
International Industrial Energy Assessments: A Survey of Programs Around the World

Presented for the ECEEE Summer Study

Lynn Price and Hongyou Lu

China Energy Group

Energy Analysis Department

Environmental Energy and Technologies Division

Lawrence Berkeley National Laboratory

Belambra Presqu'île de Giens, France

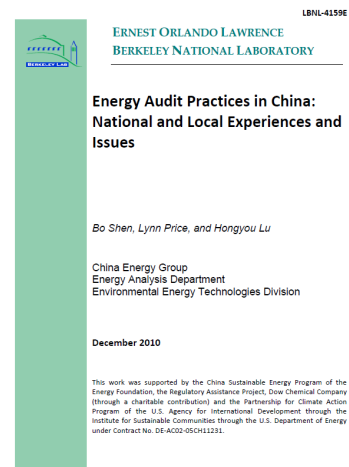
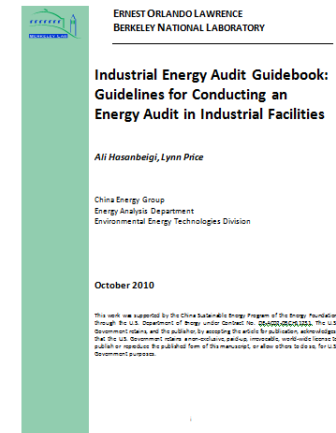
June 2011

Outline

- Background
- Introduction
- Methodology
- International Industrial Energy Assessment Programs
- Findings and Conclusions

Background

- Part of LBNL's Energy Assessments Research Series, which also includes:
 - *Industrial Energy Audit Guidebook: a step-to-step technical guide for conducting an energy assessment at the plant level*
 - *Energy Audit Practices in China: to understand China's national and local experiences and issues*



Background

- Purpose of this paper:
 - Understanding international experiences in development and implementation of nation-wide energy assessment programs
 - To provide a reference for use in China
 - To inform countries that are developing or interested in developing similar programs
- Main questions to answer:
 - Is there any available **national-level** energy assessment programs initiated by the **government** for industry?
 - If so, what are the key elements for a successful and sustainable program?

Introduction

- Role of Industrial Energy Assessments:
 - Set up baseline
 - Prioritize cost-effective energy-saving measures
 - Drive energy-efficient investments
 - Offer targeted, comprehensive or customized recommendations
- Role of Industrial Energy Assessment Programs:
 - Reduce costs of assessments at individual plants
 - Demystify and increase the adoption of cost-effective measures
 - Standardize assessment process and results
 - Provide trusted and quality-controlled energy auditors

Methodology

- Found 22 programs in 16 countries and regions
 - Australia, Canada, Denmark, Finland, France, India, Ireland, Japan, Netherlands, Norway, Portugal, Sweden, Switzerland, the United Kingdom, the United States, and the European Union
- Information was gathered through:
 - International databases on policies and programs
 - Program web pages
 - Government announcements and legislation documents
 - Program evaluation reports, and research papers
 - Internet searches

Methodology

- Two Main Categories of Programs
 - Stand-alone Energy Assessment Programs
 - Integrated Energy Assessment Programs

