ONEIDA

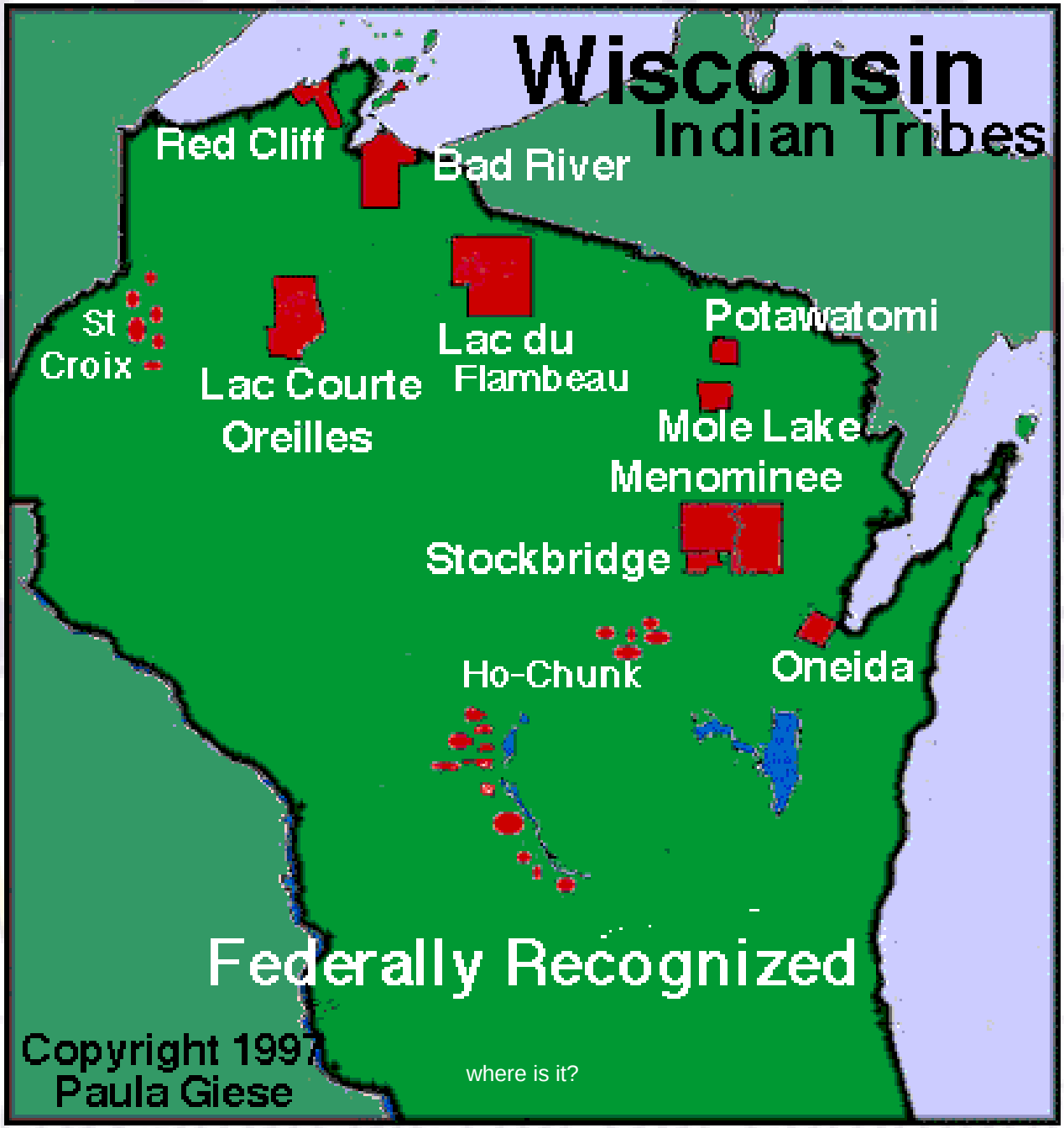
ENERGY TEAM

Energy Strategies for Our Community

Oneida Tribe of Indians

Energy Audits

U.S. DOE – Tribal Energy Program – 3/25/14


Wisconsin
Indian Tribes
Red Cliff
Bad River
St Croix
Lac Courte Oreilles
Lac du Flambeau
Potawatomi
Mole Lake
Menominee
Stockbridge
Ho-Chunk
Oneida
Federally Recognized
Copyright 1997
Paula Giese
where is it?

Overview

- Repurchase and restoration of lands a priority since casino started in 1993
- Reservation size of 65,430 acres (roughly 8 x 12 miles) with Oneida ownership of approximately 25,032 acres
- Membership of 16,986 with 7,397 members living on the Reservation or in immediate area
- Surburban sprawl from Green Bay and rising land prices

Energy Team

- Oneida Energy Team started in 2006
- Four Main Areas of Focus
    1. Buildings and Operations
    2. Residential
    3. Energy Development
    4. Transportation
- Interdepartmental team reports to Business Committee
- Energy Action Plans

DOE Energy Efficiency Development and Deployment Grant

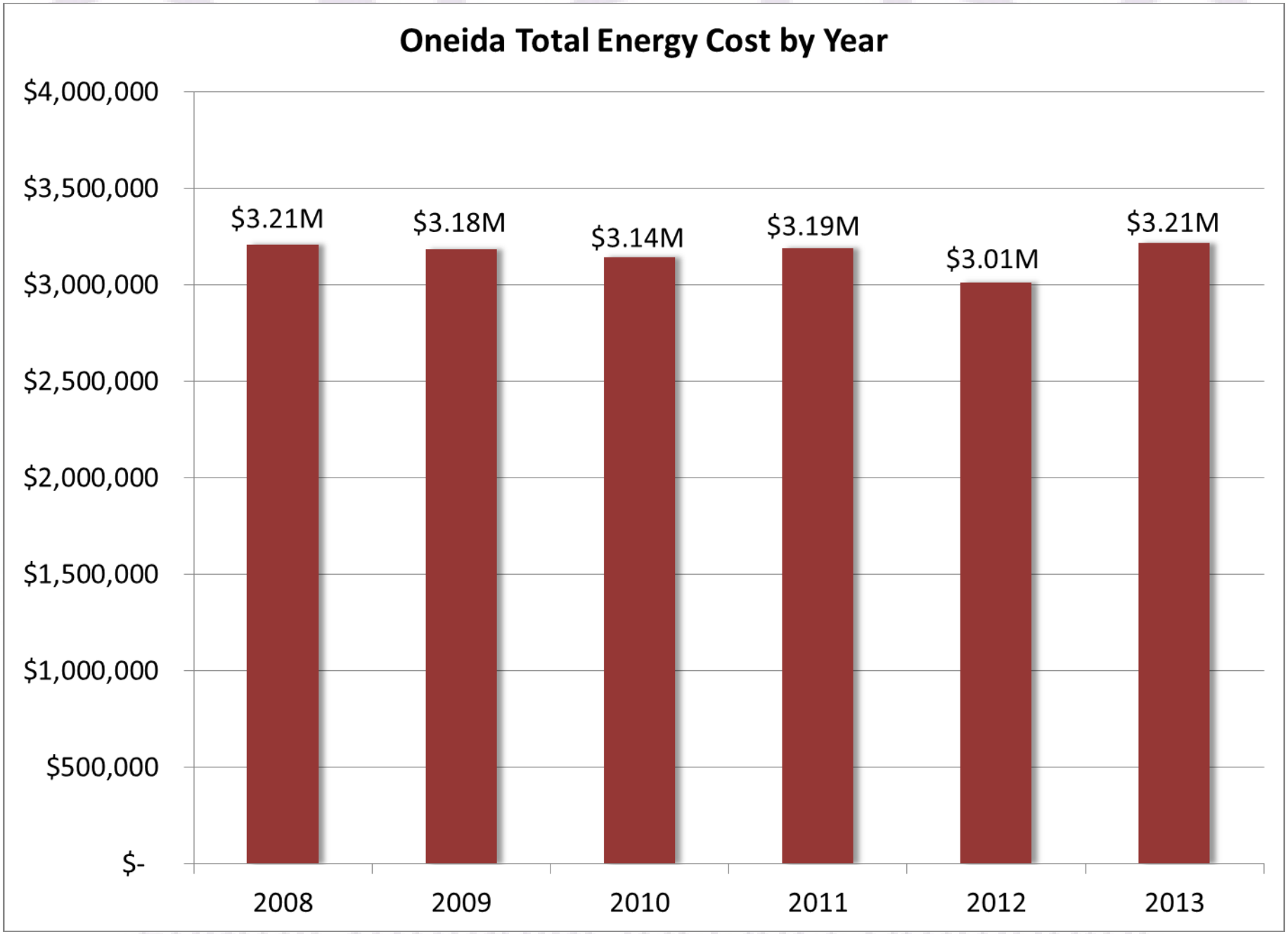
- ***Energy Audits*** of 44 tribal buildings to provide detailed feasibility studies and energy savings opportunities for each facility

- ***SEH/GDS*** identified improvements for:
  - HVAC Systems
  - Lighting
  - Insulation
  - Motion Sensors
  - Temperature Setbacks

Energy Audits

SEH

GDS Associates, Inc.


Oneida Total Energy Cost by Year
$4,000,000
$3,500,000
$3,000,000
$2,500,000
$2,000,000
$1,500,000
$1,000,000
$500,000
$-
$3.21M
$3.18M
$3.14M
$3.19M
$3.01M
$3.21M
2008
2009
2010
2011
2012
2013

	Buildings with Energy Data	Total Square Footage	Average Heat Degree Days	Total Energy Cost	Average Cost per Square Foot
2008	85	1,229,479	7,854	$3,207,485	$ 2.61
2009	86	1,289,269	7,777	$3,183,019	$ 2.47
2010	89	1,289,269	6,993	$3,141,961	$ 2.44
2011	89	1,289,269	7,675	$3,188,643	$ 2.47
2012	90	1,289,269	6,251	$3,009,751	$ 2.33
2013	92	1,376,764	7,614	$3,213,270	$ 2.33

Results from Site Visits

The 44 facilities audited ranged from 1,200 - 160,000 SF in size, with a combined total square footage of 1,142,577 SF

- Over 680 energy reduction opportunities (ERO) identified in the study. Stand alone measure savings include:
- 3,700,000 in kWh Savings
- 99,500 in Therm Savings
- 1,800,000 in Gallons of Water Savings
- $480,000 in Annual Savings

