

Wind Power Option



for Oakland University

There were two parts of the study

- **Wind Speed Study Results**

- Wind speed was recorded for two years at a 50 meter tall “met tower” located on the south side of the main campus
- Data collected for 2006 & 2007

- **Feasibility Study Results**

- This data was then used in a full engineering and cost analysis for one or more wind turbines for the Oakland campus



OAKLAND UNIVERSITY

50 meter tall NRG wind
anemometer tower.

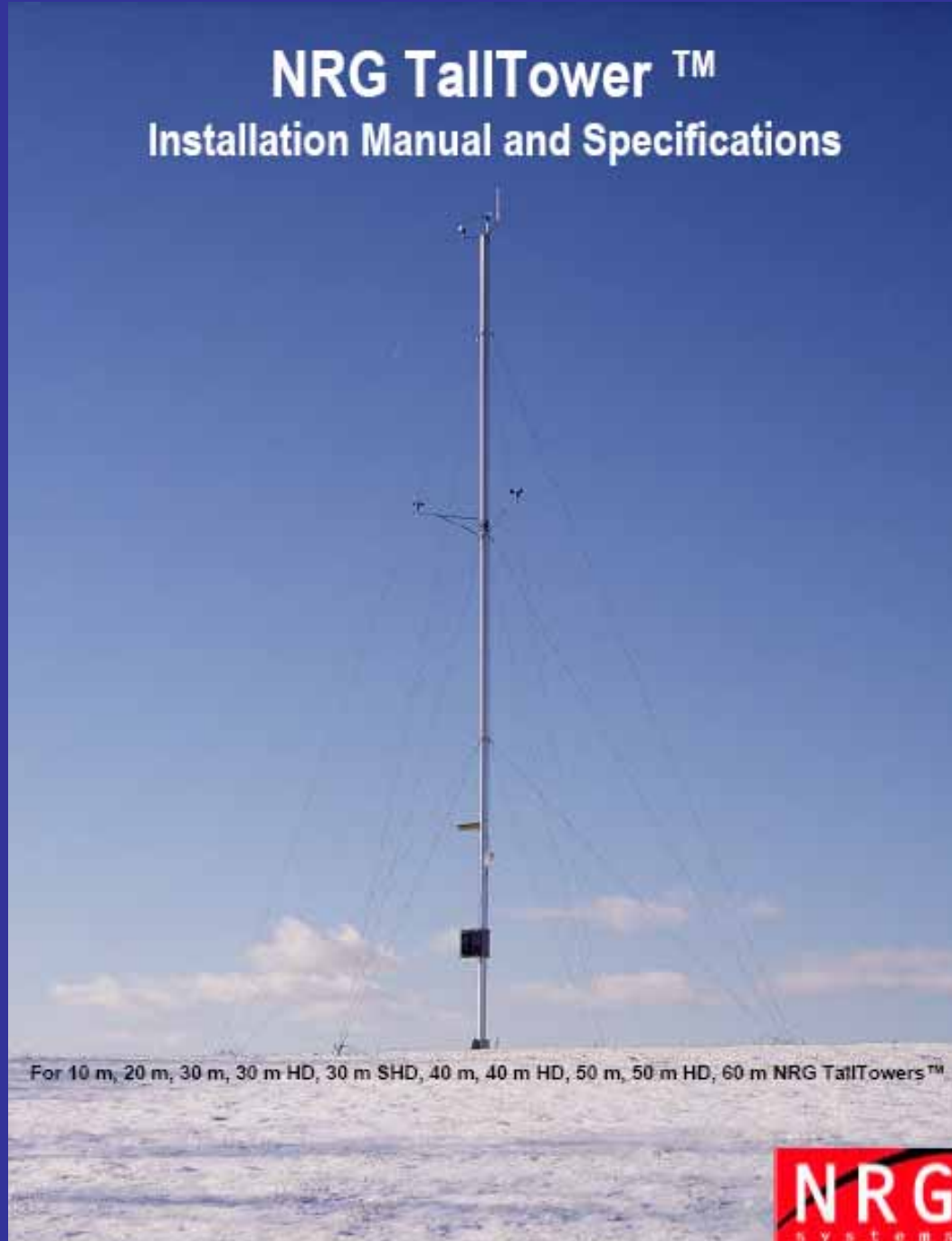
In cooperation with
Alternate Energy
Solutions, Inc. of
Eastpoint, Michigan.

www.aesmichigan.com



NRG TallTower™

Installation Manual and Specifications



For 10 m, 20 m, 30 m, 30 m HD, 30 m SHD, 40 m, 40 m HD, 50 m, 50 m HD, 60 m NRG TallTowers™



