



Integrated Resource Plan
Electric System
Pre-Council December 16, 2013

Integrated Resource Plan Electric System



- Integrated Resource Planning (IRP)
- Electric Integrated Resource Plan
- Staff Recommendations and Implementation Plan
- Projected Costs and Timing

Integrated Resource Planning



What is an Integrated Resource Plan (IRP)?

1. Demand Forecast
2. Review of Supply Resources
3. Plan for Future Supply to Meet Future Needs
4. Integration of Projected Future Supply Cost into Demand Side Management Options

2008 Electric Integrated Resource Plan Summary Recommendations



- Develop Additional DSM Programs
- Endorse Improved Building Codes
- Measure Effects of DSM Program
- Move Towards Time of Use and Demand Pricing Structures
- Investigate the Development of Reciprocating Engine Generation
- Pursue Financially Feasible Biomass Development
- Acquire Additional Sources of Wind Generation
- Pursue Transmission Projects to improve Import Capability
- Update the IRP in the 2013 Time Frame

2008 Electric Integrated Resource Plan



Develop Additional DSM Programs

- Home Performance with Energy Star
- Enhanced Home Performance with Energy Star
- Commercial Lighting Rebate
- Commercial Heat Pump/Air Conditioner Rebate
- Revised Loan Requirements to Address Energy Efficiency Goals
- Addition of Solar Rebate Programs

Endorsed Improved Building Codes

- Water & Light Advisory Board Letter to Codes Commission

2008 Electric Integrated Resource Plan



Measure Effects of DSM Programs

- Residential

Program	Cost	Benefit	Continue
HomePerformance w/EnergyStar	\$748,842	\$858,345	Yes
AirConditioner/HeatPump Rebates	\$206,730	\$515,150	Yes
Online Energy Audit	\$8,260	\$266,957	Yes
Energy Audits	\$0	\$208,424	Yes
Tree Power	\$15,240	\$69,333	Yes
AirConditioner Exchange Program	\$22,950	\$79,858	Yes

- Commercial

Program	Cost	Benefit	Continue
Commercial Lighting Incentive	\$312,397	\$2,486,992	Yes
Commercial HVAC	\$282,350	\$71,867	No

2008 Electric Integrated Resource Plan



Pursue Financially Feasible Biomass Development

- Currently using Wood, Conducted Miscanthus Test Burn and Purchased Engineered Biomass Test Burn Fuel

Acquire Additional Sources of Wind Generation

- Additions of Crystal Lake 20 MW Wind Contract
- Issued RFP for Additional Renewable Energy Sources

Pursue Transmission Projects to Improve Import Capability

- South Transmission Line Project

Update the IRP in the 2013 Time Frame

Integrated Resource Plan

Significant Changes Since 2008



Demand Projections

- Economic Downturn
- Demand Side Management (DSM) Performance

Supply Resources

- Cost/Forecast of Natural Gas
- Base Load Generation Changes
- Peaking Generation Changes

