

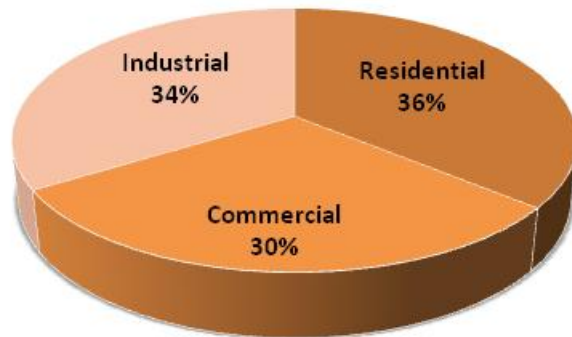


AGENDA

- Welcome
- Current Energy State
 - ▶ Electric Sector
 - ▶ Natural Gas Sector
- Production – Consumption - Potential - Recommendations
- Technologies with Highest Potential by County
- Selected Projects
 - ▶ Solar
 - ▶ Wind
 - ▶ Combined Heat & Power
 - ▶ Geothermal
 - ▶ District Energy

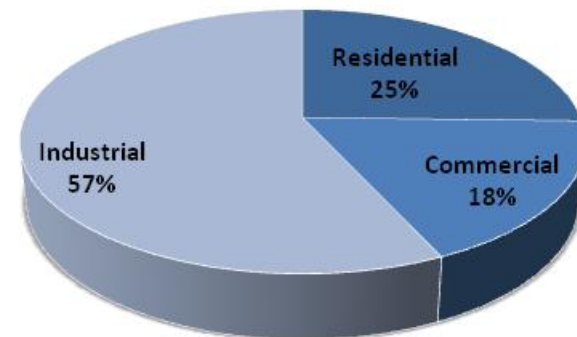
Energy Consumption by Sector and County

Electrical Consumption



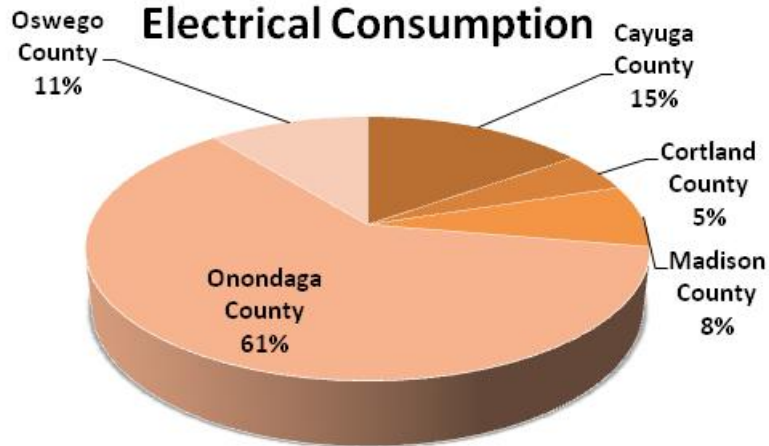
ICF International

Natural Gas Consumption



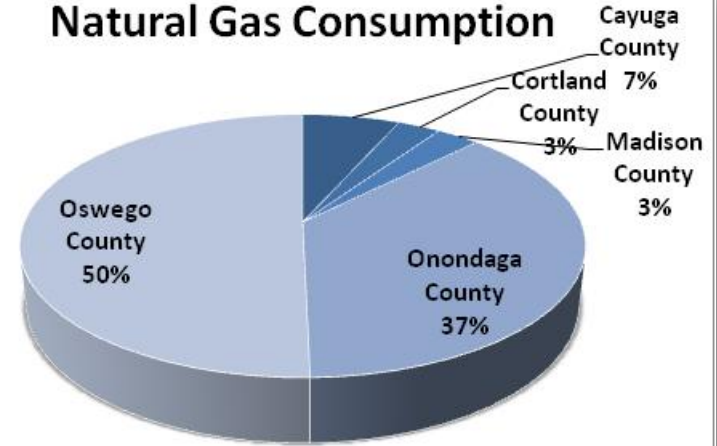
ICF International

Electrical Consumption



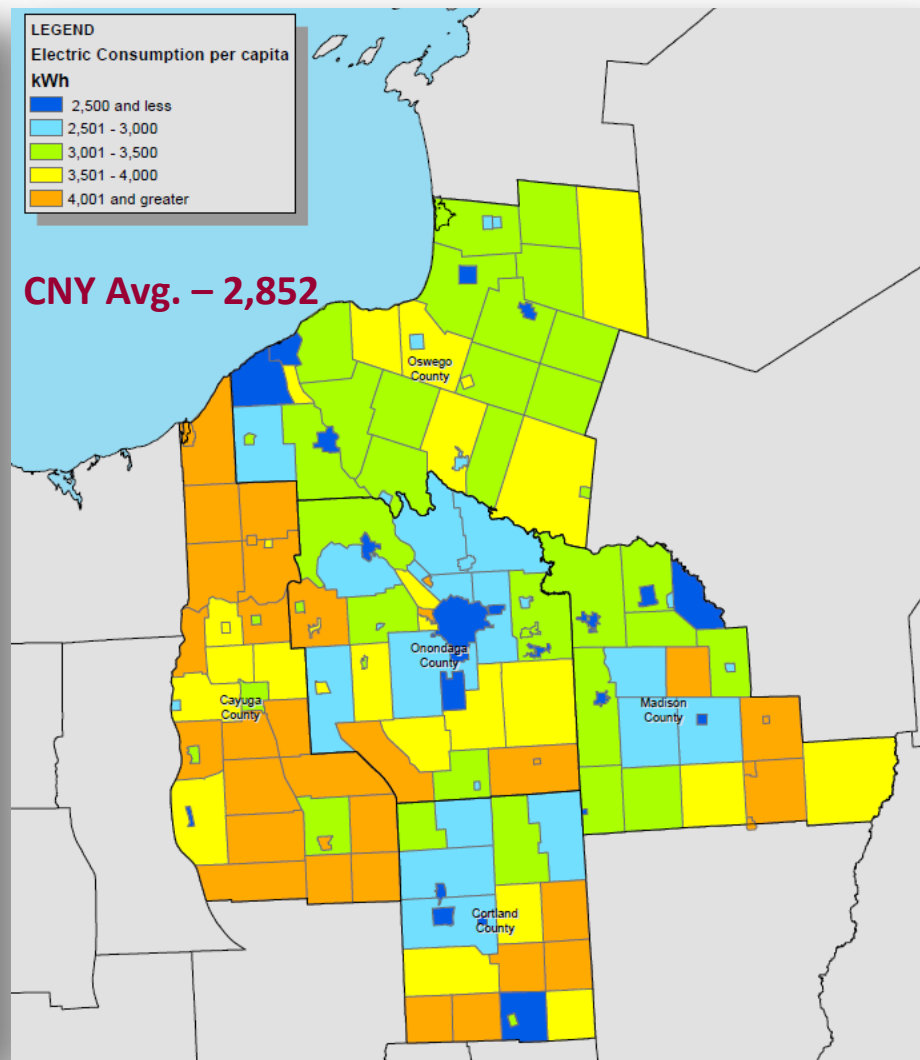
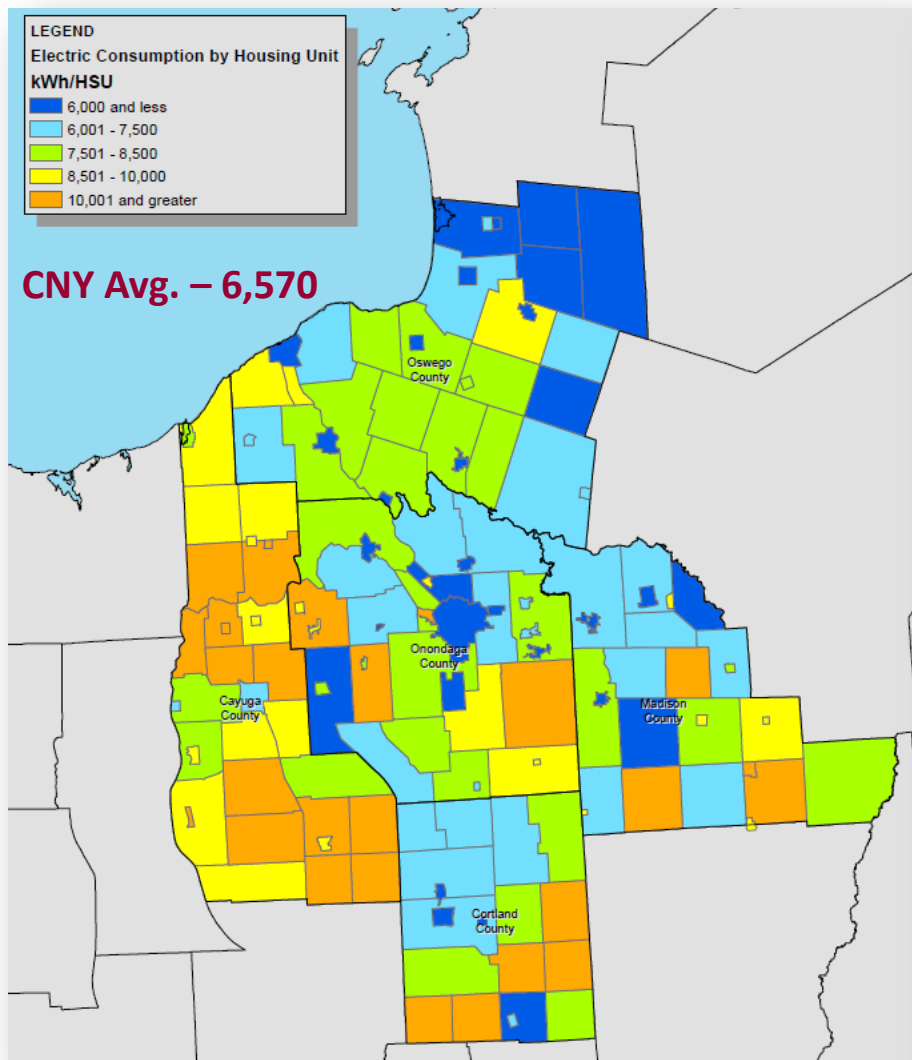
ICF International

