Powering Remedial Systems in Massachusetts

NEWMOA
"Moving Toward More Sustainable Remediation"

Wednesday, December 4, 2013 – Dayville, CT
Thursday, December 5, 2013 – Westford, MA

Thomas M. Potter
MADEP's *Acting* Clean Energy Director

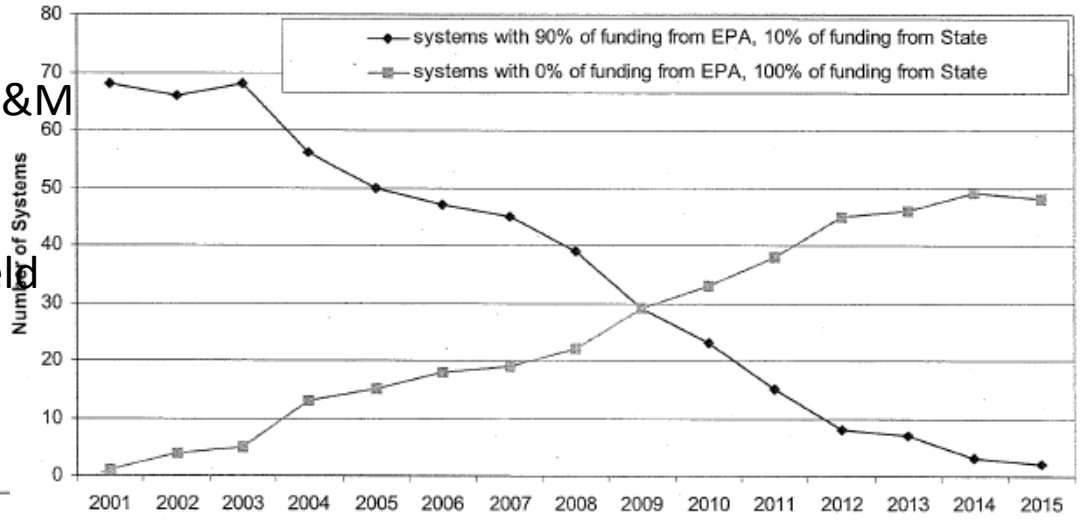
NEWMOA

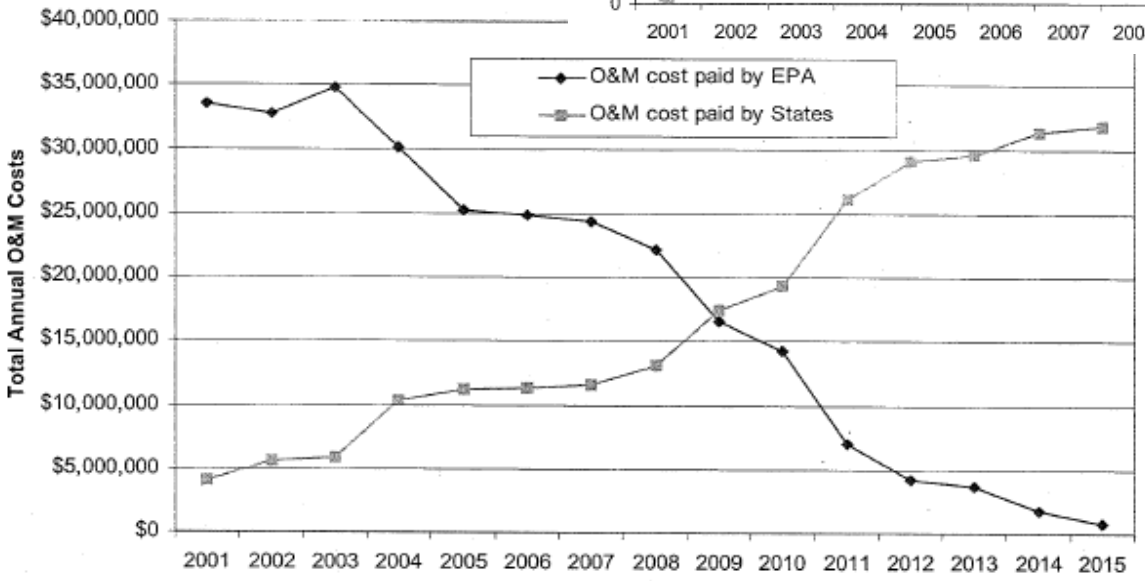
MassDEP

State Lead Groundwater Pump and Treat Systems

After 10 yrs states perform O&M

Baird O&M similar to POTW or municipal 21E or Brownfield

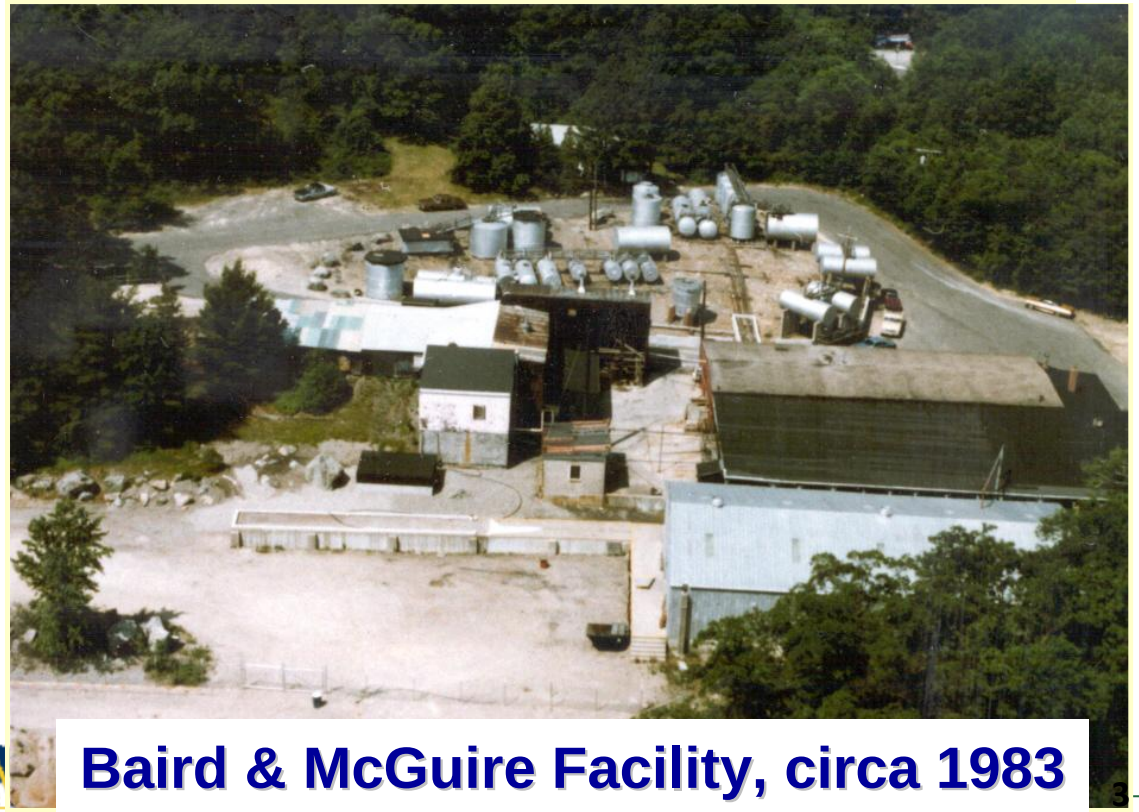




Source: Groundwater Pump and Treat Systems: Summary of Selected Cost and Performance Information at Superfund-financed Sites, 2001