50 Meter Tall Tower Assembly



50 meters

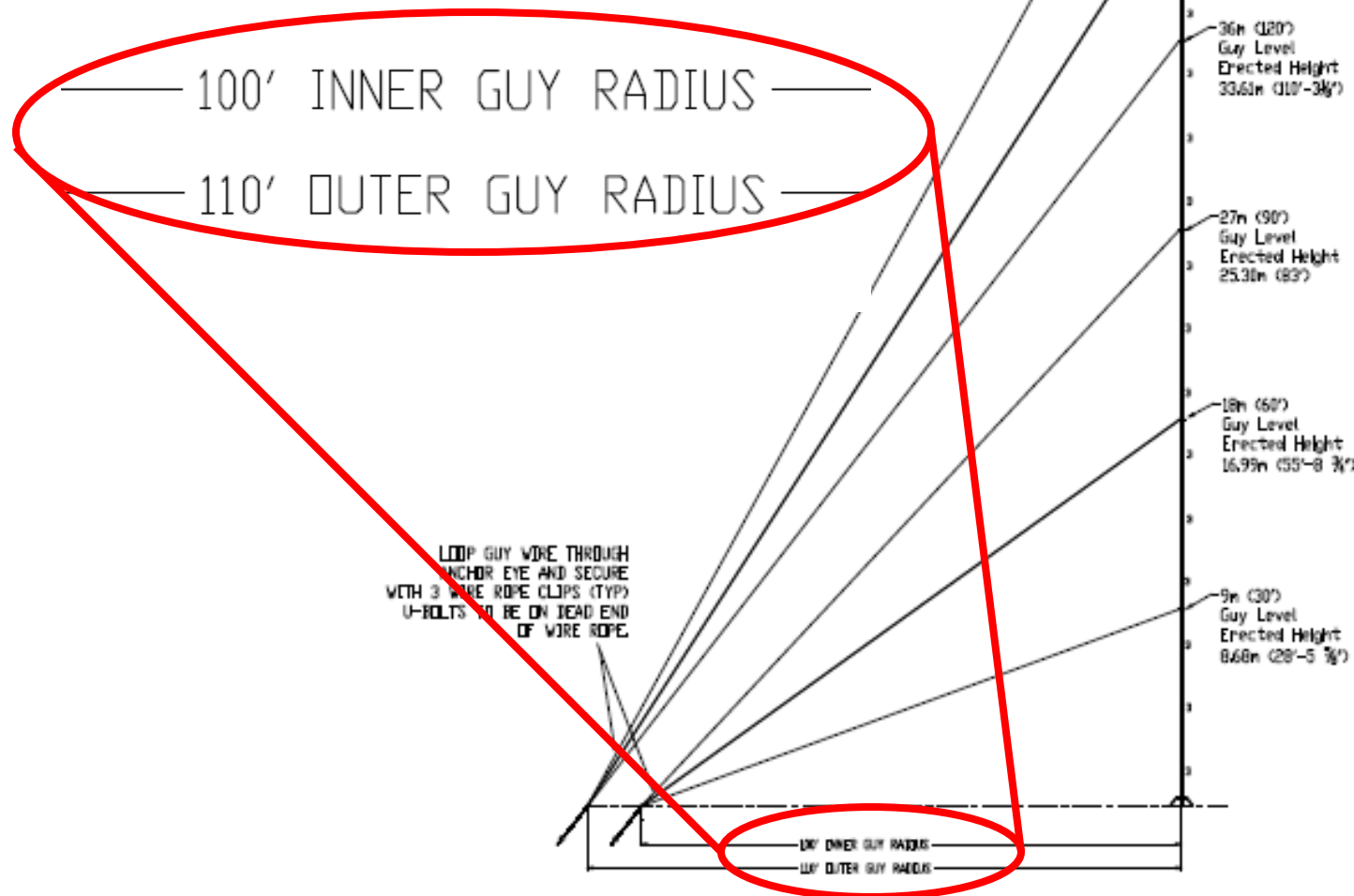
43.5 meters

36 meters

27 meters

18 meters

9 meters

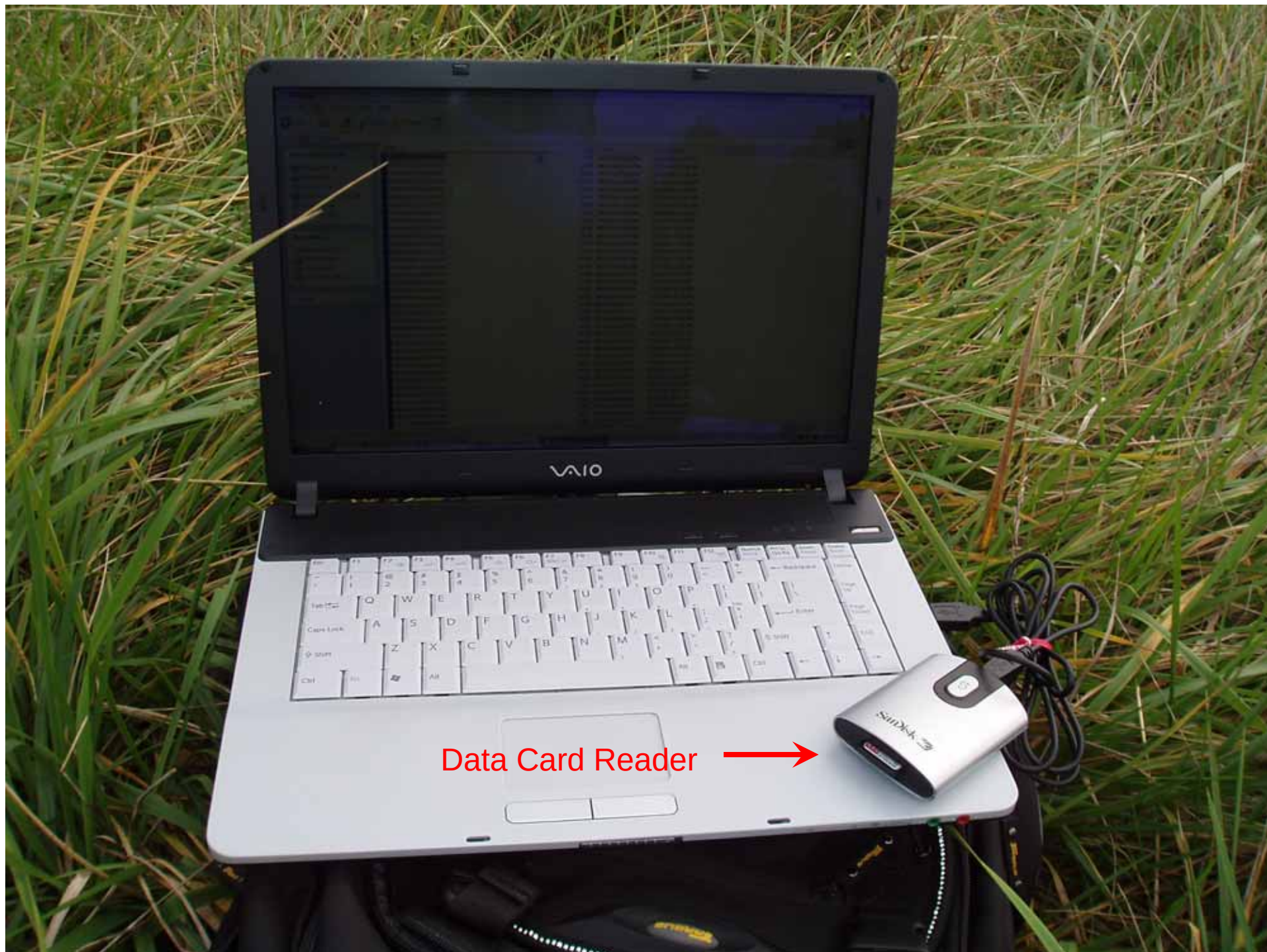






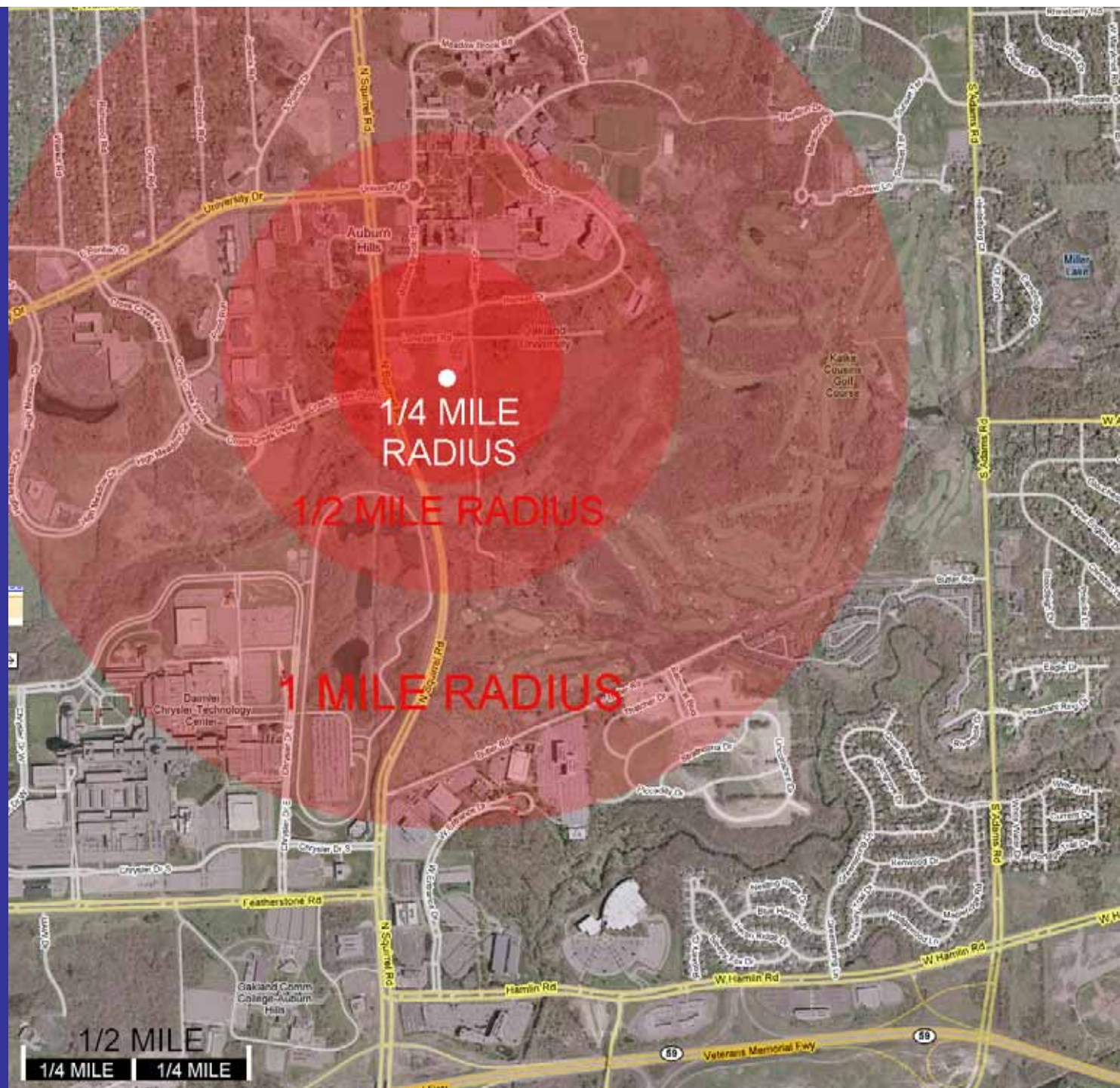






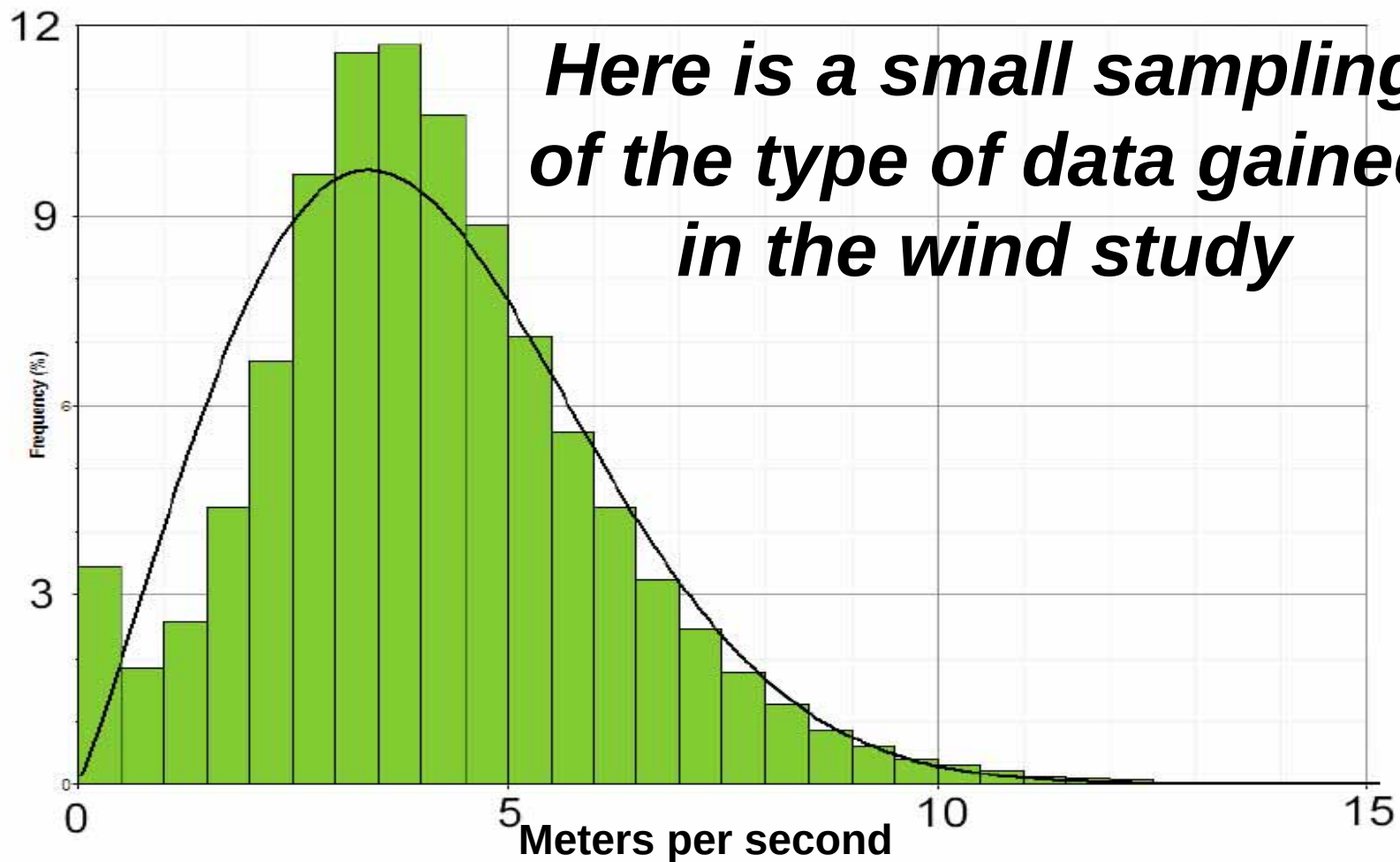
Data Card Reader →



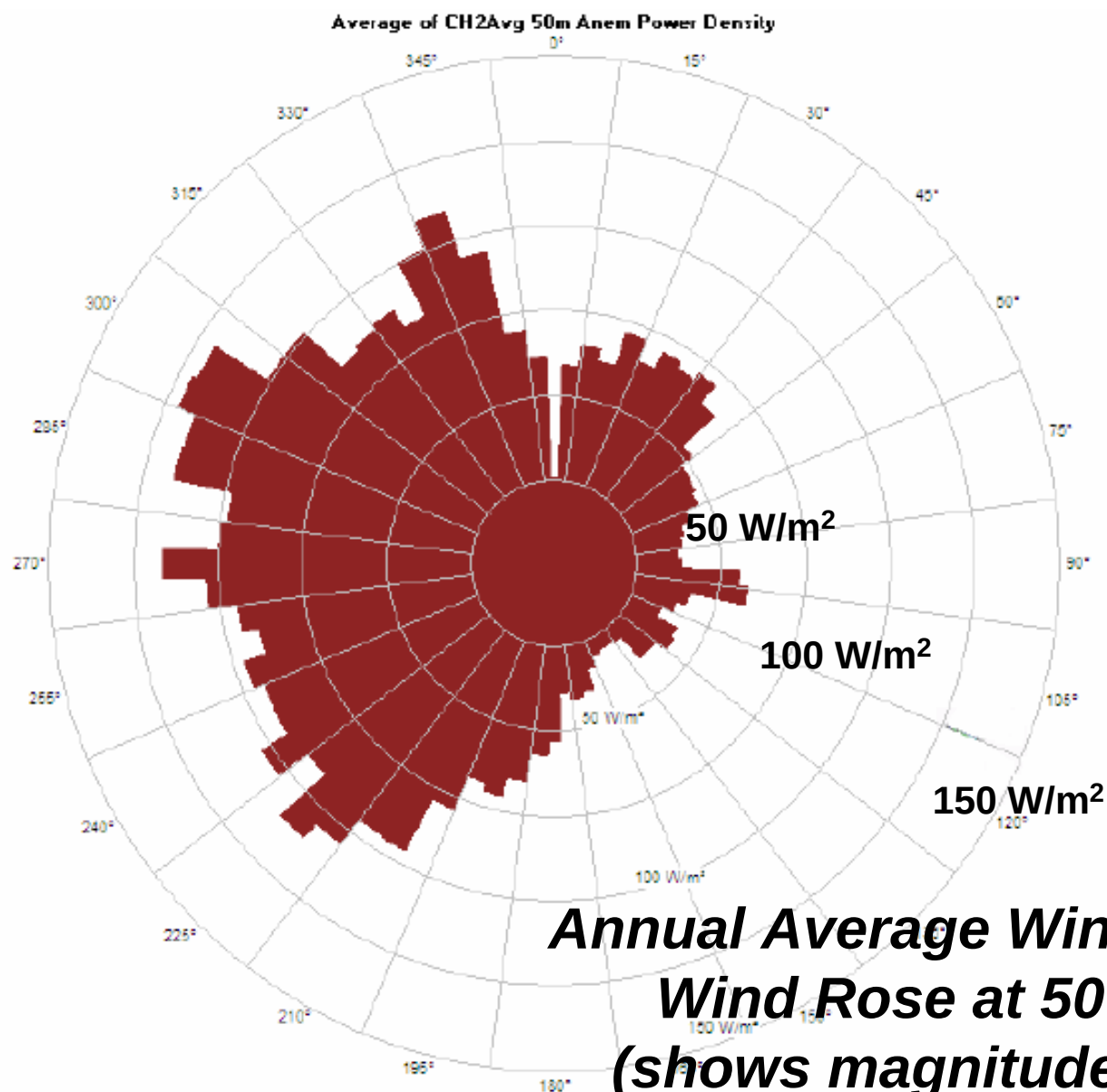


Average Wind Data Results

<u>Height</u>	<u>Wind Speed</u>	<u>Method</u>
30 m	3.0 m/s	measured
40 m	3.6 m/s	measured
50 m	4.1 m/s	measured
75 m	5.2 m/s	calculated
80 m	5.4 m/s	calculated
100 m	6.2 m/s	calculated



***Wind Speed Frequency Distribution at 50 Meters
(percent time for each wind speed)***



Potential Installation Sites

1



2



3



4



Artist's Rendering of Oakland Wind Turbine



(image courtesy of Khaled Dahr & Jim Leidel)