Natural Gas Consumption

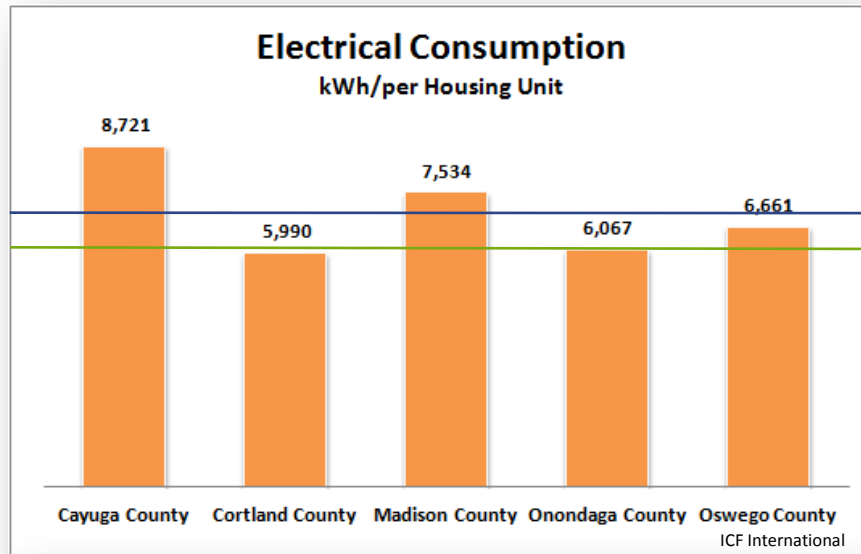


ICF International

Electric Consumption per Housing Unit and per Capita

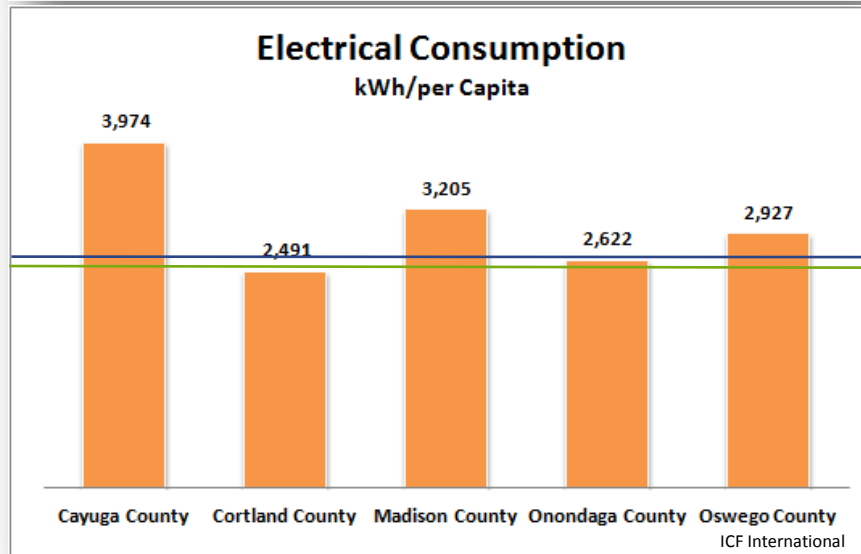


Electric Consumption per Housing Unit and per Capita



7,332 NYS Average

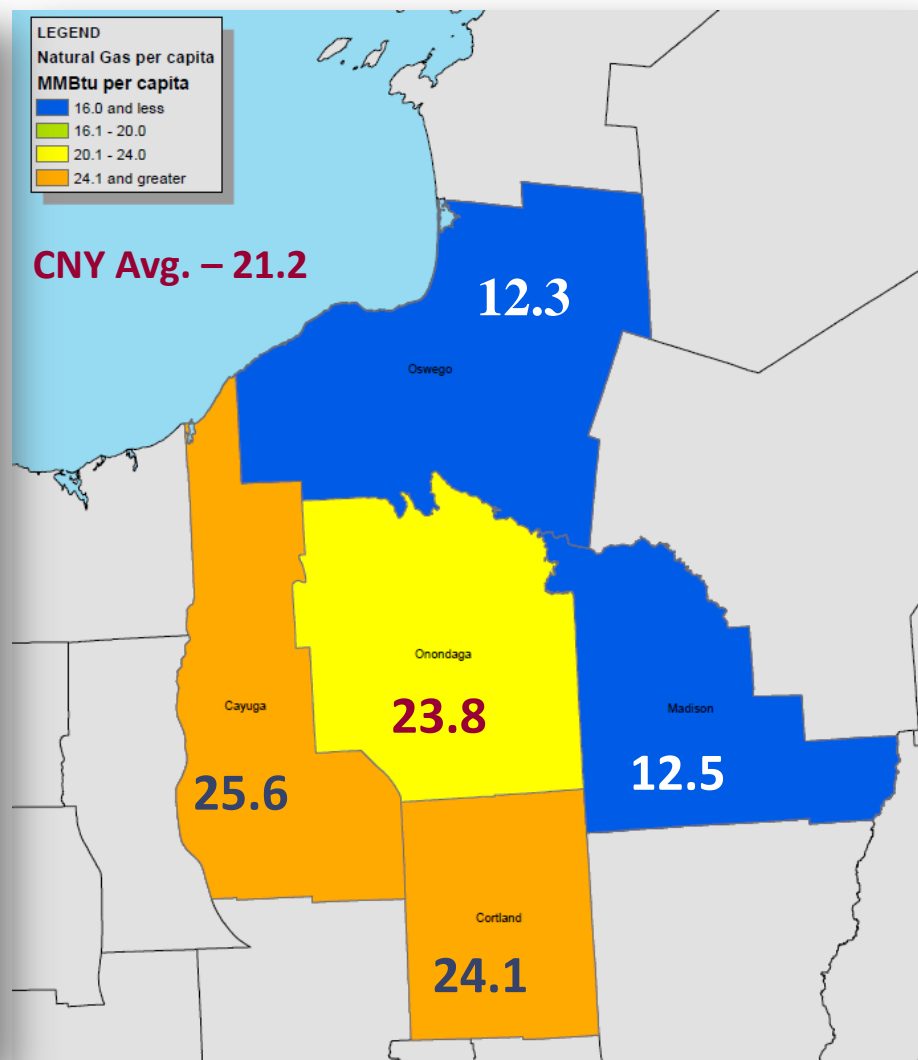
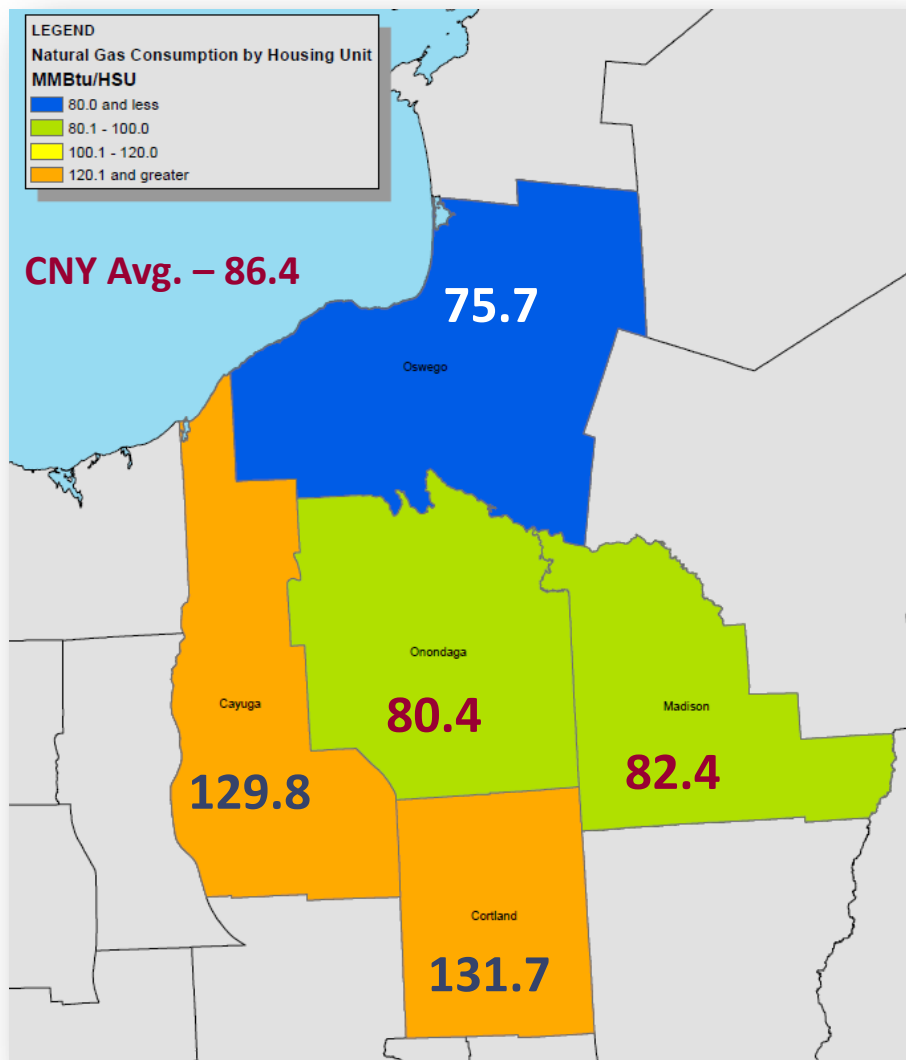
6,570 CNY Average