Baird & McGuire History

- Former Chemical Manufacturing Facility
  Operated from 1912 to 1983 (70 years)
  Located in Holbrook, MA – 32 Acres
- Site Listed on NPL in 1983

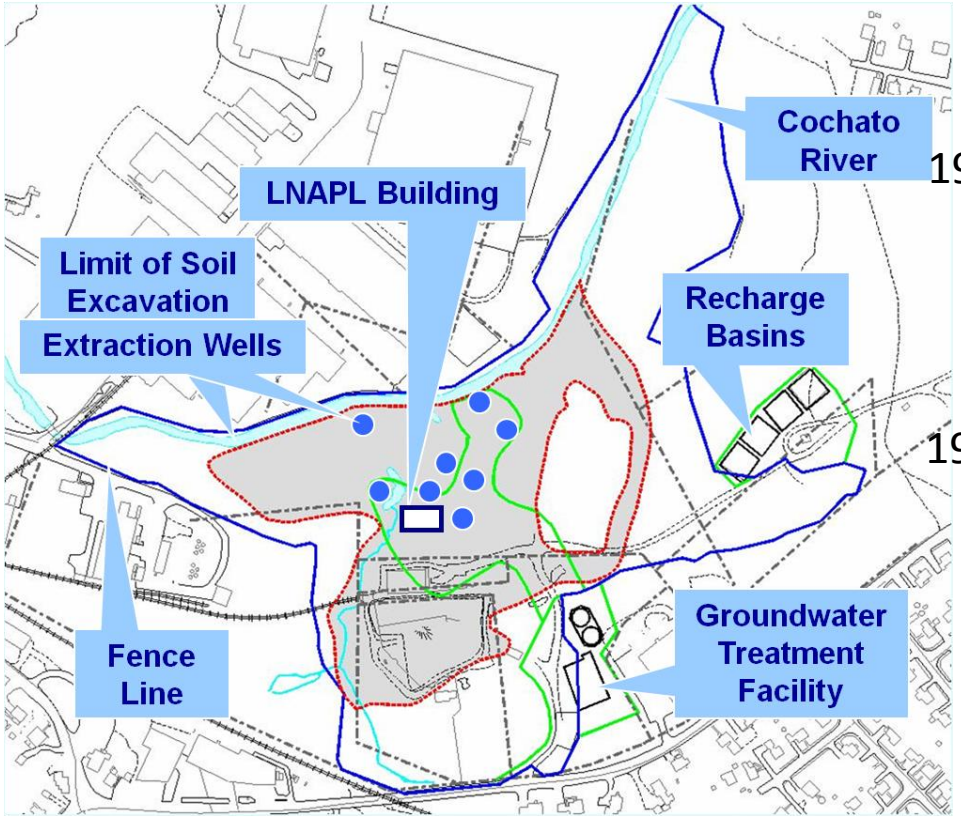


Baird & McGuire Facility, circa 1983

1986 ROD: Groundwater, Soil, Sediment

- Incineration of Soils and River Sediments
  - From 1995 to 1998
  - 248,000 cubic yards of soil & sediment incinerated (12.5 acres of soil)
  - Residual ash buried on site (300 cubic yards failing TCLP stabilized)
- Pump and Treat System
  - Started 1993 to treat incineration dewatering and process flows
  - Effluent discharge to infiltration basins
  - EPA RSE done in 2001 and upgrades completed in 2004
  - Transferred to state (MassDEP) in 2004
  - MassDEP improvements on-going
  - Monitoring SVOC, Pesticides and Arsenic
  - Cleanup Levels set at drinking water standards, MCLs & State GW1
  - LNAPL discovered in 1996 and recovery from 1999 to present

Site Map and Site Features



1989 ROD: Cochato River Sediment

- Dredged in 1994
- Wetland Restoration

1990 ROD: Municipal Water Supply

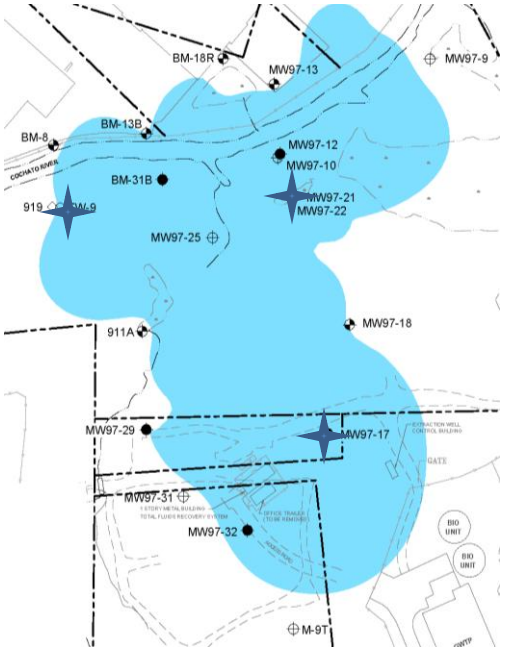
- Reopening of old well field to replace lost supply planned
- ESD issued in 2003 to expand existing water capacity at the Upper Reservoir/Great Pond

Remediation – 1996 to 2006*

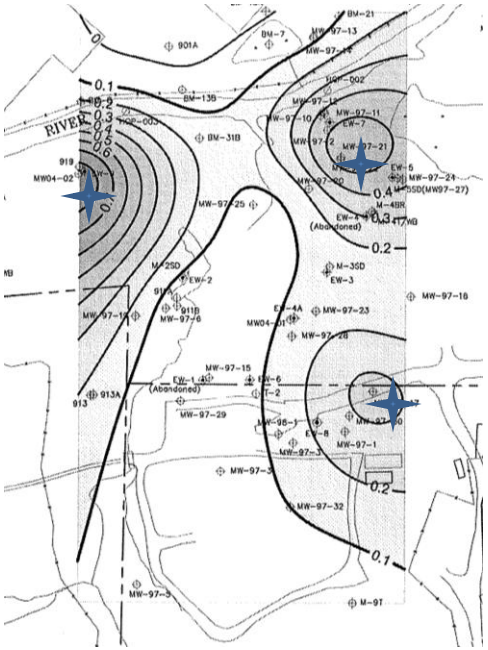
A) Incinerator & Restored Wetland
B) Groundwater Treatment Plant
C) Bauer, Inc.
D) Excavation
E) Backfilled Incinerated Ash
F) Cochato River

* Treatment must achieve groundwater restoration at drinking water standards, MCLs and GW1

