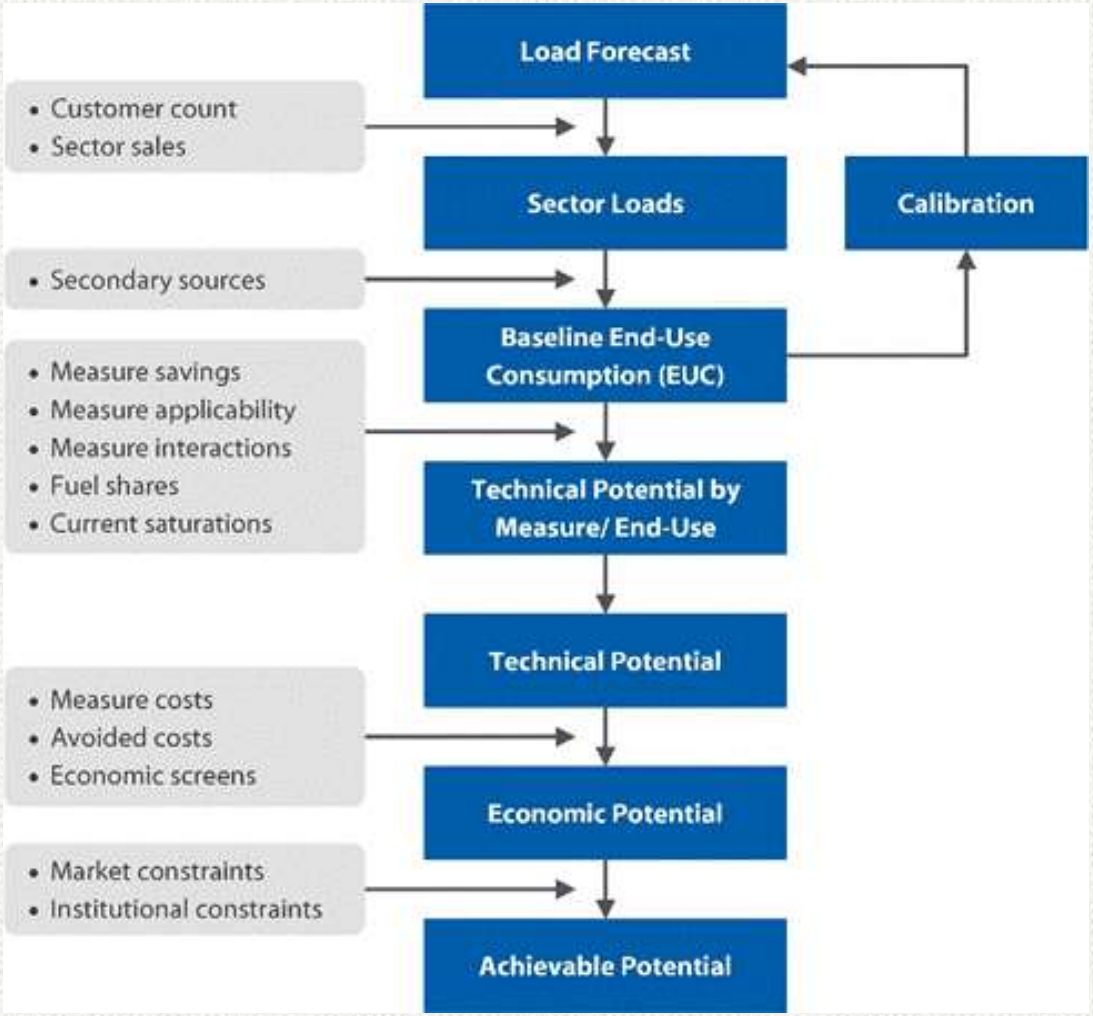
CPA Study Process

- 3rd CPA under I-937 regulation
- Completed by a consultant
- RFP issued in June 2014
- Contract awarded to The Cadmus Group and signed Jan 2015
- Work began in Feb 2015
- Will rely largely on NWPCC 7th Plan supply curve files

Objectives of a CPA

- Quantify the amount of energy that could be saved from installing energy efficiency measures in a utility's service territory over a planning period
- Account for effects of known codes and standards
- Determine the cost of acquisition to compare energy efficiency to supply-side alternatives
- Provide measure-level cost, savings, and potential data for program planning