List of Surveyed Programs

Country	Program Name	Assessment Requirements and Program Type
Australia	Energy Efficiency Opportunities Program (EEO)	Mandated energy assessments by law (I)
Canada	ecoENERGY for Industry	Voluntary assessments in VAs (I)
Denmark	Voluntary Agreements(VA) with Greenhouse Gases (GHGs)Tax	Mandatory assessments in VAs with tax exemption (I)
Finland	Finnish Energy Audit Program in Industry	Voluntary assessments in VAs (I)
France	Energy Audits for SMEs	Free energy assessments (S)
	AERES Negotiated Agreements with threatened tax	Voluntary assessments in VAs with threat of using tax (I)
India	Energy Managers Training	Training programs for certified energy auditors (I)
Ireland	Energy Advice, Mentoring & Assessment for SMEs	Free energy assessments (S)
	Large Industrial Energy Network (LIEN)/Energy Agreement Program (EAP)	Mandatory assessments in VAs with required energy management system (I)
Japan	Energy Conservation Assessment	Free energy assessments (S)
	Certified Energy Managers (required by the Amended 2005 Energy Conservation Law)	Mandated energy assessments by law with required energy management system (I)
Netherlands	Long-Term Agreements (LTA)	Mandatory assessments in VAs with required efficiency targets (I)
Norway	Industrial Energy Efficiency Network (IEEN)	Voluntary assessments in VAs with CO ₂ tax (I)
	Energy management – companies in networks (EM-Network)	Voluntary assessments in VAs with required efficiency targets (I)
Portugal	Management System of Intensive Energy Consumption (SGCIE)	Mandated assessments with required energy management system and efficiency targets (I)
Sweden	Program for improving energy efficiency in energy-intensive industries (PFE)	Mandatory assessments in VAs with tax exemption (I)
	Energy Audits for Companies	Free energy assessments (S)
Switzerland	CO ₂ Target Agreements	Mandatory assessments in VAs with tax exemption (I)
UK	Carbon Surveys of Carbon Trust	Free energy/carbon assessments (S)
US	Save Energy Now (SEN) LEADER	Mandatory assessments in VAs with required efficiency targets (I)
	Industrial Assessment Centers (IACs)	Free energy assessments (S)
EU	EU Eco-Management and Audit Scheme (EMAS)	Mandatory assessment in VAs with required efficiency targets and required environmental management system (I)

Two Types of Programs

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Availability of Key Components in the Selected Stand-Alone Energy Assessment Programs

Programs	Assessment Costs	Standardized Manuals	Auditor Training	Auditor Certification	Database of Energy Assessment Results	Post-Assessment Follow-ups	Standardized Tools	Availability of Case Studies	
US Industrial Assessment Centers (IACs)	Free	Y	Y	Y	Y	Y	Y	Y	
UK Carbon Surveys (Carbon Trust)		N/A	N ¹	N	N		N		
Japan (Energy Conservation Center of Japan)			Y				Y		
Ireland (Energy Advice to SMEs)		Y	N				N ²		N
Sweden (Energy Audits for Companies)	Y		N						
France (Energy Assessment for SMEs)	Cost-shared		Y	Y		N	Y		

Stand-Alone Energy Assessment Programs

- Characteristics:
 - National programs to offer FREE energy assessments to Small-and-Medium Sized Enterprises, OR
 - Highly subsidized assessments
- Common elements:
 - Energy assessment manuals/guidebooks
 - Energy auditors training
 - Standardized assessment tools
 - Case studies
- Other good elements but not commonly used:
 - Certification of energy auditors
 - Database
 - Follow-up

*Japan
US
UK
Ireland
Sweden
France*

Examples will be given in the following slides...

Stand-alone Energy Assessment Programs

Certified Energy Experts



Qualified Specialists

Trained in BestPractices assessment and analysis software tools, Qualified Specialists help industrial facilities identify ways to improve system efficiency.

Find a Qualified Specialist

Locate a Qualified Specialist in your area to help optimize the following energy systems in your plant:

Compressed Air Systems: [Qualified AIRMaster+ Specialists](#)

Pumping Systems: [Qualified Pumping System Assessment Tool \(PSAT\) Specialists](#)

Process Heating Systems: [Qualified Process Heating Assessment and Survey Tool \(PHAST\) Specialists](#)

Steam Systems: [Qualified Steam Tool Specialists](#)

Fan Systems: [Qualified Fan System Assessment \(FSAT\) Specialists](#)

Become a Qualified Specialist

Enhance your career and business potential through BestPractices' training and qualification process:

Compressed Air Systems: [Qualified AIRMaster+ Specialists](#)

Pumping Systems: [Qualified Pumping System Assessment Tool \(PSAT\) Specialists](#)

Process Heating Systems: [Qualified Process Heating Assessment and Survey Tool \(PHAST\) Specialists](#)

Steam Systems: [Qualified Steam Tool Specialists](#)

Fan Systems: [Qualified Fan System Assessment \(FSAT\) Specialists](#)

Stand-alone Energy Assessment Programs

Training and Tools

Tools to help you plan each stage of your project:



Cut Carbon, Cut Costs Online training tool

Watch the training videos and complete a cost and carbon saving plan for your workplace. Covers 6 introductory management modules.