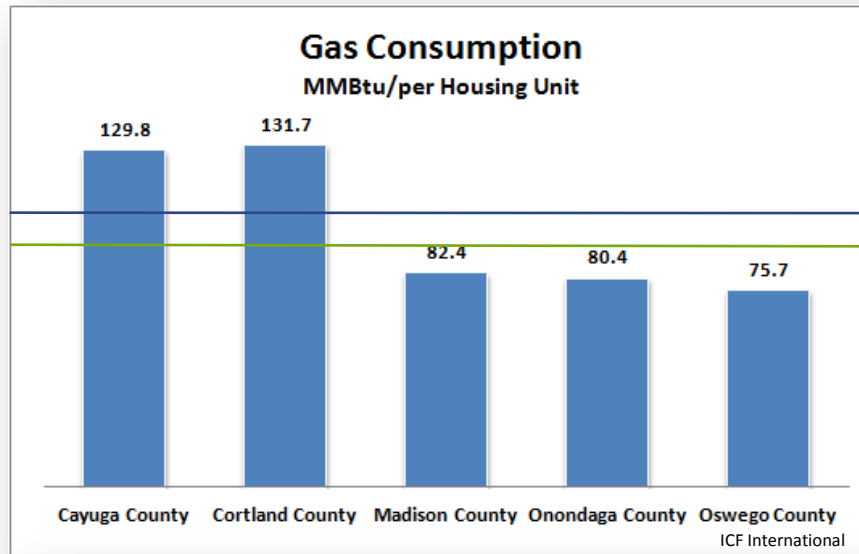
2,627 NYS Average

2,582 CNY Average

Natural Gas Consumption per Housing Unit and per Capita

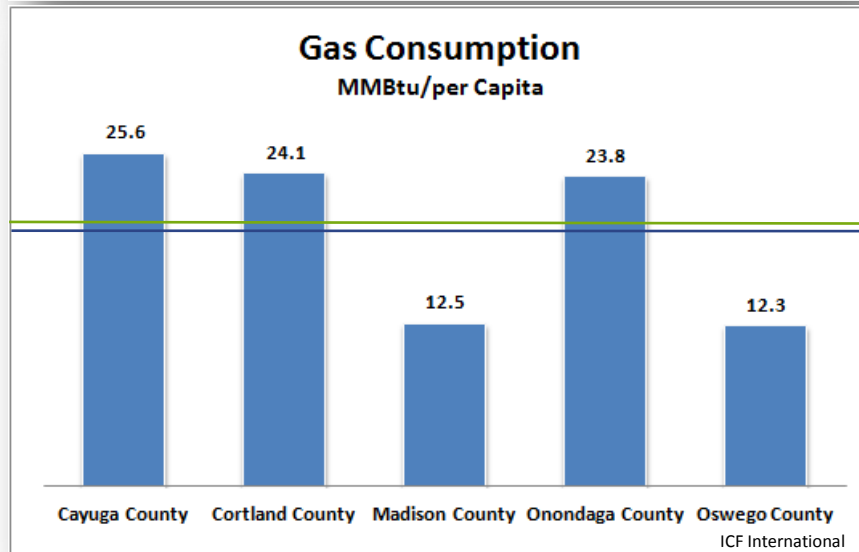


Natural Gas Consumption per Housing Unit and per Capita



NYS Average

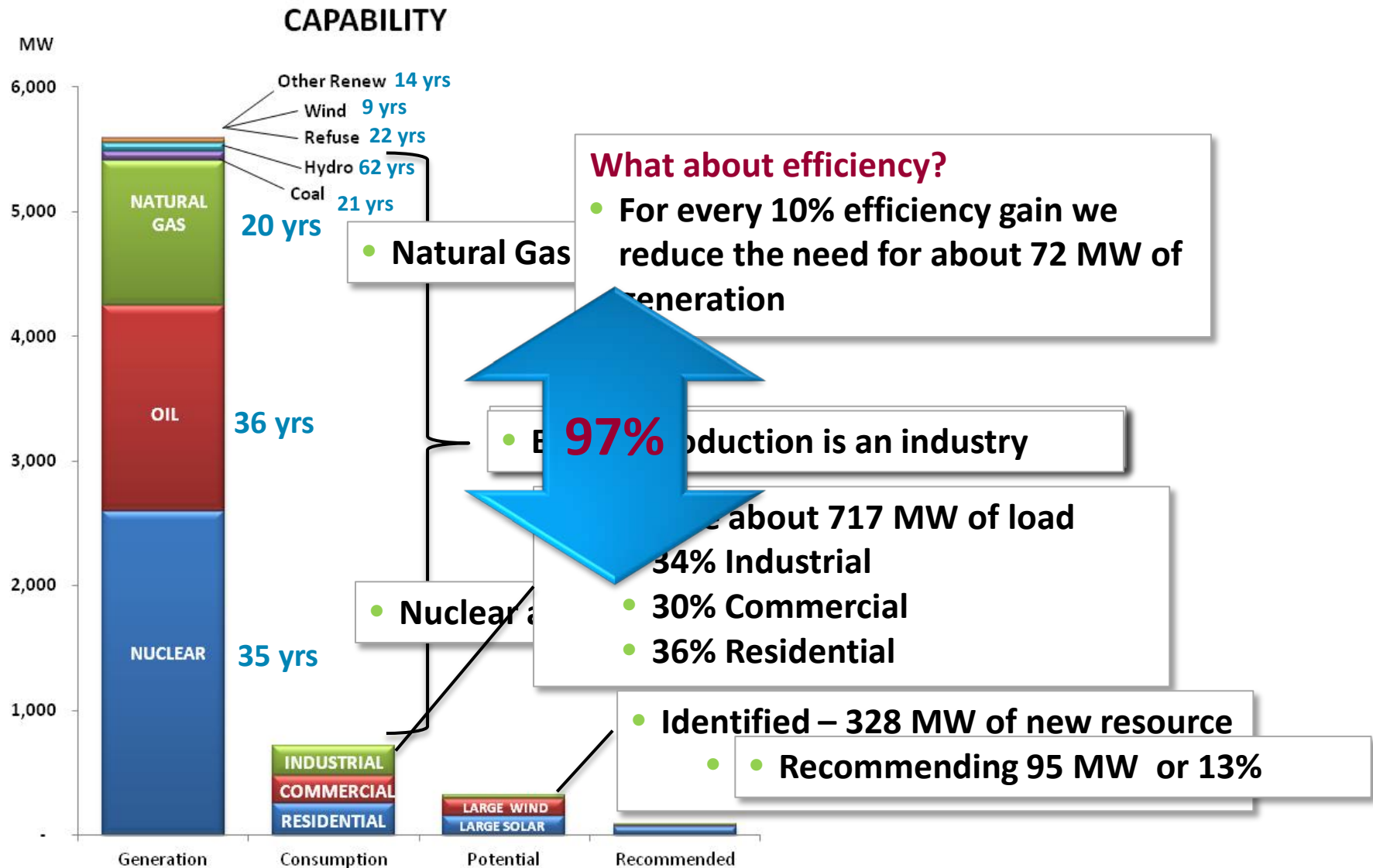
86.4 CNY Average



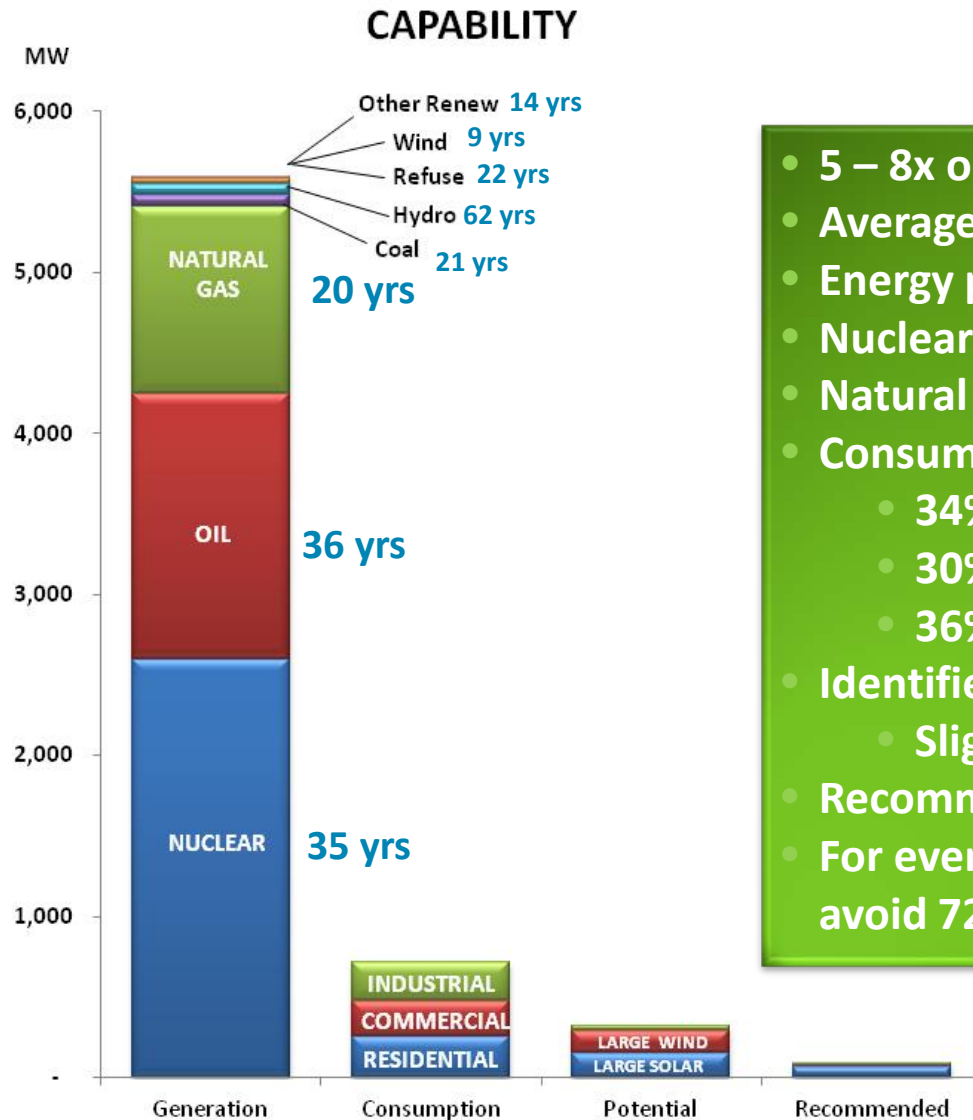
20.9 NYS Average

21.2 CNY Average

Generation – Consumption – Potential - Recommendations









Generation – Consumption – Potential - Recommendations



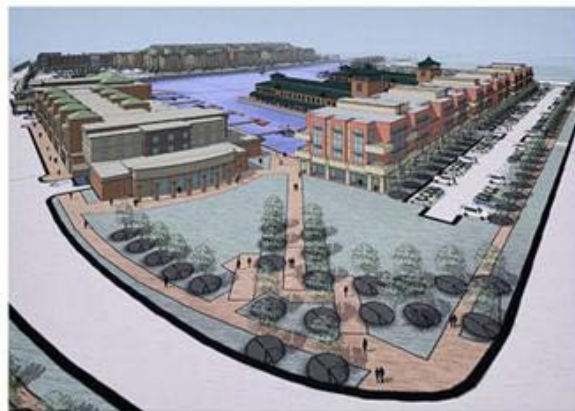
- 5 – 8x our regional consumption
- Average age of 30 years
- Energy production is an industry
- Nuclear actually supplies 82%
- Natural Gas actually supplies 15%
- Consume about 717 MW of load
 - 34% Industrial
 - 30% Commercial
 - 36% Residential
- Identified – 328 MW of new resource
 - Slightly less than ½ of need
- Recommending 95 MW or 13%
- For every 10% in efficiency gain we avoid 72 MW of new generation

Highest Potential for Distributed Generation by County

Firm	Distributed Generation	Cayuga	Cortland	Madison	Onondaga	Oswego
	Solar Thermal	●	●	●		●
	Solar Electric (PV)	●	●	●	●	●
	Wind		●	●		●
	CHP				●	
	Geothermal	●	●	●		●