Overview of Methodology



Hierarchy of Sources for Measures

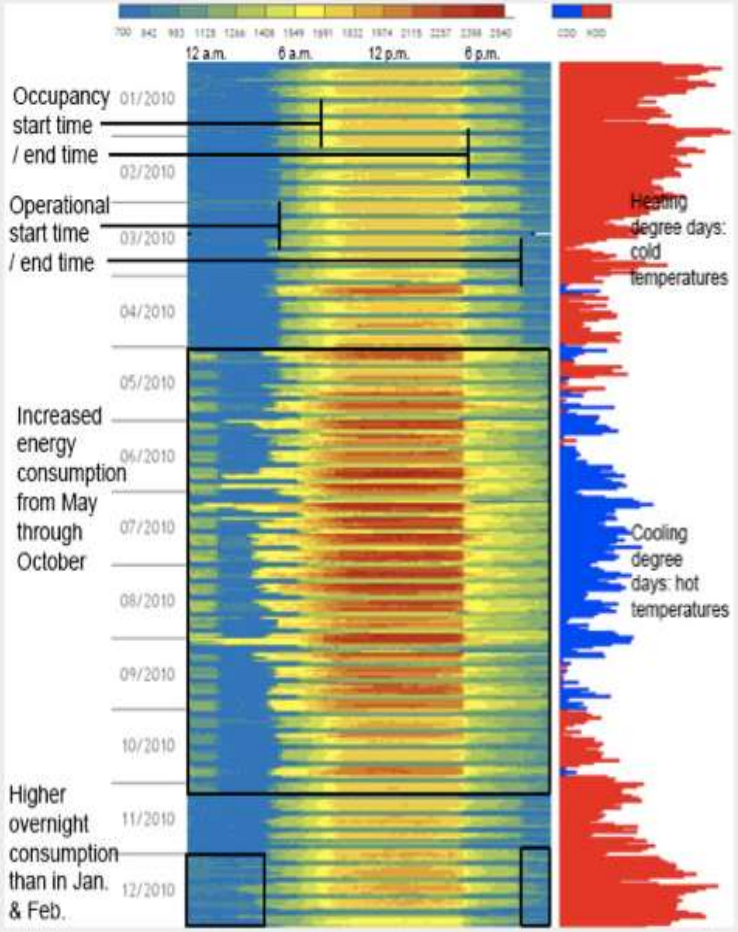
- Draft 7th Plan Workbooks
  - ~40 workbooks available
- Regional Technical Forum
- 6th Power Plan
- Other sources
  - SCL evaluations
  - Cadmus' measures database
  - National databases/sources (ES Calculators, DEER, etc.)

Stand Alone Measures

- Cogeneration
- LED Street Light Conversion
- Indoor Agriculture
- Enterprise Data Centers
- Waste Heat Recovery

Improvements for 2016 CPA

- Potential for energy conservation to reduce demand at peak times
  - Delivered by Retroficiency
- Impact of proposed SCL rate design on conservation projects in the downtown core
- Delivering more granular data for incremental conservation in the IRP
- Collaboration with the Office of Sustainability and the Environment



An office building demand map (Image by Retroficiency)

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NEW SUPPLY RESOURCES

Supply Considerations in the IRP

- Time horizon (20 years): 2016-2036
- Legal, regulatory and policy compliance
- Additional resources if needed will be added to existing resources
- Evaluation criteria include:
  - Reliability:
    - Availability
    - Deliverability
  - Cost, Financial Risk
  - Environmental impact

Supply Resources
Existing Own Resources

- Skagit Hydro Project (Ross, Diablo, Gorge and Newhalem)
  - FERC license expires in April 2025
- Boundary Hydro Project
  - FERC license expires in 2055
- Hydro Efficiency
  - Expected higher efficiency for two units of Boundary hydro project starting in fall 2016 and fall 2017

Supply Resources
Existing Own Resources

- Cedar Falls Hydro Project
- South Fork Tolt Hydro Project
  - FERC license expires in July 2029
- Annual Planned Conservation