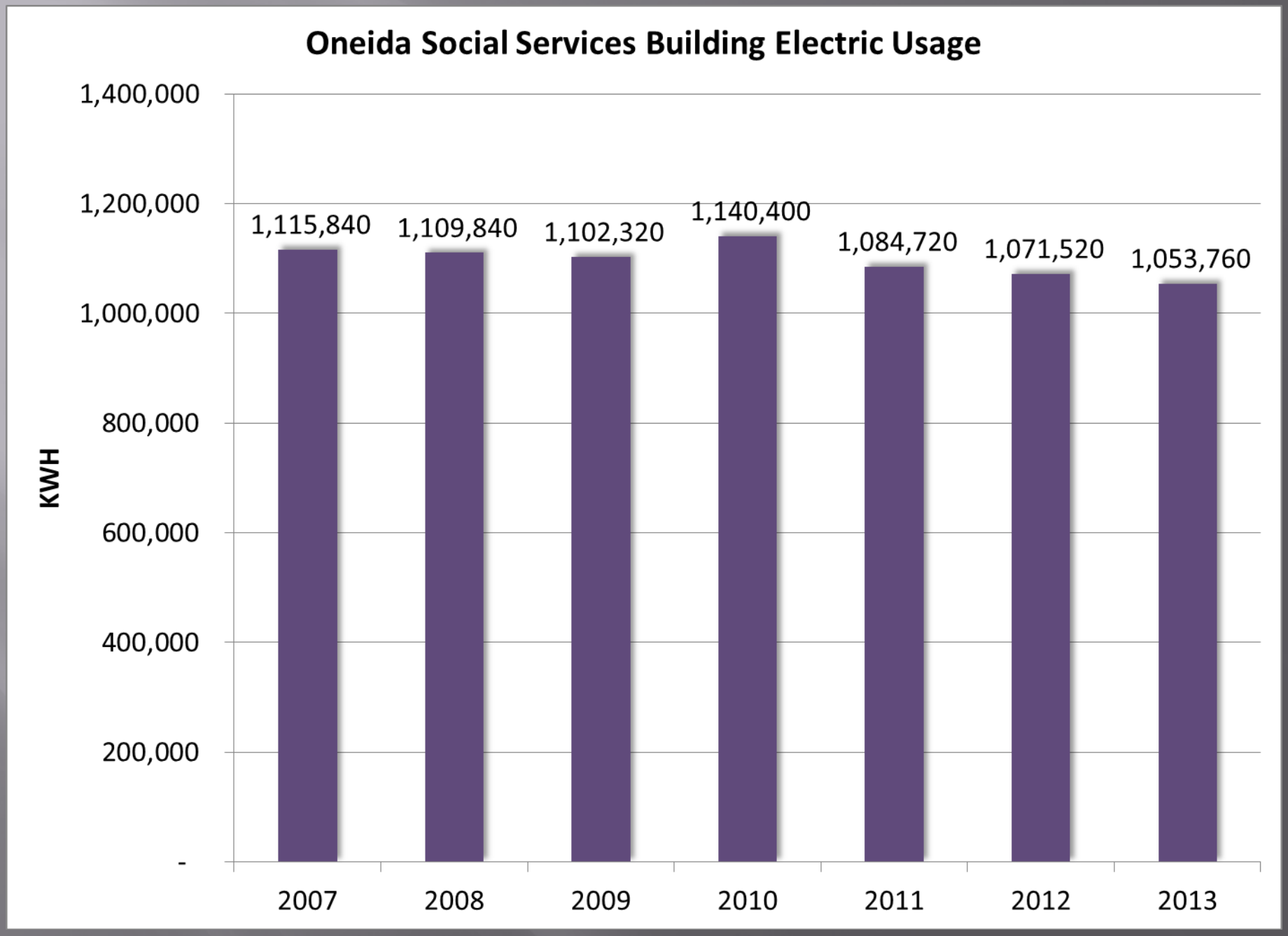
Technical Calculations

Quantity of ERO's	General Scope of Measures	Total Est. Project Savings	Total Est. Project Cost	Average ROI
26	Building Weatherization	$6,554	$38,795	4.3
14	Water Heater Replacement	$4,859	$13,200	4.4
30	Energy Controls	$4,693	$3,022	0.6
18	Small Unit Replacement	$13,235	$129,025	11.3
144	Operational Adjustments	$190,056	$59,159	0.4
194	Relamping / Relighting	$111,878	$211,628	2.6
86	Lighting Occupancy	$37,519	$132,163	3.2
13	Motors and Drives	$14,042	$22,115	3
105	Electrical Demand Management	$19,853	$57,620	2.3
36	Water Saving Measures	$9,075	$2,920	0.2
8	Building Use Change/Closure	$11,334	$12,395	3.1
674	**Totals**	**$423,098**	**$682,042**	

Oneida Facilities & DPW Staff

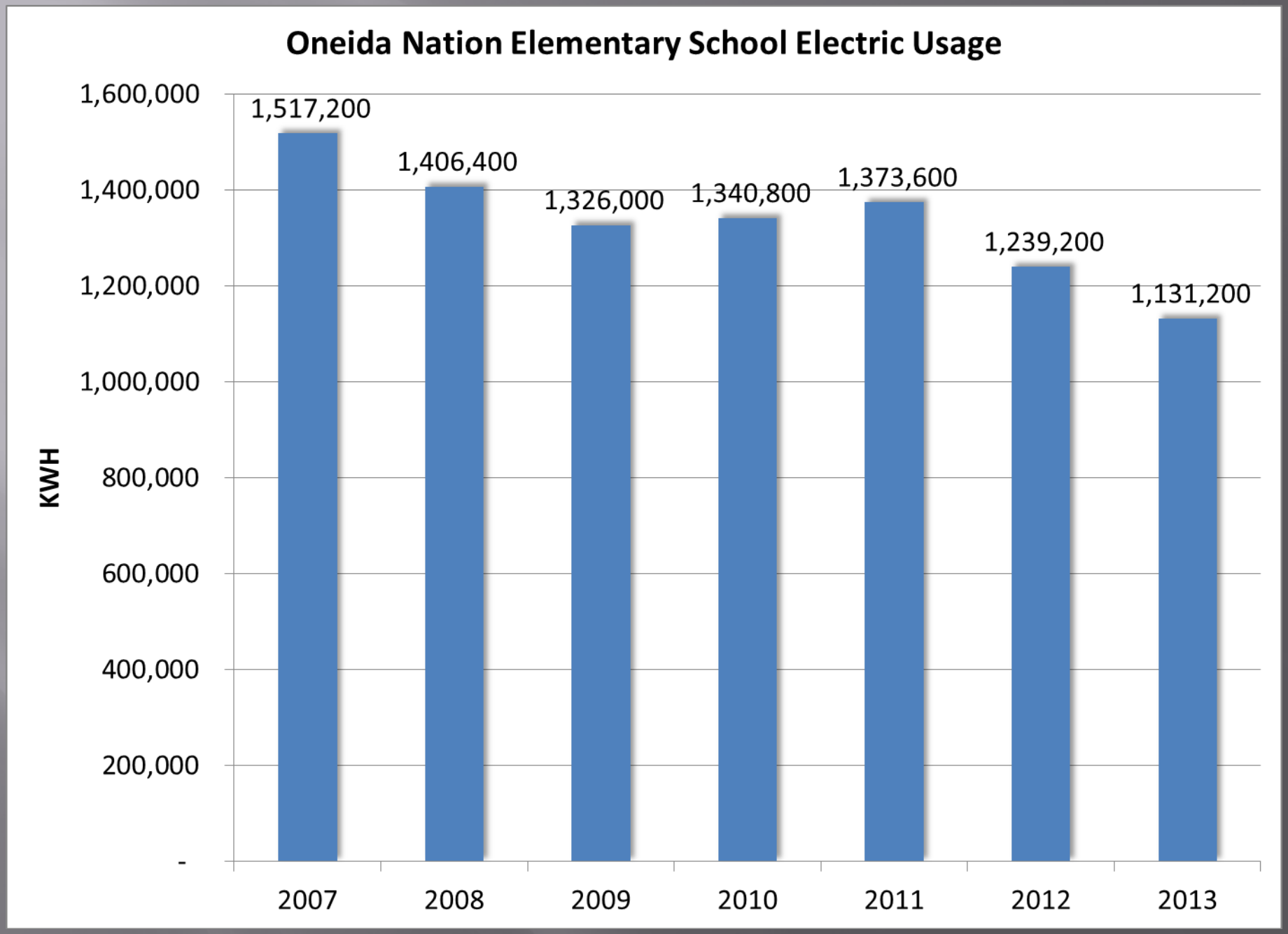
- Jacque Boyle – Facilities Director
- Ray Olson – Energy Manager
- Kevin Rentmeester – Electrical Manager
- Mark Engel – Master Electrician
- Mitch Skenandore – Journeyman Electrician
- Jill Brocker – Journeyman Electrician
- Waylon Denny – Journeyman Electrician
- Brad Vanevery - Journeyman Electrician


No Food or Drink Allowed In Gym
EXIT


Oneida Social Services Building Electric Usage
KWH
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
-
1,115,840
1,109,840
1,102,320
1,140,400
1,084,720
1,071,520
1,053,760
2007
2008
2009
2010
2011
2012
2013


NATION
HERITAGE
HOME
VISITOR


NATION


Oneida Nation Elementary School Electric Usage
KWH
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
-
1,517,200
1,406,400
1,326,000
1,340,800
1,373,600
1,239,200
1,131,200
2007
2008
2009
2010
2011
2012
2013


