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Energy Efficiency and Capital Planning

ComEd Panel Discussion

9/10/13

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Provider: Energy Center of Wisconsin

Provider number: G175

Title: Building Energy Efficiency into Capital Planning

Course number: COM364

Speaker(s): Rob Whittier

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Building Energy Efficiency into Capital Planning

by Energy Center of Wisconsin

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Approval date: 07/30/2013

Course ID: 0090010135

Approved for:

1

General CE hours

X

LEED-specific hours

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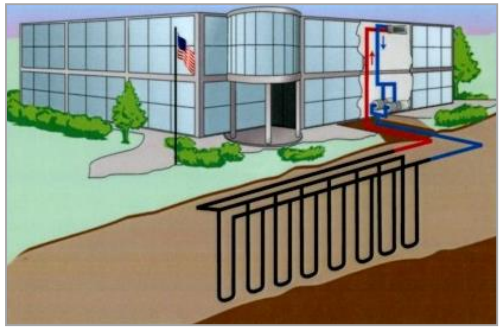
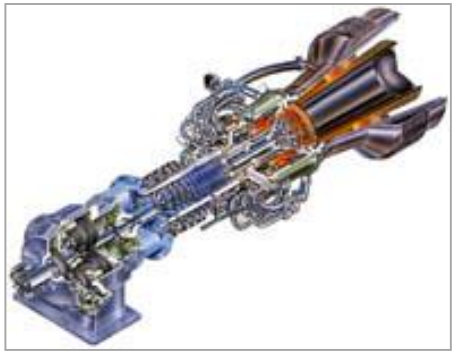
Northwestern University – Energy Overview

Two campuses, three utilities, and a complex energy landscape

- Total energy spend of $52M
- Electricity – ~260M kWh annually (FY ’12)
  - Chicago – 90,267 MWh
  - Evanston – 168,428 MWh
- Heating and Cooling - Central Plants ~18.6M therms
  - Chicago - 5,980,803
  - Evanston - 12,668,839
- Geothermal – Two projects under construction providing ~ 250tons cooling
- Cogeneration – Analysis underway
  - 7.9MW – Taurus 70
  - ~48% of annual electricity demand



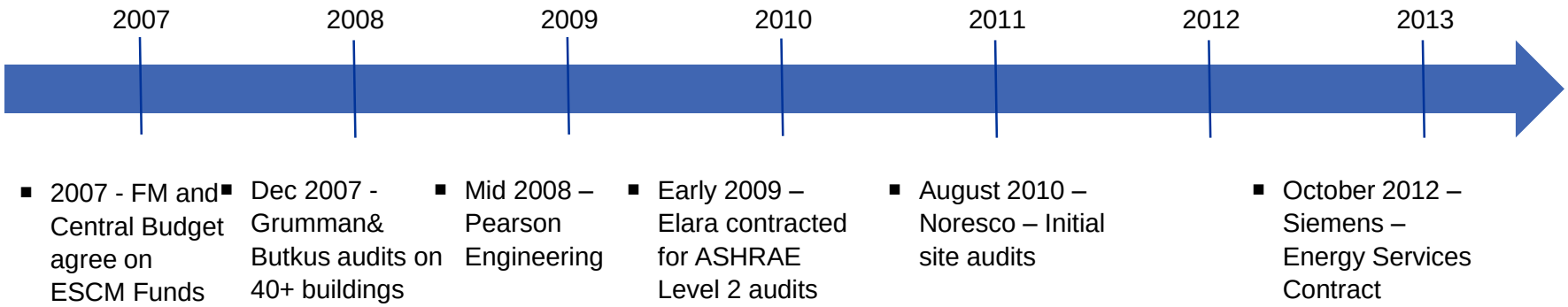


Northwestern University – Facility Overview

Challenging built environment…

- 214 facilities totaling ~12.5M sq. ft.
- Range from 1,400 to 945,936 sq. ft., from residential to classroom to biomedical research
- Source EUI from 32 to over 800 kBtu/sqft
- Six LEED NC silver and gold buildings
- LEED EB+OM study underway
- New projects – Kellogg 350k, Lakeside Athletics 550k, Bienen School of Music 152k, Visitors Center 80k, New Medical Research 1,200k