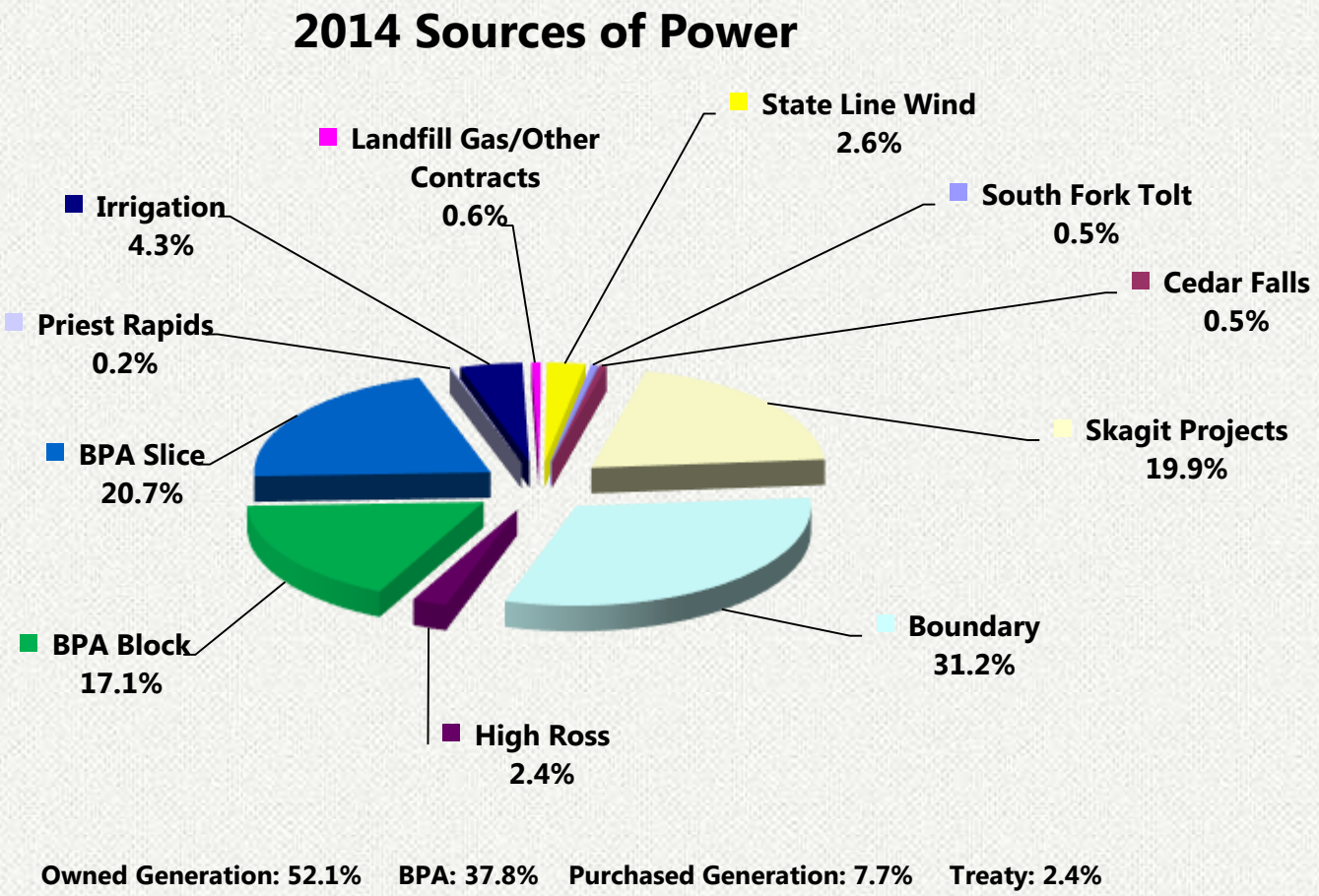
Supply Resources
Existing Long-Term Contracts

- Bonneville Power Administration (BPA) Block and Slice
  - BPA block and slice contract will expire in September 2028
- Grand Coulee Project Hydroelectric Authority (GCPHA)
  - GCPHA will expire in stages from 2022 to 2027
- High Ross
  - High Ross contract will expire in January 2066
- Priest Rapids
  - Priest Rapids contract will expire in April 2052
- Northern California Power Agency Exchange (NCPA)
  - Seasonal exchanges annually with NCPA will expire in 2018

Supply Resources
Existing Long-Term Contracts

- Sierra Pacific Industries (SPI) Biomass
  - SPI wood waste biomass contract will expire in July 2017
- Stateline Wind
  - Stateline contract will expire in December 2021
- Lucky Peak
  - Lucky Peak contract will expire in April 2038
- Landfill Gas (LFG)
  - Columbia Ridge landfill gas contract will expire in December 2033
- King County West Point Wastewater (Distributed Generation)
  - West Point wastewater treatment cogeneration contract will end in March 2033

