Independent Power Producers Coalition of Michigan

PURPA Technical Advisor Committee

Michigan Public Service Commission

February 3, 2015

IPPC

Small QFs (=<20 MW)

Hydro		Biomass		Waste-to Energy	
Boyce Hydro…	10.50 MW	Hillman Power…	18 MW	Kent County…	17 MW
Elk Rapids Hydro…	0.76 MW	Viking/Lincoln…	18 MW	**Landfill gas**	
White's Bridge…	0.75 MW	Viking/McBain…	18 MW	Granger…	40 MW
Tower-Kleber…	2.86 MW			*(8 facilities all <20 MW)*	
City of Beaverton…	0.96 MW				

IPPC

- Ancillary benefits
- Energy value
- System benefits
- Capital requirements
- QF technologies
  - Hydroelectric
  - Landfill gas
  - Waste to energy
  - Biomass

Ancillary benefits

Environmental

- Carbon mitigation
- Emission profiles
- Waste management

Resources

- Forest health & stewardship
- Flood control
- Habitat

Social

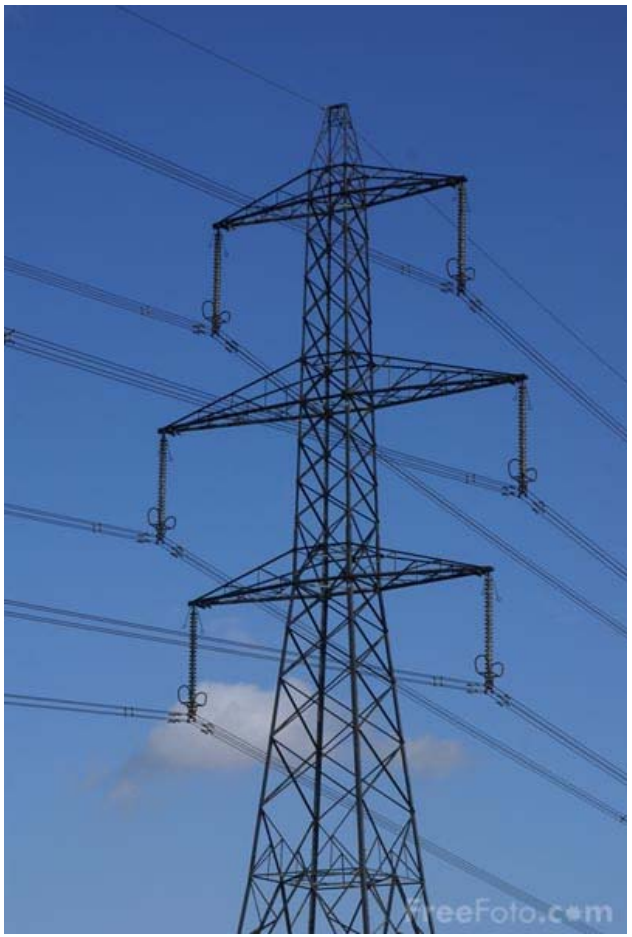
- Local jobs, local resource
- Tax base, property value
- Recreation

Energy values

- Renewable
  - Clean Power Plan (CPP / Sec. 111(d))
  - Michigan Renewable Portfolio Standards (RPS)
- Fuel diversification
  - Biomass
  - MSW
  - Water
  - LFG
- Baseload
  - Capacity factor
  - Availability

System benefits

- Source diversification
  - By fuel
  - By ownership
- Capacity
  - Grid reliability
    - Voltage support
    - VARs
      - $1 million annual value*
    - Distributed generation
    - Minimize impact of transmission outages
  - Baseload
    - Up to 90%-plus capacity factor
  - Dispatchable



**Source: NEMA.org – based on 100 MW installed capacity*

Capital requirements

- New *or* existing facilities
  - Both have on-going CapEx, financeability needs
  - Cost recovery over time
- Similar needs as utilities