EXIT

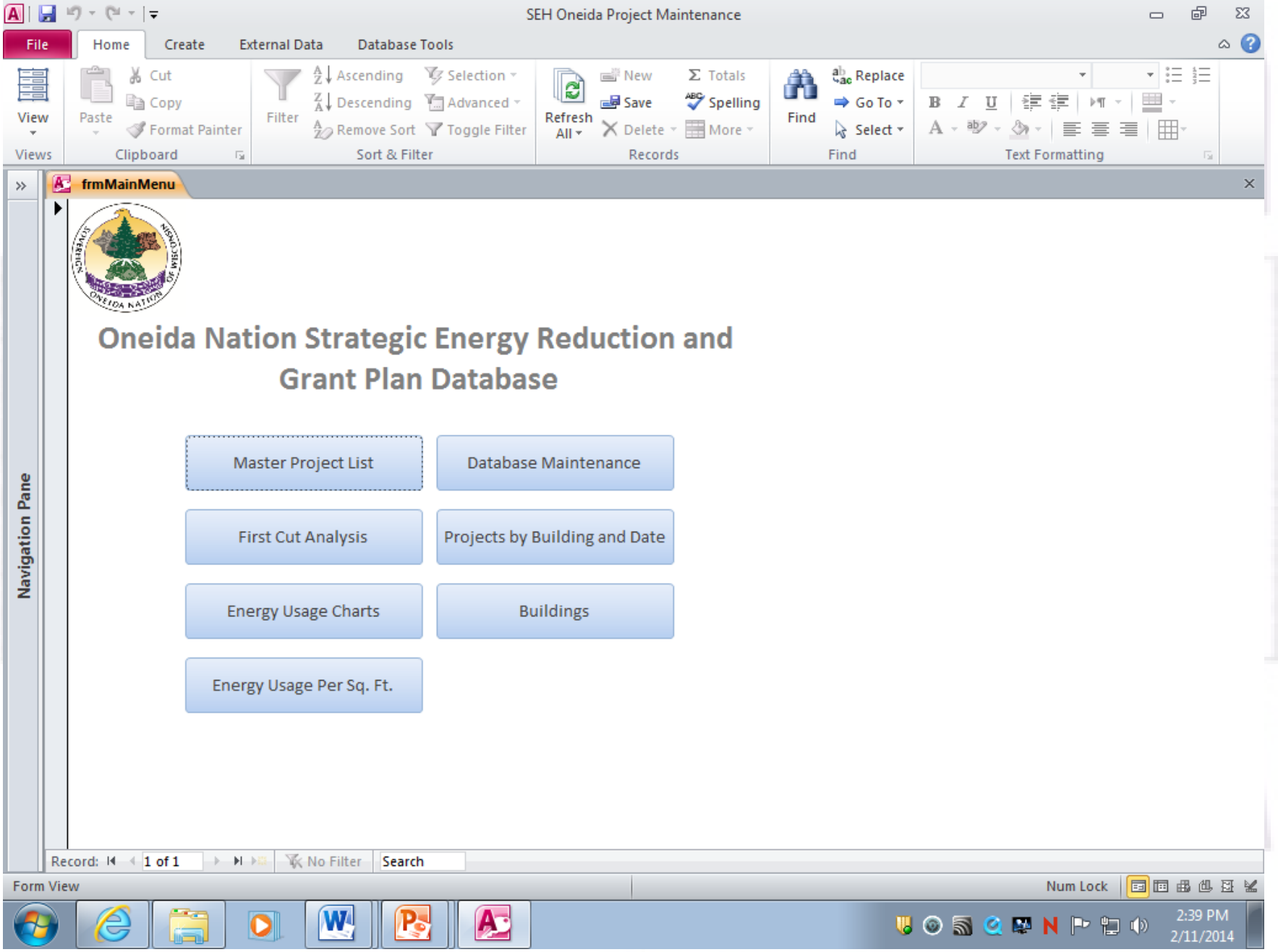

EXIT
WERNER


COMPLETED
PROOF SENT OUT
IN PROGRESS


GRANTS OFFICE


NATIVE AMERICA

Facility	Description	Amount	Completion	Est. Annual KWh Saved	Est. Annual Therms Saved	Est. Annual Saving
172 Child Care	Outdoor lighting	$6,675	May-12	23,869		$2,145
County H Rec Center	Lighting Upgrades (gym)	$7,337	Feb-13	24,422		$2,198
Elder Services	Boiler & Controls	$79,900	Mar-12		6,658	$6,658
	Air Dirt Separater	$6,900				
Green Earth Library	Lighting Upgrades	$2,755	Jun-12	10,555		$950
Health Center	Pole Lights	$38,671	Nov-11	127,555		$11,480
	Soffit lights	$3,824				
Library	Replace furnaces/AC	$20,600	Mar-12		240	$240
Little Bear	Exterior Lights	$1,808	Mar-12			
NHC	Gym Lighting	$13,966	Jan-13	61,066		$5,496
	Outdoor Lighting	$20,500	Jan-12	72,988		$6,569
OPD	Outdoor lighting	$8,105	Apr-12	28,855		$2,597
Skenandoah	Lighting Upgrades (LED)	$28,745	Sep-11	106,571		$9,591
	Outdoor lighting	$18,031	Nov-11	30,900		$2,781
Social Services	Lighting Upgrades -gym	$10,919	Sep-12	40,711		$3,664
	Lighting Upgrades - 1st Floor	$7,323	Jan-12			
	Outdoor Lighting	$51,489	Jun-12	183,311		$16,498
Turtle School	Big Gym upgrade	$34,096	Jun-12	44,766		$4,029
	Outdoor lighting	$8,523	Jun-12	23,766		$2,139
	Boilers	$147,990	Sep-12		12,325	$12,325
	Chiller and Ice Storage (BIE)	$320,956	Sep-12			$32,182
	Interface for Trane	$6,500	Sep-12			
	Electrical Supplies	$4,263	Sep-12			
Health Center	Install new roof top units	$342,030	Jun-13	125,000		$11,000
	Electrical panel/components	$9,456	Jun-13			
	Electrical supplies	$15,563	Jul-12			included
	TOTAL FOR ALL PROJECTS	**$1,216,925**		**904,335**	**19,223**	**$132,542**



Next Steps

- Continue efficient implementation of audit recommendations
- Monitor energy usage and document effectiveness of upgrades
- Advocate for energy efficiency and life-cycle considerations in any new building construction
- Work as a coordinated Energy Team to support residential, transportation, and renewable efficiencies as well

ONEIDA ENERGY TEAM

Energy Strategies for Our Community

GENE SCHUBERT – ENV POLICY ANALYST
ESCHUBER@ONEIDANATION.ORG
920-496-5362

Yaw^ko! (Thank you)

Energy Strategies for Our Community

Shekóli (Greetings) from Oneida

ONEIDA ENERGY TEAM

Energy Strategies for Our Community

ENERGY OPTIMIZATION MODEL

Department of Energy
Tribal Energy Program Review
Denver, Colorado

Michael Troge

Oneida Tribe of Indians of Wisconsin

March 24 - 27, 2014

AGENDA

- the idea of sustainable energy
- current energy situation
- energy optimization model
- findings
- initiatives
- projects

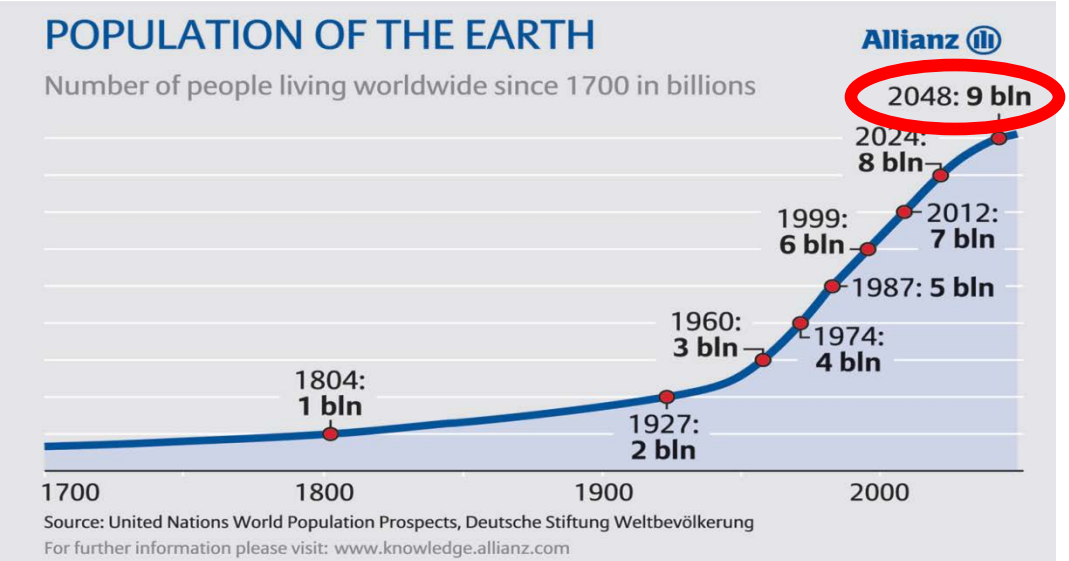
Thank you!

- **Department of Energy & Tribal Energy Program**
- **H&H Energy Management Systems (Madison, WI)**
- **Godfrey & Kahn S.C. (legal-financial advisor)**
- **Oneida Tribal Energy Team, Department of Land Management, Department of Public Works, Environmental Resource Board, Planning, Staff**
- **Partners: UW-Extension, State Energy Office, Focus on Energy, USDA, EPA, Wisconsin Public Service, WE Energies**

- **Energy Information Administration and the Energy Laboratories for their stats and research**

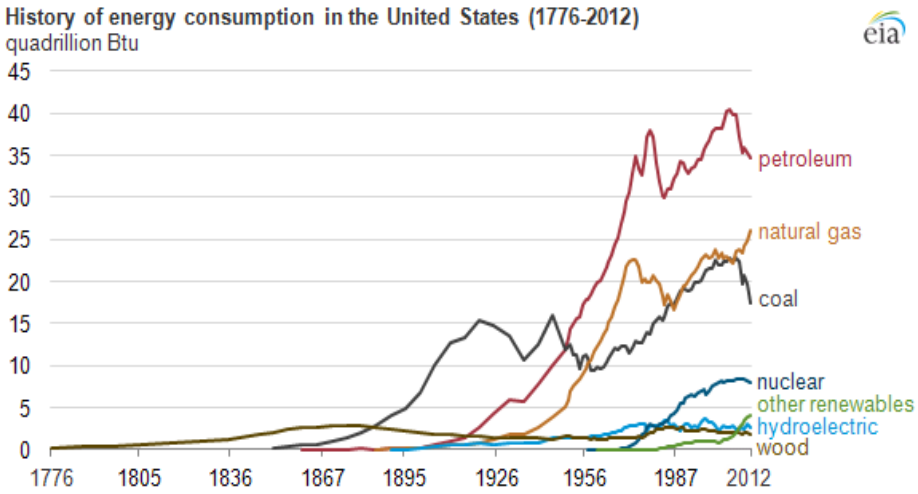
CHALLENGES

- **Population**
  - Carrying Capacity
    - Water
    - Food
  - Infrastructure
    - Climate
    - Energy
- **Money!**



2100

???



History of Energy Consumption in the United States, 1776-2012
(U.S. Energy Information Administration 2013)

What's the concern????

We are a

small community

in a

GLOBAL ECONOMY!

We face an uncertain future!

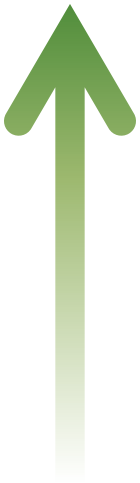
PERSONAL OPINION:

COMPETITION AMONG COMMUNITIES

IS NOT IN OUR BEST INTEREST!

