Industrial and Process Efficiency

NYSERDA Opportunities for Industry

NASEO
September 14, 2011

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What is NYSERDA?

- New York State Energy Research and Development Authority
- Public benefit corporation
- Established by New York State Legislature in 1975
- NYSERDA addresses New York's energy, economic & environmental challenges
- Industrial efficiency funding through SBC & EEPS

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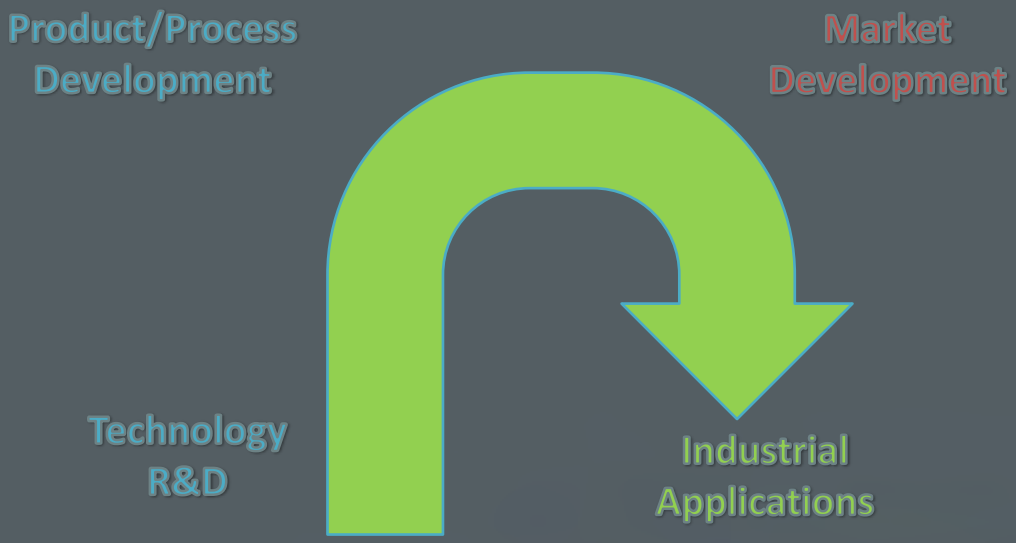
NYSERDA Approach

Supporting Energy Efficiency through the Technology Innovation Chain

R&D

Market Transformation

Deployment



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Energy Efficiency Portfolio Standard

- NYSERDA Industrial & Process Efficiency Program
  - $105 Million over 3 years for electric & natural gas savings
  - Goals: 840,000 MWh, 17 million Therms
  - Includes: Manufacturing & Data Centers
    - Similar load shape
    - Process-oriented
    - Economic development impact
    - Mission critical
    - Load growth potential