HYDROELECTRIC POWER

Independent hydro facilities

Entity	Plant	Capacity (kW)	PPA expires	Customer
Boyce Hydro Power, LLC	Edenville	4800	2022	CECo.
Boyce Hydro Power, LLC	Smallwood	1200	2022	CECo.
Boyce Hydro Power, LLC	Sanford	3300	2022	CECo.
Boyce Hydro Power, LLC	Secord	1200	2022	CECo.
Black River Ltd Partnership	Alverno	1100	2016	CECo.
Tower Kleber Ltd. Partnership	Kleber	1200	2016	CECo.
Tower Kleber Ltd. Partnership	Tower	560	2016	CECo.
Commonwealth Power	Irving	600	2018	CECo.
Commonwealth Power	Middleville	350	2018	CECo.
Commonwealth Power	LaBarge	850	2017	CECo.
Northbrook Energy LLC	Fallasburg	900	2016	CECo.
Thornapple River Assn -Northbrook	Ada	1100	2017	CECo.
Northbrook Energy LLC	Morrow	880	2018	CECo.
Cascade Twp - operated by Northbrook	Cascade	1600	2019	CECo.
Elk Rapids Hydroelectric Power	Elk Rapids	700	2019	CECo.
Michiana Hydoelectric	Bellevue Mill Dam	60	2020	CECo.
City of Beaverton	Beaverton	960	2020	CECo.
White's Bridge Hydro	White's Bridge	775	2016	CECo.
Hope Renewable Energy, LLC	Hubbardston	412	2017	CECo.
Renewable World Energies	Belding Dam	280	2016	CECo.
	Total capacity	**22,827**		
Northbrook Energy LLC	French Landing – Belleville	1650		DTE
Ypsilanti Twp	Ford Lake - Rawsonville Rd.	1920		DTE
City of Ann Arbor	Barton Dam	900		DTE
City of Ann Arbor	Superior Dam	500		DTE
	Total capacity	**4970**		

The power of moving water

- Domestic & Secure
  - Water supply not subject to disruption
    - Foreign supply
    - Costs & economics
    - Fuel transportation
- Renewable – sustainable, not depleted, natural energy in falling water
- Efficient – 85-90% overall vs. ~40%
- Clean
  - No air emissions or toxic byproducts
  - CPP eligible
- Small hydro plant rehabilitations
  - Pioneered renewable energy movement in 1980s

Bellevue Mill: 45 kW *(20-50 homes)*

Before

Built:	1854
Abandoned:	1955
Pictured:	1975

After

Restored:	1977*
Electrified:	1982
PPA: Consumers Energy	

**On going*

Elk Rapids: 700 kW *(400-700 homes)*

Before

Built:	1916
CECo.:	1950
Scrapped:	1965
Pictured:	1984

After

Electrified:	1984
PPA:	CECo.

Ancillary benefits

- Waterfowl, fish habitat
- Recreational lakes
- Public access
- Flood control
- Enhanced property value, tax base
- Blocks upstream migration of invasive species
- Employs operators, skilled trades, suppliers and services

Energy value

- Carbon-free = Sec. 111(d) / CPP compliant
- No air emissions
- Not reliant on fuel availability / cost
- Predictable, controllable schedule, continuous

System benefit

- Baseload power
  - Continuous, steady, reliable
- Distributed generation
- Rapid demand response
  - Faster than fossil fuel power plants
- Capacity factors +/-60%
- Black start capability
- Brick-and-mortar capacity, infrastructure
  - Reduces transmission, energy import needs
  - 100+ year life span vs. 30-60 for fossil fuel, nuclear
- Operation not affected by fuel cost/availability

Capital requirements

- Regulatory compliance
  - Environmental
  - Public access, recreation
  - Dam security
  - Dam safety
    - FERC, MDNR, MDEQ

Capital requirements

FERC mandates: Environmental

- Water quality
- Tailrace flow
- Water level monitoring, reporting
- Invasive plant species (impoundments)
- Endangered species monitoring
- Shoreline erosion monitoring, reporting, intervention

Capital requirements

FERC mandates: Public access

- Road access, parking lots
- Fishing platforms
- Portage pathways & facilities
- Boat ramps & docks
- Toilet & trash facilities
- Picnic tables & seating
- Directional signage, warning signals
- Safety barriers & railings
- Handicap accessibility