As I see it, we're in transition

Sustainability & Cooperation



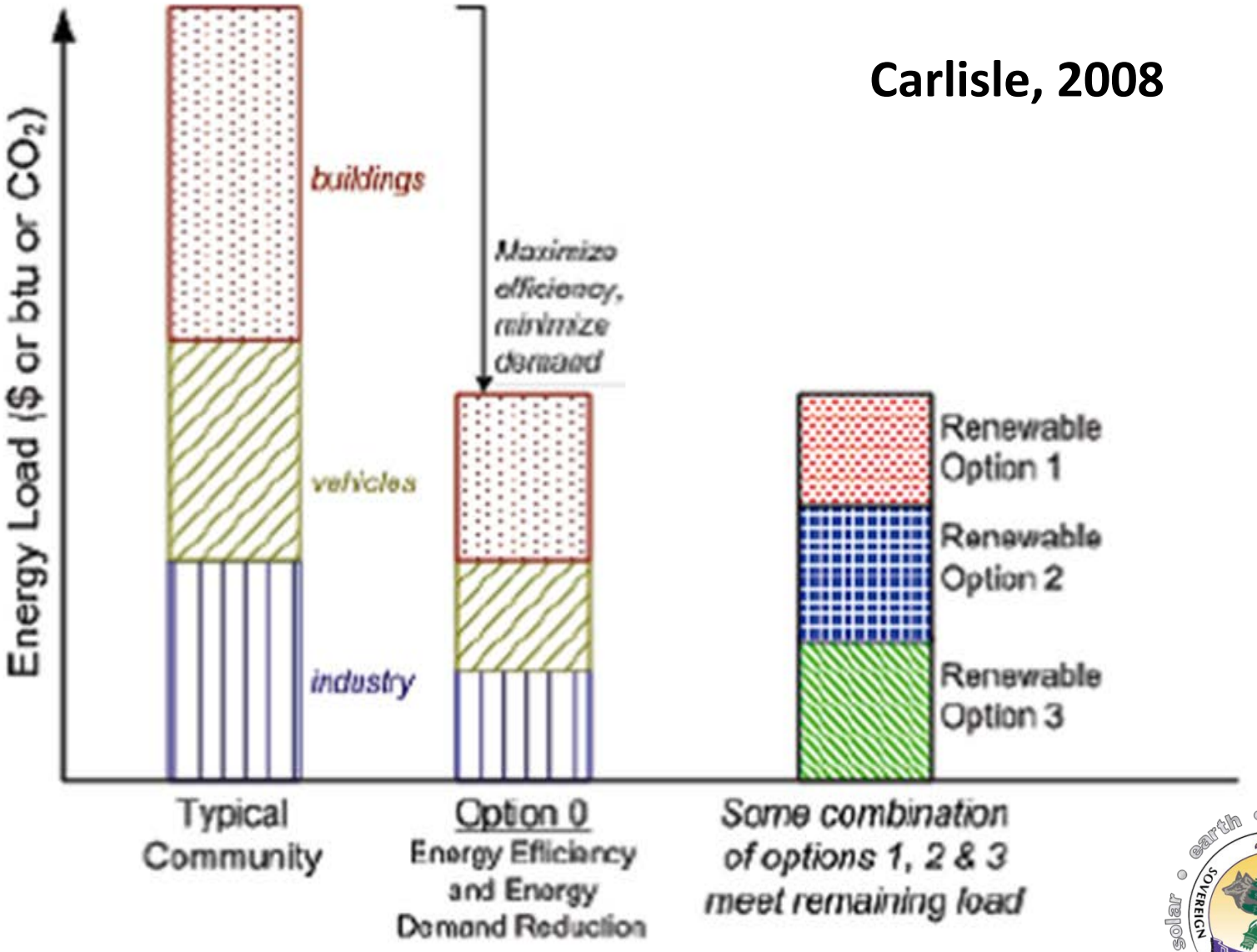
Competition….Winners and Losers

Key Elements of a Renewable Energy Community

Nancy Carlisle et. al., 2008, National Renewable Energy Laboratory

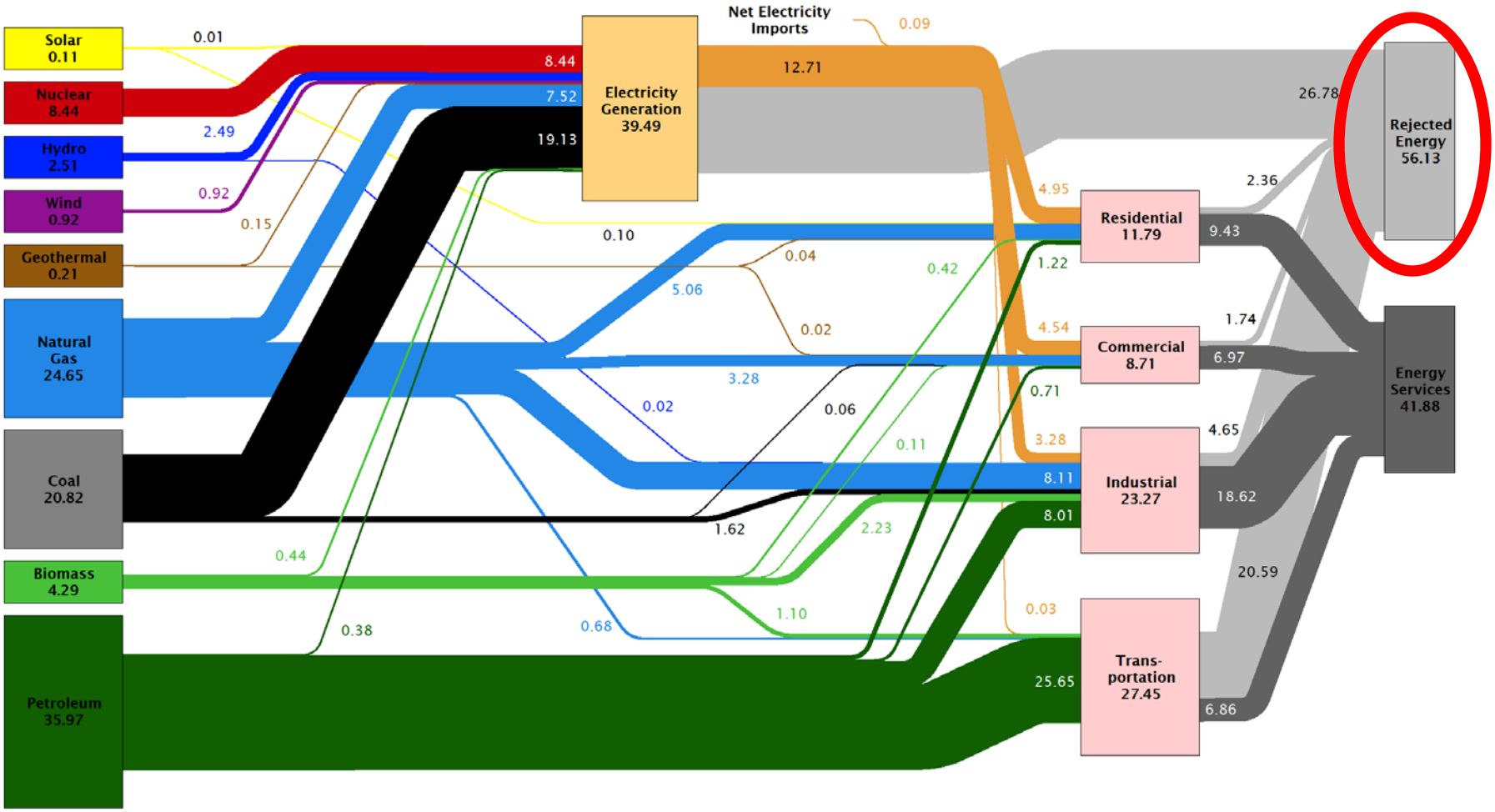
1. **Sustainable Design**
2. ***Solar/Zero Energy Buildings and/or Micro-Grids***
3. **Advanced and Energy Efficient Transportation**
4. **Utility Role Expansion**
5. **Putting it all together**

Carlisle, 2008



Estimated U.S. Energy Use in 2010: ~98.0 Quads

Lawrence Livermore National Laboratory



Source: LLNL 2011. Data is based on DOE/EIA-0384(2010), October 2011. If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports flows for hydro, wind, solar and geothermal in BTU-equivalent values by assuming a typical fossil fuel plant "heat rate." (see EIA report for explanation of change to geothermal in 2010). The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. End use efficiency is estimated as 80% for the residential, commercial and industrial sectors, and as 25% for the transportation sector. Totals may not equal sum of components due to independent rounding. LLNL-MI-410527

1 QUAD is enough energy to power 32 million homes

https://flowcharts.llnl.gov (Lawrence Livermore National Laboratory)

Oneida Energy Situation

Current Tribal community energy usage as of 2011 = 412,000 MMBtu.
= 121 million kWh

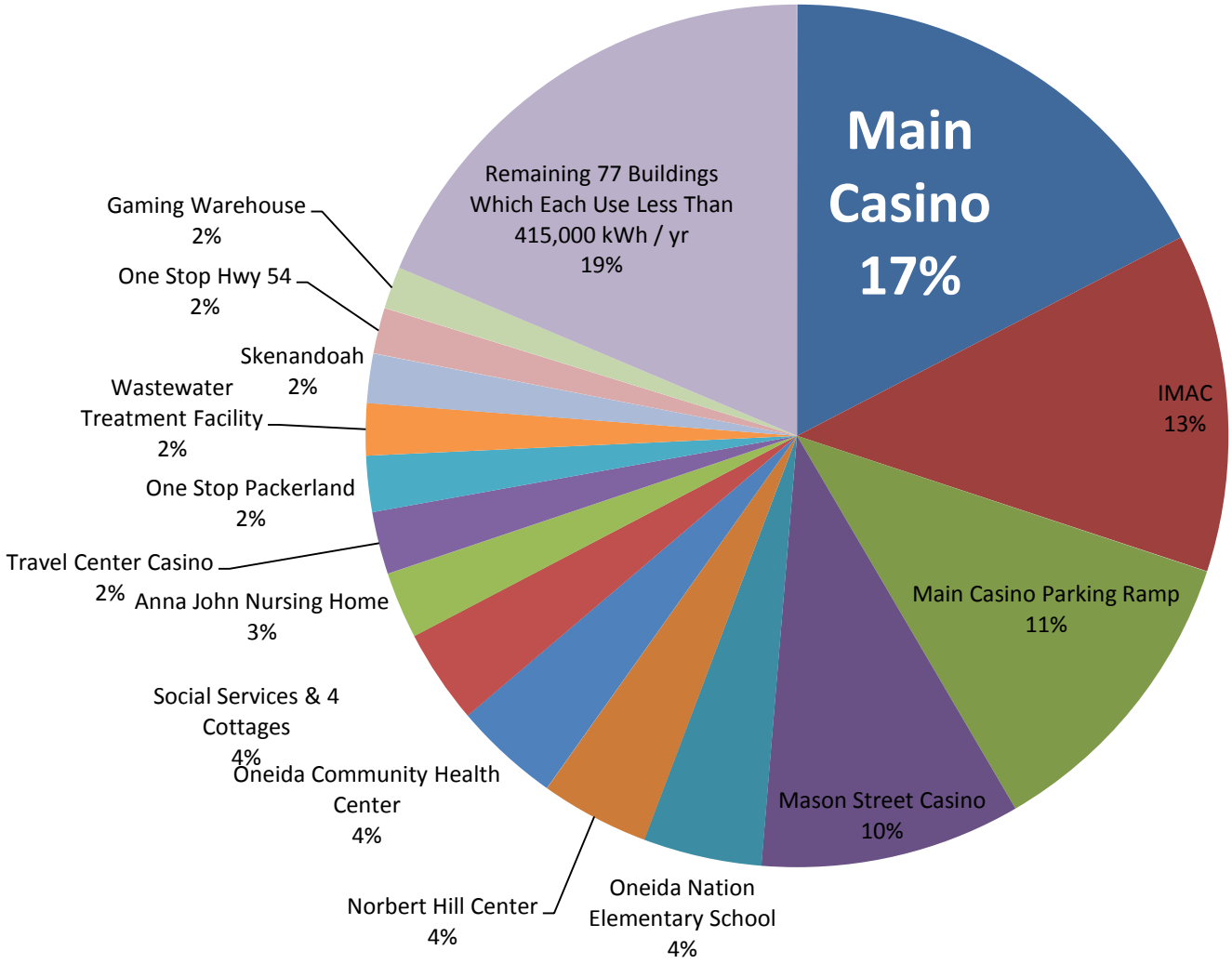
Institutional electricity:	31,000,000 kilowatt-hours	=	105,000 MMBtu
Institutional natural gas:	540,000 therms	=	54,000 MMBtu
Institutional transp fuel:	145,000 gallons	=	5,000 MMBtu
Housing electricity:	16,000,000 kilowatt-hours	=	48,000 MMBtu
Housing natural gas:	2,000,000 therms	=	200,000 MMBtu