Market Conditions

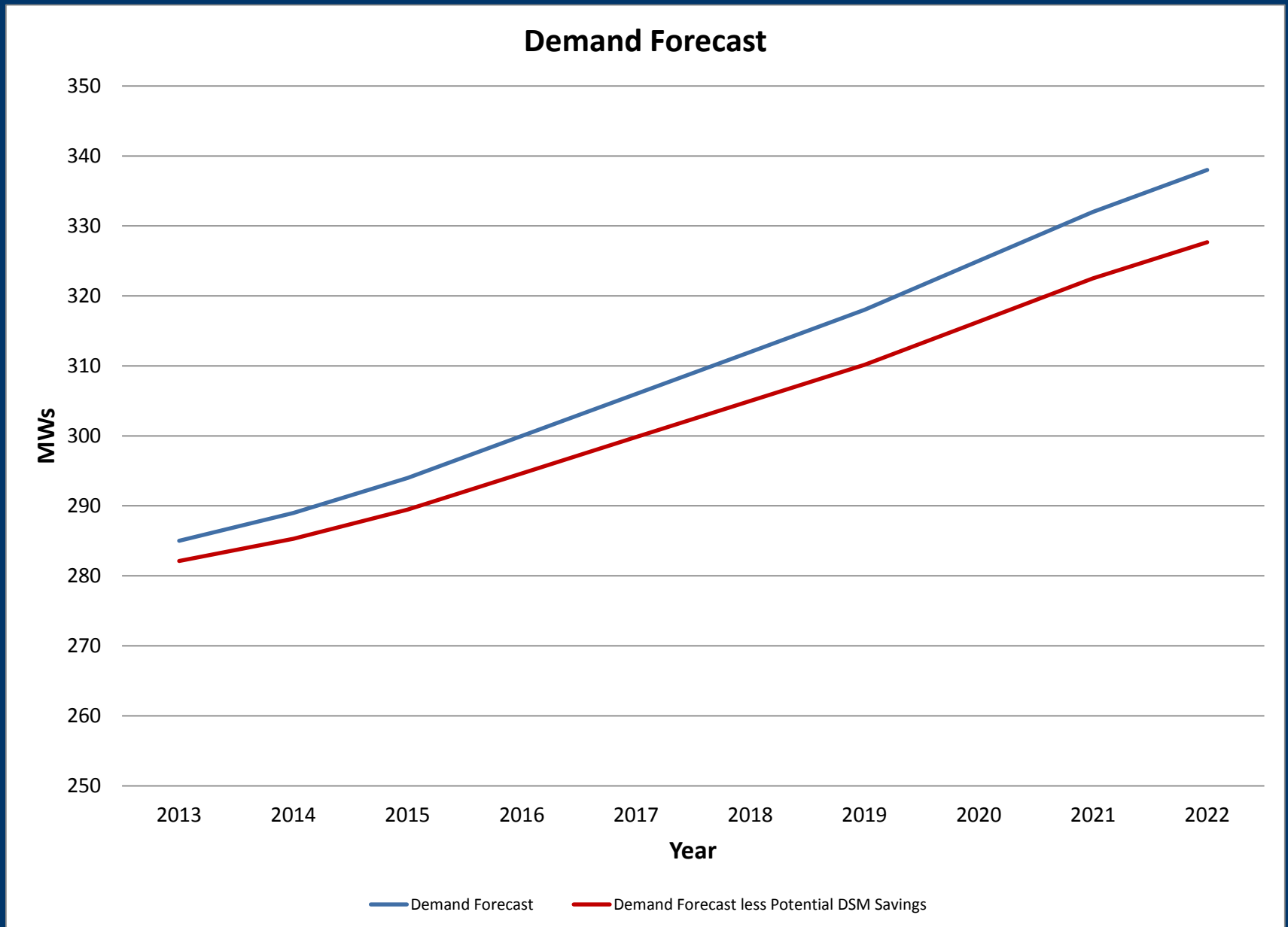
- Energy Cost \$/MWh, Capacity Cost \$/MW