Capital requirements

FERC mandates: Security

- Physical assessments & evaluations
- Cyber assessments & evaluations

Capital requirements

FERC mandates: Safety

- Letter of Owner's/Licensee's Responsibilities and Obligations
- Annual inspections & reports
  - FERC & owner engineers
- Independent consultant inspection & report (every 5 years)
- Probable Maximum Flood (PMF) analysis
  - High hazard classification dams
  - Construction solutions
- Potential Failure Mode Analysis
- Annual spillway gate tests
- Monthly inspections & reports on internal drainage
- Earthen dam maintenance (annual)
  - Vegetation, drainage systems
- Emergency Action Plans (EAPs) updates
  - Local and state emergency response exercises

Capital requirements

Example: Boyce Hydro

- Est. Probably Max. Flood cost …$10.5 M / 6 yrs.
- FERC annual compliance
  - 45-55% of annual revenue
  - Avg. revenues @ current CECo. rates …$1.8 million

KENT COUNTY WASTE TO ENERGY FACILITY

Renewable Energy For Michigan

Integrated solid waste management system

- Energy recovery
- Single stream recycling
- Landfill
- Transfer station
- Curbside and drop off facilities

A 25-year success story

- Commercial operation in February of 1990
- Solid waste management for 600,000 residents
  - Grand Rapids
  - Kentwood
  - East Grand Rapids
  - Wyoming
  - Grandville
  - Walker

Ancillary benefits

- Processes up to 625 tons of municipal waste daily
- Recovers energy from 185,000 tons MSW/year
  - 25 percent of total Kent Co. volume
  - 90% reduction in volume
- Good paying jobs
  - 40 full-time employees
  - $4.5 million annual payroll

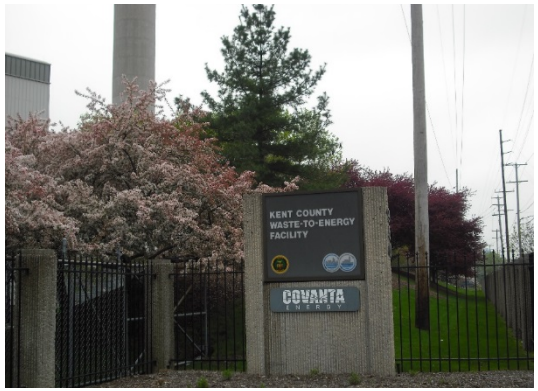
Energy value

WTE under the EPA Clean Power Plan

- Excluded from Regulation
  - Stack CO_2 emissions do not count against state mass goals
  - EfW facilities do not have an emission rate requirement
- Eligible to generate Emission Rate Credits (ERCs)
  - New capacity added after 2012 can generate ERCs for states with rate-based plans

System benefits

- 15 MW of renewable, baseload electricity
  - 11,000 Kent County homes
    - Equal to East Grand Rapids and Walker combined
- 90 percent capacity factor
  - Reliable baseload



Capital requirements

- $65 million investment
  - Todays cost: $156 million
- $4 million investment in 1999
  - Emissions reductions retrofit
  - New federal air emission requirements

Capital requirements

Plant refurbishment

- 2011 – 2015 Actual: $7,139,420
- 2016 – 2018 Budgeted: $8,722,652

Total **$15,862,072**

- 2019 – 2021* ?????????**

* *Power Purchase Agreement expires with Consumers Energy in February 2022*

** *Year-to-year agreements to sell electricity = no capital expenditure planning*

LANDFILL GAS

Granger profile

40 MW

- Granger Electric – 15 MW
  - Ottawa, Byron Center, Grand Blanc I & Pinconning
- Granger Electric of Michigan – 12.6 MW
  - Grand Blanc II, Brent Run & Watervliet
- Granger Electric of Lansing – 12 MW
  - Lansing, plant 1 & Lansing plant 2

Ancillary benefits

- Michigan-made energy
  - Built & operated
  - Local fuel resources
  - Local labor
- Energy recovery from waste

Energy value

- Michigan RPS & CPP qualified
- “Matches” utility fossil fuel generation sources
  - Brings “value added” of distributed baseload renewable power
- Baseload

System benefits

- Fuel diversification
- High capacity factor
  - 60% to 95%
- Demand response capabilities
- Dispatchable
- Distributed generation
  - Supports distribution with VARs
  - Transmission system extensions
  - Voltage stability

Capital requirements

- LFG as capable as combined cycle natural gas
  - Continuous generation
  - High capacity factor