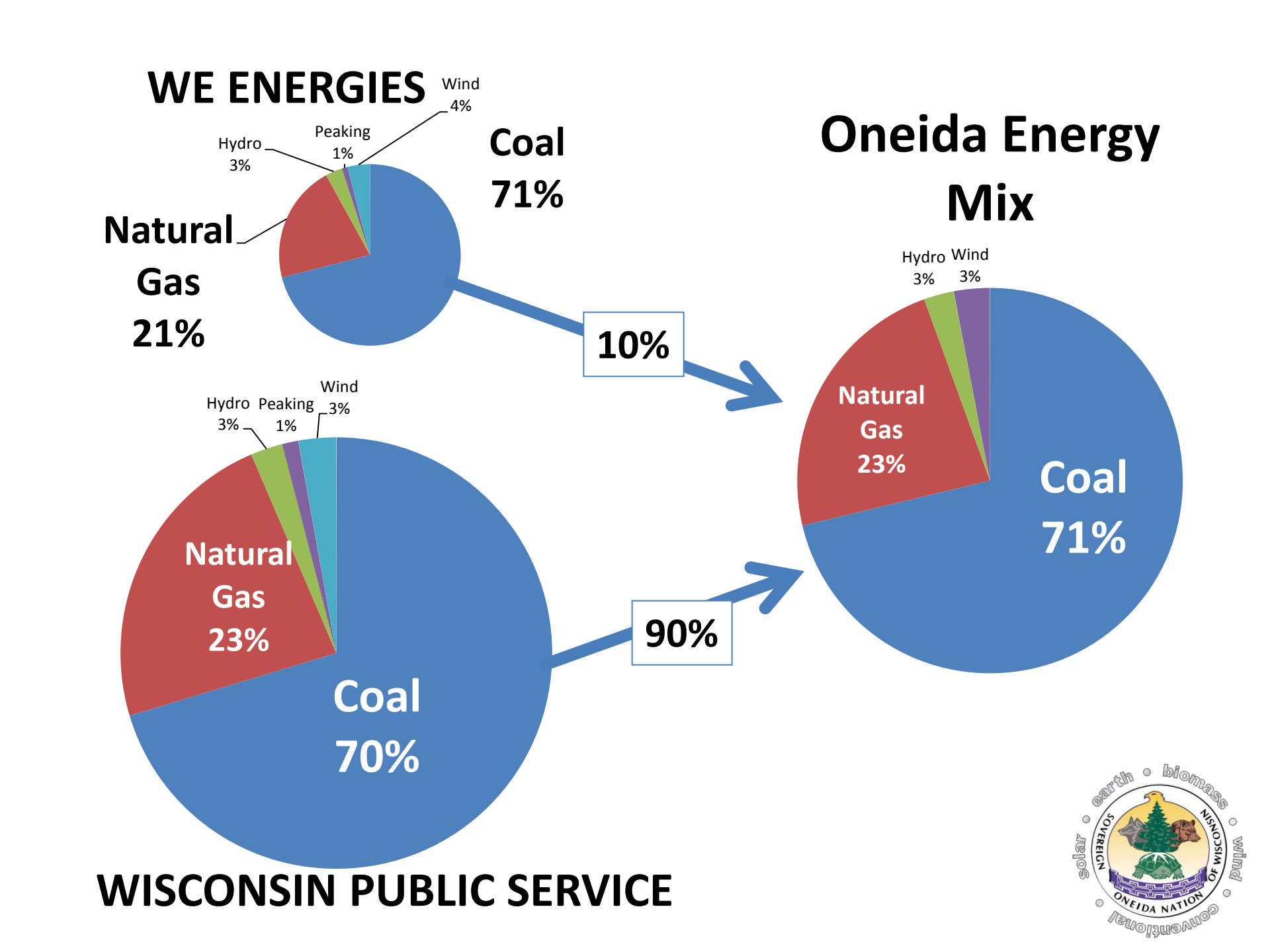
5% RPS = 20,600 MMBtu = 6 million kWh

10% RPS = 41,200 MMBtu = 12 million kWh

20% RPS = 82,400 MMBtu = 24 million kWh

Electricity Use by Building (not therms)




WE ENERGIES
Wind 4%
Peaking 1%
Hydro 3%
Coal 71%
Natural Gas 21%
10%
Oneida Energy Mix
Hydro 3%
Wind 3%
Natural Gas 23%
Coal 71%
Hydro 3%
Peaking 1%
Wind 3%
Natural Gas 23%
Coal 70%
90%
WISCONSIN PUBLIC SERVICE
solar
earth
biomass
wind
conventional
SOVEREIGN
ONEIDA NATION
OF WISCONSIN

Solar

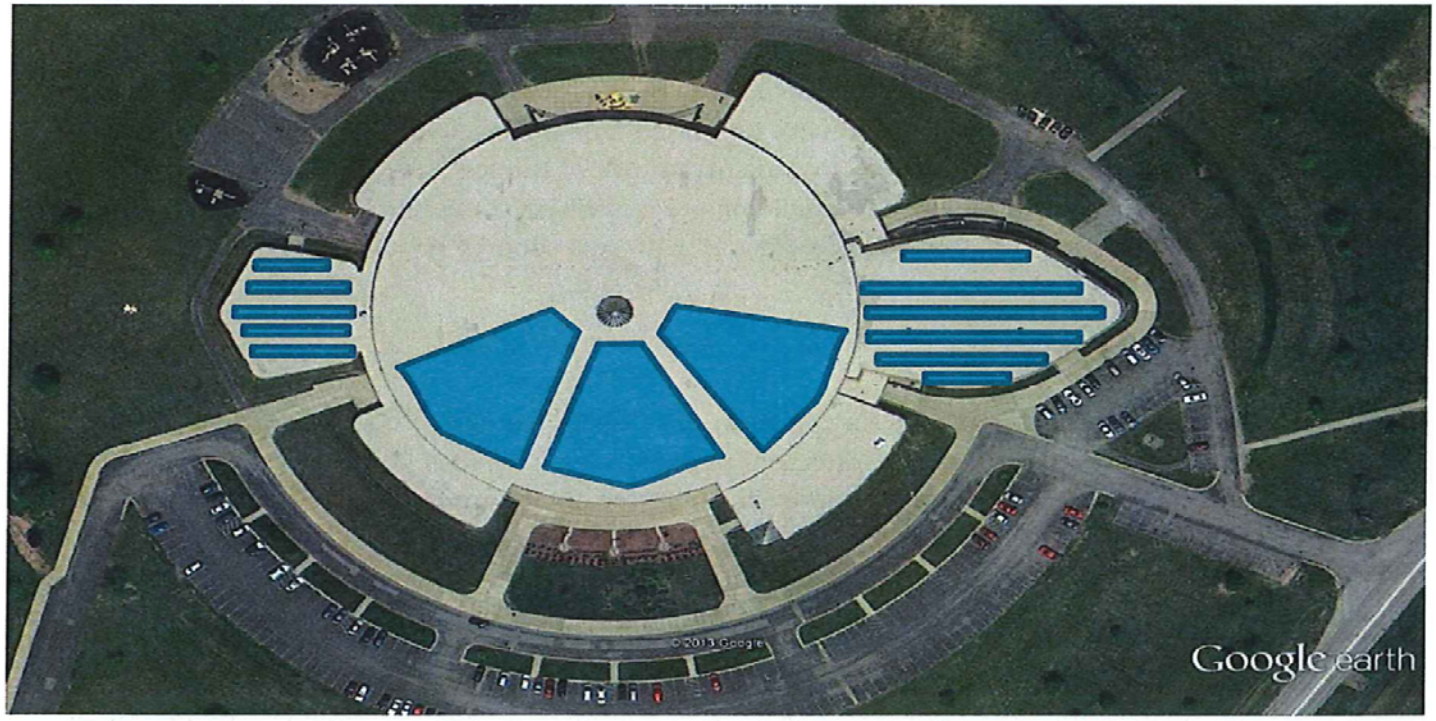
Examples projects

And

Financial data

Oneida Elementary (Turtle) School

Facility	Usage	Size PV	Cost	% of Usage
Turtle School	1,373,600 kWh	550 kw	$1.65 million	49%



662 kW total, 510 kW on the shell, 107 kW on the head, 45 kW on the tail.

Assumptions: 60 cell modules (avg. 265 watts each), 25 deg tilt, ballasted design, no inverter site constraints

Economics

Energy Production, Cost, Economics and Environment		
Energy Production	**A**	**B**
Solar PV system rated capacity (kW - DC)	659.85	659.85
Estimated annual output (kWh/yr)	816,894	816,894
Percentage of facility usage	49%	49%
Cost		
Estimated solar PV installed cost	$1,667,340	$1,667,340
Federal tax credit	$0	$500,202
Focus on Energy rebate (pre tax value)	$0	$0
Net present value of accelerated depreciation (5 years)	$0	$564,747
System cost after incentives (after tax benefits)	**$1,667,340**	**$602,391**
Economics		
25 year discounted net present value (NPV)	-$79,475	$985,474
25 year internal rate of return (IRR)	2.3%	10.5%
years until cost recovery	26.3	9.5
Value		
GROSS value of energy production over 30 years (NPV)	$1,904,697	$1,904,697
NET system value over 30 year system life (NPV)	$237,357	$1,302,306
your pre-purchased energy price with a solar PV system ($/kWh)	$0.073	$0.026
Environment		
CO_2 emission offset (tons/year)	905.1	905.1
Assumptions		
System cost per kW	$2,527	$2,527
Federal income tax rate	35%	35%
State income tax rate	7.9%	7.9%
Electric rate in current year ($/kWh)	$0.080	$0.080
Estimated electric rate price inflation (%/year)	3.20%	3.20%
Panel efficiency degradation (%/year)	0.50%	0.50%
Discount rate (used only in NPV)	2.70%	2.70%

ribal owned with no tax credits applicable, B – Private taxable entity ownership

AJRCCC
solar thermal
(Actual Project!)