A Piecemeal Approach to EE

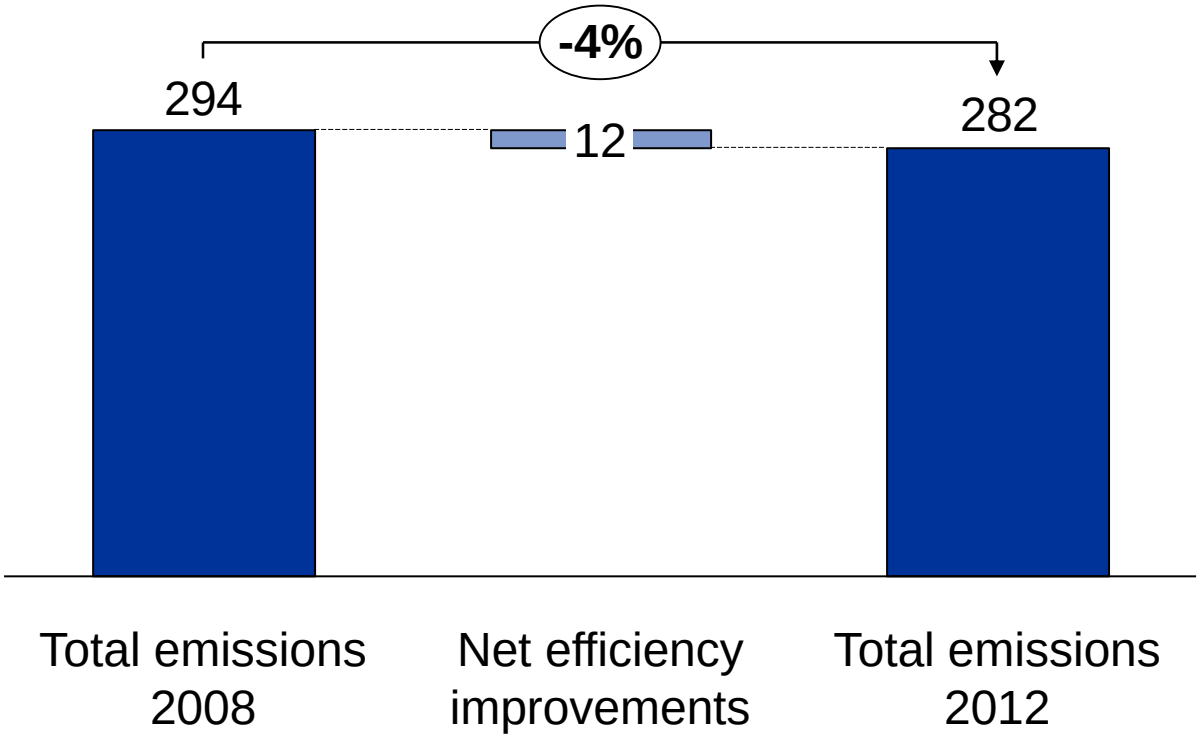


- 2007 - AVP of Facilities Management approaches central budget with proposal for $10M energy fund, amortizing projects and paying back fund with increases in utility rates and energy savings from projects.
- 2007 - Grumman & Butkus audits 40+ buildings
- 2008 - Pearson Engineering contracted to manage ESCM program suggests Elara to complete program
- 2008 – Elara ASHRAE Level 2 audits identify $10.3M in projects – Central $7.8M, Housing $1.8M, and Law School, $1.0M
- 2010 – Engaged Noresco to audit 14 facilities and implement ESCMs