[Enter now >](#)



Action plan tool

Once you have used the Cut Carbon, Cut Costs tool, the action plan tool will help you to identify carbon saving measures for your organisation.

[Enter now >](#)



Project planning tool

Have a project in mind? The project planning tool will help you build a business case to present to board and develop a specification for your contractors.

[Enter now >](#)

Tools to help you identify cost and carbon saving opportunities:



Carbon footprint calculators

We have two carbon footprint calculators; the indicator and the organisational footprint calculator.

[Footprint calculator >](#)



Energy Analyser tool

Downloadable tool that helps you analyse your energy consumption, energy cost and carbon emissions.

[Enter now >](#)

Online training provided by the Carbon Trust in UK

Stand-alone Energy Assessment Programs

Energy Assessment Database

Industrial Assessment Centers Database in the U.S.

- As of 05-23-2011, the IAC database contains:
 - **14,970** Assessments
 - **112,161** Recommendations
- Searchable database by:
 - [Assessments](#): Industry Type, Size, Year, Energy Costs, Products
 - [Recommendations](#): Type, Savings, Cost, Implemented
 - Industry Type: [SIC](#) and [NAICS](#)
- Featuring:
 - Top 10 Energy Saving Measures by Energy Savings, Implementation Rate, and Recommended Times



Policy Measures Applied in National Programs, with Energy Assessment as a Key Component

Policy Scheme	Program Names	Voluntary or Mandatory Assessments	Energy or Environmental Management Systems	Subsidies	Energy/CO ₂ Tax	Energy-Efficiency Improvements	
Voluntary Agreement	Canada (ecoEnergy for Industry)	Voluntary assessments	Not required	Available	N/A	Not required	
	Finland (Energy Agreement Program in Industry)						Threat of using
	France (AERES)				N/A	Required	
	Norway (EM-network)				Apply taxes	Not required	
	Norway (IEEN)						
	US Save Energy Now LEADER	Mandatory assessments	Required	N/A		Required	
	EU EMAS				N/A	Nor required	
	Ireland (LIEN and EAP)		Not required			Required	
	Netherlands (LTA)						
	Sweden (PFE)						
	Denmark (VA with GHGs Tax)				Tax exemption	Nor required	
	Switzerland (CO ₂ Target Agreements)						
Mandated by Law	Australia (EEO)		Required	Available	N/A	Nor required	
	India(Energy Managers Training)						
	Japan (Certified Energy Managers)						
	Portugal (SGCIE)				Tax exemption	Required	

Integrated Energy Assessment Programs

- Characteristics:
 - Combined with other policy measures
 - Energy assessment serves as a first step to reach other goals
 - Two thirds of the surveyed programs are categorized in this group
- Common elements:
 - Voluntary agreements + mandatory/ voluntary assessments
 - Provide cost-shared assessments
 - Required energy efficiency improvements
 - In-house or third-party energy auditors
- Other good elements but not commonly used:
 - Mandated energy assessments by Law
 - Certified energy/environmental management systems
 - Applying energy/CO2 taxes or tax exemption

Australia
Canada
Denmark
Finland
India
Netherlands
Norway
Portugal
Switzerland
EU

