

Energy-Saving Opportunities for Manufacturing Enterprises

The United States Department of Energy (U.S. DOE) strives to meet national energy intensity and climate goals by providing energy management tools and resources, plant audits, and new technologies to the nation's manufacturers.

Energy Audits Reduce U.S. Industry Energy Costs

Since 2006, more than 800 large U.S. companies have participated in *Save Energy Now* audits. The average energy cost savings identified by an audit of a single energy-intensive system within an enterprise is \$1.4 million USD (9.8 million RMB). The average source energy savings identified by an audit is 191 billion Btu (6,900 tce), or 6.5% of the total source energy consumed by the enterprise. The average natural gas savings identified is 146 billion Btu (5,300 tce) per energy audit, or 11.5% of the plant's total natural gas consumption. Average CO₂ emissions reduction identified is 12,000 metric tons per plant per year.

In addition, more than 1,700 small- and medium-sized U.S. companies have participated in Industrial Assessment Center audits since 2006 identifying average energy cost savings of \$230,000 USD (1.6 million RMB) per audit. The average source energy savings identified by an audit is 25 billion Btu (900 tce), or 8% of the total source energy consumed by the enterprise. The average natural gas savings identified is 11 billion Btu (400 tce) per energy audit, and average CO₂ emissions reduction identified is 3,000 metric tons per plant per year.

Energy Audit Process

U.S. DOE energy audits apply software tools to identify energy savings opportunities in energy-intensive heating, steam,

U.S. Energy Savings Results 节能成果

The table below shows the overall potential annual savings identified in *Save Energy Now* energy audits.* 以下这张表显示的是“节能从现在开始”提供的能源审计所找到的每年的节能潜力*。

Average Savings Amount Identified Per Audit 一次审计发现的平均节能量	Large Enterprises 大型企业 (annual source energy consumption > 0.5 trillion Btu** or 18,000 tce) (年均一次能源消耗 > 0.5 万亿Btu 即> 1.8万吨标煤)	Small or Medium Enterprises 中小型企业 (annual source energy consumption < 0.5 trillion Btu or 18,000 tce) (年均一次能源消耗 < 0.5 万亿Btu 即< 1.8万吨标煤)
Cost Savings 成本节省量	\$1.4 million USD (9.8 million RMB) \$140万美元 (980 万人民币)	\$230,000 USD (1.6 million RMB) \$23万美元 (160 万人民币)
Energy (source) 一次能源节省量	191 billion Btu (6.5%) (6,900 tce) 1910 亿Btu (6.5%) (6,900 吨标煤)	25 billion Btu (8%) (900 tce) 250 亿Btu (8%) (900 吨标煤)
Natural Gas 天然气	146 billion Btu (5,300 tce) 1460 亿Btu (5,300 吨标煤)	11 billion Btu (400 tce) 110 亿Btu (400 吨标煤)
Carbon Dioxide (CO ₂) 二氧化碳 (CO ₂)	12,000 metric tons 1.2 万吨	3,000 metric tons 3,000 吨

*Annual savings numbers based on small, medium, and large plant assessments as of April 2010. *平均节省量的数据来自大、中、小型企业评估的结果 (到2010年4月为止)。 **BTU (British Thermal Unit). 英制热量单位. 1 billion Btu = 36 tce.

compressed air, motors, pumps, and fan systems. Two types of audits are offered:

- Large enterprises: U.S. DOE Energy Experts conduct 3-day audits at U.S. facilities that have a minimum annual energy use of 0.5 trillion Btu (18,000 tce) and significant potential for implementing energy efficiency improvements.
- Small- and medium-sized enterprises: 1-day audits are conducted by a team of engineering faculty and students through the U.S. DOE Industrial Assessment Centers, located at 26 U.S. universities.

Software Tools

Free software decision tools developed by the U.S. DOE can help enterprises find ways to reduce energy use and costs. The Quick Plant Energy Profiler (Quick PEP) tool is available in Chinese and several of the system-specific tools feature metric units and international currencies.

Training

A key component of the U.S. DOE *Save Energy Now* model is educating manufacturing facility employees and energy consultants about industrial system efficiency, including how to use the software tools to analyze and enhance industrial system performance.

Save Energy Now Success Factors

- Facilitate an energy management approach to identify and implement energy- and carbon-saving technologies and best practices
- Achieve quick energy and cost savings with a small investment
- Focus on improving system-based energy efficiency with minimal effect on production
- Use proven software tools and resources based on U.S. DOE research in industrial energy use and management

Energy Management Standards

In preparation for the international energy management standard, ISO 50001, the U.S. DOE is providing training and support to help U.S. enterprises implement energy management strategies and the American National Standards Institute (ANSI) Management System for Energy (MSE) standard, ANSI/MSE 2000–2008.

Energy-Efficient Technologies

Since 1979, the U.S. DOE has supported more than 600 separate industrial technology research, development, and demonstration projects that have resulted in significant improvements for U.S. manufacturers.