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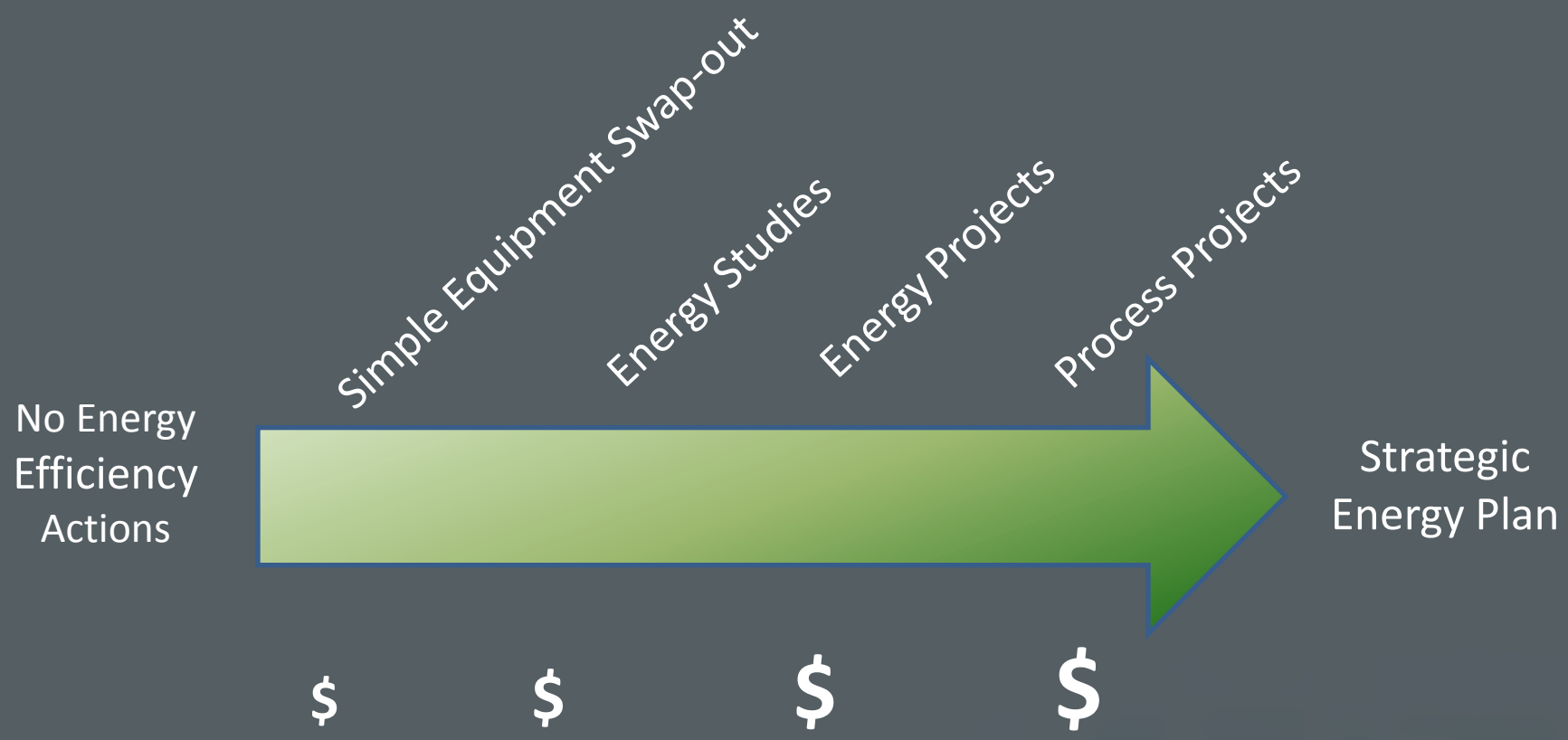
Energy Efficiency Continuum



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Industry and Data Center Outreach

NYSERDA Objective	Increase use of NYSERDA programs to drive energy savings of 840,000MWh and I.7 million MMBTU
Outreach Contractors	Upstate – CHA Downstate – Energy & Resource Solutions Data Centers – Willdan
Targeted Verticals	Manufacturing, forest products, mining & extraction and data centers
Key NYSERDA Programs	FlexTech, Industrial and Process Efficiency
Eligibility	Facilities must participate in System Benefits Charge

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Financial Incentives

Program	Upstate	Downstate
Studies	50/50 cost share	50/50 cost share
Electric Efficiency	$ .12 / kWh	$ .16 / kWh
Natural Gas Efficiency	$15/MMBtu	$20/MMBtu

Up to $1,000,000 for Studies
Up to $5,000,000 for Efficiency

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FlexTech

Comprehensive, customized energy studies

- Cost share 50/50
- Up to $1,000,000
- Max 10% of energy costs
- Engineering feasibility studies
- Energy master plans
- Project specific
- Retro-commissioning
- CHP
- Choose from:
  - NYSERDA Contractors
  - Customer's own consultant

Identifies Cost Effective, Site Specific Energy Strategies

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Industrial and Process Efficiency

Performance Based Incentives	Upstate	Downstate
Electric Efficiency	$ .12 / kWh	$ .16 / kWh
Natural Gas Efficiency	$15/MMBtu	$20/MMBtu
Operations and Maintenance	$.05 / kWh $6/MMBtu	$.05 / kWh $6/MMBtu

Measurement: Energy saved per unit produced

Cap: 50% of project cost or $5 million per site

M&V: required >500,000 kWh or 10,000 MMBtu

Improved productivity = less energy

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More than the Mechanical Room

Productivity-based savings

- Energy use is embedded in every step
- Every piece of scrap has an energy component
- Lean/6 Sigma/Productivity Projects all have an energy component