City Light's Long Term Resources



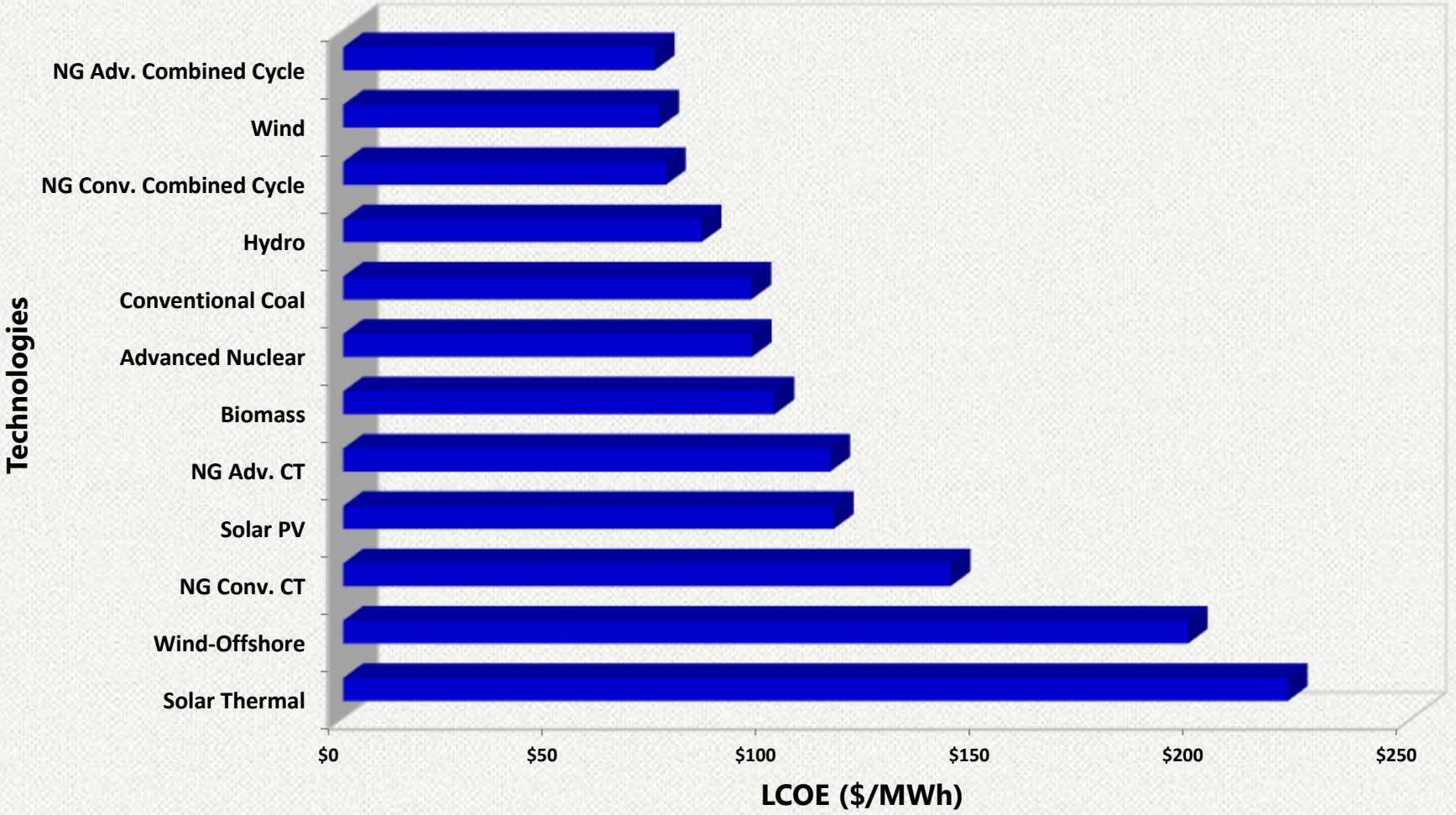
Potential Future Supply Resources

- Wind
  - Long Term Power Purchase Agreement (PPA)
  - Build
- Solar
  - Utility Scale Solar (PPA vs. Build)
  - Rooftop
  - Community Solar: 4 Projects
- Solar Thermal
- Geothermal