France
Ireland
Japan
Sweden
US

Integrated Energy Assessment Programs

Required Energy Efficiency Improvements

- Netherlands:
 - LTA3: 2% per year of reduction in conventional fuel use to 2020;
 - voluntary energy assessments; required to invest in measures with a payback period less than 5 years
- Norway:
 - Required to achieve an energy saving of at least 10 % of the total energy consumption or conversion to new renewable energy sources (2003-2007)
- United States:
 - Save Energy Now LEADER Program requires companies that join to reduce energy intensity (energy use per unit of product) by 25% in 10 years;
 - mandatory energy assessments; required to establish a baseline and action plan

Integrated Energy Assessment Programs

Energy/Environmental Management Systems

Energy Management Standard EN16001

Energy Management System »

[Click here for an overview of benefits](#)

Transition from IS393 »

[Click here for further details](#)

EN 16001 Resources »

[Click here for further details](#)

An **Energy Management Standard** specifies the requirements for an energy-management system. The new **EN 16001** standard represents the latest best practice in energy management.

Ireland's Energy Management Standard IS 393 (2005) formed the basis for the EN 16001 standard.

An **Energy Management System** helps you to integrate energy management into your business structures, so that you:

- › Save energy
- › Save costs
- › Improve your energy and business performance

A company that implements and maintains an energy management system will continuously improve its energy performance year on year. Longer term cost savings of over 20% are regularly achieved.

What resources do you need to implement EN 16001?

It depends on the scale and complexity of your process and whether you are certified to ISO 14001.

Engineering input is needed during the Energy Review phase, to analyse energy use.

Systems input is needed to set up and align EN 16001 systems alongside ISO 14001.

After that, minimal extra input is required, since energy management is everyone's responsibility. Some people will have extra responsibility, but all staff should be energyaware.

Findings and Conclusions

- 22 National energy assessment programs initiated by the government are found in 16 countries and regions (EU)
- Two main types of industrial energy assessment programs:
 - stand-alone energy assessment programs: free/subsidized, for SMEs
 - Integrated energy assessment programs: large companies, voluntary-based
- Essential elements:
 - Coverage of costs
 - Training of energy experts (e.g., India, Japan, U.S.)
 - Standardized guides and tools
- Other good policy measures can be added on:
 - Database and certification of energy auditors
 - Voluntary agreements
 - Energy/environmental management systems
 - Required energy-efficiency improvements
 - Energy/CO2 taxes threat

Other Resources

- Industrial Energy Audit Guidebook: Guidelines for Conducting an Energy Audit in Industrial Facilities
<http://china.lbl.gov/publications/industrial-energy-audit-guidebook>
- Energy Audit Practices in China: National and Local Experiences and Issues
<http://china.lbl.gov/publications/energy-audit-practices-china-national-and-local-experiences-and-issues>
- Industrial Energy Assessments: A Survey of Programs Around the World
<http://china.lbl.gov/publications/industrial-energy-assessments>
- Energy Efficiency Guidebooks for Industry
<http://china.lbl.gov/research/industry/energy-efficiency-guidebooks-industry>

Acknowledgement

The authors are appreciated with the helpful suggestions and comments from the reviewers of this paper.

The authors would like to thank the China Sustainable Energy Program of the Energy Foundation and the U.S. Department of Energy for their support.

Thank you!

Questions?

Contact:

Lynn Price

LKPrice@lbl.gov

+1 (510)486-6519

Hongyou Lu

HYLu@lbl.gov

+1 (510)486-7534

Issues to Discuss

- What are the experiences or advices we can bring to China or other countries that are developing similar national energy assessment programs for industry?
- What are the keys in order to encourage companies to undertake industrial energy assessments?
- Cost-effectiveness of the programs? Which type of programs are more successful? Standalone, or intergraded? Or do we need both of them?

Terminology:

Energy Assessment or Energy Audit?

- Energy Assessment:
 - Defined by ASME (the American Society of Mechanical Engineers) Standards for system assessments:

[Energy assessment is] “a standardized framework”, [which] “involves collecting and analyzing system design, operation, energy use, and performance data, and identifying energy performance improvement opportunities for system optimization.”
- Energy Audit:
 - An inspection or survey of energy flows in the audited facility.
 - May or may not include energy-saving improvement identification.