制造业中的节能机会

美国能源部 (U.S. DOE) 通过向全美的制造业企业提供能源管理工具和资源, 进行工厂能源审计, 以及提供新兴技术, 致力于实现全国降低能源强度和气候变化的目标。

通过能源审计降低美国工业能源成本

从2006年开始, 美国有超过800家大型企业参与了美国能源部“节能从现在开始”项目中的能源审计。对企业单个高耗能系统进行审计, 平均可以找到140万美元 (980万人民币) 的能源成本节省潜力。平均而言, 一次审计可以找到1910 亿Btu (6900 吨标煤) 的一次能源节能潜力, 占企业一次能源消耗量的6.5%。每次审计平均可以找到1460 亿Btu (5300 吨标煤) 的天然气节能潜力, 占工厂天然气消耗总量的11.5%。通过审计发现, 每年每家工厂有1.2万吨的二氧化碳 (CO₂) 减排潜力。

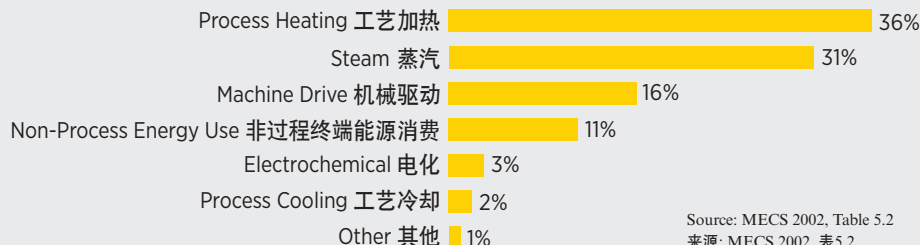
此外, 自2006年以来, 超过1700家中小型美国企业也参与了美国能源部工业评估中心提供的能源审计, 平均一次能源审计可以找到价值为23万美元 (160万人民币) 的能源成本节省潜力。平均而言, 一次审计可以找到250 亿Btu (900 吨标煤) 的一次能源节能潜力, 占企业一次能源消耗量的8%。每次审计平均可以找到110 亿Btu (400 吨标煤) 的天然气节能潜力以及3000吨二氧化碳的减排潜力。

能源审计过程

美国能源部的能源审计通过利用软件工具来找到高能耗系统的节能潜力, 包括供热、蒸汽、压缩机、电机、水泵和风机系统。共有两种不同的能源审计:

- 大型企业: 美国能源部的能源专家将在美国工厂内进行为期3天的审计。

U.S. Manufacturing Energy End Use 美国制造业终端能源消费



Targeting the top two energy-consuming systems, *Save Energy Now* audits have identified average process heating source energy savings of 11.03% and steam source energy savings of 7.03% per enterprise.

通过侧重于两大最为耗能的系统, “节能从现在开始”的能源审计, 平均而言, 在参加审计的每家企业中找到占其工艺加热一次能耗11.03%的节能量, 以及占蒸汽系统一次能耗7.03%的节能量。

这些大型工厂的年能耗量必须在 0.5 万亿Btu (1.8万吨标煤) 以上, 并必须有明显的潜力去落实节能改进。

- 中小型企业: 位于美国26家大学的美国能源部工业评估中心向中小型企业提供为期1天的能源审计, 审计队伍由工业评估中心的老师和学生组成。

软件工具

由美国能源部开发的免费软件工具可以帮助企业找到合适的方法来降低能耗和能源成本。“快速能源档案工具 (Quick PEP)” 目前已有中文版, 其他针对具体系统的软件工具也包括公制单位和国际汇率转换的功能。

培训

美国能源部的“节能从现在开始”模式中包括了一个关键要素, 即向制造业工厂的员工和能源顾问提供有关工业系统效率的培训, 包括如何使用软件工具来分析和加强工业系统的能效表现。

能源管理标准

在准备国际能源管理标准 (ISO 50001)

的同时, 美国能源部也提供培训和支持, 以帮助美国企业实施能源管理战略和实施美国国家标准研究院 (ANSI) 制定的能源管理系统 (MSE) 标准, 即ANSI/MSE 2000-2008。

节能技术

从1979年以来, 美国能源部支持了超过600项单独的工业技术研究、开发和示范项目, 这些项目已经为美国制造业中提供了显著的节能收益。

“节能从现在开始”的成功要素

- 通过利用促进能源管理的方法, 明确并实施节能减碳技术以及节能减排的最佳实践经验。
- 通过小规模的投资, 较快地实现节能量并降低成本。
- 侧重于系统的能效改进, 而将对产量的影响最小化。
- 基于美国能源部在工业能耗和能源管理中的研究成果, 使用有效的软件工具和资源。

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

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Download software tools and publications, view training sessions, and learn more about the U.S. DOE *Save Energy Now* resources at www.industry.energy.gov. For more information, please contact: James Quinn, U.S. Department of Energy, james.quinn@ee.doe.gov.

The U.S. Department of Energy Office of Energy Efficiency and Renewable Energy supports research and development in energy efficiency and renewable energy technologies to improve the U.S. economy, provide for a cleaner environment, and increase U.S. energy independence. The Industrial Technologies Program works with U.S. industry to improve industrial energy efficiency and environmental performance.

请通过以下网站, 下载软件工具和资料, 了解培训课程, 以及更多的有关美国能源部“节能从现在开始”项目的信息和资源。 www.industry.energy.gov 如果想了解更多的信息, 请联系美国能源部詹姆斯·奎恩 (James Quinn), james.quinn@ee.doe.gov。

美国能源部能源与可再生能源办公室支持能源效率和可再生能源技术的研究和开发, 从而促进美国经济发展, 提供更清洁的环境, 并提高美国的能源独立性。工业技术项目与美国的工业企业合作, 致力于改进工业能源效率和环境保护。