Here is a typical wind turbine under consideration

1,500 kW each

77 meter blade
diameter

100 meter tower

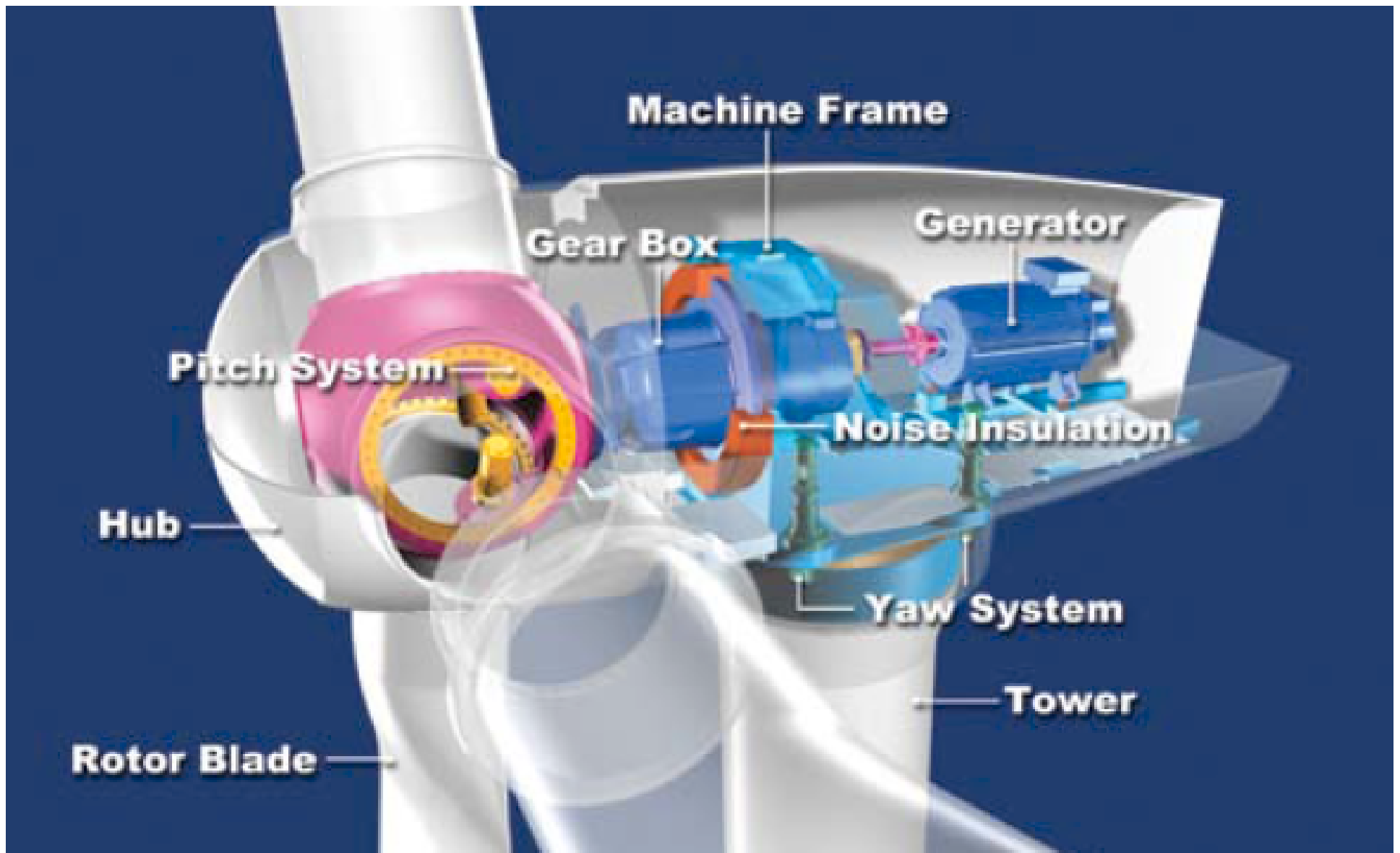
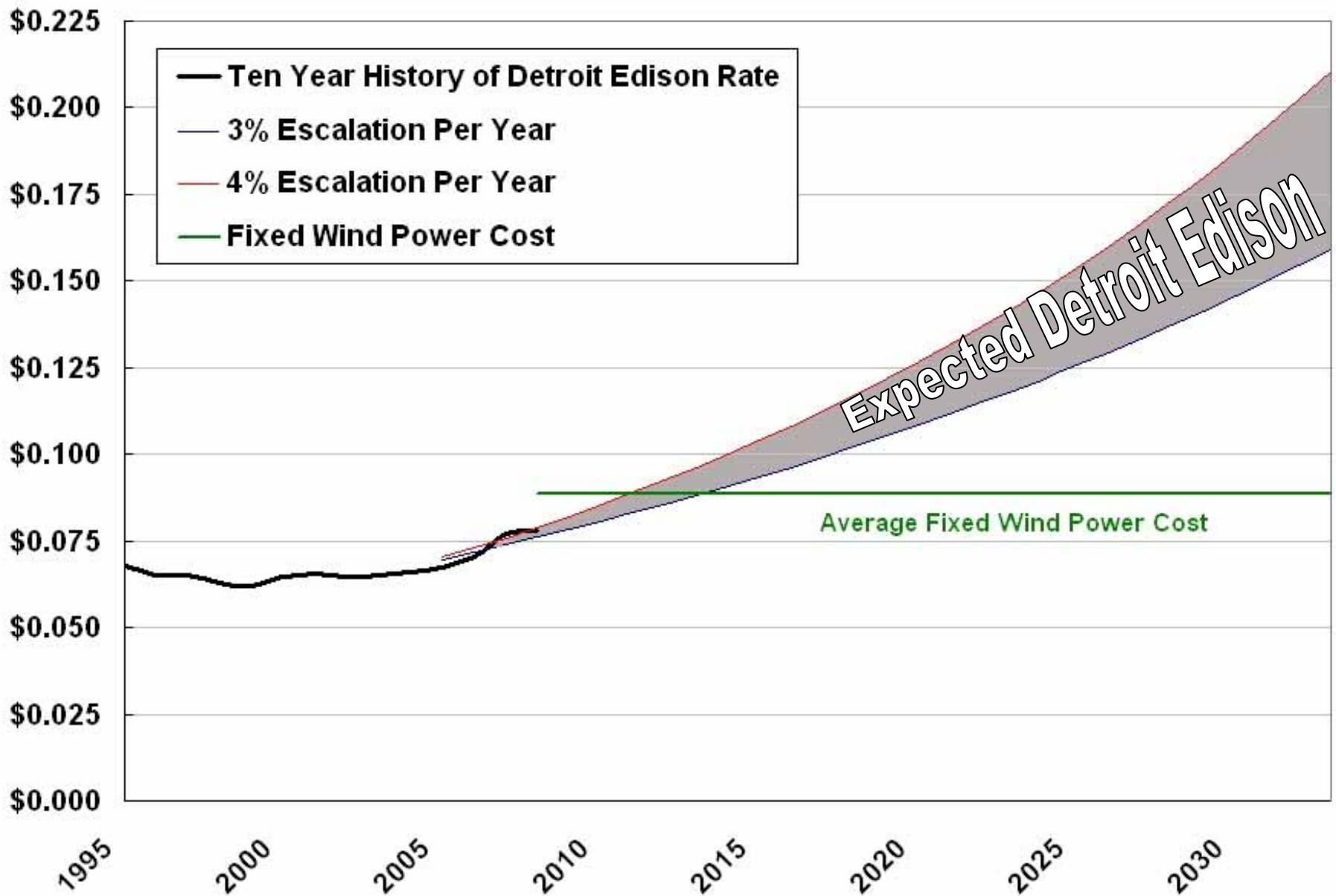


Illustration of turbine components



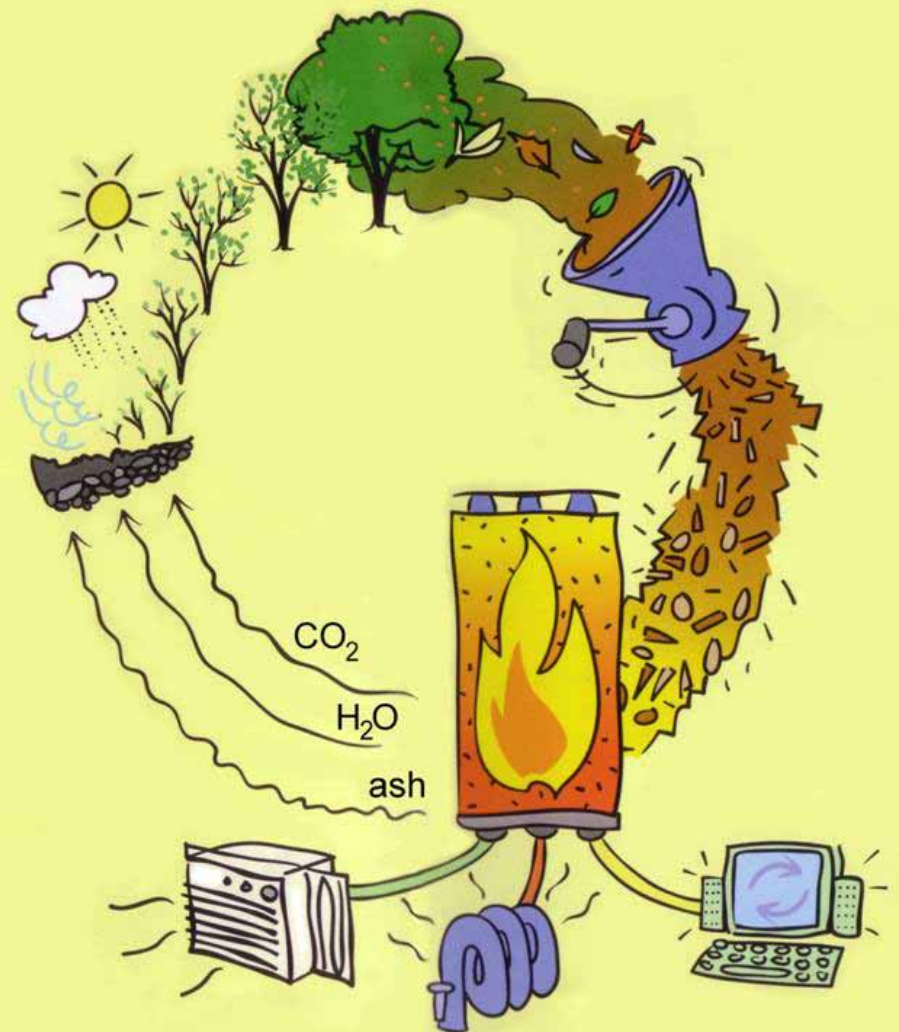
Projected Cost per kW-hr Electricity Over 25 Year Project