If we can calculate energy savings, we have an incentive

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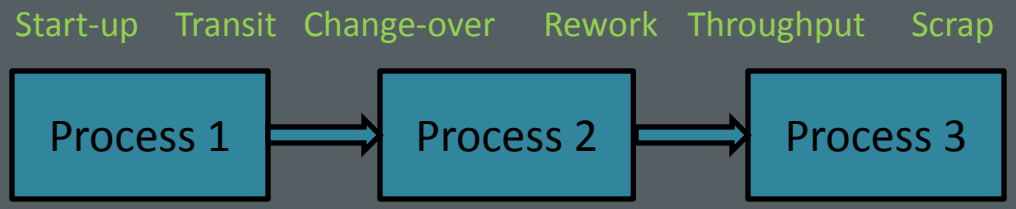
Energy Efficiency in Manufacturing

Energy Stream Map: Integrate energy into the Value Stream Map

INPUTS
Raw Materials
Time
Labor
Water
Energy



OUTPUTS
Final product
Air emissions
Wastewater
Waste

- Identify, quantify, & estimate energy use at each point along the map
  - Use vs. need analysis
  - Recovery opportunities
  - Alternative layout
  - Alternative technology
- Develop a future state Energy Stream Map

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Case Study: Southeastern Containers

Plant:

- 250,000 ft^2 plant
- 4 blow molding lines

Objective:

- Improve Operating Cost
- Improve Sustainability

Focus: Compressed Air in Blow Molding Machines

- Installed Air Recovery System
- Decreased Energy from 22.5 kWh/1000 bottles to 18.8 kWh/1000 bottles

Energy Savings: 1,400,000 kWh
NYSERDA Incentive: $129,000

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Case Study: Irving Tissue

Plant:

- Paper making
- Modernization
- Fort Edward, NY

Systems Installed:

- Process
- Drives
- Pumping
- Vacuum
- Pulp agitation

Energy Savings: 14,800,000 kWh
NYSERDA Incentive: $1,775,000

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Industrial and Process Efficiency:

DATA CENTERS: Improved IT & Computing = Energy Efficient

- Energy savings per unit of data processed
- Support system efficiency
  - Process cooling
  - Air flow management
  - Utilization of waste heat
  - Virtualization
  - Next generation servers
  - Applications management strategies

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Importance of Data Centers in NYS

New York has the second largest concentration of data centers in the US.

Energy efficient growth of data center load is key to maintaining sustainability of the NYS economy and IT delivery infrastructure

Studies found

- NYS data centers consume ~4.5 billion kWh/yr at a cost of ~$600 million
- Energy consumption by data centers is forecasted to double in 3-5 years

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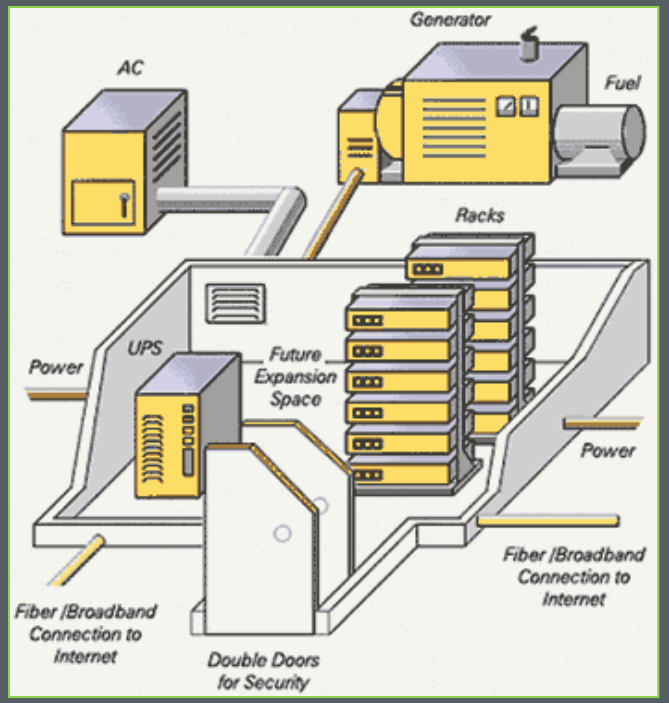
Challenges Facing Data Centers

- Growing IT Demand
- Constrained space and power availability
- Increasing energy and operating costs
- Common themes
  - Over-provisioned IT infrastructure
  - Ineffective/inefficient cooling
  - IT and Facilities coordination
  - Reliability is king