Demand & Energy Forecast

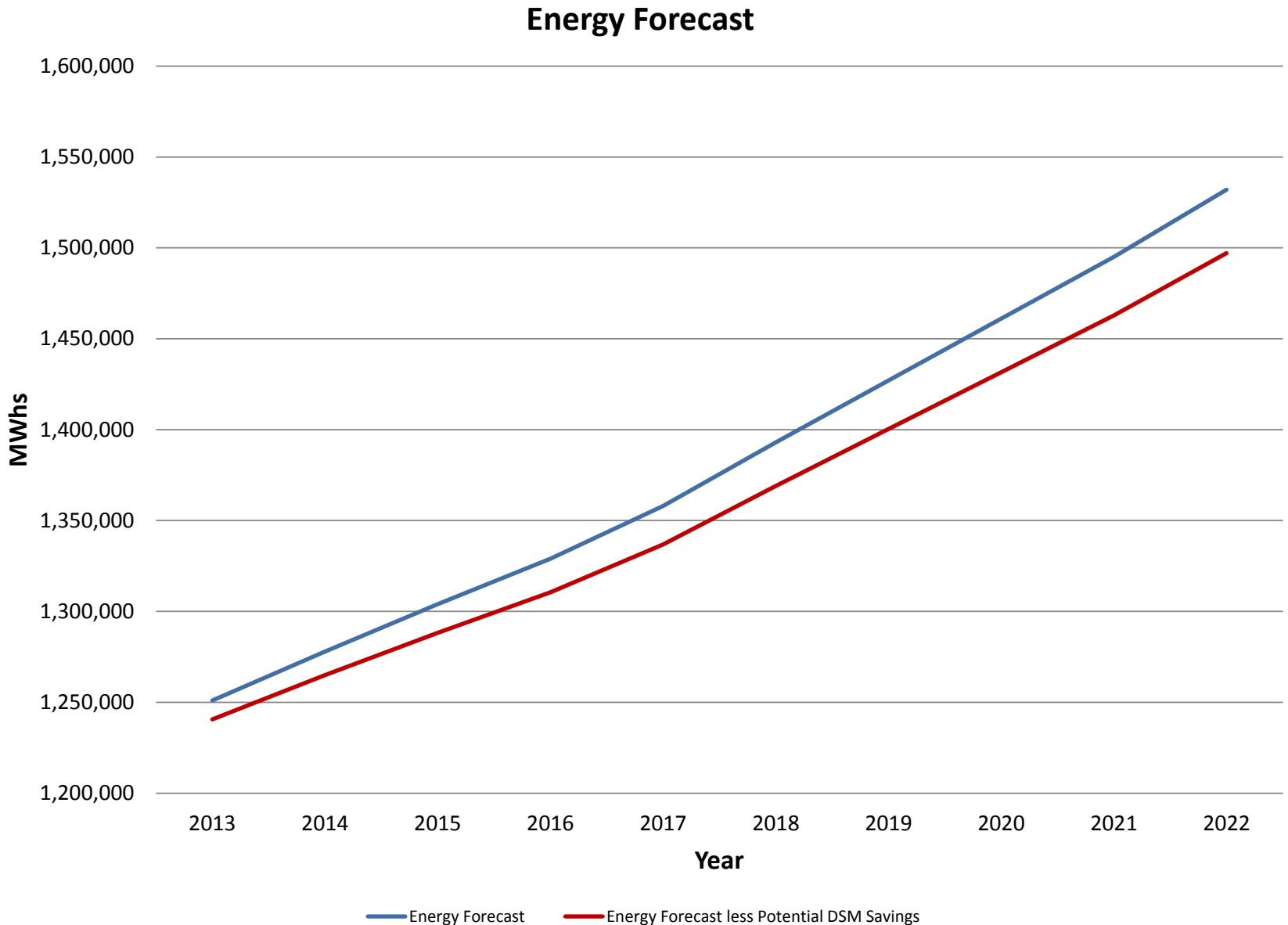
YEAR	Coincident Peak Demand (MW)		Total Energy (GWh)	
	2008 STUDY	2013 UPDATE	2008 STUDY	2013 UPDATE
2008	278	257*	1,221	1,155*
2009	284	250*	1,244	1,107*
2010	289	265*	1,266	1,182*
2011	295	277*	1,292	1,175*
2012	300	272*	1,318	1,170*
2013	306	285	1,340	1,251
2014	311	289	1,362	1,278
2015	317	294	1,388	1,304
2016	322	300	1,414	1,329
2017	328	306	1,437	1,358
2018	333	312	1,459	1,393
2019	339	318	1,485	1,427
2020	344	325	1,511	1,461
2021	350	332	1,533	1,495
2022	357	338	1,564	1,532
2023	364	345	1,594	1,569
2024	371	353	1,629	1,607
2025	378	360	1,656	1,645
2026	385	366	1,686	1,663
2027	392	373	1,717	1,695
2028	399	381	1,752	1,727
Average Increase	1.8%	2.0%	1.8%	2.2%