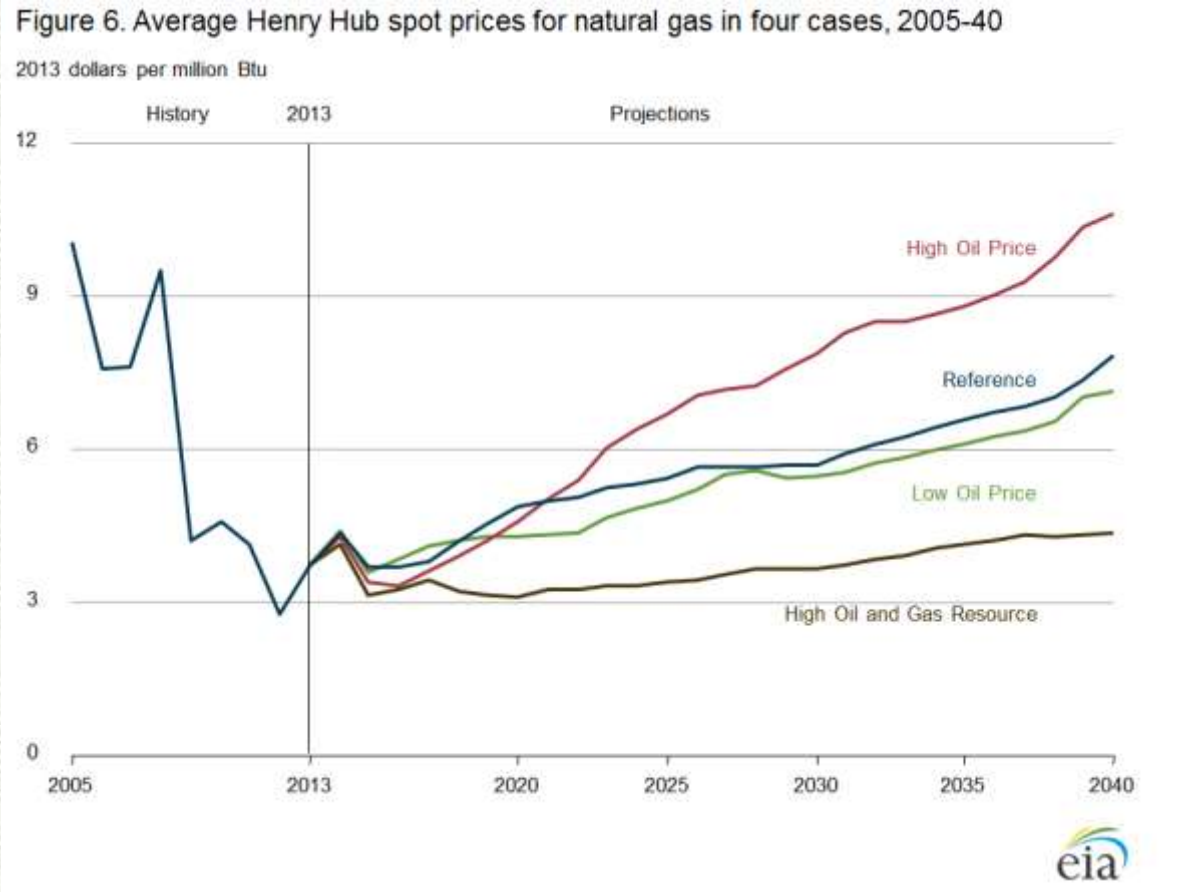
Potential Future Supply Resources

- Biomass
  - Long Term Power Purchase Agreement (PPA)
  - Build
- Natural Gas-Fired Combined Cycle Combustion Turbine (CCCT)
- Natural Gas-Fired Single Cycle Combustion Turbine (SCCT)
- Renewable Energy Certificates (RECs)
  - Wind, Solar, and Biomass
  - Market Purchases

Levelized Cost of Energy (2013 $/MWh) in 2020
Energy Information Administration (EIA)



US Energy Information Administration Natural Gas Price Outlook



Source: http://www.eia.gov/forecasts/aeo/section_prices.cfm
City Light will use IHS North American Gas and Power Scenarios

Market and Policy Uncertainties

- Price of natural gas:
  - Yearly Henry Hub natural gas spot prices varied from $8.86/mmBtu in 2008 to $3.73/mmBtu in 2014
  - Affects short term and long term market prices for electricity
- Actual power plants may cost more or less than generic plants for build:
  - Economic Conditions
  - Developers qualifications
  - Site quality
  - Transmission availability
- Future federal or states greenhouse gas emission limits
- Taxes and incentives:
  - Production Tax credits (PTC), investment tax credits (ITC), and other federal programs may lower prices
  - Federal and states incentive programs are time limited