Biomass Power Option

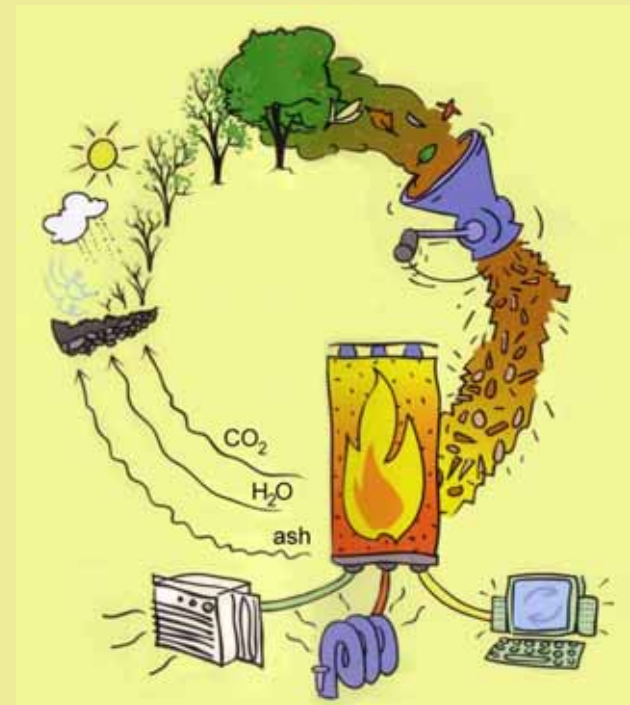


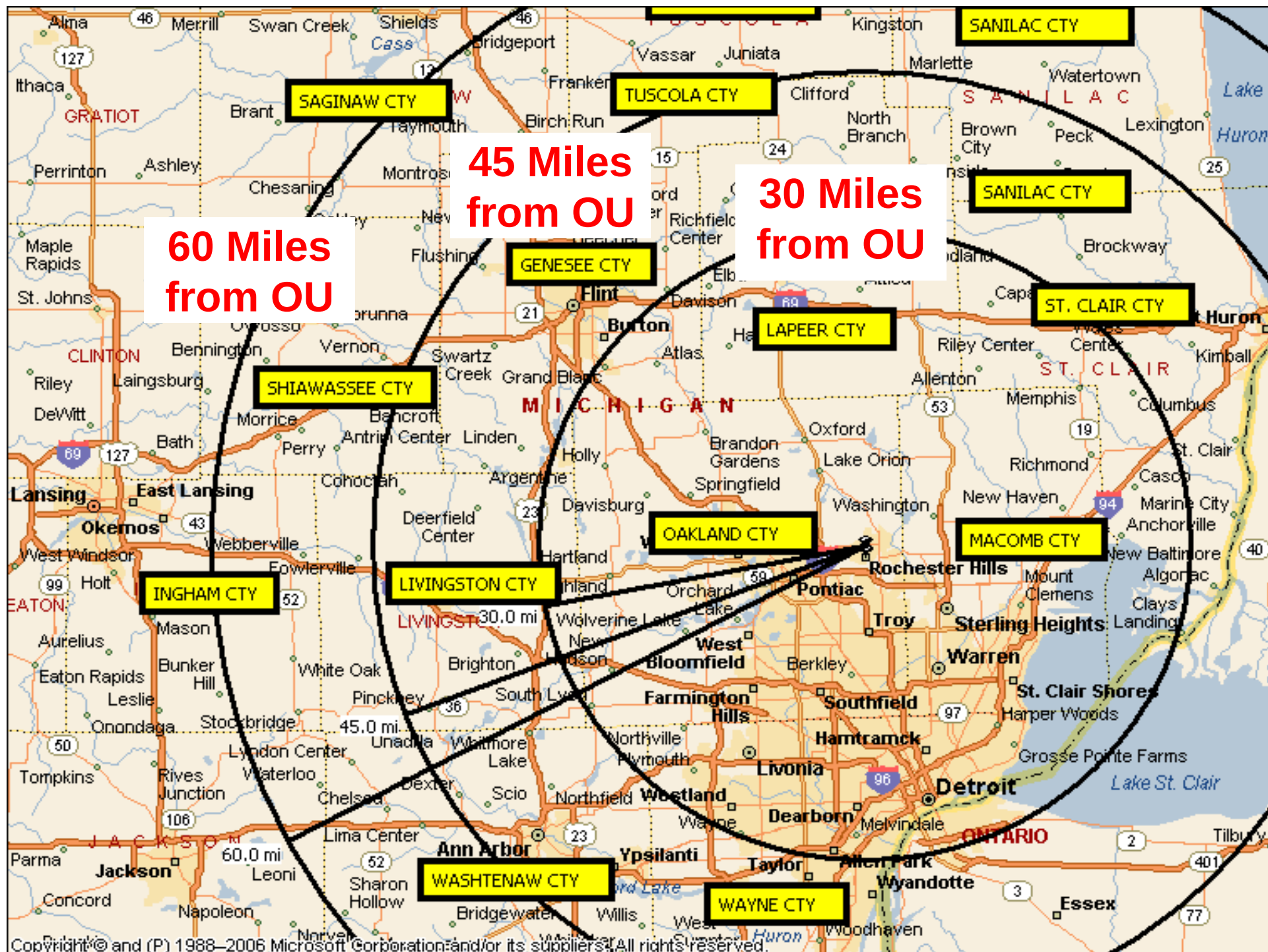
for Oakland University

- Wood supply
- Campus growth & future needs
- Wood boilers
- Proposed sites
- Costs & savings



**We looked at 14
counties in SE
Michigan & found
1.7 million tons of
urban waste
wood per year**







Urban Waste Wood Findings from Study



a. Estimate from this study (2007)

1.7 million tons per year (MTPY)

b. MSU – Univ. of Cincinnati Study (2007)

1.5 MTPY

d. National Renewable Energy Labs (2005)

4.3 MTPY for all of Michigan

0.9 MTPY for 14 county area

c. Oak Ridge National Labs (1999)

2-4 MTPY for all of Michigan (cost based)



Urban Waste Wood Findings from Study

This study looked at:

White wood from industrial & construction

Storm damage

Land clearing for development

Non utility tree trimming

Utility company tree trimming

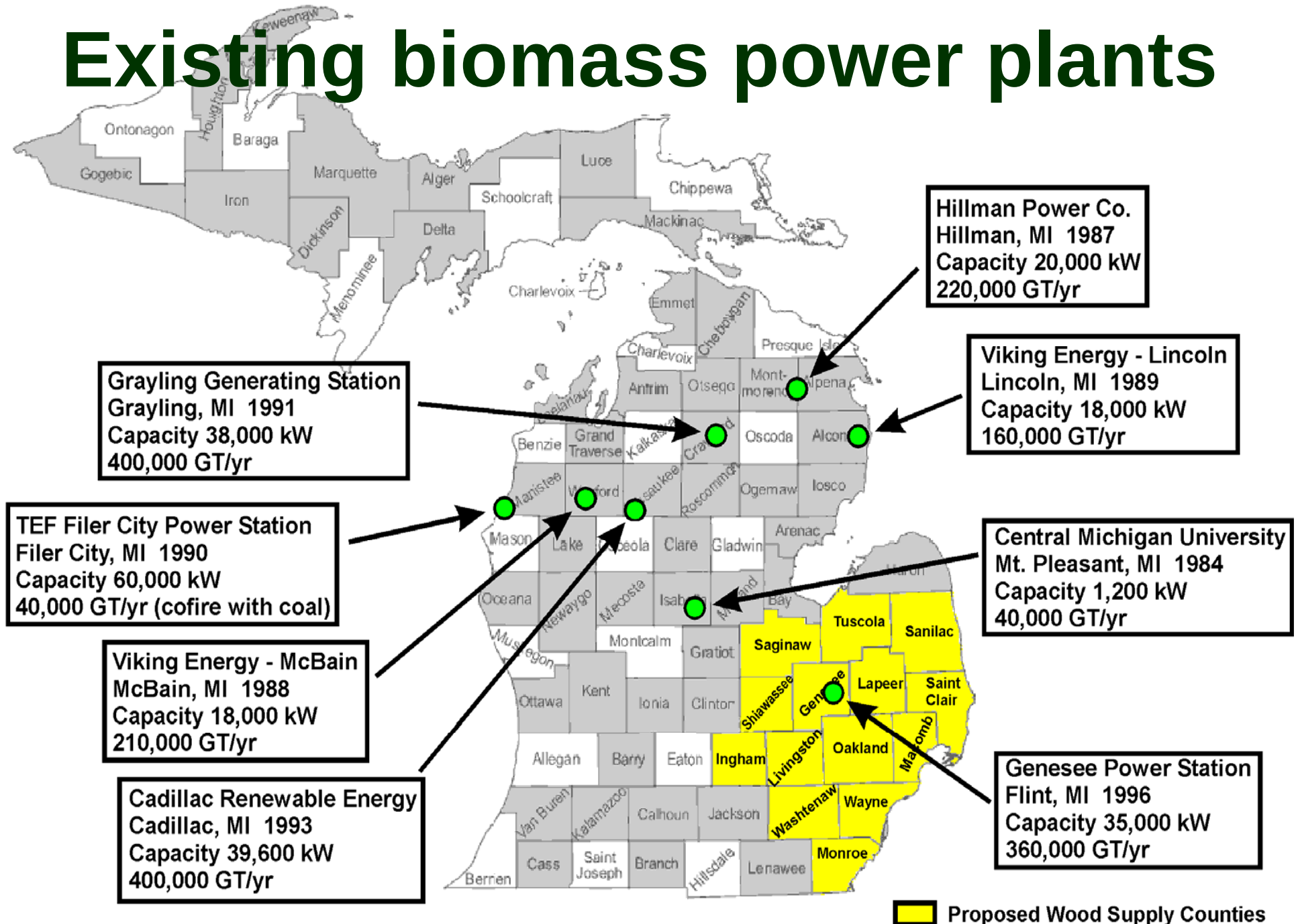
South Mich. Forest product residues

South Mich mill residue

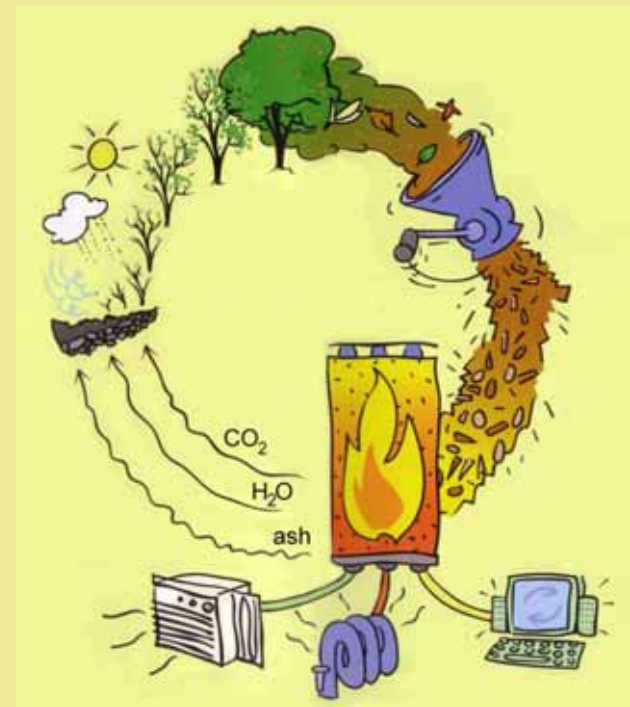
2% of urban forest (dead & dying)



Existing biomass power plants



Nearby wood recyclers could easily serve the new system





J.h. **Hart**
urban
FORESTRY



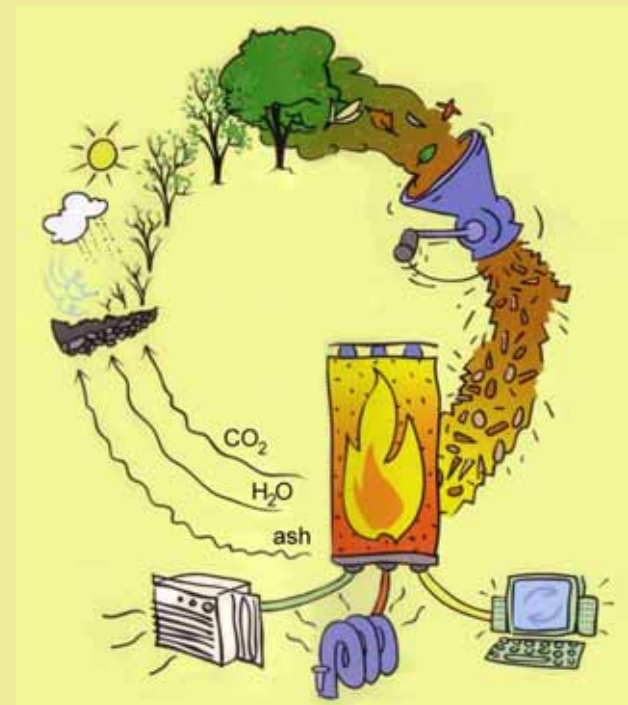






Other campus's heat with wood:

- Central Michigan University
- Northern Michigan University is developing a plant





CMU Wood Boiler Plant

**(heats
most of
campus)**

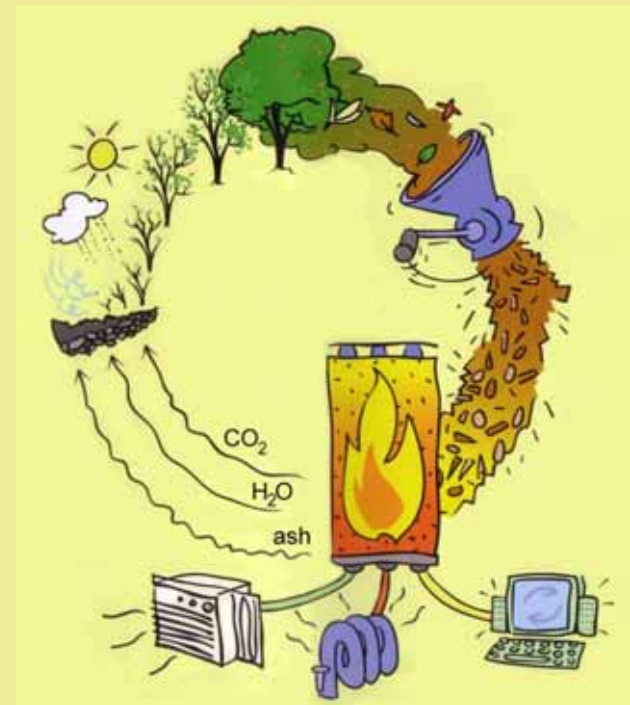
**(note: only water vapor
is coming from stack)**