Capital requirements

Standard capex

- 3.2 MW system

YEAR	DESCR	CAPEX (Millions $)
0.0	Initial construction	6.00
3.0	Compliance modifications	0.10
5.5	Major engine overhaul	0.60
8.0	Fuel processing mod replacement	0.25
11.0	Engine (major) overhauls	0.60
13.0	Mechanical modifications	0.30
16.5	Engine (major) overhauls	0.65
19.0	Electrical modifications	0.25
22.0	Engine (major) overhauls	0.70
24.5	Compliance modifications	0.25
27.5	Engine (major) overhauls	0.70
30.0	Fuel processing mods	0.25
TOTAL		**10.65**

BIOMASS

Michigan PURPA biomass facilities

Cadillac Renewable Energy	36 MW
Genesee Power Station	36 MW
Grayling Generation Station	36 MW
Hillman Power Co.	18 MW
TES Filer City	6 MW eq.
Viking Energy of Lincoln	18 MW
Viking Energy of McBain	18 MW

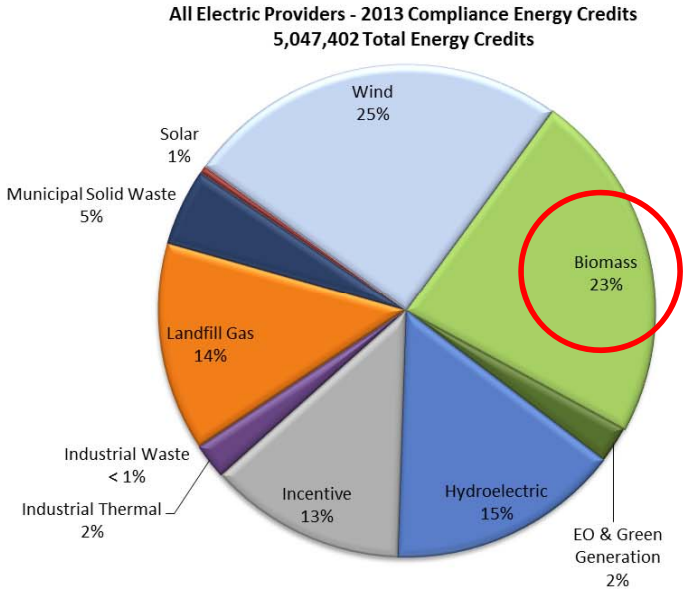
Ancillary benefits

- Home-grown, Michigan-made energy
- Waste management
  - Waste wood… 2.3 million tons
  - Scrap tires... 6.2 million PTEs
    - 59% of all scrap tires generated
  - Railroad ties… 200,000 tons
- Forest stewardship
  - Timber management (thinnings)
  - Disease & infestations (sanitation)
  - Habitat development
- Local economics
  - 700 jobs
  - $60 million annual fuel purchases & wages
  - Millions in local tax revenues

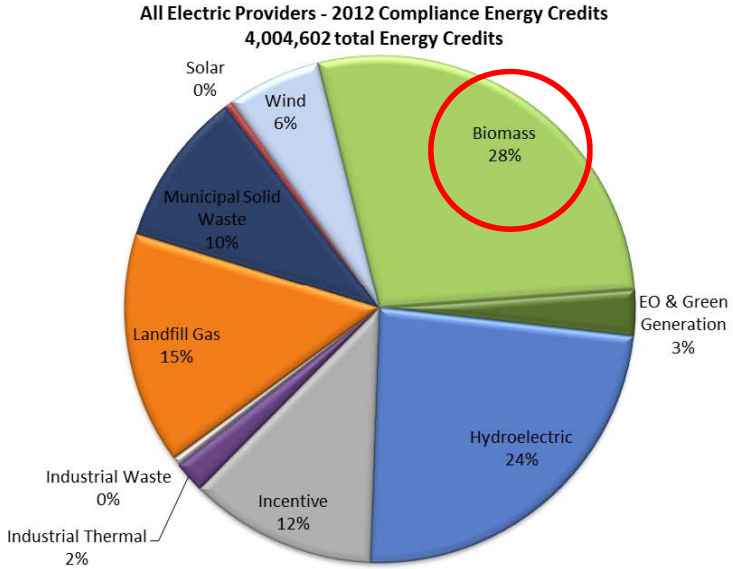
Energy value

Waste-based feedstock = carbon neutral

- Eligible for CPP state implementation plans (SIP)
  - EPA McCabe memo
- Michigan's RPS
  - 32% of all compliance RECs, 2014 (Est.)