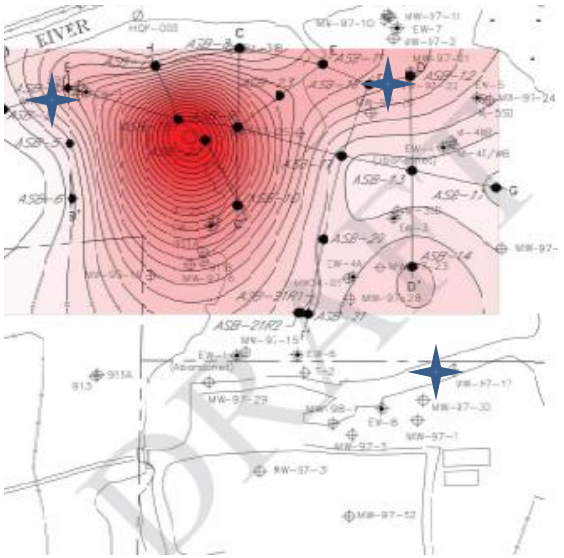
Arsenic 2004 to 2010 (blue area above MCL of 10 ug/l)



2004



2010



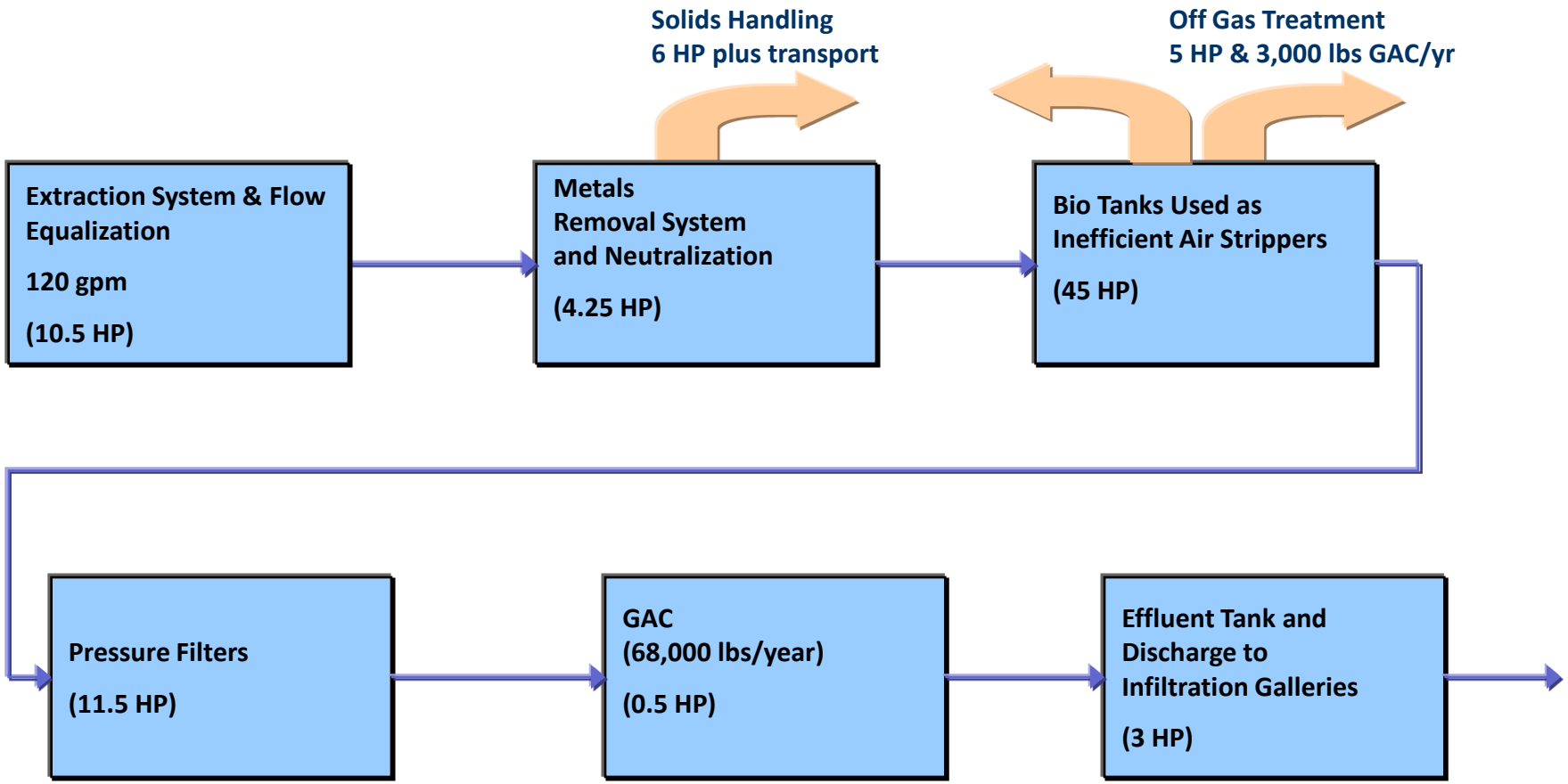
2010 arsenic investigation

State Operation of Treatment System Since 2004

Concerned with **plant operations**, **site conditions**, **cost**, **energy** and **GHG**

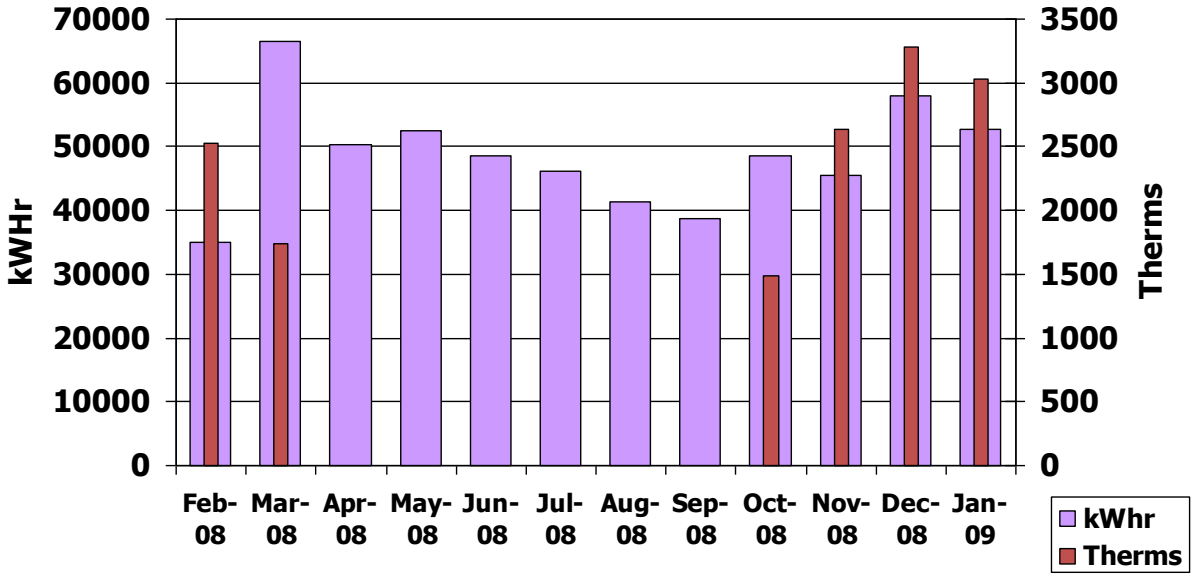
- Significant Cost Reductions through Automation and Reduction in Staff, Elimination of On-Site Laboratory and Reduction of Process and Site Monitoring - 2004 to 2006
- Energy Efficiency Opportunity Study (SAIC for MassDEP) – 2006
- Utility Audits Phase One, National Grid (lights and sensors, VFDs on extraction, bio-clarifier, influent, filter press pumps) – 2008
- Carbon Footprint Analysis and CHP/GWSHP Study (US EPA OSRTI and MassDEP) – 2009
- Utility Audits Phase Two, National Grid (VFD on blower, energy efficient blower motor) – 2010
- Feasibility Study of Third-Party Financing of 500 kW Solar PV to Provide All Electricity Needs for the P&T Facility (possibly GWSHP) with Power Purchase Agreement – 2012
- Optimization Study (US EPA and MassDEP) Assess Remaining Duration of Clean-up and Alternatives to Pump & Treat – 2013
- Replacement and Relocation of Extraction Wells to Treat Arsenic Contamination – On-going