photo - Jim Leidel 2005



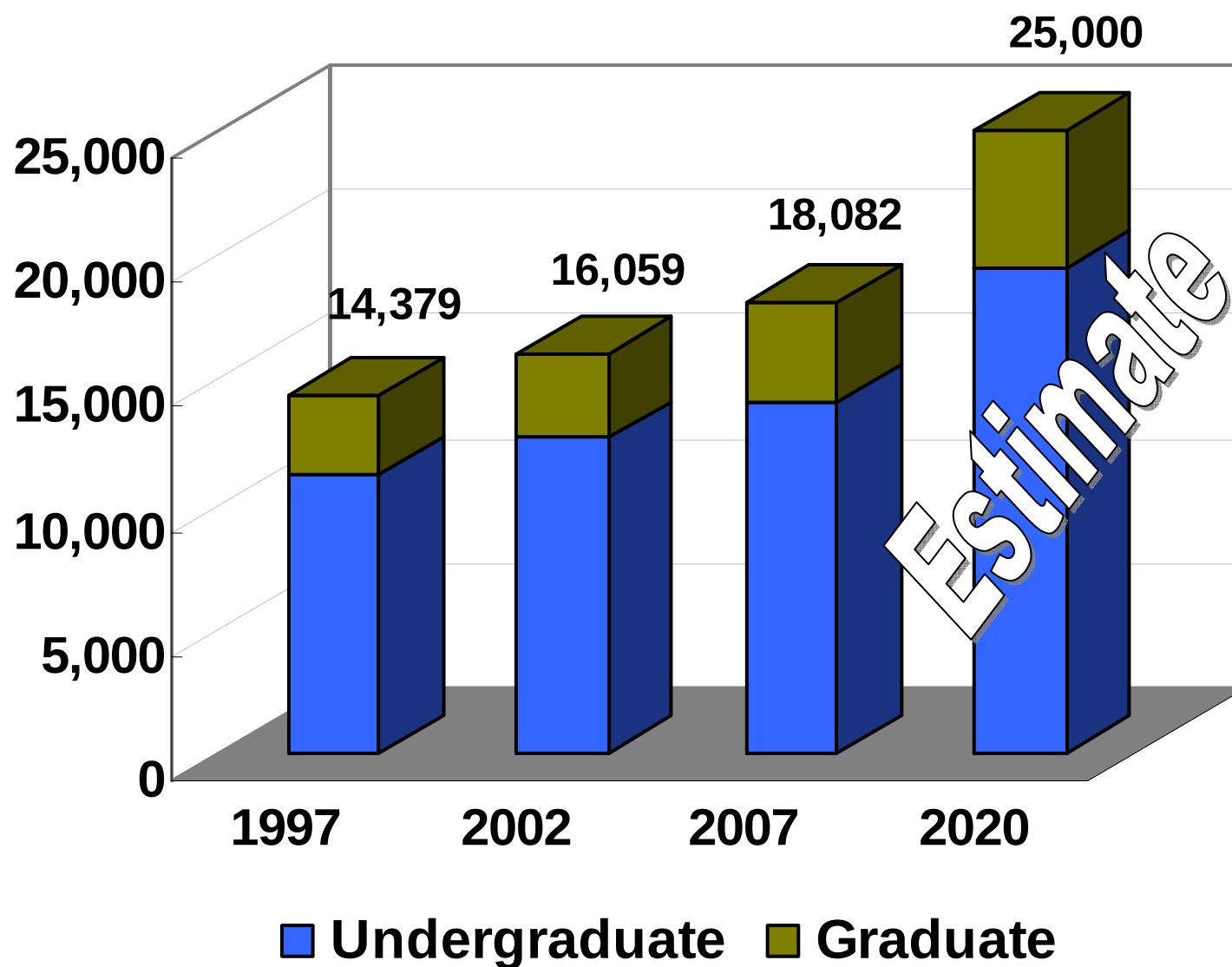
**Next we look at
the future needs
for campus:**

- 1. Replace aging
boilers.**
- 2. More capacity
for future growth**



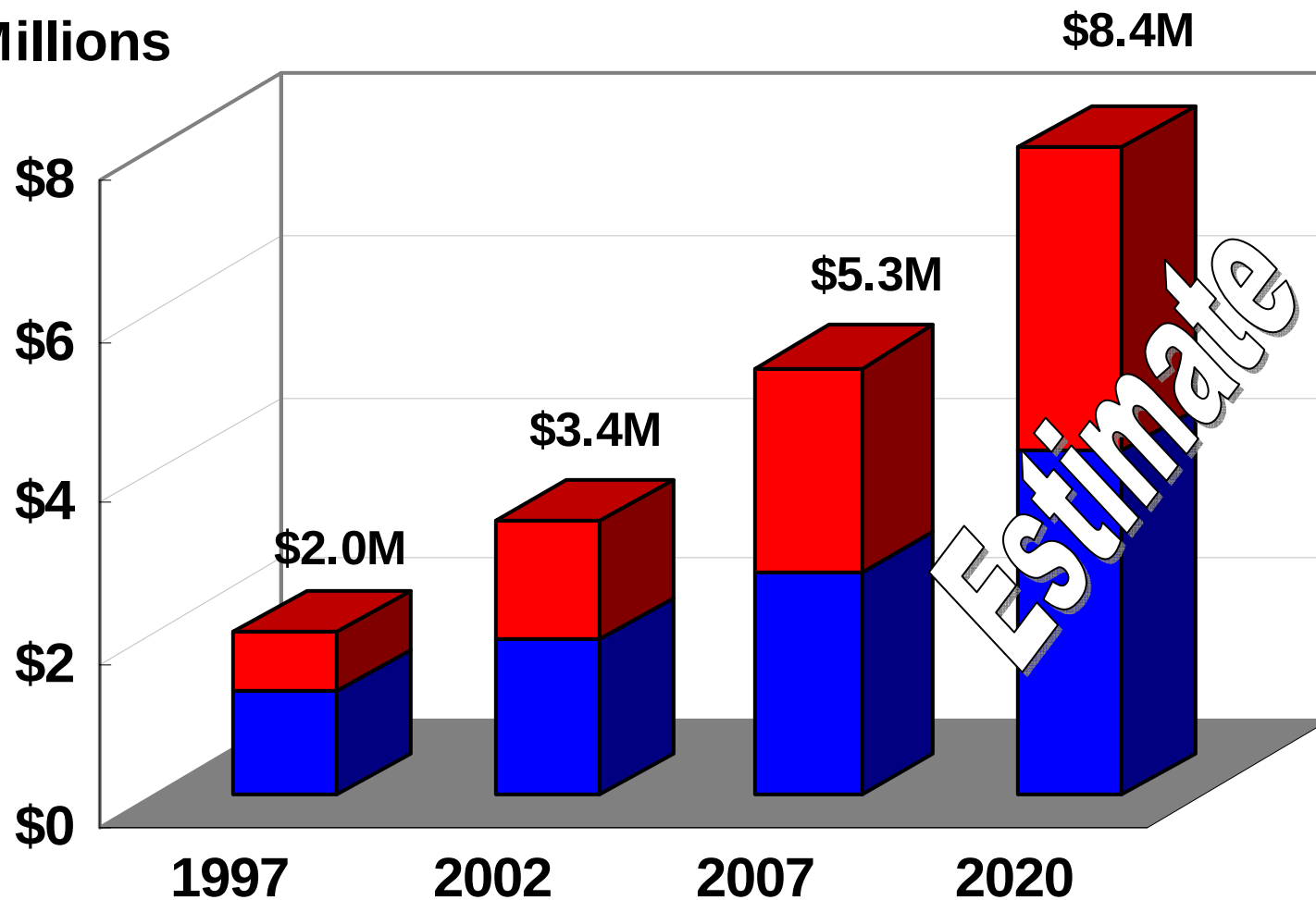
Existing Central Heating Plant

Unit	Capacity (MMBTU/hr)	Year Installed	Age in years / Condition
B-1	100	1969	39 / good
B-2	100	1969	39 / good
B-3	34	1959	49 / fair
B-4	32	1957	51 / marginal
Total	265		



Oakland University Ten Year Fall Enrollment Growth with 2020 Vision

Millions

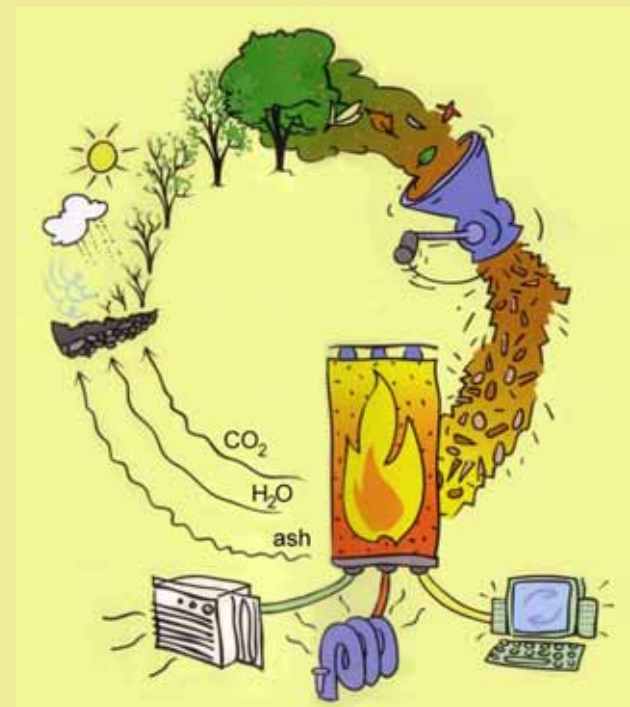


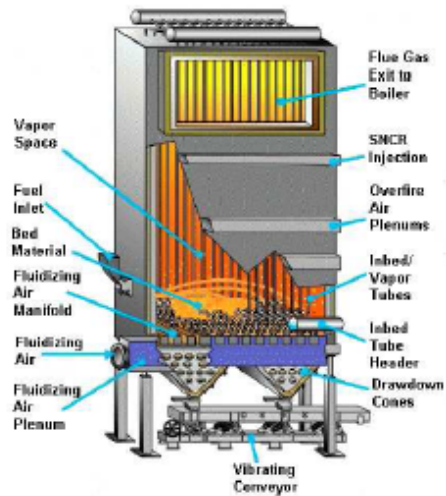
■ Electric cost ■ Natural gas cost

Oakland University Ten Year Energy Growth with 2020 Vision

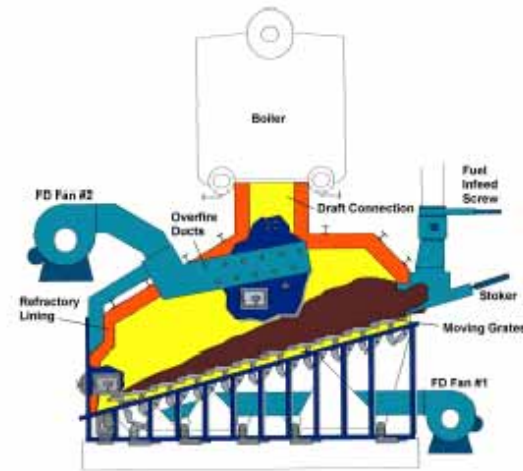
2020 Projection based on \$0.085/kWhr electricity and \$11/MMBTU gas

We then looked at various wood boiler systems

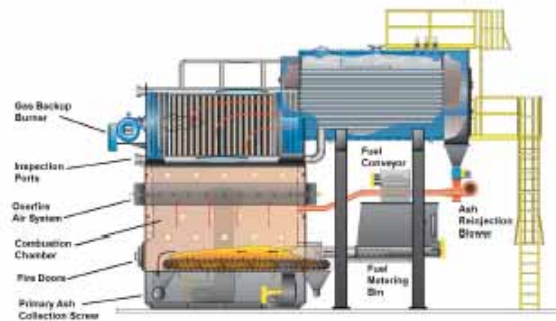




EPI Fluid Bed
(Steam & HW)