Wind

Potential sites

And

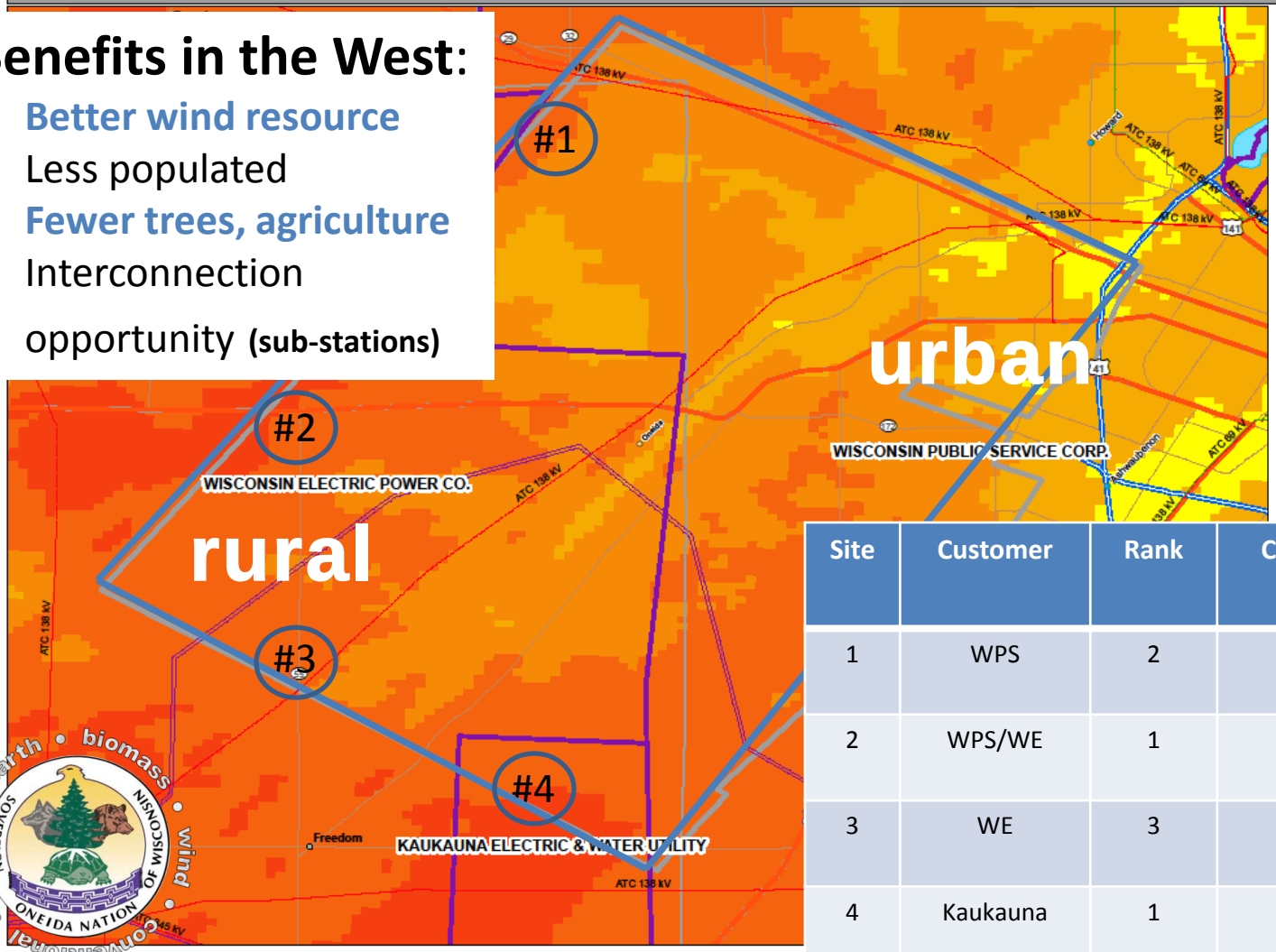
Financial comparison

Wind Turbine Potential

Wind Resource at 70 meters - Oneida

Benefits in the West:

- **Better wind resource**
- Less populated
- **Fewer trees, agriculture**
- Interconnection opportunity **(sub-stations)**



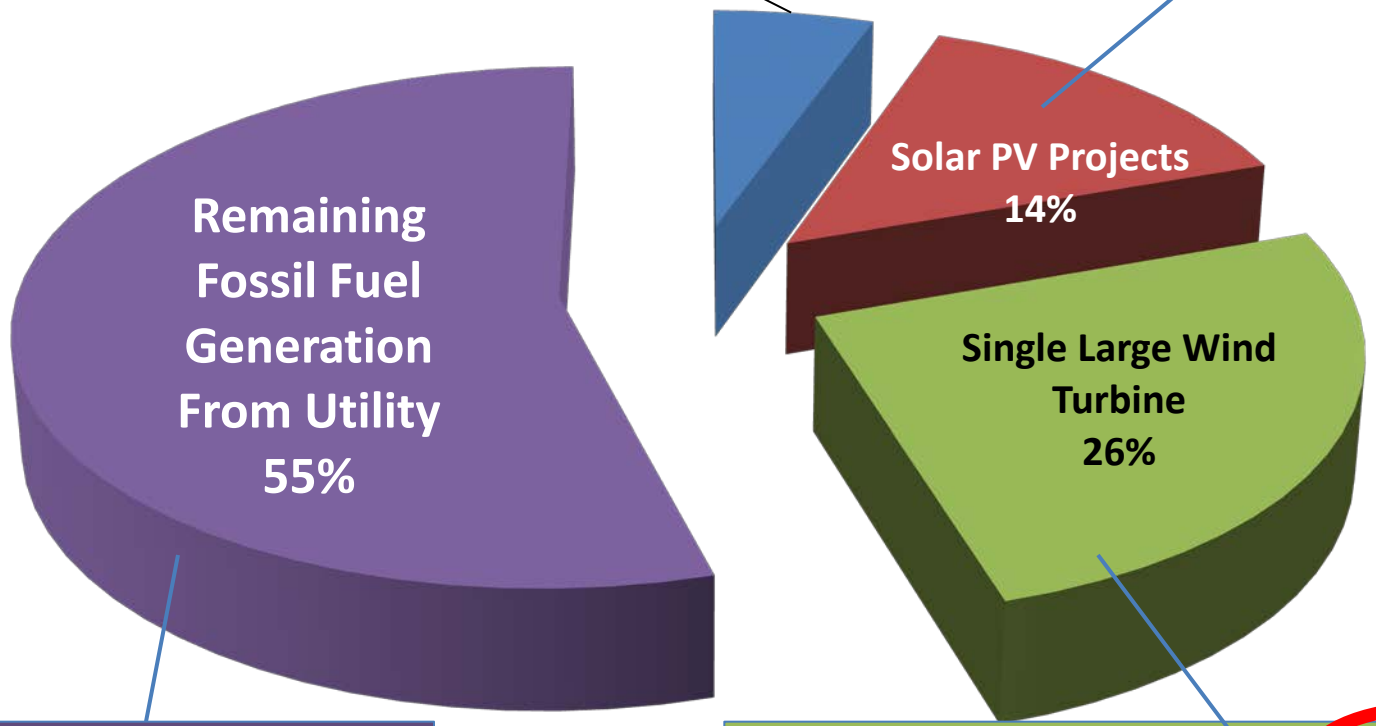
Site	Customer	Rank	Capacity Factor	Population Density
1	WPS	2	36%	Low
2	WPS/WE	1	37%	Medium
3	WE	3	35%	Medium
4	Kaukauna	1	37%	Low

Wind Financial Comparision

	Scenario #1	Scenario #2
Project size	1.7 Megawatts	1.7 Megawatts
Production	5.4 million kWh	5.4 million kWh
Project life	25 years	25 years
Power purchase price	$0.04 / kWh	$0.04 / kWh
Grant	$912,000 (25%)	$0
Tax Credit	$0	$0
Installation cost with transmission	$2.7 million	$3.6 million
Payback	15 years	24 years
IRR	5.4%	0.2%
NPV	$433,556	-($586,126)

Best Potential Renewable Energy Opportunities

Investment Required: $7.58 M
Expected Rate of Return: 2-11%
Cost of Energy Generated: $0.026 - $0.095 / kWh