	District Energy Systems				●	



SELECTED PROJECTS



► **Solar (19 sites)**

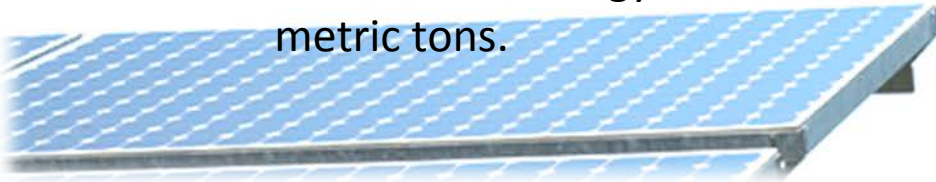
- Combined net annual energy production between 6,290 MWh and 9,430 MWh.
- Potentially offset 5,900 metric tons of CO₂ emissions per year.
- If 19th location included: net energy increase to between 7,670 MWh and 11,500 MWh and CO₂ emissions reductions would increase to 7,200 metric tons.

► **Alternate Solar (10 sites)**

- Net energy output would be between 62,430 MWh and 93,610 MWh annually; resulting in an offset of CO₂ emissions estimated at 48,995 metric tons.

► **Combined Solar (29 sites)**

- 19 original sites plus 10 additional sites = between 70,100 MWh and 105,110 MWh in net energy; and a total offset of CO₂ emissions estimated at 56,195 metric tons.



Large and Small Solar Sites



Site Rank	Site Name	Size	Score	System Size (kW) ¹	Annual Energy Production ² (MWh)	Offset CO ² Emissions ³ (metric tons)	LCOE (¢/kWh)	Site ID
1	McQuay Applied Terminal Systems	Large	9	1,330	1,410-2,110	890 – 1,320	9.9 – 16.6	30
2	Berry Plastics Manufacturing Facility	Large	9	1,030	1,040-1,560	650 – 980	10.6 – 17.6	51
3	Keystone Properties - Victory Packaging	Large	9	870	880-1,310	550 – 820	10.7 – 17.9	27