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SCL SOLAR PV

Federal and State Incentives

- Incentives:
  - Federal:
    - 30% Federal Tax Credit (FTC): expires in December 2016
  - Washington State:
    - WA-State sales tax exemption: expires in June 2018
    - WA-State production incentives:
      - Renewable Energy Cost Recovery Incentive Payment Program (ends in June 2020): provides a rebate of $0.15-$0.54 per KWh produced by the system and maxes out at $5000 per year

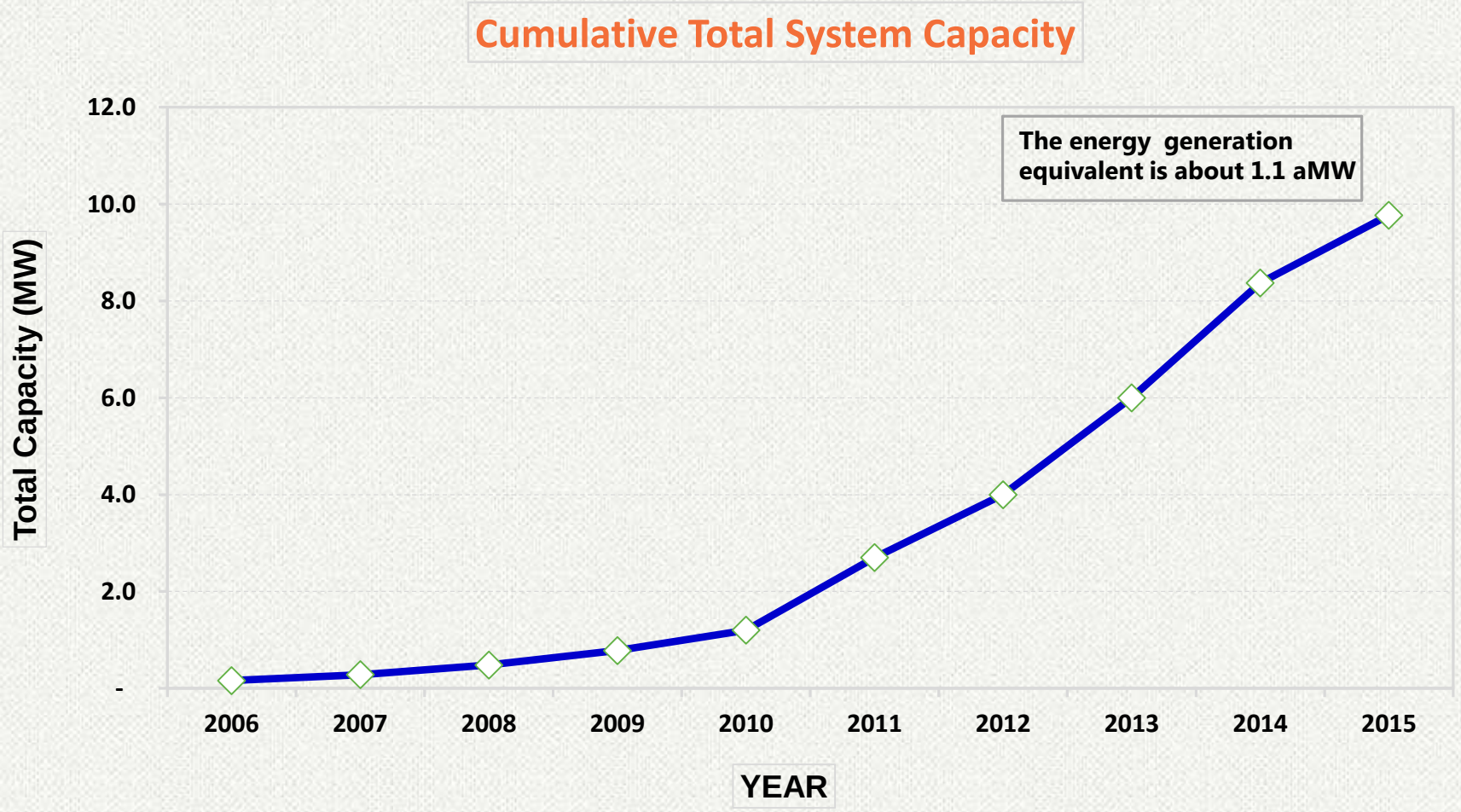
Net Metering

- Net Metering:
  - WA-RCW 80.60 requires utilities to provide net-metering
  - Maximum allowable generating capacity for a net metering system: 100 KWs
  - Net metering cap in a utility's system: 0.5% of 1996 peak load (SCL 1996 peak: 1950 MW)