Cost of Energy Purchased Over Next 25 Years (3.2% inflation): $0.12

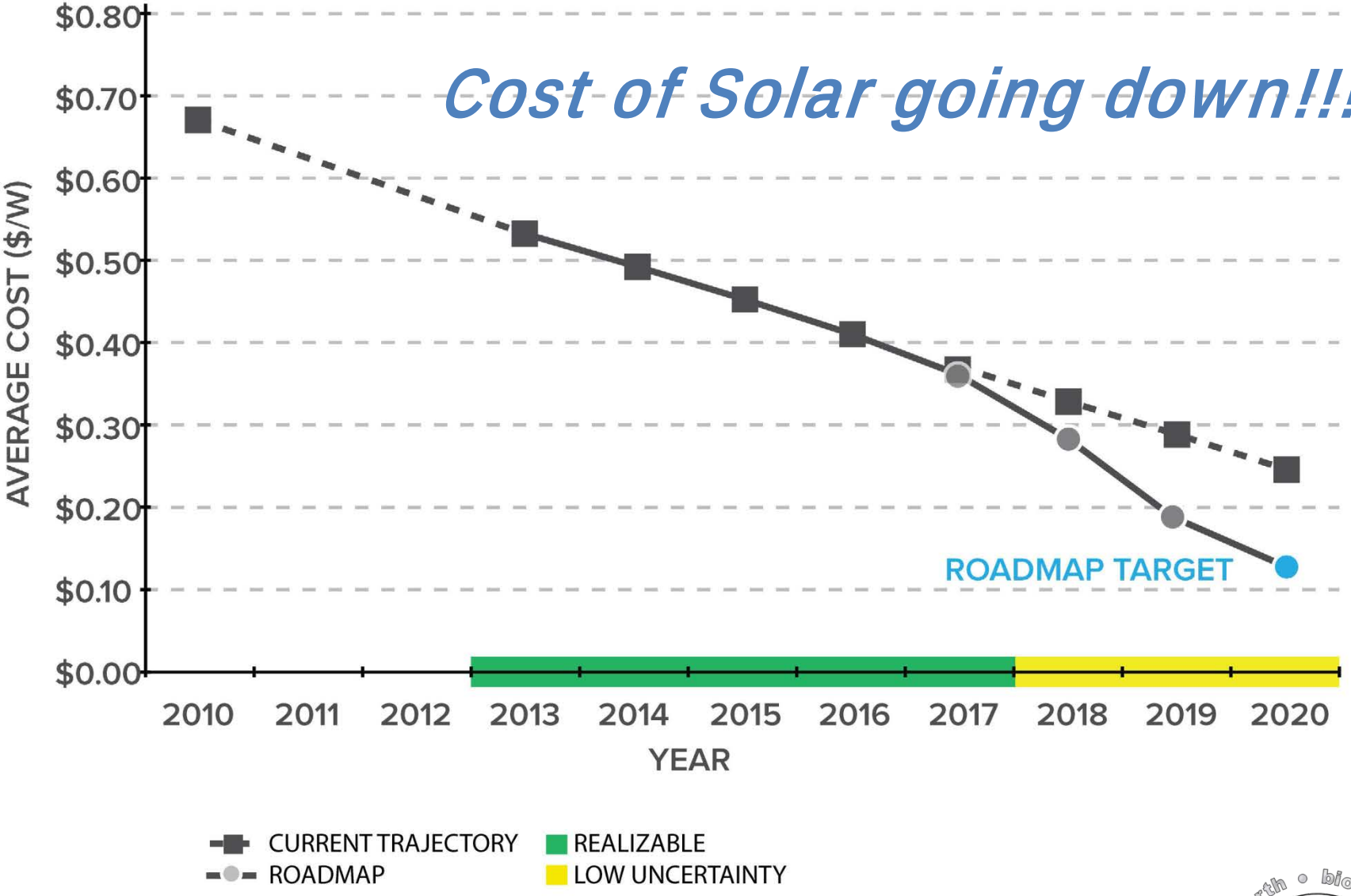
Investment Required: $3.6 M
Expected Rate of Return: 0-5%
Cost of Energy Generated: $0.027

Main reasons these technologies are not adopted…

- Primarily economic – competitive markets don't recognize social benefit
- Fossil fuel industry is firmly established
- Subsidies don't go to the priorities
- Not policy driven or inconsistent policies
- The price we pay for energy does not reflect the cost of producing it
- State renewable portfolio standard (currently at 10%) has been achieved in large part using non-domestic sources (Canadian Hydro)

Challenges with Current Utility Policy

- **Net Metering**
  - Wisconsin Utility policies inconsistent
  - Cap at 20 to 100 kW for true net-metering
  - Over-production is credited at the “avoided cost”
  - monthly basis
- **Third Party Ownership**
  - Third party ownership of wind and solar not explicitly allowed at the state level
  - Interconnection and other roadblocks discourage the future of renewable energy



Residential PV customer acquisition costs: Current trajectory and roadmap (Ardani et al. 2013, [NREL])

Exploring other support mechanisms

- ***Cost of Solar going down!***
- 3rd party ownership (currently not allowed by our Public Service Commission)
- Bulk purchase programs
- Community investment
- Renewable Energy Credits
- PACE – Property Assessed Clean Energy
- Energy efficiency is still the primary goal

Renewable Energy Funding Matrix

	Financing Method	Risk	Likelihood of Success	Rates of Return
Tribe Self-Funds Projects	Cash	Low	High	Low
	Bond/Debt	Low	High	Low
Grants	DOE Tribal Energy Grant	Low	Low	High
	Focus on Energy (State-Level) Grant	Low	Medium	High
Partnership with Taxable Investor	Sale Leaseback	Medium	Medium	High
	Partnership Flip	Medium	Medium	High

Partnership with Taxable Investor

- **Renewable energy projects receive tax benefits**

- **Tribes have indirect access to Federal tax benefits while limiting up-front costs**
  - **Sale-Leaseback:**
    - Project sold to Tax Equity investor
    - Leased back to the Tribe
    - End of term purchase (usually 5-9 years)
  - **Partnership Flip:**
    - Project company jointly owned by a tax equity investor and the Tribe
    - Tax benefits and power revenue go to investor
    - Tribe buys out investor at end of term

Biomass (Thermal)

Fuel comparison

And

Future costs

TABLE 2 – Fuel type comparison – in order of cost (2013)

Fuel Type	Energy Content (Btu)	Seasonal Efficiency () = efficiency value used to determine cost	Unit Cost[4]	Cost Per 1,000,000 Btu
Natural Gas	100,000 per therm	70-94% (90%)	$0.80 per therm	$8.89
Wood Chips	3,780 per pound (@ 50% moisture) to 6,190 per pound (@ 25% moisture)	50-75% (70%)	$50 per ton (50% moisture used to determine cost)	$9.45
Wood used in OWB – EPA Phase 2[1]	22,000,000 per cord[3]	69%	$225 per cord	$14.82
Wood Pellets	15,400,000 per ton	70-85% (80%)	$190 per ton	$15.42
Propane	92,000 per gallon	70-94% (90%)	$1.60 per gallon	$19.32
Wood used in OWB – Pre-2008[2]	22,000,000 per cord[3]	40%	$250 per cord	$28.41
Shelled Corn	380,000 per bushel (@ 15% moisture)	70-85% (80%)	$360 per ton	$29.61
Heating Oil	138,000 per gallon	70-85% (75%)	$3.6 per gallon	$34.78
Electricity	3,413 per kWh	100%	$0.12 per kWh	$35.16

@ $5/gal, $60/MMBtu

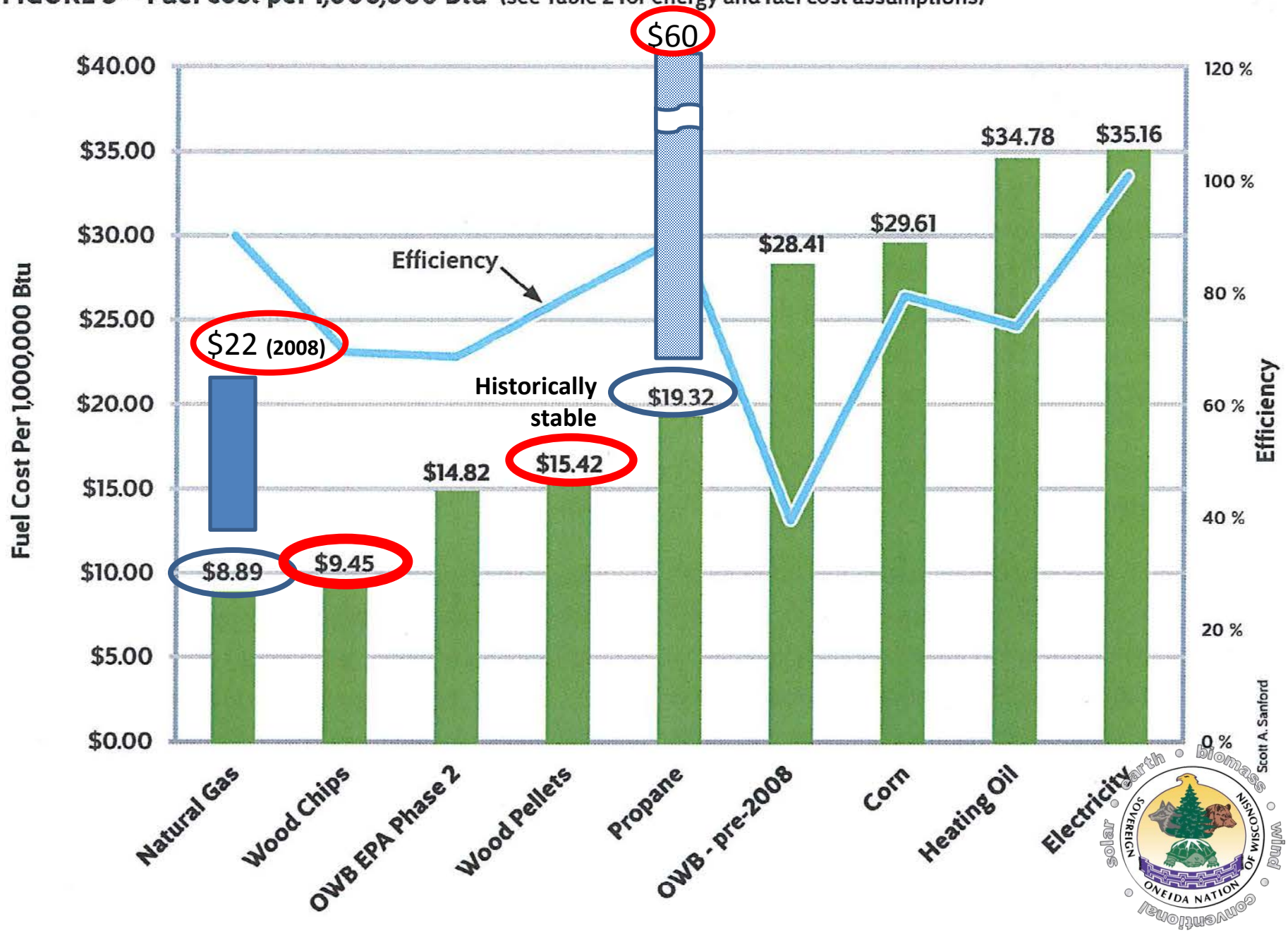
[1] Meets EPA Phase 2 emissions requirement

[2] Typical pre-2008 outdoor wood-fired boiler (does not meet EPA Phase 2 requirement

[3] 6,500 Btu/pound (20% moisture)

[4] Fuel costs in Madison, WI for 2013-14 heating season delivered to point of use (does not include any storage costs)

FIGURE 3 – Fuel cost per 1,000,000 Btu (see Table 2 for energy and fuel cost assumptions)