4	Johnston Paper Co.	Small	9	250+	250-370	160 – 250	11.0 – 18.3	108
5	Briggs & Stratton Power Products	Small	9	250+	260-390	160 – 240	11.0 – 18.4	71
6	SUNY Cortland Park Center	Small	8	250+	260-390	160 – 240	11.1 – 18.5	97
7	Stoda Warehouse	Small	8	180	190-290	120 – 180	11.2 – 18.6	114
8	BJ's Wholesale Club, East Syracuse, NY	Small	9	250+	250-380	160 – 240	11.4 – 19.0	107
9	BJ's Wholesale Club, Clay, NY	Small	9	250+	250-380	160 – 240	11.5 – 19.2	91
10	Fingerlakes Mall	Small	9	130	130-200	80 – 130	11.7 – 19.5	26
11	CNY Regional Transit Authority	Small	9	250+	250-370	160 – 230	11.8 – 19.6	75
12	McLane Northeast Supplier	Small	8	250+	250-370	160 – 230	11.8 – 19.6	47
13	Syracuse University Physical Plant	Small	8	160	160-240	100 – 150	12.0 – 20.1	142
14	Syracuse School District BOVA Supply Center	Small	8	150	150-220	90 – 140	12.1 – 20.2	155
15	JGB Enterprises	Small	9	150	150-220	90 – 140	12.2 – 20.3	169
16	Wegmans Supermarket	Small	8	140	140-210	90 – 130	12.2 – 20.5	130
17	Great Northern Mall	Small	8	200	190-290	120 – 180	12.3 – 20.5	12
18	Tops Market	Small	9	70	70-100	40 – 60	13.0 – 21.7	163
29	Colgate University Old Golf Course ⁴	Large	8	1,340	1,380-2,070	870 – 1,300	10.2 – 17.0	29+