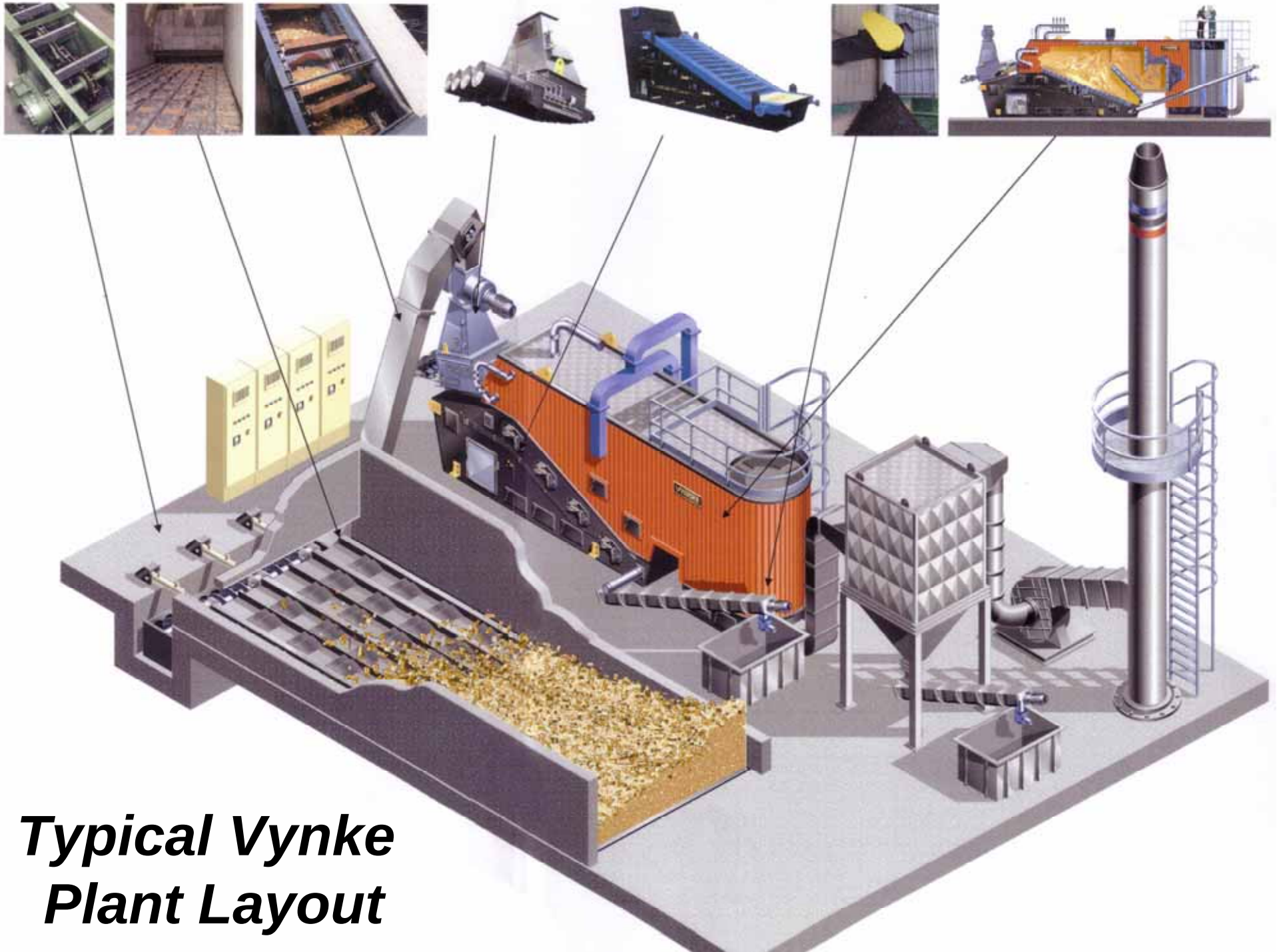
English Stoker
(Steam & HW)



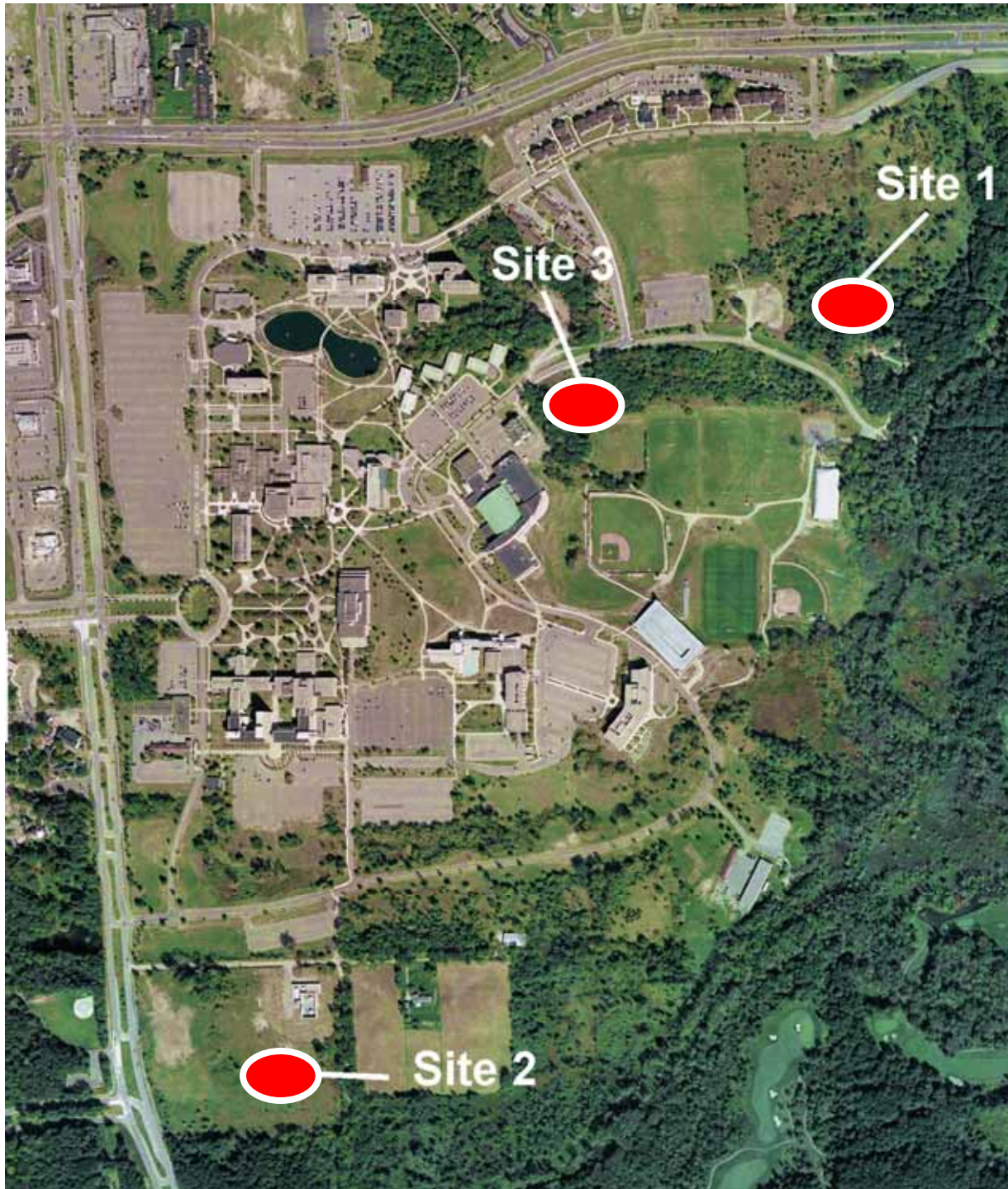
Hurst Stoker
(HW Only)



Vynke Stoker
(Steam & HW)