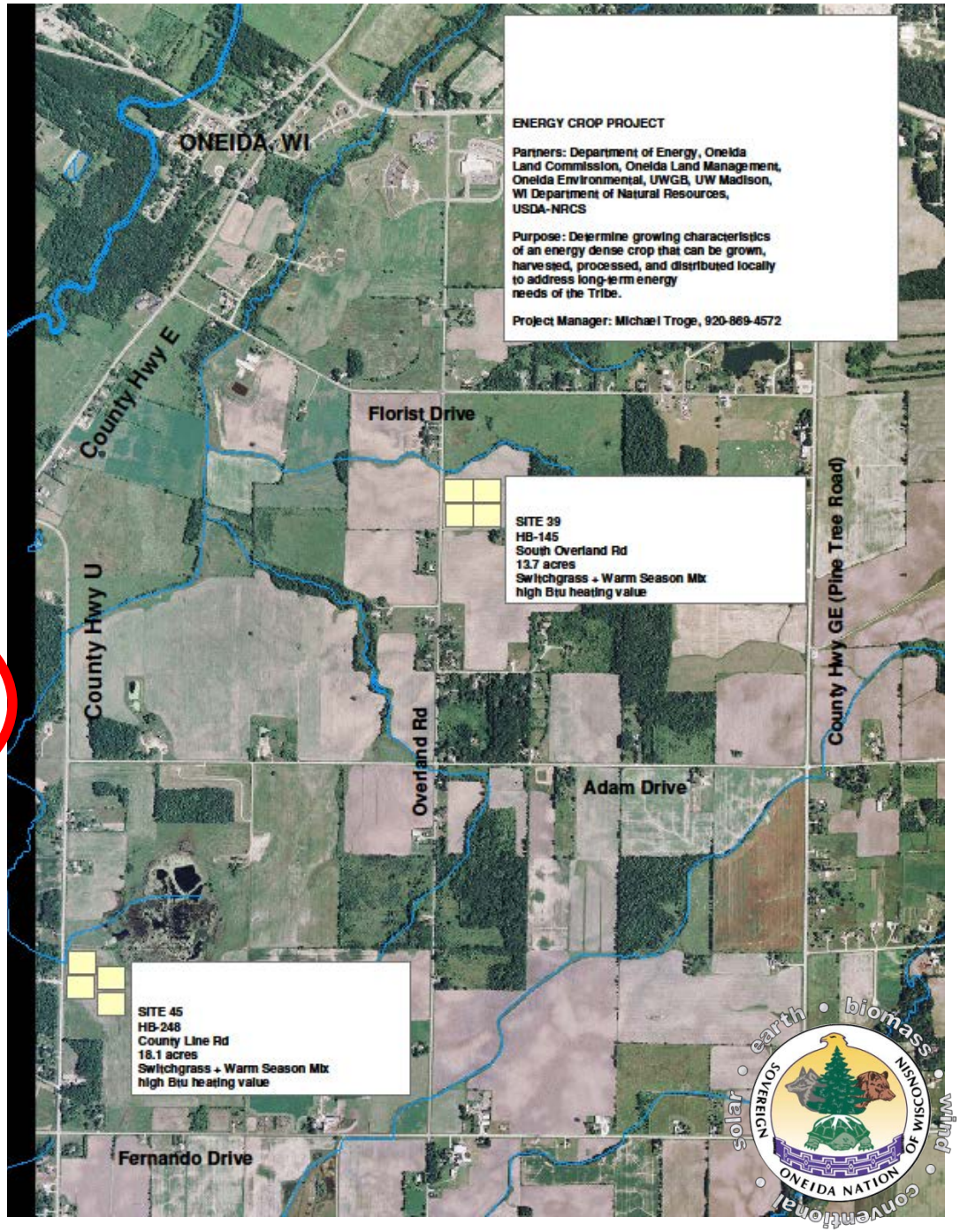


Oneida Farm Grain Dryer

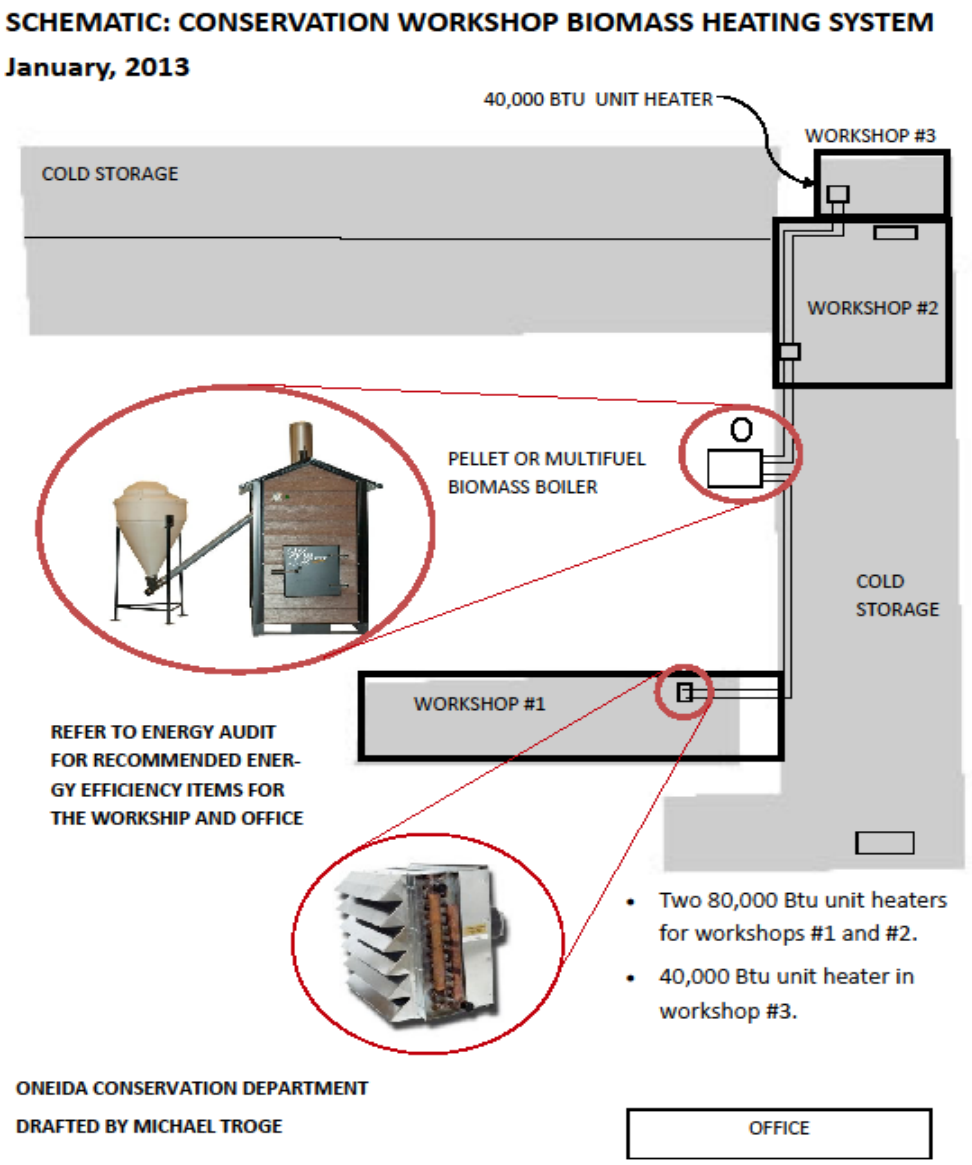
Fuel Comparative			
	Current System	Biomass Systems	
System	Fossil Fuel	Pellets (100%)	Chips (100%)
Model	MC 980	Even-Temp	Even-Temp
Output	3,662,005	3,180,000	3,180,000
Age/Cost	20 years	$116,000	$130,000
Fuel			
Type	Propane	Wood Pellets	Wood Chips
Units	Gallons	Tons	Tons
Normalized Units	15,826	86	130
Cost/Unit	$1.20	$180	$55
Total Cost	$18,991	$15,527	$7,163
Energy Inflation	3%	3%	3%
Annual Savings		$3,464	$11,828
Estimated Payback (Years)		23	9

Biomass resources

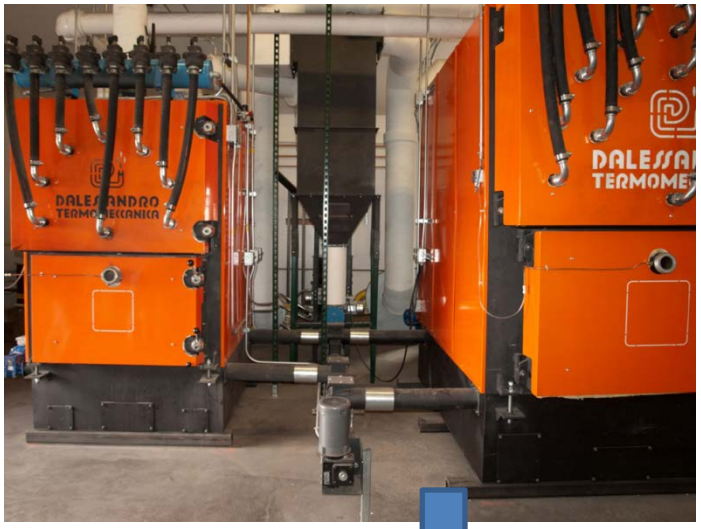
- DOE funding for first 2 years of 5-10 yr study
- Partnership: Oneida Tribe, UWGB, UWM, WDNR, NRCS, DOE
- Opportunity to use agriculture as a means to grow a local thermal energy crop.
- Research, investment, marketing, & business model vital to success

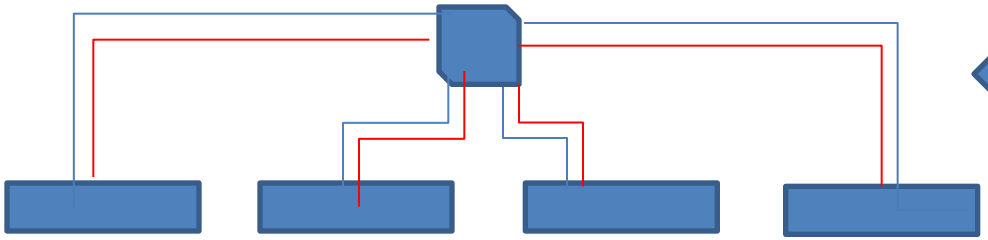


Conservation Department Demonstration



Campus Style Energy





solar earth biomass wind conventional
SOVEREIGN ONEIDA NATION OF WISCONSIN

Benefits of Local Biomass Energy

(**sustainable** harvest of grasses and trees)

Economic & social

- Local source
- Transport costs kept low
- Local jobs
- Keep dollars local
- Heating source
- Possible Biofuels
- Use existing equipment
- Keep capital costs low

Environmental

- Water quality improved
- Habitat improved
- Soil erosion mitigated
- Phosphorus runoff mitigated
- Recycled carbon (GHG)
- Regenerates itself
- Low maintenance
- Restore pre-industrial landscape

HEATING THE MIDWEST
WITH RENEWABLE BIOMASS

ONEIDA EVENT

What: **Heating the Midwest**

Who: anyone interested in biomass energy, especially Tribes

Where: Radisson Hotel and Conference Center

When: April 29 pre-conference tour
April 30 – May 1 conference

http://heatingthemidwest.org/conferences/

Hosts: Heating the Midwest
Oneida Tribe of Indians of WI
University of Wisconsin Green Bay

Yaw^ko!

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