Support System Efficiency

- Air Flow Management
- Cooling
- Use of Waste Heat
- UPS System Upgrades



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IT and Computing Efficiency

- Server Virtualization
- Storage Consolidation
- Next generation servers
- Applications management
- Server load prioritization, optimization, “right-sizing”

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Case Study: Data Center Cooling

BASELINE CASE

Five (5) standard CRAC Units, no economizers, no High Density cooling solution

Total kWh / Year/Unit	188,203
Unit Quantity	5
Total kWh / Year	**941,015**

PREFERRED CASE

Three (3) CRAC Units with economizers plus High Density cooling solution

Three (3) CRAC Units	364,910
High Density Solution	274,405
Total kWh / Year	**639,314**

SUMMARY

BASE CASE kWh/year	941,015
PREFERRED CASE kWh/year	639,314
Annual kWh Savings	301,701
Projected NYSERDA Incentive	$ 48,272

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Case Study: Virtualization

Number of Servers before virtualization	**200**
Number of Servers after virtualization	**10**

Energy Saving Measure	Energy Savings					
	Baseline Usage	Installed Usage	Energy Savings	Electric Cost Savings	Incentive Rate	Total Incentive
	kWh/Yr	kWh/Yr	kWh/Yr	$/yr	$/kWh	$
Install Virtual Server - Direct Energy Savings	394,200	19,710	374,490	$ 67,408.20	0.16	$ 59,918.40
Install Virtual Server - Indirect Equipment Support Savings	242,545	12,127	230,418	$ 41,475.17	0.16	$ 36,866.82
Combined	636,745	31,837	**604,908**	$ 108,883.37	N/A	**$ 96,785.22**

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Combined Heat & Power

Eligibility

- Reciprocating engine or gas turbine-based system
- 60% annual fuel conversion efficiency
- NO_x emission rate ≤ 1.6 lbs/MWh
- Incentives based on kWh & average peak summer kW
- Capped at $2 million

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Operations and Maintenance

- Incentives are provided to support the implementation of operations and maintenance programs and systems which promote persistent, measurable energy savings
- Incentive is $.05/kWh up to 50% of project cost, max. $500k
- Ongoing monitoring and documentation required, with M&V period of 2 years

Examples

- Compressed air pressure reduction
- Night set-back, temperature set-points on AHU
- Data Center-raising temperature set points
- Data Center-air flow management (i.e. blanking panels)

Key Account Manager Strategy

- Large Industrial Customers are assigned NYSERDA Project Manager
- Other Customers managed by Outreach contractors
- Key Outreach Partners throughout state
- Contact customers, bring into programs, build long term relationships

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Key Account Manager Strategy

Role of NYSERDA Key Account Manager

- Determine project eligibility
- Site visits
- Assist customers with applications
- Project follow-up
- Ongoing relationship to avoid missed opportunities
- Single Point of contact for customer

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DOE: Save Energy Now

Marketing and Outreach

- Joint effort between NYSERDA and Network partners
- Outreach to accomplish energy efficiency through NYSERDA programs

Syracuse University Founded A.D. 1870

mi MULTIPLE INTERVENORS

ESF
State University of New York
College of Environmental Science and Forestry

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MACNY
The Manufacturers Association

SYRACUSECOE
center of excellence

ANTARES
Group Incorporated

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SEN: Project Activities

Benchmarking Report

- Characterization of New York State's manufacturing industries to determine the most energy and carbon dioxide intensive sectors
- Target specific companies within energy intensive sectors for outreach about NYSERDA FlexTech and Industrial Process Efficiency programs
- Joint effort between NYSERDA and Network partners

Process Consultants Directory

- Identified 65 companies with special knowledge of the technologies and processes used by the most energy intensive industries.
- Compiled a directory of process consultants for use by manufacturers
- Joint effort between NYSERDA and Antares Group, Inc.

SEN: Progress to Goals

Benchmarking Report

- Estimated energy intensity and CO_2 footprint for each Industry by NAICS code
- Established six target industries – most intensive
  - ✓ **Chemicals (325), computers & electronics (334), food (311), nonmetallic minerals (327), paper (322), and primary metals (331)**
- Created list of top 60 companies in the target industries for both CNY and NYS

Results

Projects	Electric Savings (kWh)	Natural Gas Savings (MMBtu)
37	**54,346,271**	**18,912**

More Info

- Visit www.nyserda.org/ipe
- 1-866-NYSERDA
- Brian Platt x-3309

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