Alternate Solar Sites



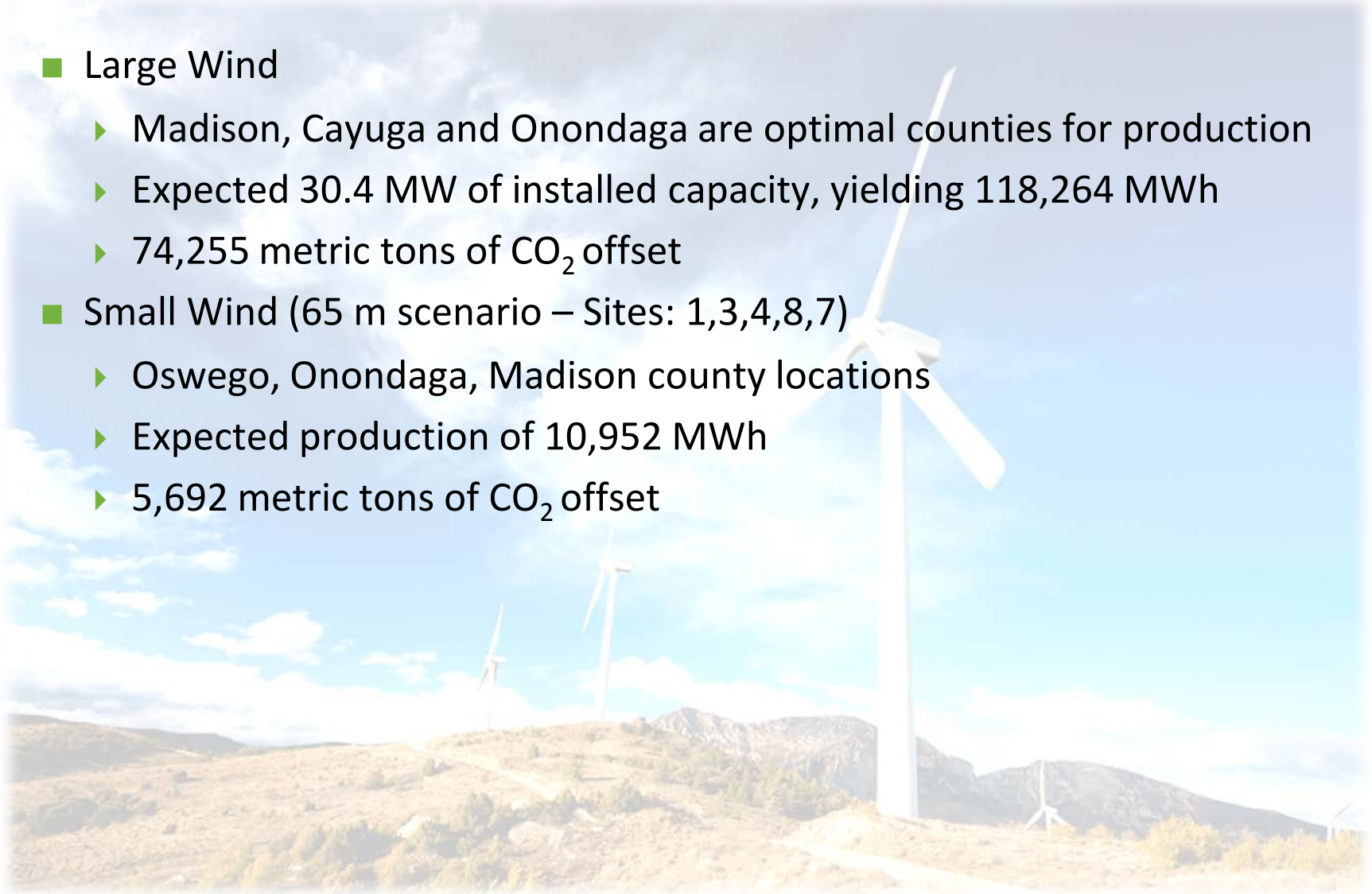
Site Rank	Site Name	Size	Score	System Size (kW)	Annual Energy Production (MWh) ¹	Offset CO ₂ Emissions ² (metric tons)	LCOE (¢/kWh)	Site ID
1	Honeywell – 9-11a (top)	Large	8	21,090	22,190-33,280	13,930 – 20,900	8.6 – 14.3	51A
2	Syracuse Airport	Large	9	22,610	23,750-35,620	14,910 – 22,360	8.5 – 14.2	8A
3	Honeywell – 9-11b (berms)	Large	8	4,910	5,170-7,750	3,250 – 4,870	9.3 – 15.5	52A
4	Salina Landfill	Large	8	5,430	5,710-8,570	3,590 – 5,380	9.2 – 15.4	2A
5	Honeywell – 15a	Large	8	2,280	2,400-3,600	1,510 – 2,260	9.7 – 16.2	54A
6	Raymour & Flanigan Warehouse	Large	9	1,510	1,590-2,380	1,000 – 1,490	9.9 – 16.6	45A
7	SUNY Cortland	Large	9	430	470-700	300 – 440	10.4 – 17.3	46A
8	SUNY Morrisville	Large	9	320	360-530	230 – 330	10.3 – 17.2	48A
9	Onondaga County Community College	Large	8	400	420-630	260 – 400	10.7 – 17.8	49A
10	MWB Water Reservoir	Large	8	350	370-550	230 – 350	10.8 – 18.1	5A