SCL Solar PV

- Currently 1,868 customers (May 2015)
- 9.77MW cumulative total capacity (May 2015)
- Less than 0.1% of SCL demand
- Expected Cost per panel with 1 KW capacity is: $4000
- Average system size per customer: 5 KW

Cumulative Total System Capacity
(2006-2015)



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ENVIRONMENTAL IMPACT

Environmental Impacts Statement

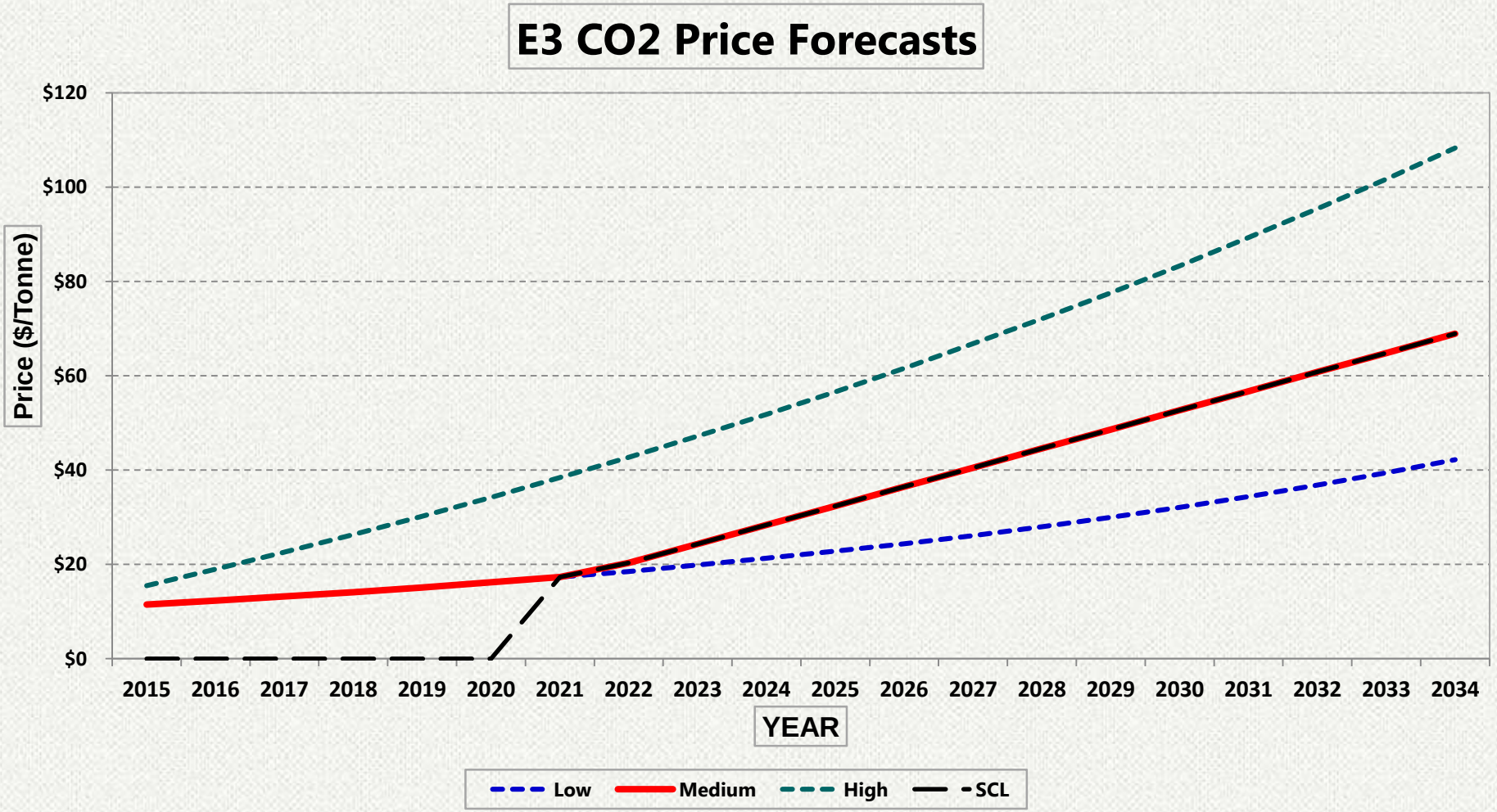
Impacts By Resource Type

- The 2012 EIS assessed environmental impacts and mitigation options by individual power generation resource, and then by portfolio
- Operation and construction impacts, and mitigation options were assessed for each resource type
- We expect the EIS will not need substantial modification
- We will update as needed
- We will review and evaluate environmental risk for any SCL resource acquisitions, including renewable energy credits