*actual numbers

Projected Demand Forecast Reduction by DSM Program



Projected Energy Forecast Reduction by DSM Program

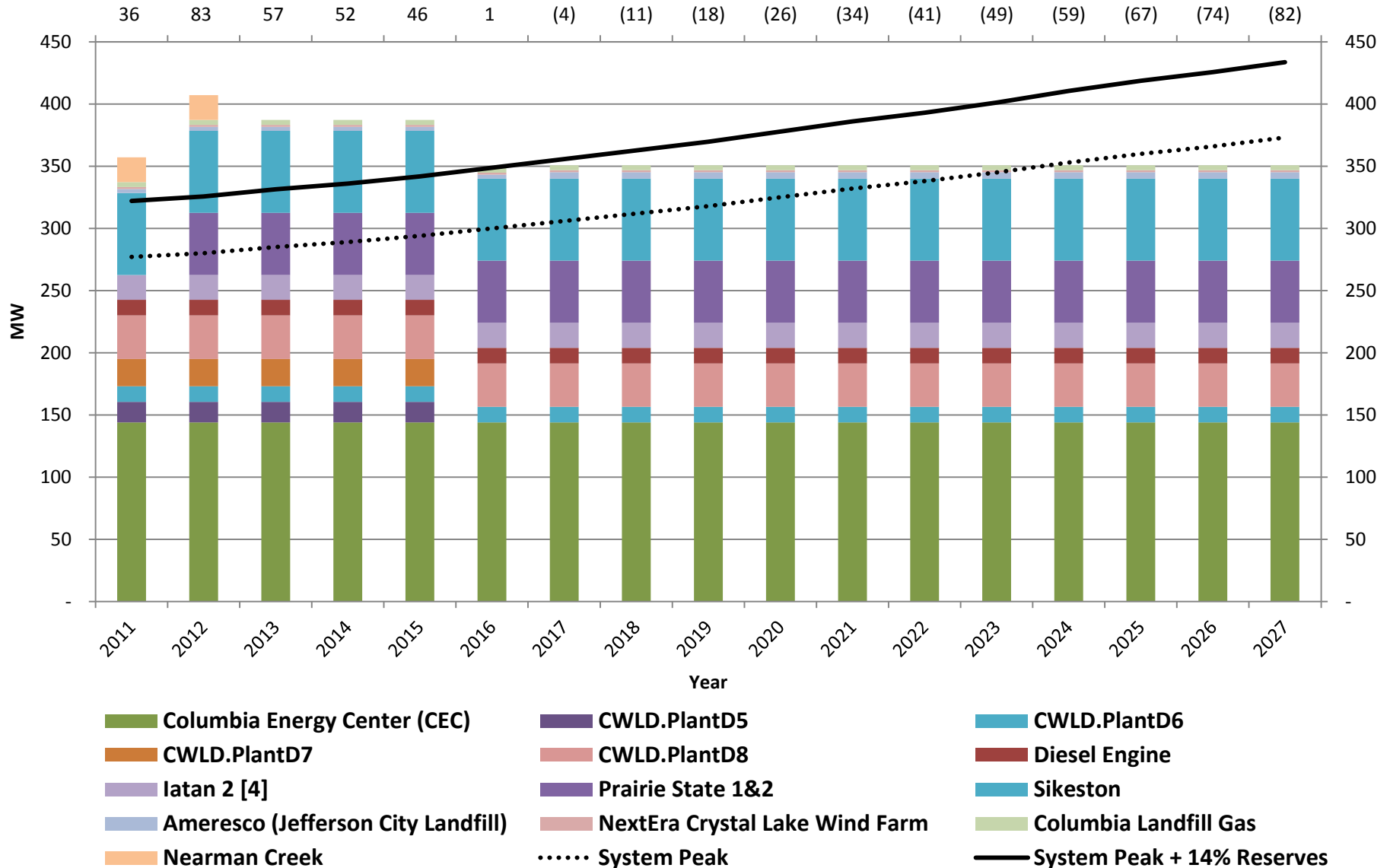


Columbia Generation Resources

UNIT	DESCRIPTION	CAPACITY
Bluegrass Ridge	Wind	6.3
Crystal Lake	Wind	10.5
Columbia & Ameresco	Landfill Gas	5.0
Distributed Generators	Diesel	12.5
Columbia Energy Center	Combustion Turbine	144.0
CWL Turbine 5	Coal-fired Steam	16.5
CWL Turbine 6	Combustion Turbine	12.5
CWL Turbine 7	Coal-fired Steam	22.0
CWL Turbine 8	Gas-fired Steam	35.0
Iatan II	Coal-fired Steam	20.0
Nearman Creek	Coal-fired Steam	20.0
Prairie State	Coal-fired Steam	50.0
Sikeston	Coal-fired Steam	66.0
TOTAL Nameplate MW		420.3
TOTAL MW w/ wind credit adjustment		408.2