2013



2012

System benefits

- Baseload, dispatchable
  - “Stored” energy = fuel
    - On-site
    - On the stump
- Regional grid support
  - Voltage stabilization
  - VARs
  - Grid reliability
    - Replaces need for transmission build-out
- Diversification
  - Hedge on commodity fuels

System benefit

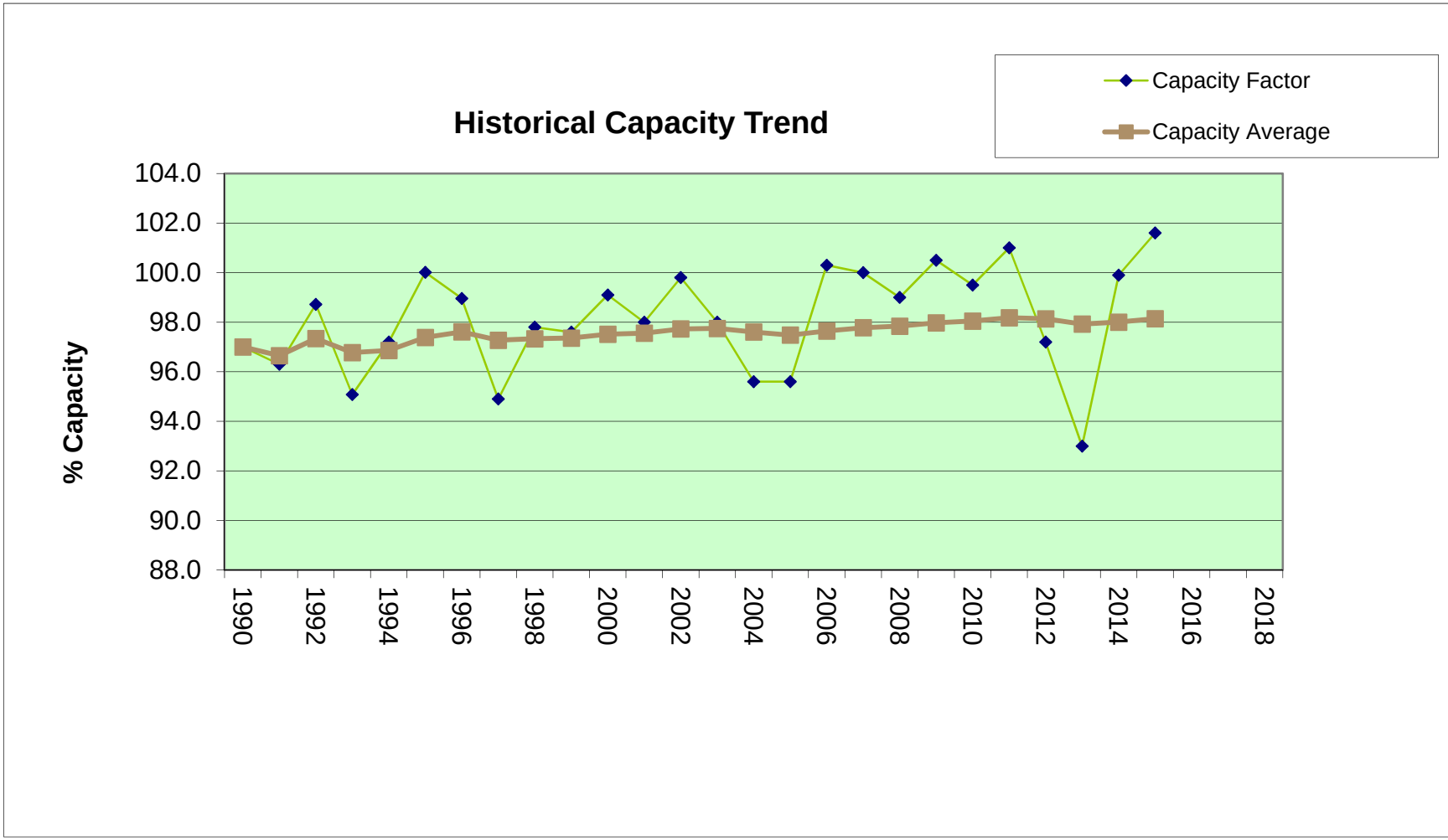
2014 availability

- Hillman Power Co. ….93.10%
- Viking Energy of Lincoln ….97.00%
- Viking Energy of McBain ….96.60%
- CECo. / DTE ave.* ….81.89%