Treatment Process Flow



Average motor horsepower indicated in parentheses

Monthly Energy Usage



Energy Costs for 2008 – $100 K Electricity and $23 K Natural Gas

Prior Efforts on Energy and GHG Emissions

1. Energy Efficiency Opportunity Study – 2006 SAIC for MassDEP
2. Utility Audits Phase One – 2008 (lights and sensors, VFDs on extraction, bio-clarifier, influent, filter press pumps)
3. CHP and Carbon Footprint Analysis – 2009 (Combined EPA and MassDEP Study)
4. Utility Audits Phase Two – 2010 (VFD on blower, energy efficient blower motor)

Why Solar Baird? Continuation of On-Going Efforts

Climate Registry Information System
MassDEP 2008 Report GHG Emissions Report

CRIS: Climate Registry Information System
Entity Emissions Detailed Report
Massachusetts Department of Environmental Protection
(Public)
3/12/2012 17:10:10 EDT

Operational Control: National - US

DIRECT EMISSIONS (metric tons)	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)	SF6
Stationary Combustion - Scope 1	986.92748	981.37796	0.0169	0.01682			
Mobile Combustion - Scope 1	384.97583	382.37707	0.01119	0.00756			
Process - Scope 1	0	0	0	0			
Fugitive - Scope 1	31.11343	0.06804	0.00607	0			
TOTAL DIRECT EMISSIONS	1,403.01674	1,363.82307	0.03416	0.02438			

INDIRECT EMISSIONS (metric tons)	CO2e	CO2	CH4	N2O
Purchased Electricity - Scope 2	1,969.4736	1,954.50859	0.18223	0.03584
Purchased Heating - Scope 2	0	0	0	0
Purchased Cooling - Scope 2	0	0	0	0
Purchased Steam - Scope 2	0	0	0	0
TOTAL INDIRECT EMISSIONS	1,969.4736	1,954.50859	0.18223	0.03584

CRIS: Climate Registry Information System
Entity Emissions Detailed Report
Massachusetts Department of Environmental Protection
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TOTAL EMISSIONS: MassDEP - 21E site - Baird & McGuire
Does the Entity control the Facility's emissions? Yes
Equity Share (%) N/A

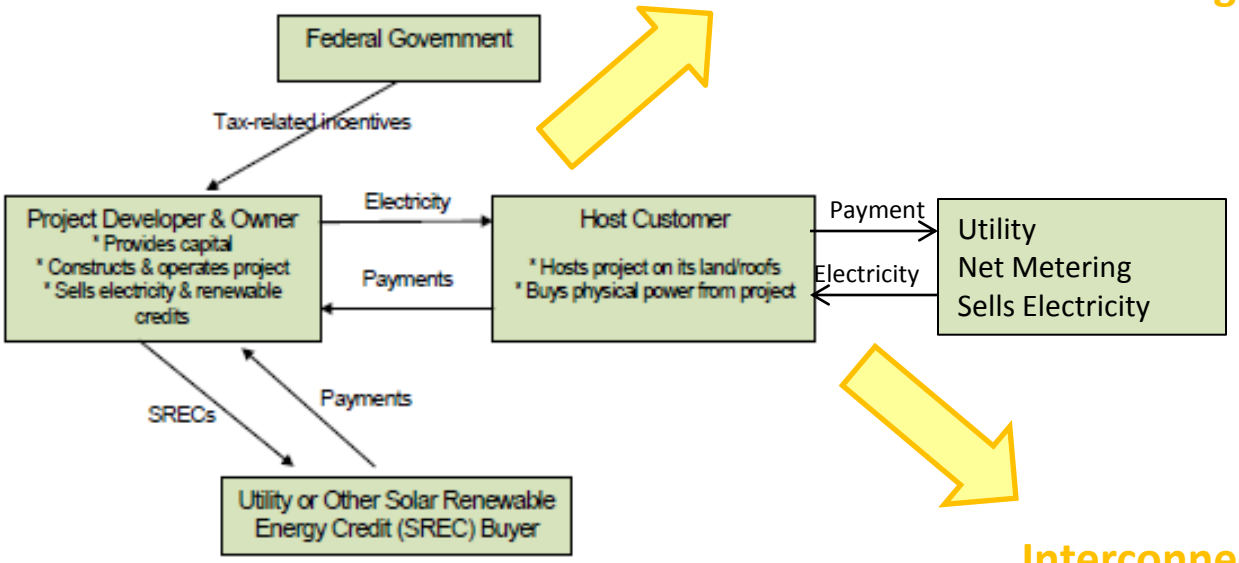
DIRECT EMISSIONS (metric tons)	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)
Stationary Combustion - Scope 1	90.33748	89.83166	0.0016	0.00152	0	0
Mobile Combustion - Scope 1	0	0	0	0	0	0
Process - Scope 1	0	0	0	0	0	0
Fugitive - Scope 1	0	0	0	0	0	0
TOTAL DIRECT EMISSIONS	90.33748	89.83166	0.0016	0.00152	0	0

INDIRECT EMISSIONS (metric tons)	CO2e	CO2	CH4	N2O	HFCs (CO2e)	PFCs (CO2e)
Purchased Electricity - Scope 2	246.58	244.71067	0.02282	0.00449	0	0
Purchased Heating - Scope 2	0	0	0	0	0	0
Purchased Cooling - Scope 2	0	0	0	0	0	0
Purchased Steam - Scope 2	0	0	0	0	0	0
TOTAL INDIRECT EMISSIONS	246.58	244.71067	0.02282	0.00449	0	0

1. GHG Reductions – 13% PV, 17% PV and GWSHP
2. Potential for Savings -Third Party Financing

Third Party Financing Model of Solar at Baird&McGuire

PPA – Power Purchase Agreement



Interconnection Agreements

SREC Prices
ACP Ceiling
Spot Market
Clearinghouse Floor 0.28 $/kWhr

Investigation of Solar PV for Meeting all Energy Needs at Baird

Net Metering
Solar Carve Out Program
Third-Party Financing Model for Solar
- no up front capital expenditure
- potential savings on energy from day one

- Examined the Size of Available Area (GIS) and Used IMBY NREL Solar Estimator and DOER Financial Spreadsheet
- Issued an Request For Information to Gauge Interest
- Funded Feasibility Study to Verify Assumptions and Expected Benefits, and Obtain Support for Power Purchase Agreement (PPA) and Procurement
- PPA Duration – remaining duration of the remedy? alternatives to P&T? Questions lead to Optimization Study completed May 2013

Why Renewable Energy for Operating Remedial Systems?