■ Large Wind

- ▶ Madison, Cayuga and Onondaga are optimal counties for production
- ▶ Expected 30.4 MW of installed capacity, yielding 118,264 MWh
- ▶ 74,255 metric tons of CO₂ offset

■ Small Wind (65 m scenario – Sites: 1,3,4,8,7)

- ▶ Oswego, Onondaga, Madison county locations
- ▶ Expected production of 10,952 MWh
- ▶ 5,692 metric tons of CO₂ offset



Large Wind

Site	NCF%	Nameplate Capacity (MW)	100 m Wind Speed (m/s)	Gross Energy Production (MWh)	Loss Estimate (%)	Net Energy Production (MWh)	COE (\$/kWh)	Offset CO ₂ Emissions (metric tons)	Site ID
Madison	44.6	9.60	7.52	46,605	19.5	37,517	8.4	23,556	2
Cayuga	45.0	9.60	7.60	46,906	19.3	37,853	8.5	23,767	3
Onondaga	43.7	11.20	7.41	46,906	19.3	42,894	8.6	26,932	6

Small Wind

Site	NCF%	65 m Wind Speed (m/s)	Gross Energy Production (MWh)	Loss Estimate (%)	Net Energy Production (MWh)	LCOE (\$/kWh)	Offset CO ₂ Emissions (metric tons)	Site ID
Alcan Aluminum Corporation	33.8	6.69	2534	17.2	2098	10.8	1317.3	1
SUNY Oswego	31.2	6.43	2336	17.2	1934	11.5	1214.3	3
St. Luke's Residential Health	30.9	6.39	2313	17.2	1915	11.6	1202.4	4
Marquardt Switches Inc.	27.1	6.10	2020	17.2	1673	12.9	1050.4	8
Fabius Greenwood Farm, LLC	23.5	5.76	1749	17.2	1448	14.5	909.1	7



■ QUEENSBORO FARMS, CANASTOTA, NY

▶ Current

- › Dairy processing facility with significant thermal loads and significant amounts of compressed air use.
- › Currently uses two rotary screw compressors totaling 160 HP to meet this load. The compressors are about 30% less efficient than modern air.

▶ Proposed Project

- › A natural gas-engine-driven air compressor would displace significant amounts of electrical use without requiring electrical interconnection to the utility grid.
- › Would **displace about 80 kW from the grid** and **save about \$16,000 per year** with a simple payback just over 10 years
- › Approximately **60 metric tons** of annual CO₂ reduction

Potential Site	County	Description	City (C), Village (V) or Town (T)	Incremental Cost	First Year Energy Cost Savings	Simple Payback Period (years)
SUNY Cortland, Park Center	Cortland	Retrofit existing ice rink and pool facility with heat pump system that extracts heat from ice making operation and uses the recovered heat to maintain pool water temperature.	Cortland (C)	\$1,104,000	\$306,000	3.6
Onondaga Community College, Coulter Library	Onondaga	Replace existing dual duct system for 90,000 square foot library with geothermal heat pump HVAC installation.	Onondaga (T)	\$453,000	\$33,300	13.6
Empire Brewing Company, Empire Farmstead Brewery	Madison	A geothermal heat pump system would be a natural complement to the proposed 20,000 square foot brewing operation, where waste heat such as that present in the mash be extracted to heat the building in winter.	Cazenovia (V)	\$90,200	\$9,160	9.8
Syracuse Community Health Center (SCHC)	Onondaga	The SCHC is proposing to construct a new 60,000 square foot medical office building on South Salina Street in Syracuse.	Syracuse (C)	\$217,000	\$17,800	12.2



SUNY Cortland



Empire Brewing Company

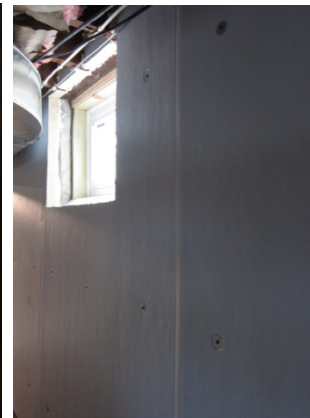
■ Syracuse Inner Harbor Redevelopment

- ▶ Proposed develop the 28 acre Syracuse Inner Harbor site into a mixed use neighborhood of housing retail and office buildings.
- ▶ Plans call for construction of more than 500 housing units, a satellite college campus, 100 room hotel, office buildings and other amenities.
- ▶ Engage the developer as early as possible to explore the potential benefits that district energy could bring to the project. Potential technologies that could be considered include
 - › Geoexchange heating and cooling using the harbor itself or the brine aquifer beneath the site,
 - › Biomass heating and high efficiency central heating and cooling plants.

NYSERDA Residential Penetration

- Penetration rate for Energy STAR in 5 county region is 3.7% since 2001
- Annual penetration rate is below 0.5%
- If we increase adoption rate to 2.5% of stock (5x ~ 7,000 units)
 - ▶ 40 year implementation
 - ▶ Annual cost of \$56 million at \$8,000/unit
- Key influences:
 - ▶ Energy costs
 - ▶ Economy
 - ▶ Service provider availability
 - ▶ High upfront costs to implement
 - ▶ Lack of financial assistance
- Potential solutions
 - ▶ PACE loans
 - ▶ On bill financing

■ Town of Preble Town Hall - Comprehensive Energy Retrofit



QUESTIONS?



THANK YOU