Over the past four years, EE has reduced energy use by 4%

Historical evolution of carbon footprint

'000s of metric tons CO_2-equivalent

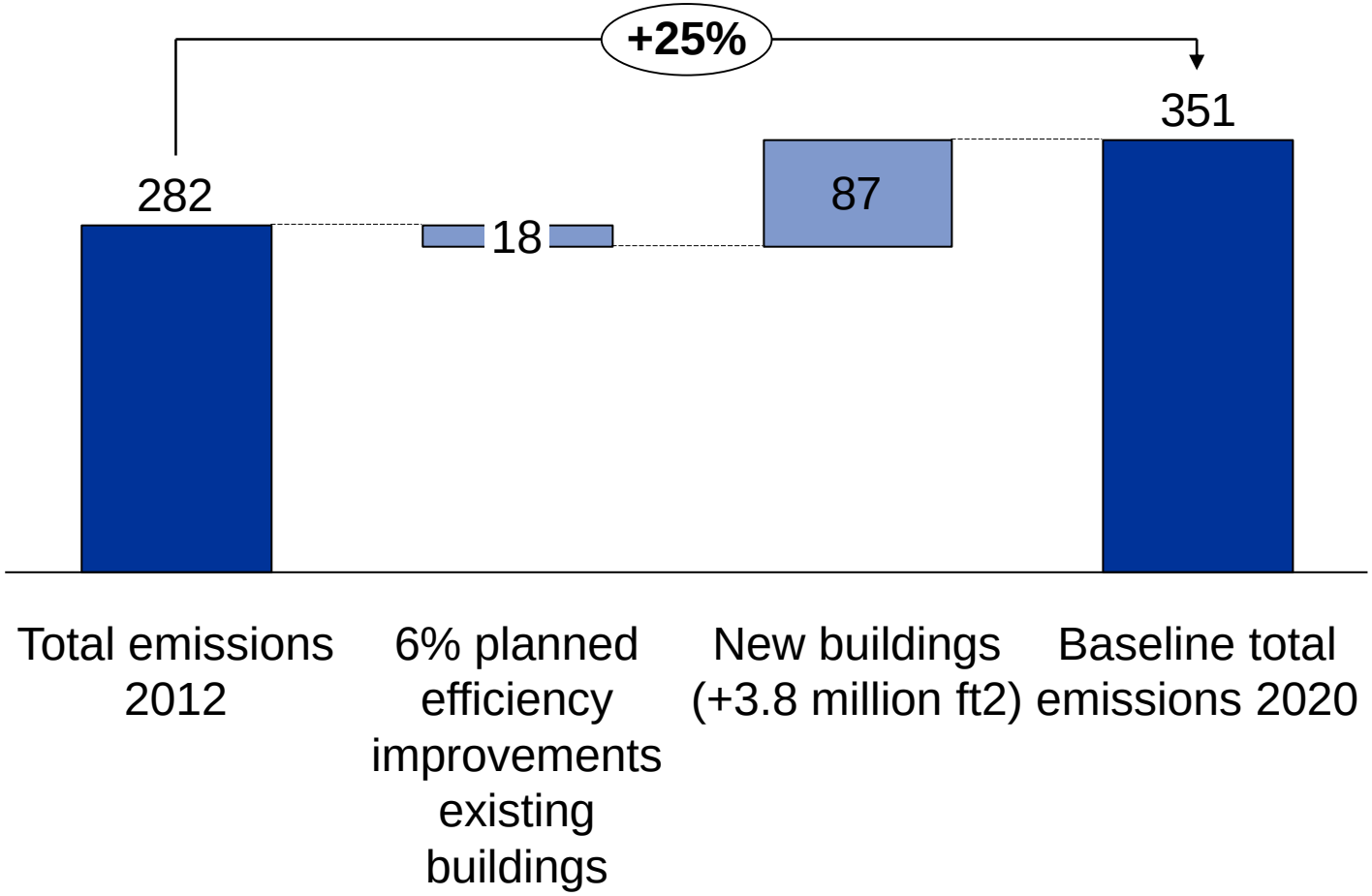


But gross sq. will grow by 25% in the next eight years

ESTIMATES

Evolution of carbon footprint in baseline scenario

'000s of metric tons CO_2-equivalent



Energy Efficiency Opportunity

	Description	Annual energy savings %, 2020	Initial investment $ millions	NPV*** $ millions
			ESTIMATES	
1 **Increase efficiency existing buildings**	▪ Increase efficiency of existing buildings by 25%* instead of 6%	15%	61	45
2 **Increase efficiency new buildings**	▪ Increase efficiency of new buildings as compared to similar existing buildings by 70%** instead of 30%	14%	NA	NA (>0)

* Maximum NPV-positive savings in existing buildings, based on 2009 McKinsey report, expert interviews, and a statistical analysis of NU's building stock