Where renewable energy projects are technically and financially feasible, they can provide:

- Reductions in projected annual electricity costs (vs. utility costs) for 20+ years
- Known electricity costs for 20+ years (i.e., budget predictability)
- Reductions in greenhouse gases vs. utility power (cleaner & local electricity generation)
- Jobs, some local and near term
- Productive re-use of land with few alternative uses
- Use of publicly funded incentives on public projects

Main Feasibility Study Topics

- How technical and financial feasibility review was conducted
- Results in benefits and risks of solar PV project at Baird & McGuire
- Tips for performing renewable energy feasibility reviews on contaminated sites

How: Going from Land Availability through Technical & Financial Feasibility

- Is there enough land to (a) produce a feasible project, and (b) meet the economic and environmental goals of the site owner/operator?
- If **no,** stop there OR find off-site project that can serve site and/or community via community net metering
- If **yes,**
  - Size and design the system to optimize electricity production, cost, and/or local materials (allowing for remediation access)
  - Determine preferred ownership structure
    - Third-party ownership brings access to federal tax benefits, among other features
  - Calculate project costs for different contract lengths
  - Review & mitigate project risks
    - SREC price risk can be a significant factor in many states

How: Site Limitations

Wetlands – 100 ft buffer
Cochato River – 200 ft buffer
100 year Floodplain
Property Ownership – PRP
Setbacks and Easements
Remedy and Contamination

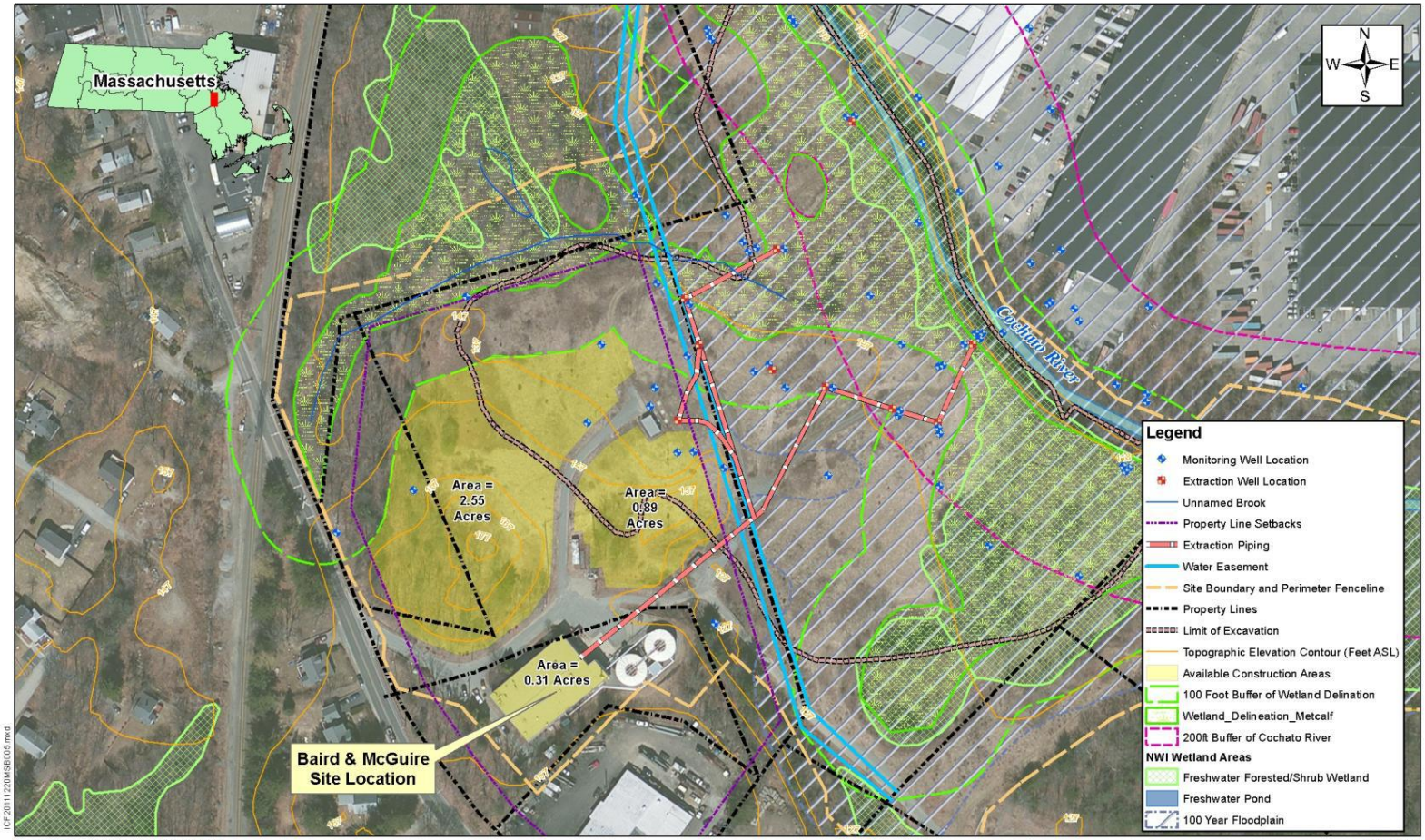
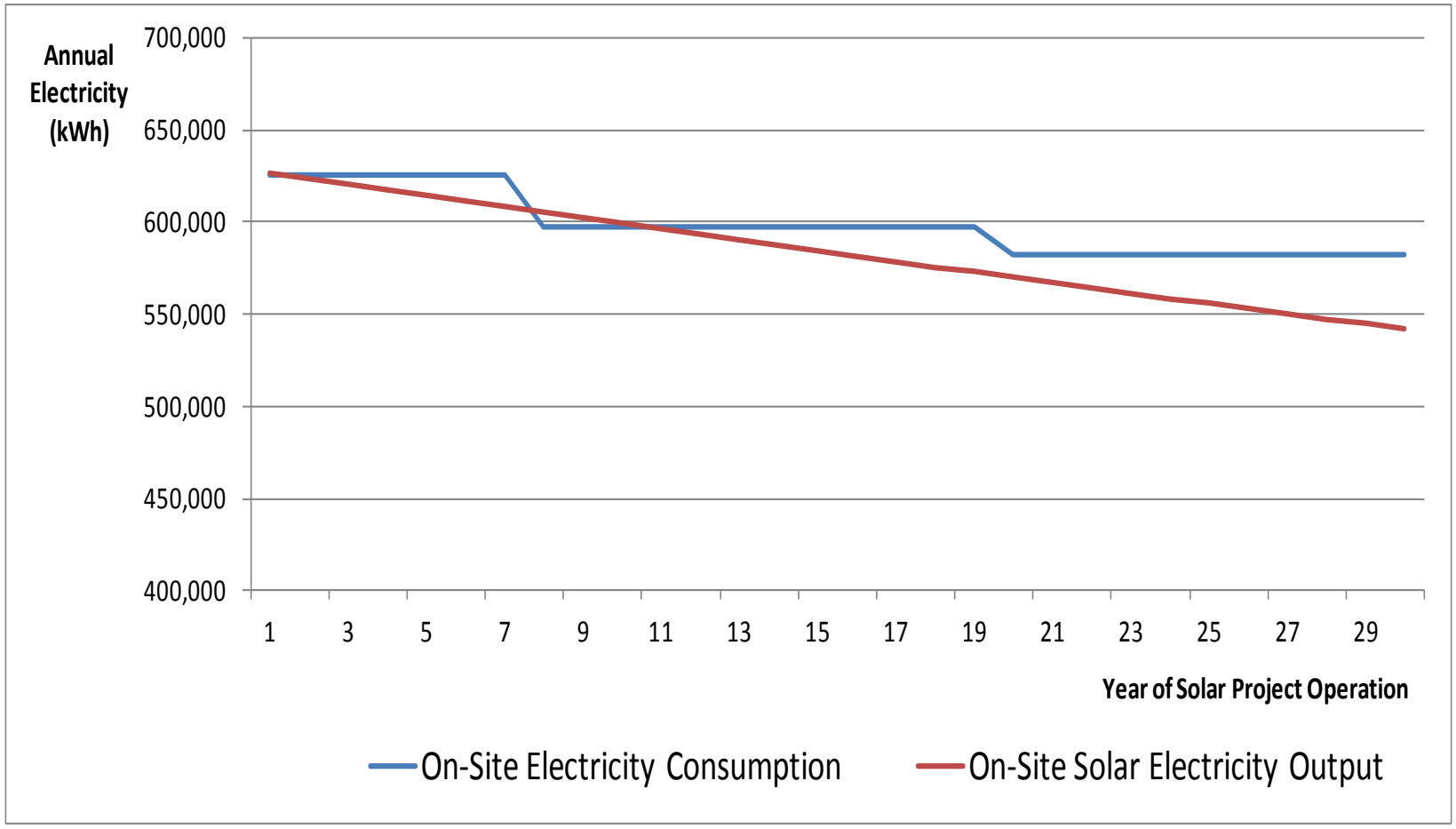