Current CWL Balance of Loads & Resources: 2011-2027

Capacity Surplus/(Deficit)



Integrated Resource Plan

2013 Update: Summary



- Continue Existing DSM programs
- Improve Building Codes
- Addition of DSM Programs Beyond 2008 IRP Not Recommended
- Supply Side Expansion Limited to Natural Gas and Renewable Sources
- Analyze Expansion of CEC to Combined Cycle
- Review Rate Structure to Address Net Metered Generation Sources

Integrated Resource Plan 2013 Update: DSM



Performance of Demand Side Management

- Total Resource Cost (TRC)
 - Utility Benefit/Cost Ratio Greater Than or Equal to One
- Market Influence on TRC
 - Capacity
 - Energy
- Avoiding the Whipsaw Effect

Integrated Resource Plan

2013 Update: Implementation



Staff Recommendations & Implementation Plan

- Purpose
- Demand Side
- Supply Side
- Integration Issues

Integrated Resource Plan Implementation: Demand Side



Customer Outreach Program: \$150,000

- Use a Customer Outreach Program to Populate an Appliance Load Model of our Existing Community Energy Loads

Distribution System Model: \$150,000

- Design Future Improvements & Expansions

Energy Efficiency Programs: \$150,000/yr

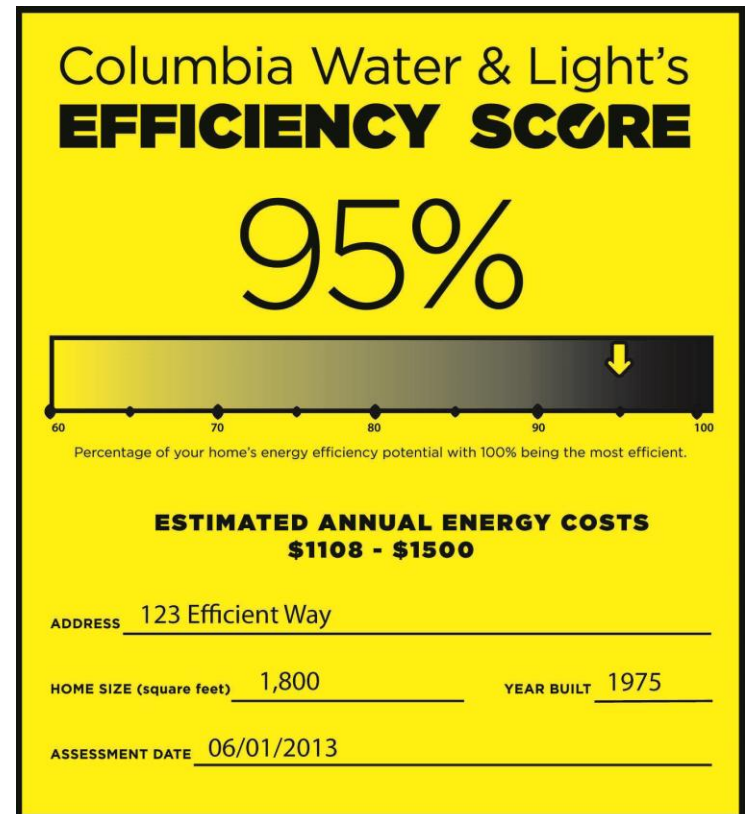
- Based on Findings of Research Noted Above
- Additional Outreach/Education/Marketing plan

Energy Efficiency Tracking Software: \$95,000 + \$32,000/yr

Integrated Resource Plan Implementation: Demand Side



- Efficiency Score Marketing & Outreach: \$20,000
 - Score on Real Estate Listings (MLS)
 - List on City GIS System
 - Fully Integrate with Rental & Low-income Sectors
 - Use Scores on MidMoHousing.com