** Maximum NPV-positive savings in new buildings, based on expert interviews

*** "Increasing efficiency existing buildings" NPV is extrapolated from BaU building improvement financials

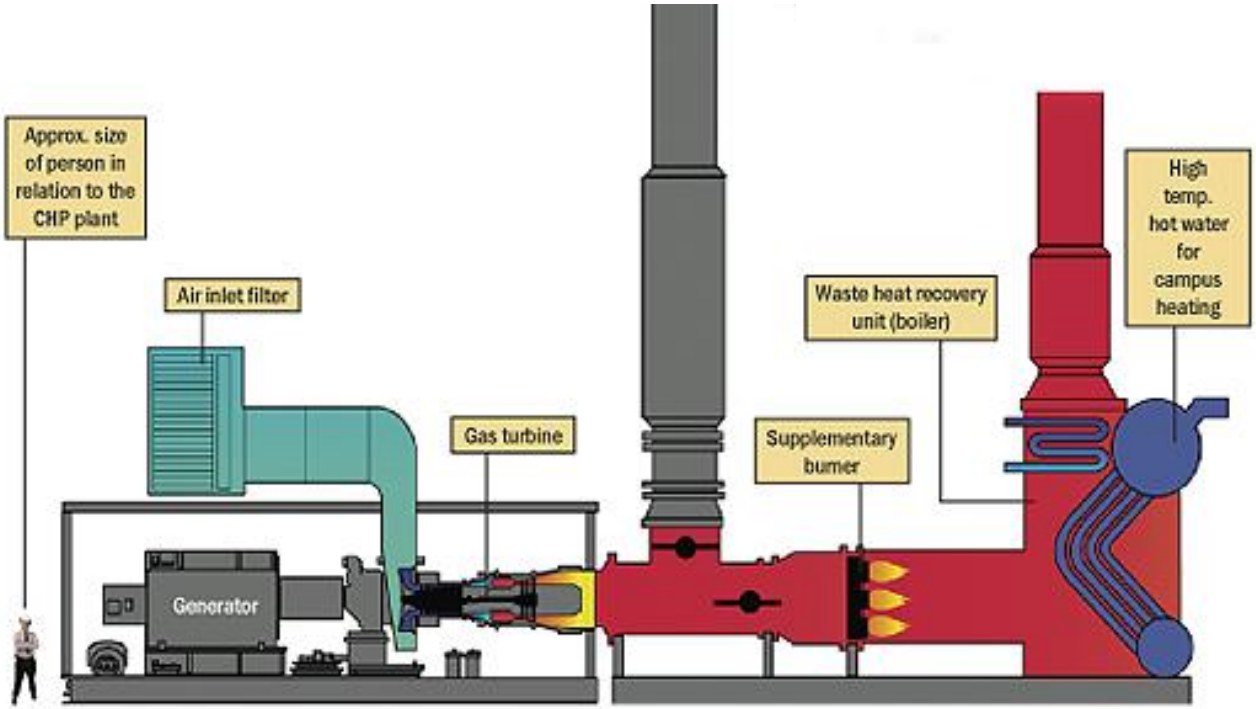
Financing Options

- Finance externally
  - Tax-free bond
  - Conventional loan
- Revolving green fund
  - Replenish fund with EE savings
- Endowment
  - $7.1B endowment earning ~ 7.5% avg for past 3 years
- Cash-on-hand
  - Upfront capital costs of the energy efficiency improvements are allocated from cash reserves

Northwestern Energy Retrofit Initiative (NERI) - $40M allocated to EE projects to be implemented by 2015

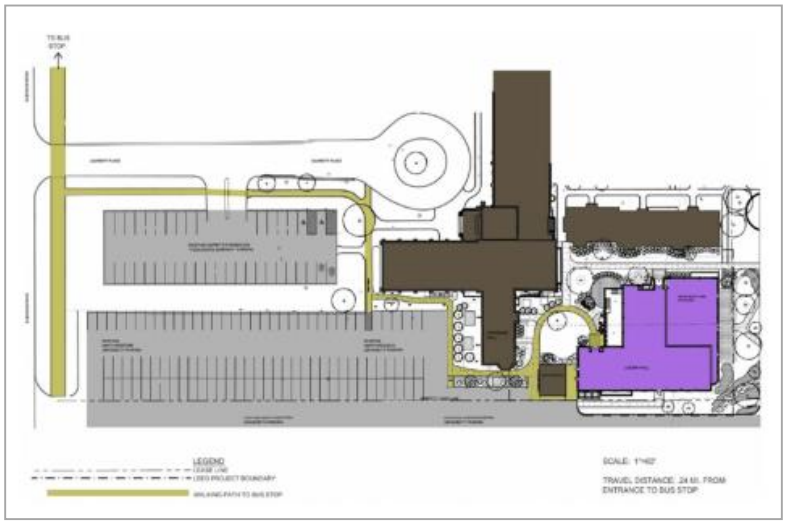
Non-NERI Projects

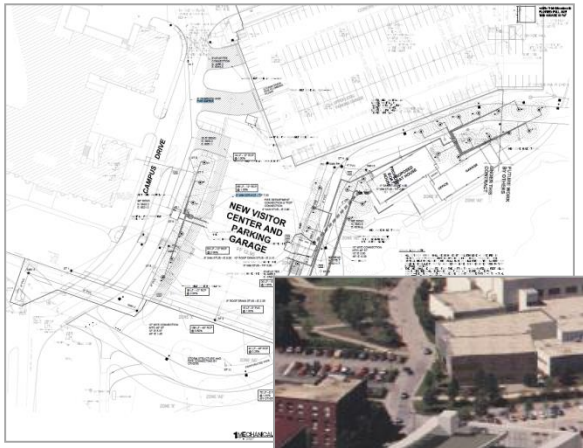
- Cogeneration (Combined heat and power)
  - Deploy a 7.9 mega-watt natural gas turbine and heat recovery steam generator (HRSG)
  - Provide ~48% of campus electrical load, 95% of steam load
  - Reduction of 17,900 metric tons CO2e



Geothermal

- NU Visitors Center
  - 30 wells bored to 650 ft. providing 100% of cooling and heating
- Kellogg School of Mgmt.
  - 60+ well system in an adjacent field would provide >50% + of heating and cooling
- Lakeside Athletics Complex?
- Prentice Medical Research?





Discussion

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