Figure 1
Baird & McGuire Site Location
775 South Street, Holbrook, MA

How: Establish Optimum Solar Array Size (502.32 kW_{DC}) to Match On-Site Electricity Consumption



Note: On-site electricity consumption would increase with use of groundwater source heat pump for heating; solar array size could increase to match

Outside Lighting Upgrade Project (Update)

Replaced 3950 W Existing Lights High Pressure Sodium with 961 W LED
Operation time 10 hrs/day

Electricity savings 10,910 kWhr per year ~1.7% of total annual load

Cost Savings 1,637 $/year

How: Design Optimum Solar Array on Site

- Land Contours
- Shading
- Remediation Access
- System Components

Note: The seven red circles on the layout are monitoring wells

How: Financial Feasibility

- 626,900 kWh of output in year 1, degrading by 0.5% annually
  - 14.25% capacity factor in year 1
  - Local measurements of sunlight at site
  - Custom system design
  - System output from NREL System Advisor Model (SAM)
- System costs from then-recent bids for 500 kW_{DC} ground mounted systems using comparable equipment: $3,914/kW including interconnection study & sales tax, or $1.97 million total system cost
- Third-party financed using "power purchase agreement" (PPA) and net metering (eliminating some charges)
- Calculated PPA electricity rate for host (MassDEP) that provided sufficient (10% on equity) return for owner – DOER Financial Spreadsheet
- Assumed current federal solar incentives (investment tax credit and MACRS accelerated depreciation) stay in place
- Several additional assumptions using industry norms

Recent Installation Costs (Update)

DOER Spreadsheet Sensitive to Installation Costs

Harwich	02645	561.440	TBD	Not Operational	7/23/2013	Information not yet provided	No Cost Data	No Cost Data
Tyngsborough	01879	555.000	TBD	Not Operational	7/23/2013	INO Electrical Service Inc.	$1,554,000.00	$2.80
Tisbury	02568	542.300	TBD	Not Operational	7/23/2013	Information not yet provided	No Cost Data	No Cost Data
Edgartown	02539	541.200	TBD	Not Operational	7/23/2013	Information not yet provided	No Cost Data	No Cost Data
Tewksbury	01876	535.000	TBD	Not Operational	6/28/2013	The Green Stop, LLC	$1,070,000.00	$2.00
Duxbury	02332	532.730	TBD	Not Operational	7/23/2013	Information not yet provided	No Cost Data	No Cost Data
Acushnet	02745	516.220	TBD	Not Operational	7/23/2013	Beaumont Solar Co.	$1,367,983.00	$2.65
Northampton	01060	507.200	TBD	Not Operational	6/28/2013	Nexamp, Inc.	No Cost Data	No Cost Data
Lancaster	01523	501.000	TBD	Not Operational	7/23/2013	Aslan Electric Inc.	$2,000,000.00	$3.99
Canton	02021	470.250	TBD	Not Operational	5/10/2013	Florence Electric	$1,676,306.00	$3.56
Fall River	02731	466.900	TBD	Not Operational	7/23/2013	ESI	$1,400,000.00	$3.00
Lee	01238	465.740	TBD	Not Operational	4/17/2013	Broadway Electrical Company	No Cost Data	No Cost Data
Barnstable	02601	462.550	TBD	Not Operational	4/17/2013	Broadway Electrical Company	No Cost Data	No Cost Data
Beverly	01915	461.160	TBD	Not Operational	7/23/2013	Altantic Boston Construction, Inc.	$1,844,000.00	$4.00

Results: Economics

PPA Contract Length	Lifetime Net Present Value (NPV) Savings to Site	% Savings to Site vs. Projected Utility Costs
10 years	$69K	9%
15 years	$279K	24%
20 years	$438K	27%
25 years	$654K	32%
30 years	$887K	35%

Note: Results are very sensitive to Massachusetts Solar Renewable Credit (SREC) price ($.285/kWh for first 10 years, which is net auction floor) and conventional utility price (4%/yr escalation) assumptions, panel degradation, O&M costs, etc.