***Typical Vynke
Plant Layout***



Three Proposed Site Locations



Artist's Renderings



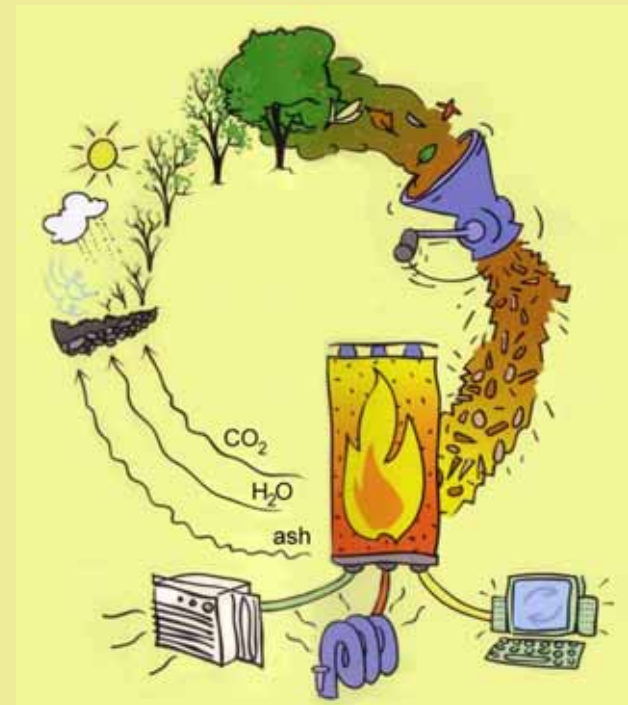




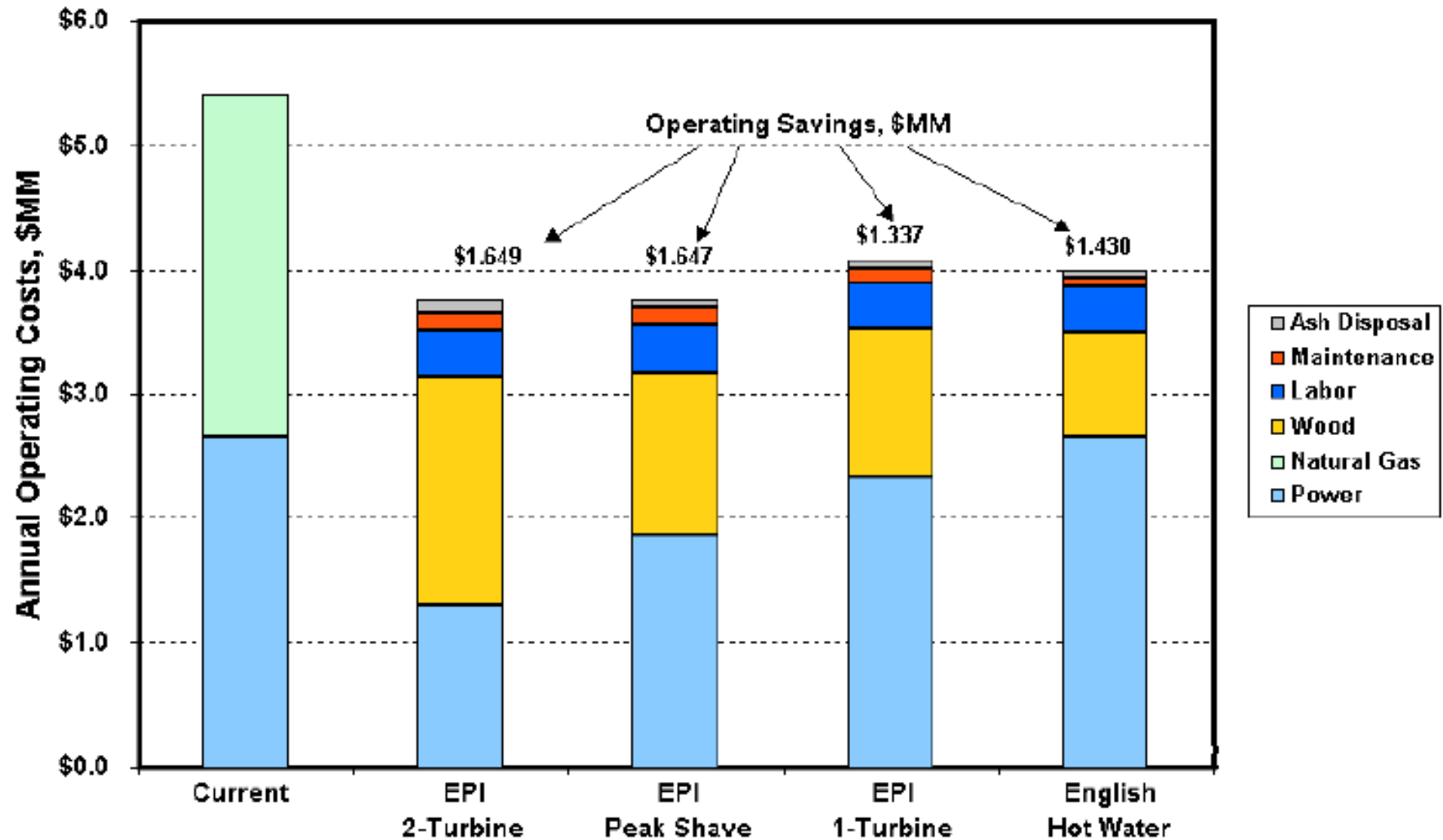


***A typical wood storage building
(in Kingsville, Ontario)***

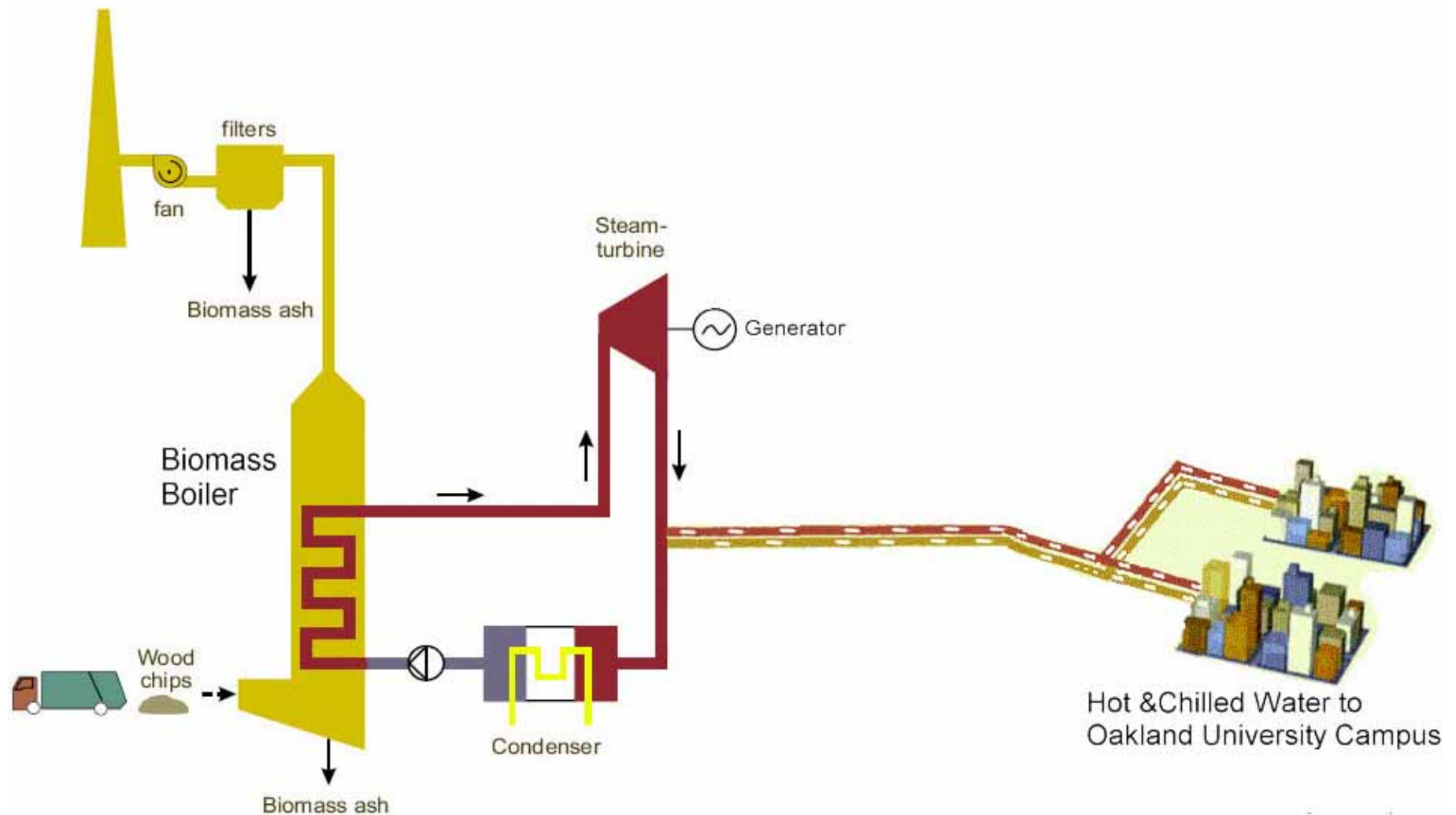
Annual operating savings are in the range of \$1.5 million



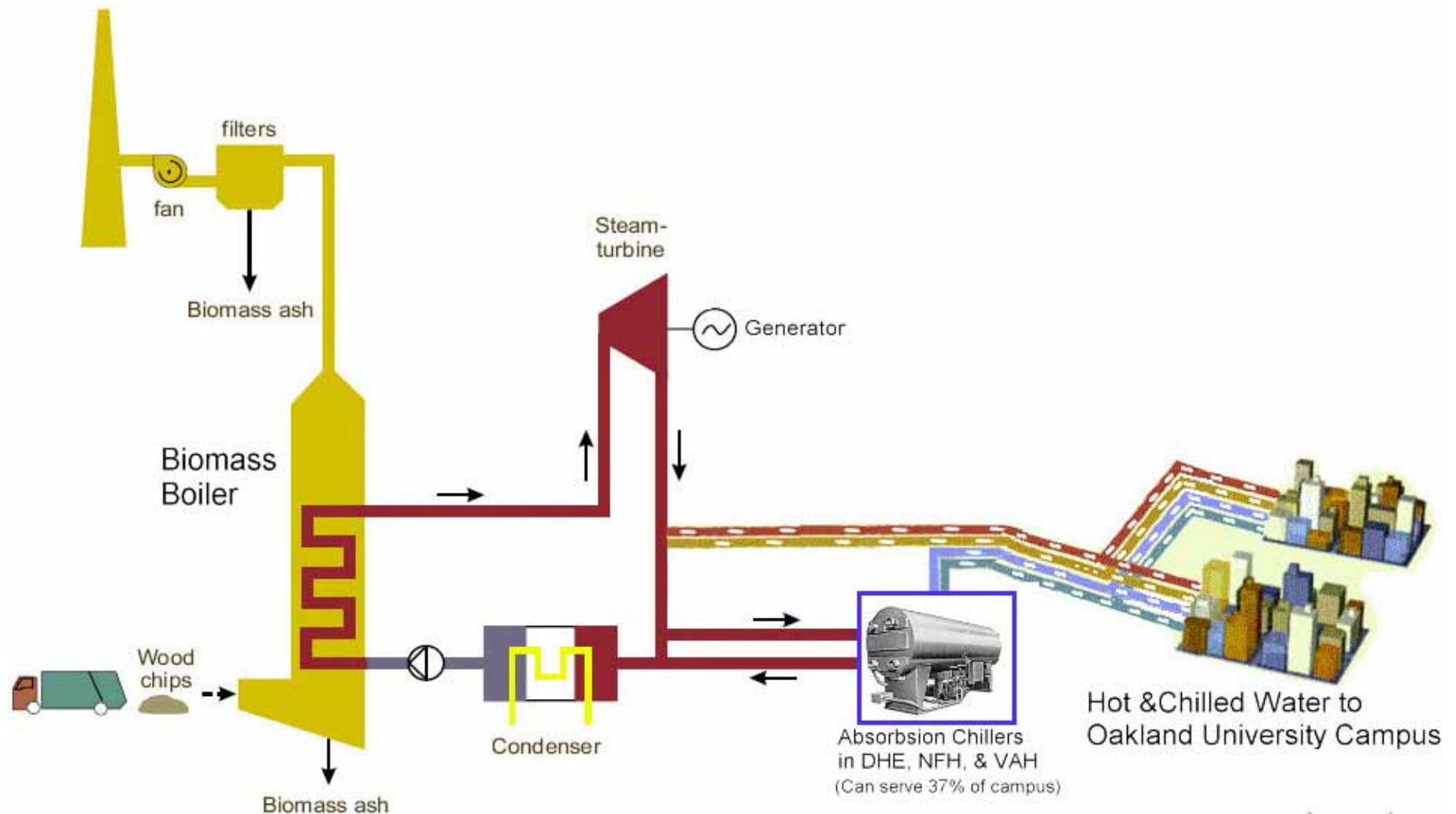
Operating Cost Estimates



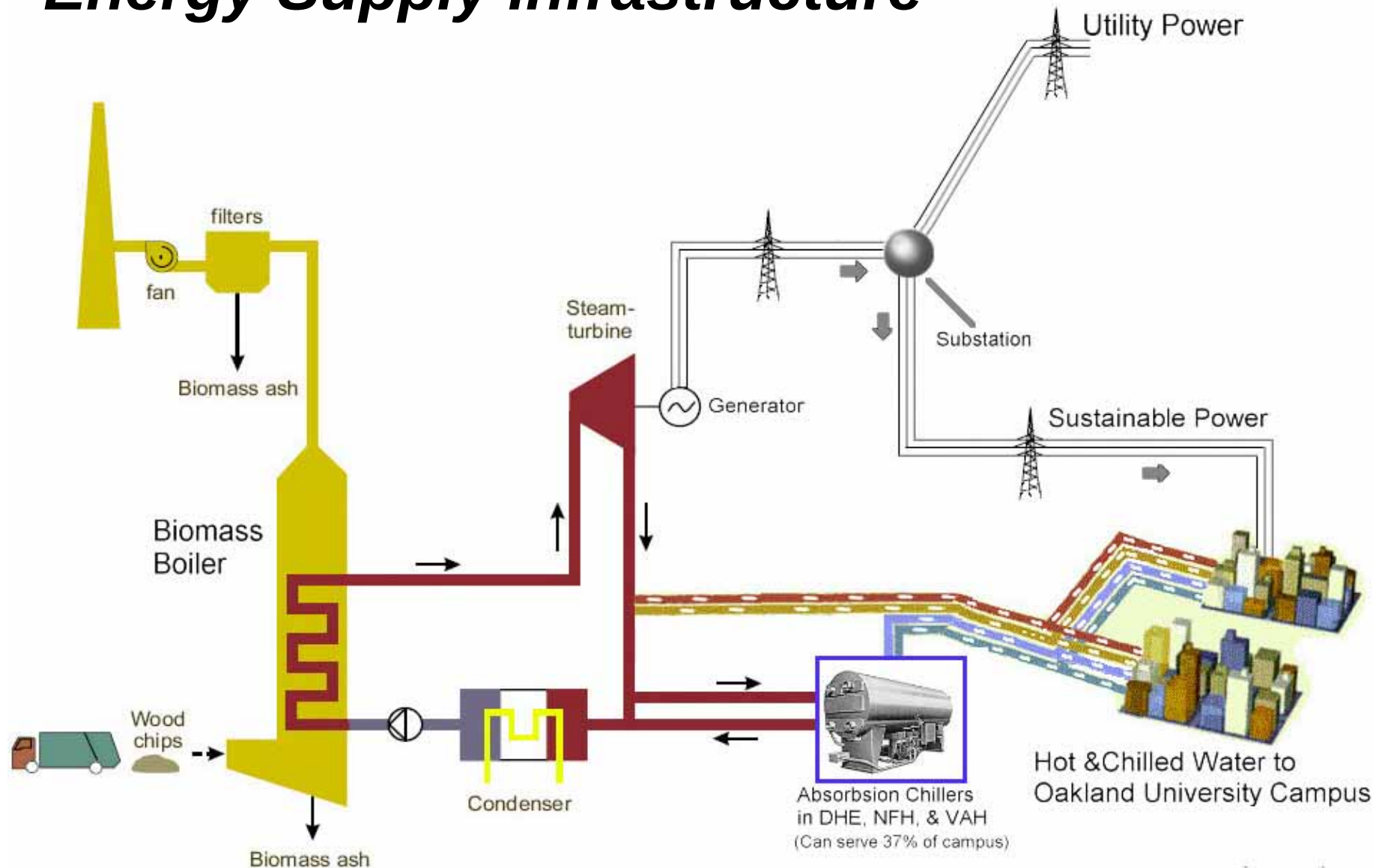
Overview of an Integrated, Renewable Energy Supply Infrastructure