Proposed Carbon Regulations

- GHG regulations proposed at federal and state levels
- City Light supports GHG regulation including EPA's Clean Power Plan and expects that limits on power sector emissions would increase the value of hydro
- The Governor and legislature are discussing options for implementing statewide programs to reduce greenhouse gas emissions

E3 CO2 Projected Prices



Environmental Impacts Statement
Impacts BY Resource Type

- The EIS first describes each energy resource and then ten elements of the environment:

  (1) Soils and Geology, (2) Air Quality, (3) Surface and Groundwater, (4) Plants and Animals, (5) Energy and Natural Resources, (6) Environmental Health, (7) Land Use, (8) Aesthetics and Recreation, (9) Historic and Cultural Resources, and (10) Employment

- Each environmental element has a section in the EIS

  - General environmental impacts that have the potential to occur for nearly every resource

  - Impacts for each electric resource and potential mitigation options

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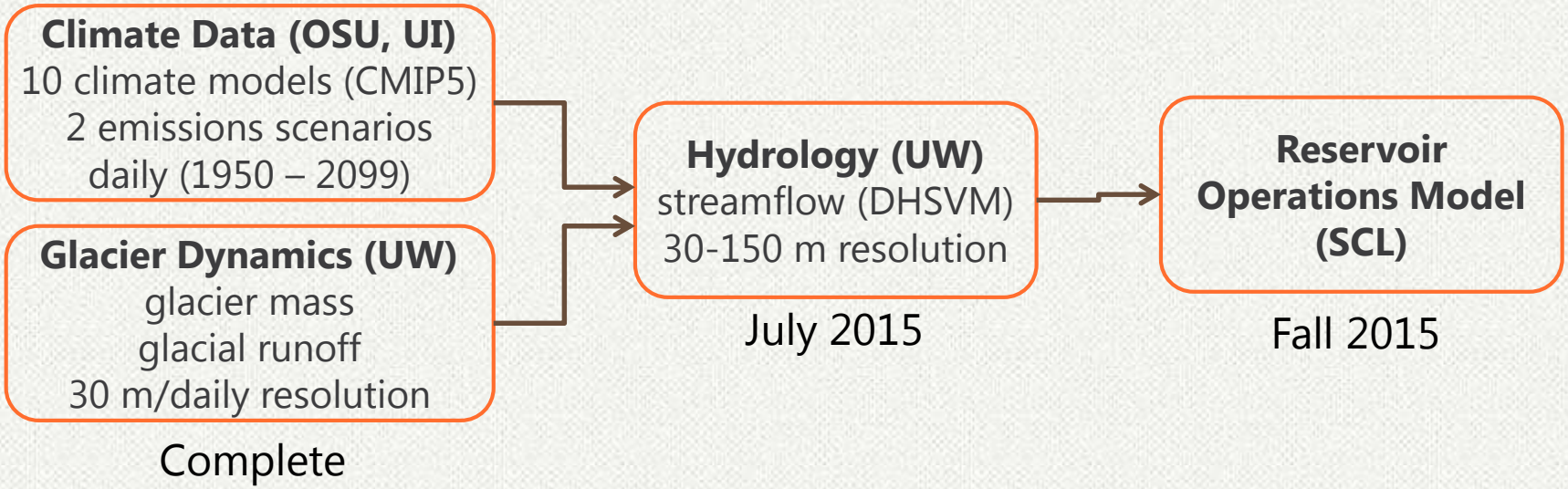
CLIMATE CHANGE ASSESSMENT

Climate Change Assessment

- Research with UW to add a glacier model to a hydrology model and project changes in glacier runoff (May 2015)
- Update streamflow projections for the Skagit (July 2015)
  - Include changes in glacier runoff
  - Finer resolution (30 -150 m) hydrological model
  - Newest climate model projections with daily climate data (CMIP5)
  - Use streamflow projections as input to reservoir operations model
- BPA is supporting research to update projections of streamflow for the Columbia River Basin (results expected Sept. 2016)
- Update assessment of warming temperatures on demand

Climate Change Assessment

Skagit River Basin Streamflow Projections (SCL)



Questions or Comments?

IRP Website:
http://www.seattle.gov/light/news/issues/irp/

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