Integrated Resource Plan Implementation: Demand Side



Develop Efficiency
Incentives to Support
New Construction:
\$100,000

- Residential
- Multi-family
- Commercial
- Industrial



Integrated Resource Plan Implementation: Demand Side



New financing programs

- Home Energy Affordability Loan (HEAL): \$100,000
- RFP for Property Assessed Clean Energy (PACE) for Boone County: \$80,000
- Pay As You Save (PAYS): \$100,000
- Photovoltaic Loans: \$250,000

Integrated Resource Plan Implementation: Demand Side



Load Modifying Resources

- Revise Load Management
- Equipment for Regional Demand Response Programs: \$160,000
- Market Potential for Demand Response Programs: \$30,000



Integrated Resource Plan Implementation: Supply Side



Electric Supply

- Develop West Ash Community Solar site: \$500,000
- Water & Light Solar Projects: \$200,000
- Biomass Test Burn: \$375,000
- Biomass Combined Heat & Power Study: \$20,000



Integrated Resource Plan Implementation: Supply Side



Municipal Power Plant

- Recommendations for Solid Fuel Units
- Continue Using Gas Turbine #6
- Upgrades to Turbine #8: \$2,500,000
- Air & Water Compliance Strategies
- Financial Model of Plant's Operating Upgrade & System Costs
- Additional Landfill Gas Generator: \$1,600,000
- Feasibility Study for Reciprocating Natural Engines at Power Plant: \$60,000



Integrated Resource Plan Implementation: Supply Side



Columbia Energy Center (CEC)

- Update Controls to Current Standards: \$2,500,000

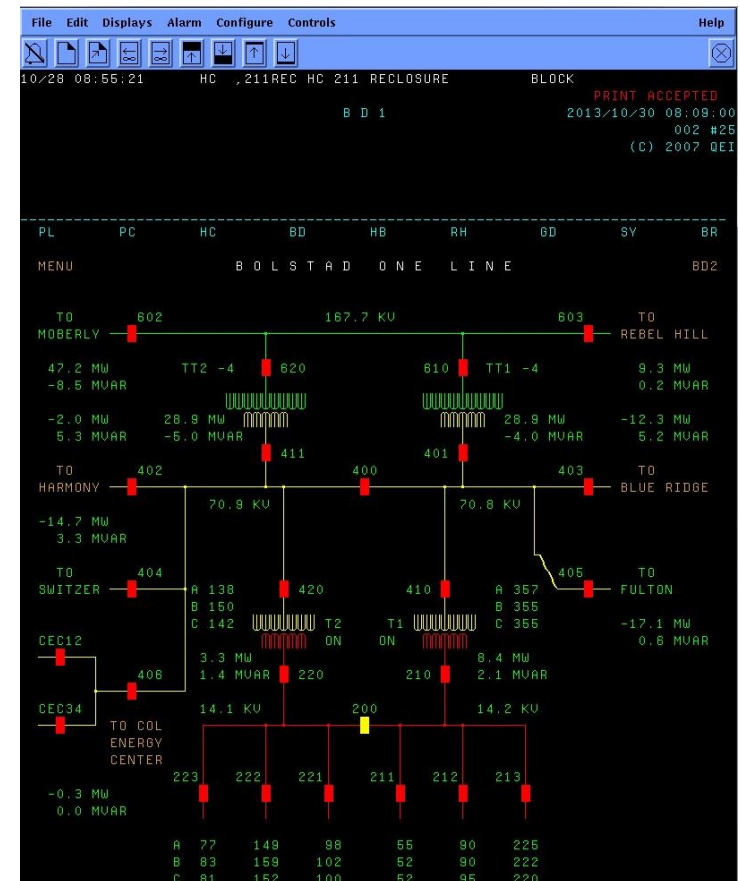


Integrated Resource Plan Implementation Integration Issues



Integration

- New Energy Management System: \$1,500,000
- Move System Operations to New Control Room: \$400,000
- Smart Grid Report
- Acquisition of Electric Car & Charging Station