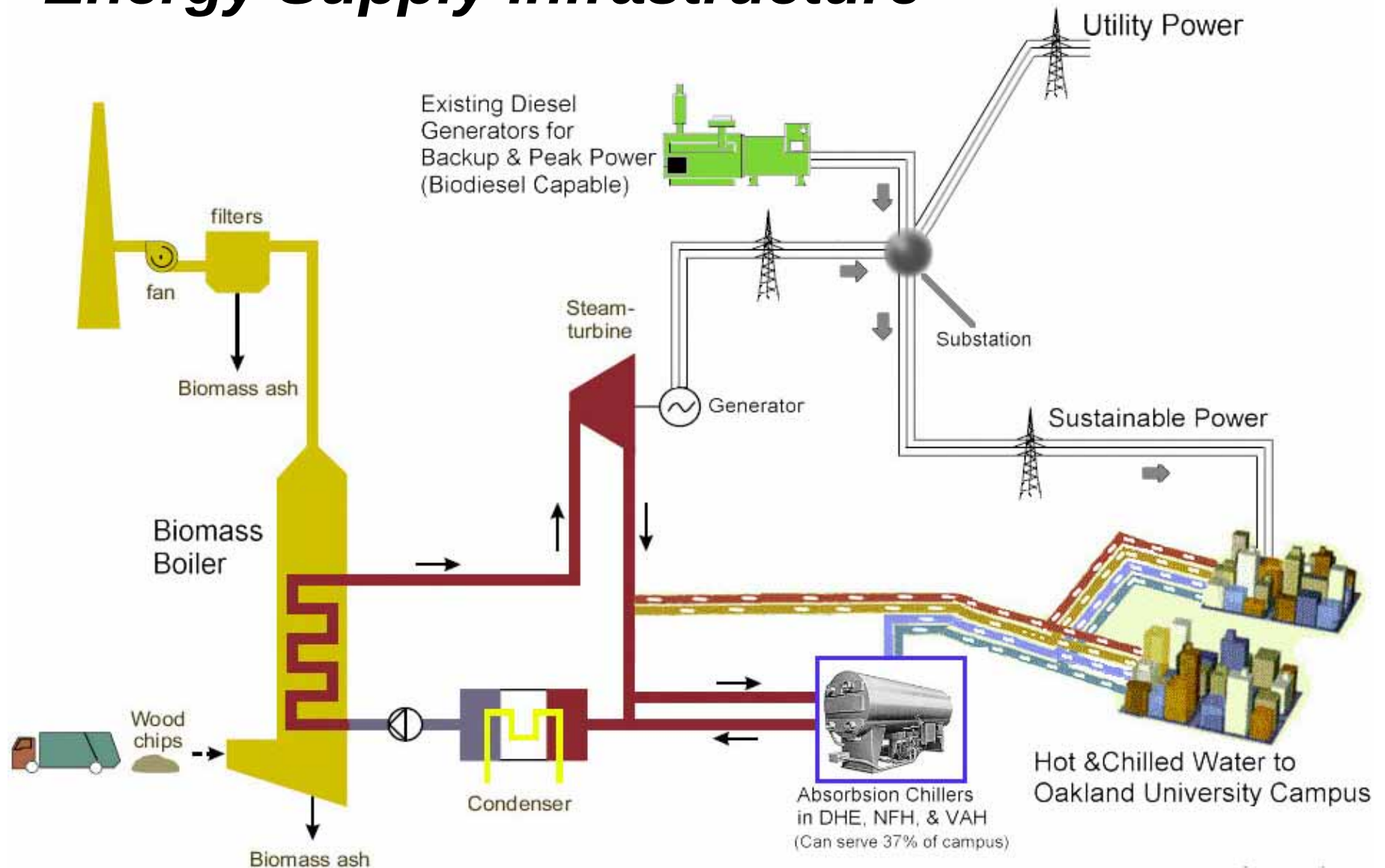
Overview of an Integrated, Renewable Energy Supply Infrastructure



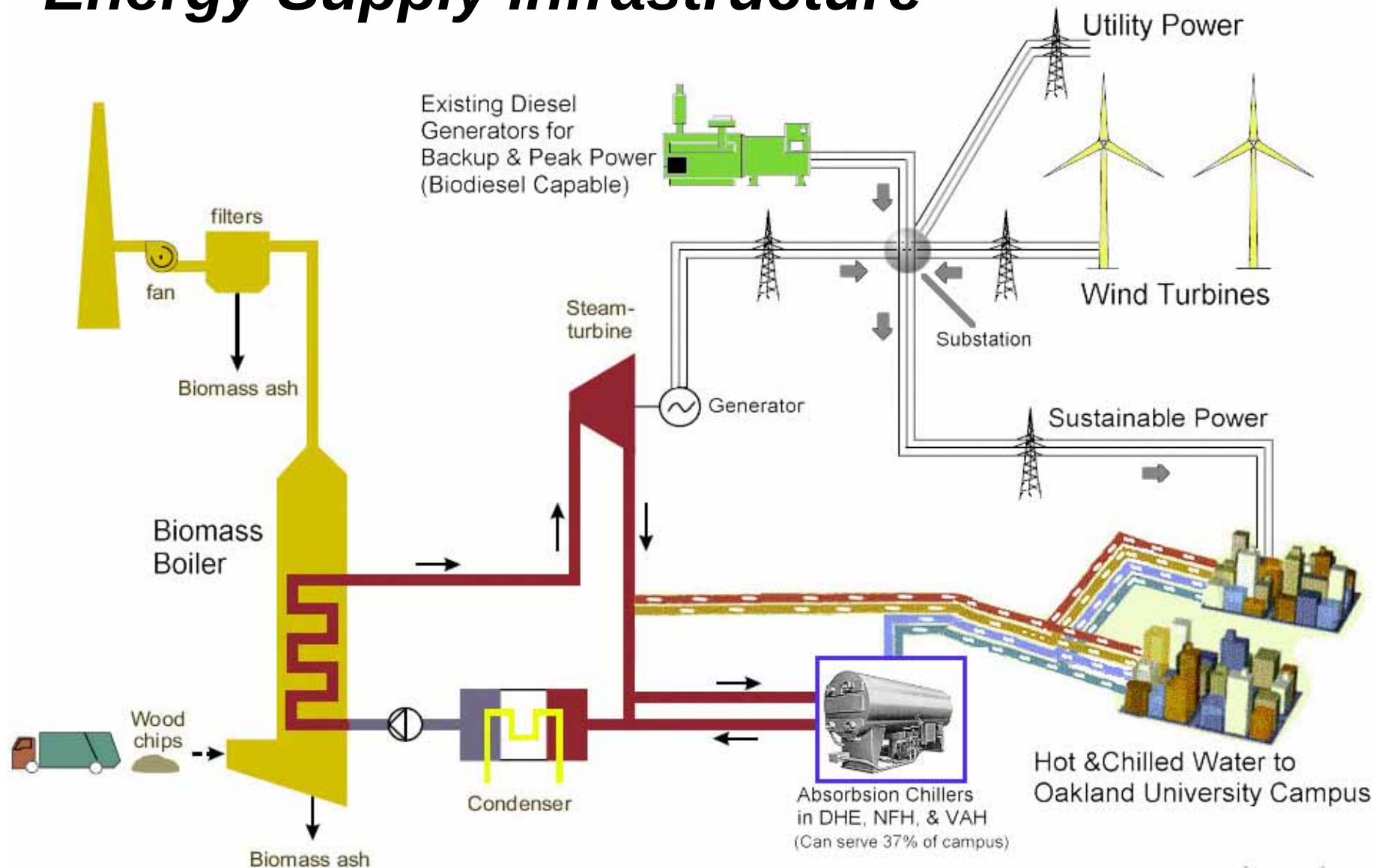
Overview of an Integrated, Renewable Energy Supply Infrastructure



Overview of an Integrated, Renewable Energy Supply Infrastructure



Overview of an Integrated, Renewable Energy Supply Infrastructure

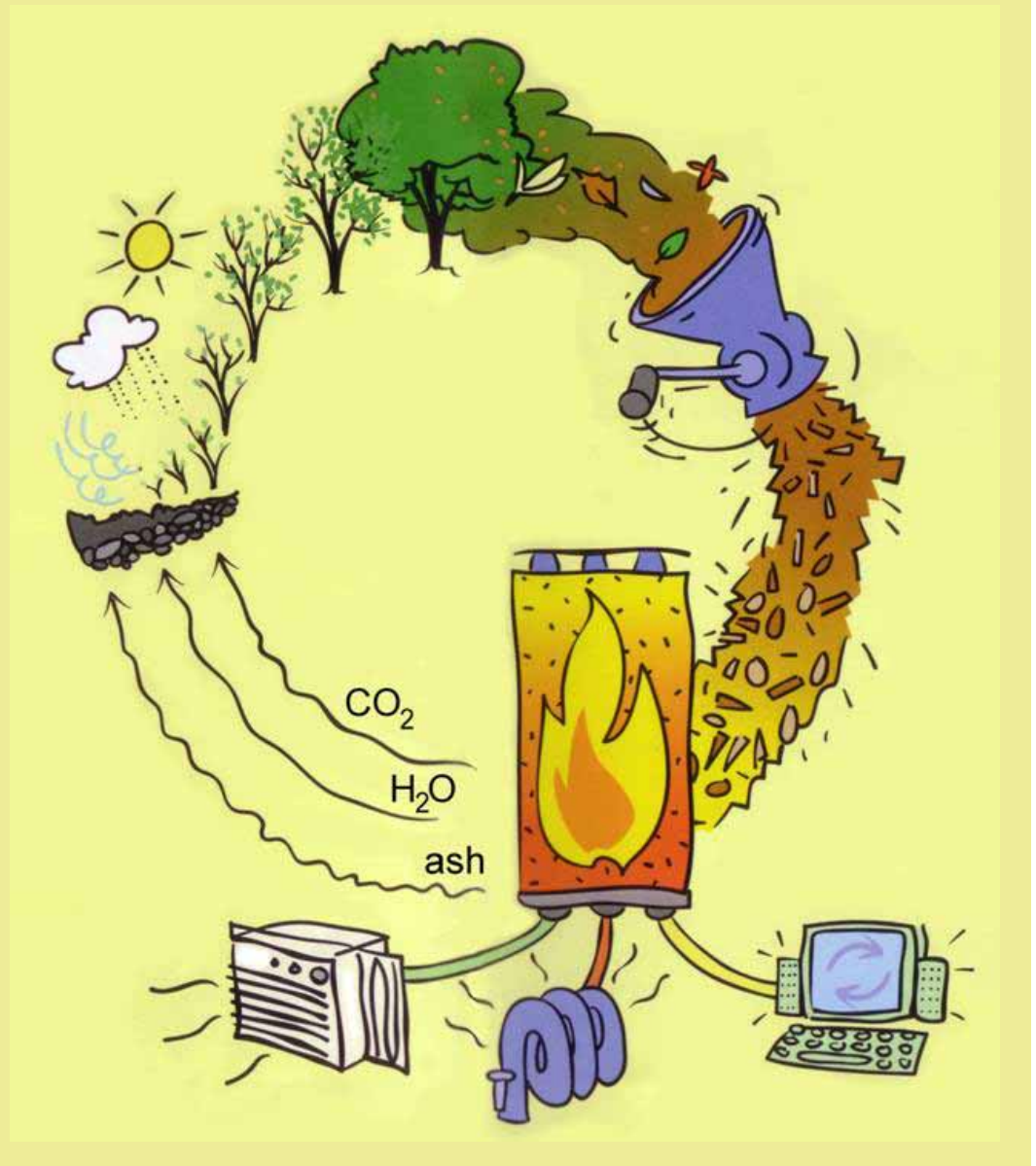


Overview of an Integrated Renewable Energy Supply Infrastructure

	Existing Fossil Fuel Mix		Proposed Renewable Energy	
	Thermal (Heating)	Electrical	Thermal (Heating)	Electrical
Central Heating Plant (natural gas)	100%		20%	
Detroit Edison		95%		20%
Diesel Generators		5%		10%
Biomass Boiler Plant			80%	50%
Wind Power				20%
Totals	100%	100%	100%	100%

Biomass & Wind Power

Sustainable
Energy Options
for the Future
of Oakland
University



OU Energy - Mozilla Firefox

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at Oakland University, [Facilities Management](#)

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([click here](#))

Home Energy Saving Tips

[Click here to activate your monitor sleep mode...](#)
(will not work on NT)

Newsletters

- Dec 2003 Issue 1
- Jan 2004 Issue 2
- Spring 04 Issue 3
- Winter 04 Issue 4
- Fall 2005 Issue 5

Green Computing Guide

Links

OU's Investigations into Wind Power

Oakland University will be investigating local wind power resources on campus with the installation of a 50 meter tall, wind sensor tower. It will be located several hundred yards south of Pioneer Drive, near Squirrel Road. Please visit [Alternative Energy Solutions](#) web site for more information and [a press release](#).

Also, for information on wind power in Michigan and elsewhere, [click here....](#)

University Energy Usage & Cost

Take a look at the historical usage and cost of the west campus utilities over the past decade. **About \$275 is spent each year per Full Year Equivalent Student.** This equates to 5 to 6% of a full time student's tuition. (based on 16 credit hours for two semesters) [more info...](#)

University Energy Purchasing

[Click here](#) to learn more on how Oakland University spends its \$5 million dollars each year to heat, cool, and power our fine institution.

OU Photovoltaic - Solar Electric Roof

OU was recently installed a 10kW photovoltaic demonstration project on the roof of the student apartment Community Building. The produced electricity from 580 Uni-Solar PV shingles and is tied directly to the University electrical grid..

[Click here for more information...](#)

[Does Michigan have a plan for renewable energy?](#)
[Click here](#)




Visit www.oakland.edu/energy for more info...