** 2014 PSCR Plan - Case U-17317, as revised and corrected*

System benefit

Production History Viking Energy of McBain



Capital requirements

- Same maintenance & capital needs as utility
  - Fuel handling
  - Boiler
  - Turbine/generator
  - Interconnection
- PPA terms = recovery of capital investment

Capital requirements

Deferred capital investments

- Hillman Power Co. ……..$2.0 million
  - Boiler overhaul
- Viking Energy of Lincoln …..$1.2 million
  - Major turbine overhaul
- Viking Energy of McBain ….$0.5 million
  - Generator overhaul

Capital requirements

Major Projects 2011 – 2015 Viking Energy of McBain

Project Description	In-service Date	Cost	Depreciation
Truck Dump Cylinder Replacement	2/23/2011	$ 31,564	10 Year
Stach Replacement	5/25/2011	$ 125,000	20 Year
Grate Overhaul	5/25/2011	$ 220,925	20 Year
ID Fan Damper Replacement	5/17/2012	$ 14,597	20 Year
Radial Stacker	5/22/2012	$ 160,158	20 Year
Circulating Water Pump Rebuild	7/1/2012	$ 13,398	10 Year
Rebuild Boiler Feedwater Pump 1	7/1/2012	$ 38,170	10 Year
Rebuild Metering Bin Augers & Bearings	5/17/2012	$ 92,022	10 Year
Precipitator Transformer Replacement	2/7/2013	$ 31,333	20 Year
Electromatic Relief Valve	5/24/2013	$ 35,941	10 Year
Cooling Tower 1 & 2 Gearbox Replacement	5/24/2013	$ 42,048	20 Year
Cooling Tower Dry Pipe	5/24/2013	$ 31,727	20 Year
Boiler Water Washing Windows	5/24/2013	$ 32,951	20 Year
Precipitator Transfer Conveyor Overhaul	5/24/2013	$ 23,658	10 Year
Turbine Overhaul & Modification	5/24/2013	$ 1,182,709	10 Year
Stoker Grate Drive Replacement	10/24/2013	$ 40,495	20 Year
Condenser Partial Retube (Air Removal Section)	10/24/2013	$ 48,573	20 Year
Cooling Tower Efficiency Improvements	5/18/2014	$ 120,705	15 Year
Ash Reinjection Piping Replacement	5/18/2014	$ 19,823	3 Year
Station Batteries Replacement	5/18/2014	$ 33,942	20 Year
A High Incline Conveyor Belt	6/30/2014	$ 47,441	10 Year
Turbine Stop Valve Overhaul	5/16/2014	$ 12,323	5 Year
Boiler Grate, Complete 3 year Overhaul	5/18/2014	$ 293,588	3 Year
UPS Inverter Replacement	5/15/2015	$ 20,791	20 Year
Boiler Feed Pump Recirc Valve Replacement	5/15/2015	$ 49,500	20 Year
Data Historian & Control Upgrade	5/15/2015	$ 70,000	20 Year
Creosote Storage Shed & Fencing	7/31/2015	$ 250,000	20 Year
	TOTAL	**$ 3,887,057**	

IPPC Summary

- System benefit
  - Reliable, baseload, dispatchable
  - Diversification, distributed generation
  - Grid support
- Capital requirements
  - New or existing have on-going capital costs
    - Same as utilities / must be recoverable through avoided costs, PPAs
- Energy value
  - Renewable energy resource (RPS)
  - CPP (Sec. 111(d)) applicable
- Ancillary benefits
  - Environmental, economic, social

Conclusions

- A reasonable *capacity* component in Avoided Cost is appropriate, reasonable and prudent
- Avoided cost should be based on *next-planned addition*
  - Combined cycle natural gas
- Avoided cost must be *long term*
- Avoided cost is *not just incremental energy cost* (or LMP)