Integrated Resource Plan Implementation Integration Issues



Rates

- Adjust Base Charge
- Energy Efficiency Tracking Software to Reduce Costs
- Redesign Commercial Rates and Install Demand Meters for Small General Service Customers: \$850,000

Integrated Resource Plan

Implementation

New Projects Cost and Timing



Recommended Item	Total \$	FY14	FY15	FY16	FY17	FY18	FY19+
Efficiency Score Marketing ¹	\$20,000	\$20,000					
CWL Community PV Pilot at W.Ash ⁵	\$500,000	\$500,000					
Customer Outreach Program ¹	\$150,000	\$150,000					
Design of NCPR and NCPCI ¹	\$200,000	\$100,000	\$100,000				
Funding Programs Based on Outreach Load Model ¹	\$750,000		\$150,000	\$150,000	\$150,000	\$150,000	\$150,000
Distribution Network Model ⁷	\$150,000	\$150,000					
Energy Efficiency Tracking System ¹	\$255,000	\$95,000	\$32,000	\$32,000	\$32,000	\$32,000	\$32,000
HEAL ⁴	\$100,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	
CWL PV Loan ⁴	\$250,000	\$250,000					
PAYS ⁴	\$100,000		\$50,000	\$50,000			
SGS Demand Meters ³	\$850,000	\$200,000	\$400,000	\$250,000			
CWLD MISO DR Program Development ²	\$30,000	\$30,000					
CWL Load Mgmnt to MISO DR ²	\$1,000,000		\$200,000	\$200,000	\$200,000	\$200,000	\$200,000
CWL Developed PV ⁵	\$1,000,000		\$200,000	\$200,000	\$200,000	\$200,000	\$200,000
PACE ⁴	\$20,000		\$20,000				
Electric Car and Charging Station ²	\$50,000		\$50,000				

Integrated Resource Plan

Implementation Existing

Projects Cost and Timing



Recommended Item	Total \$	FY14	FY15	FY16	FY17	FY18	FY19+
MPP Unit#8 Upgrades ⁶	\$2,500,000	\$1,000,000	\$1,500,000				
LFG Gen#4 ⁵	\$1,600,000				\$1,600,000		
CEC Controls ⁷	\$2,500,000	\$1,000,000	\$1,000,000	\$500,000			
New EMS ⁷	\$1,500,000	\$1,000,000	\$500,000				
MPP RICE feasibility ⁶	\$60,000		\$60,000				
BioMass Test Burn at MPP ⁵	\$375,000	\$375,000					
CHP Study ⁵	\$20,000	\$20,000					

Integrated Resource Plan

Implementation Project Cost & Timing

Category Breakdowns	Estimated Totals	FY14	FY15	FY16	FY17	FY18	FY19
Energy Efficiency ¹	\$1,375,000	\$365,000	\$282,000	\$182,000	\$182,000	\$182,000	\$182,000
Demand Response ²	\$1,080,000	\$30,000	\$250,000	\$200,000	\$200,000	\$200,000	\$200,000
System ³	\$850,000	\$200,000	\$400,000	\$250,000	\$0	\$0	\$0
Loan ⁴	\$470,000	\$270,000	\$90,000	\$70,000	\$20,000	\$20,000	\$0
LOAD TOTALS	\$3,725,000	\$815,000	\$1,022,000	\$702,000	\$402,000	\$402,000	\$382,000
Renewable Resources ⁵	\$3,495,000	\$895,000	\$200,000	\$200,000	\$1,800,000	\$200,000	\$200,000
Non-Renewable Resources ⁶	\$2,560,000	\$1,000,000	\$1,560,000	\$0	\$0	\$0	\$0
System ⁷	\$4,150,000	\$2,150,000	\$1,500,000	\$500,000	\$0	\$0	\$0
SUPPLY TOTALS	\$10,205,000	\$4,045,000	\$3,260,000	\$700,000	\$1,800,000	\$200,000	\$200,000
TOTALS	\$13,930,000	\$4,860,000	\$4,282,000	\$1,402,000	\$2,202,000	\$602,000	\$582,000
Needed FY14 appropriation		\$1,265,000					