Update: SREC II Program – proposed declining SREC pricing and SREC factors for market sectors

Results: Emissions Reductions

- During first year of solar PV system operation (626 MWh):
  - 518,328 pounds of CO_2
  - 48 pounds of CH_4
  - 9 pounds of N_2O
- During 20 years of solar PV system operation (11,960 MWh, accounting for performance degradation against constant utility fuel mix):
  - 9,902,880 pounds of CO_2
  - 921 pounds of CH_4
  - 179 pounds of N_2O

~ 10 million lbs of CO_{2eq}

Source: Climate Registry Information System emissions data for Baird & McGuire and emissions calculations do not consider life-cycle emissions of solar PV system production

Results: Jobs

- During Construction and Installation:
  - ~ 18 FTE Jobs on this ~ $2 million capital project
  - Assumed (8 x 60 kW) inverters from Solectria (HQ in Lawrence, MA) and mounting system from Panel Claw (HQ in North Andover, MA)
  - Sharp crystalline-silicon panels (Buy American-compliant, manufactured in Tennessee)
- Annual O&M: 0.1 to 0.2 FTE Jobs

Note: Modeled using NREL Jobs and Economic Development Impact (JEDI) tool.

Project Risks

System Owner

- Liability protections
- System access/control
- Massachusetts SREC market
- Utility interconnection/permitting time
- National cost of solar (modules & federal tax incentives)

System Host (MassDEP)

- Inflexibility of long-term contract
- Net metering & conventional electricity rates
- Site damage during construction and operations
- Owner default
- Soft costs (professional labor) for feasibility and procurement

Note: Some of the risks can be mitigated in the PPA contract, while others are market based and cannot be easily mitigated

Tips: Overall

- Understand, and ideally improve, the electricity situation on-site before considering renewable energy supply
- High-quality data from the site are essential
  - See example categories on next page
- Understand differences between direct ownership and third-party contracts
- Document each step – paves the way for procurement of successful projects and replication of the feasibility study
- Don't reinvent the wheel
  - US EPA Re-Powering America
  - US DOE/NREL
  - MassDEP & MassDOER

THANK YOU!

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***Acting* Clean Energy Director**

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Mass Department of Environmental Protection (MassDEP) Clean Energy Results Program:

http://www.mass.gov/dep/cleanenergy.htm

Mass Department of Energy Resources (DOER)

http://www.mass.gov/eea/grants-and-tech-assistance/guidance-technical-assistance/agencies-and-divisions/doer/

Massachusetts Clean Energy Center (CEC)

http://masscec.com/

Solar Photovoltaic Project Simple Financial Model

RPS Solar Carve-Out Program v1.0

DATA ENTRY AND FINANCIAL SUMMARY

Key

Entry Cells →

Calculation Cells (Not for Entry)

Select Taxable or Non-Taxable Entity: Taxable

Project and Customer Cost Assumptions

Solar Photovoltaic System Size	502320	Watts (DC STC)
Total System Cost/Watt	$ 3.914	$/Watt (DC STC)
Total System Cost →	$ 1,965,872.00	

CEC Rebate Assumptions

Rebate$ per/Watt	$ -	$/Watt (DC STC)
Total Rebate		

Project Performance and Savings/ Cost Assumptions

Annual Net Capacity Factor	14.24667%	kW (DC STC) to kWh AC
Annual Production Degradation	0.50%	%
Project Life	10	Years
Depreciation Life	10	Years
Electricity Revenue (Avoided Costs)	$ 0.0901	$/kWh
Electricity Revenue (Avoided Costs) Annual Adjustor	4.0%	%
Solar Renewable Energy Certificate (SREC) Auction Price	$ 0.285	$/kWh
SREC Auction Opt-In Term	10	Years (must be equal to or less than project life)
SREC Revenue Annual Adjustor	0.0%	%
SREC Contract Price		$/kWh
SREC Contract Term		Years (must be equal to or less than project life)
Annual Operations and Maintenance Cost Factor	$ 37.00	$/kW/Year
Annual Operations and Maintenance Cost	$ 18,586	$/Year
Annual Operations and Maintenance Adjustor	3.0%	%
Future Inverter Replacement Cost	$ 0.30	$/Watt (DC STC)
Inverter Life, Replace Every X Years	16	Year (must be equal to or less than project life)

Tax Assumptions

Federal Tax Rate	35%						
State Tax Rate	8%						
Effective Tax Rate	40%						
Federal Tax Credit	30%						
State Tax Deduction	100%						
5 Year Accelerated Depreciation Schedule (MACRS)	20.00%	32.00%	19.20%	11.52%	11.52%	5.76%	
Depreciation	20.00%	32.00%	19.20%	11.52%	11.52%	5.76%	
Asset Basis							
Gross Cost	$ 1,965,872						
Rebate	$ -						
Less 50% of Federal Tax Credit	$ (294,881)						
Asset Basis	$ 1,670,991						

Financing Assumptions

% Financed w/ Cash	100%	
% Financed w/ Loan	0%	
Loan Interest Rate	7.00%	
Loan Period	20	Years (must be equal to or less than project life)
Net Cost	$ 1,965,872	
Customer Discount Rate	10.00%	
Loan	$ -	

Solar Project Financial Analysis Summary

Net Present Value	$ 250
Simple Payback (100% Cash only)	Year 6
Estimated Return on Equity	10.01%

PRO FORMA AND PRODUCTION

Project Output	Start-Up 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Annual Generation (kWh)		626,900	623,765	620,646	617,543	614,455	611,383	608,326	605,284	602,258	599,247

FINANCIAL SCHEDULES

INCOME STATEMENT

Electricity Revenue (Avoided Cost)		$ 56,484	$ 58,449	$ 60,483	$ 62,588	$ 64,766	$ 67,020	$ 69,352	$ 71,766	$ 74,263	$ 76,848
System Residual Value (category created for Baird & McGuire Site analysis)	$ -										$ 40,186
SREC Auction Revenue		$ 178,666	$ 177,773	$ 176,884	$ 176,000	$ 175,120	$ 174,244	$ 173,373	$ 172,506	$ 171,644	$ 170,785
SREC Contract Revenue		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Revenue (Avoided Costs)	$ -	$ 235,150	$ 236,222	$ 237,367	$ 238,588	$ 239,886	$ 241,264	$ 242,725	$ 244,272	$ 245,907	$ 287,819
Replace Inverter?	No	No	No	No	No	No	No	No	No	No	No
Operations & Maintenance Costs		$ (18,586)	$ (19,143)	$ (19,718)	$ (20,309)	$ (20,919)	$ (21,546)	$ (22,192)	$ (22,858)	$ (23,544)	$ (24,250)
Inverter Replacement Cost		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Operating Expenses	$ -	$ (18,586)	$ (19,143)	$ (19,718)	$ (20,309)	$ (20,919)	$ (21,546)	$ (22,192)	$ (22,858)	$ (23,544)	$ (24,250)
EBITDA	$ -	$ 216,564	$ 217,079	$ 217,650	$ 218,279	$ 218,967	$ 219,718	$ 220,533	$ 221,414	$ 222,363	$ 263,568
Federal Depreciation Expense		$ (334,198)	$ (534,717)	$ (320,830)	$ (192,498)	$ (192,498)	$ (96,249)	$ -	$ -	$ -	$ -
EBIT	$ -	$ (117,634)	$ (317,638)	$ (103,181)	$ 25,780	$ 26,469	$ 123,469	$ 220,533	$ 221,414	$ 222,363	$ 263,568
Interest Expense		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
EBT	$ -	$ (117,634)	$ (317,638)	$ (103,181)	$ 25,780	$ 26,469	$ 123,469	$ 220,533	$ 221,414	$ 222,363	$ 263,568
Federal taxes saved/(paid)	$ -	$ 47,236	$ 117,252	$ 42,207	$ (2,911)	$ (3,133)	$ (37,062)	$ (71,012)	$ (71,295)	$ (71,601)	$ (84,869)
State taxes saved/(paid) [can not deduct federal depreciation expense]	$ -	$ (17,325)	$ (17,366)	$ (17,412)	$ (17,462)	$ (17,517)	$ (17,577)	$ (17,643)	$ (17,713)	$ (17,789)	$ (21,085)
Net Income	**$ -**	**$ (87,723)**	**$ (217,753)**	**$ (78,385)**	**$ 5,407**	**$ 5,819**	**$ 68,830**	**$ 131,879**	**$ 132,405**	**$ 132,973**	**$ 157,614**

CASH FLOW STATEMENT

Cash From Operations											
Net Income	$ -	$ (87,723)	$ (217,753)	$ (78,385)	$ 5,407	$ 5,819	$ 68,830	$ 131,879	$ 132,405	$ 132,973	$ 157,614
Federal Depreciation Expense	$ -	$ 334,198	$ 534,717	$ 320,830	$ 192,498	$ 192,498	$ 96,249	$ -	$ -	$ -	$ -
Cash Flow From Operations	$ -	$ 246,475	$ 316,964	$ 242,445	$ 197,905	$ 198,317	$ 165,079	$ 131,879	$ 132,405	$ 132,973	$ 157,614
Cash From Investing											
Installed PV Cost	$ (1,965,872)										
One Time State Solar Investment Tax Deduction (Actual Cash Value)	$ 110,089										
One Time Federal Solar Investment Tax Credit	$ 589,762										
Cash Flow From Investing	$ (1,266,022)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cash From Financing											
Loan Disbursement	$ -										
Loan Repayment (Principle)		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cash Flow From Financing	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Annual Cash Flow	**$ (1,266,022)**	**$ 246,475**	**$ 316,964**	**$ 242,445**	**$ 197,905**	**$ 198,317**	**$ 165,079**	**$ 131,879**	**$ 132,405**	**$ 132,973**	**$ 157,614**
Cumulative Cash Flow	**$ (1,266,022)**	**$ (1,019,547)**	**$ (702,583)**	**$ (460,137)**	**$ (262,232)**	**$ (63,916)**	**$ 101,163**	**$ 233,042**	**$ 365,447**	**$ 498,420**	**$ 656,034**
Net Investment	$ (1,266,022)	$ (1,019,547)	$ (702,583)	$ (460,137)	$ (262,232)	$ (63,916)	$ 101,163	$ 233,042	$ 365,447	$ 498,420	$ 656,034
Simple Payback Year	**6**						6				

Estimated Cost Savings to the Baird & McGuire Site from On-Site Solar PV PPA										
Calendar Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PPA Project Year	1	2	3	4	5	6	7	8	9	10
Estimated Groundwater Treatment Facility (GWTF) Electricity Costs (without solar project)										
Projected Electricity Consumption at GWTF Main Meter (kWh):	625,603	625,603	625,603	625,603	625,603	625,603	625,603	597,451	597,451	597,451
Projected All-In Utility Electricity Rate ($/kWh):	$0.11850	$0.12324	$0.12817	$0.13330	$0.13863	$0.14417	$0.14994	$0.15594	$0.16218	$0.16866
Projected Utility Electricity Costs (in absence of solar project) ($):	***$74,134***	***$77,099***	***$80,183***	***$83,391***	***$86,726***	***$90,195***	***$93,803***	***$93,165***	***$96,892***	***$100,768***
Estimated Groundwater Treatment Facility (GWTF) Electricity Costs (with solar project)										
Projected Solar Output On-Site (kWh):	626,900	623,766	620,647	617,543	614,456	611,383	608,327	605,285	602,258	599,247
Assumed Solar PPA Rate ($/kWh):	$0.09010	$0.09370	$0.09745	$0.10135	$0.10540	$0.10962	$0.11401	$0.11857	$0.12331	$0.12824
Projected Solar PPA Payments by Site ($):	***$56,484***	***$58,449***	***$60,483***	***$62,588***	***$64,766***	***$67,020***	***$69,352***	***$71,766***	***$74,263***	***$76,848***
Projected Physical Utility Electricity Supply Directly Offset by Solar Output (kWh):	125,121	125,121	125,121	125,121	125,121	125,121	125,121	119,490	119,490	119,490
Projected Loss Rate on Offset Utility Electricity Supply ($/kWh):	$0.01170	$0.01217	$0.01265	$0.01316	$0.01369	$0.01423	$0.01480	$0.01540	$0.01601	$0.01665
Projected Losses to Site on Utility Electricity Supply Directly Offset ($):	***$1,464***	***$1,522***	***$1,583***	***$1,647***	***$1,713***	***$1,781***	***$1,852***	***$1,840***	***$1,913***	***$1,990***
Projected Net Metered Electricity (kWh):	500,482	500,482	500,482	500,482	500,482	500,482	500,482	477,961	477,961	477,961
Projected Loss Rate on Net Metered Electricity ($/kWh):	$0.02000	$0.02080	$0.02163	$0.02250	$0.02340	$0.02433	$0.02531	$0.02632	$0.02737	$0.02847
Projected Losses to Site on Net Metering Utility Credits ($):	***$10,010***	***$10,410***	***$10,826***	***$11,259***	***$11,710***	***$12,178***	***$12,665***	***$12,579***	***$13,082***	***$13,606***
Projected Annual Solar Overproduction vs. Site Electricity Consumption (kWh):	1,297	0	0	0	0	0	0	7,834	4,807	1,796
Projected Avoided Utility Cost Wholesale Rate ($/kWh):	$0.03885	$0.04040	$0.04202	$0.04370	$0.04545	$0.04727	$0.04916	$0.05112	$0.05317	$0.05530
Projected Avoided Utility Wholesale Payments to Site ($):	***($50)***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***($400)***	***($256)***	***($99)***
Assumed Replacement REC Charges to Site ($):	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***
Projected Total Electricity Costs at Site with Solar PV Project ($):	***$67,907***	***$70,382***	***$72,893***	***$75,494***	***$78,189***	***$80,979***	***$83,870***	***$85,784***	***$89,003***	***$92,344***
Difference between GWTF's Estimated Utility Electricity Costs and Costs with Solar Project										
Projected Savings (Loss) on Solar PPA vs. Conventional Utility Supply ($):	***$6,227***	***$6,717***	***$7,290***	***$7,896***	***$8,538***	***$9,216***	***$9,933***	***$7,381***	***$7,888***	***$8,424***