



Review of policies and measures for energy efficiency in industry sector[☆]

Kanako Tanaka^{*}

Center for Low Carbon Society Strategy, Japan Science and Technology Agency (JST), 4-8 Kojimachi, Chiyoda, Tokyo 1020083, Japan

ARTICLE INFO

Article history:

Received 10 December 2010

Accepted 28 July 2011

Available online 12 August 2011

Keywords:

Industry energy efficiency

Policy review

Typology and categorization

ABSTRACT

Energy efficiency in industry plays key roles in improving energy security, environmental sustainability and economic performance. It is particularly important in strategies to mitigate climate change. The evidence of great potential for cost-effective efficiency-derived reductions in industrial energy use and greenhouse gas (GHG) emissions have prompted governments to implement numerous policies and measures aimed at improving their manufacturing industries' energy efficiency. What can be learned from these many and varied initiatives? This paper provides foundation for policy analysis for enhancing energy efficiency and conservation in industry, by surveying more than 300 policies, encompassing about 570 measures, implemented by governments in IEA countries, Brazil, China, India, Mexico, Russia and South Africa. It outlines the measures' main features, their incidence of use, and their connections with specific technical actions and key stakeholders (i.e., how and where measures affect the energy efficiency of industry). It also examines the key features underlying the measures' success: (1) potential to reduce energy use and CO₂ emissions cost-efficiently; (2) ease of policy development, execution and assessment and (3) ancillary societal effects.

© 2011 Elsevier Ltd. All rights reserved.

0. Introduction

Since 1970s, energy efficiency and conservation have become one of key component to address energy security. Recently, it is also regarded as effective ways for reduction in GHG emissions from fossil fuel to mitigate climate change as well. This paper focuses on industry and provides foundation for policy analysis for enhancing energy efficiency and conservation in industry.

Industry sector has been consuming much energy at their various processes. Total final energy use in industry was 2.4 Gtoe globally in 2006 which was calculated from IEA statistics (IEA, 2009a), it consumes nearly one third of total global primary energy supply and 36% of energy-related CO₂ emissions. The potential primary energy savings in industry for adopting best practice commercial technologies is estimated to be 25–38 EJ/year in 2004 (IEA, 2007a). This is 18–26% of the total industrial energy consumption and 5.4–8.0% of total energy consumption in all sectors. Industry's final energy use has grown by 65% between 1971 and 2005. The existing scenario analysis showed that industrial CO₂ emissions continuing to increase by 1.7 times by 2030 (IEA, 2008b).

Industry's large energy use and vast potential for energy savings make it an attractive target for improving energy security and climate mitigation through increased energy efficiency. The attractiveness is

mutated, however, by the policy challenges inherent in its great diversity. The sector's energy use is influenced by its many different technologies, processes and products; energy sources and prices; political, economic and business situations and managerial priorities and decision making paradigms. Further, its energy efficiency can be improved by a wide variety of technical actions (Fig. 1), including:

- maintaining, refurbishing and retuning equipment to counter natural efficiency degradation and to reflect shifts in process parameters;
- retrofitting, replacing and retiring obsolete equipment, process lines and facilities to new and state of art technologies;
- using heat management to decrease heat loss and waste energy by, for example:
 - proper use of insulation;
 - utilization of exhausted heat and materials from one to other processes;
- improving process control, for better energy and materials efficiency and general process productivity;
- streamlining processes—eliminating processing steps and using new production concepts;
- re-using and recycling products and materials;
- increasing process productivity—decreasing product reject rates and increasing materials yields.

Policy facilitates those technical efforts. The successful use of policy for energy efficiency improvement depends on how policy can finally give incentives for each possible technical improvement, directly or indirectly, to industry sector.

[☆]This paper had been initially prepared during the author's career at the International Energy Agency (IEA). However, it does not necessarily reflect the views of the IEA and the IEA member countries.

^{*} Tel.: +81 3(6272)9270; fax: +81 3(6272)9273.

E-mail address: tanaka.kanako@jst-lcs.jp

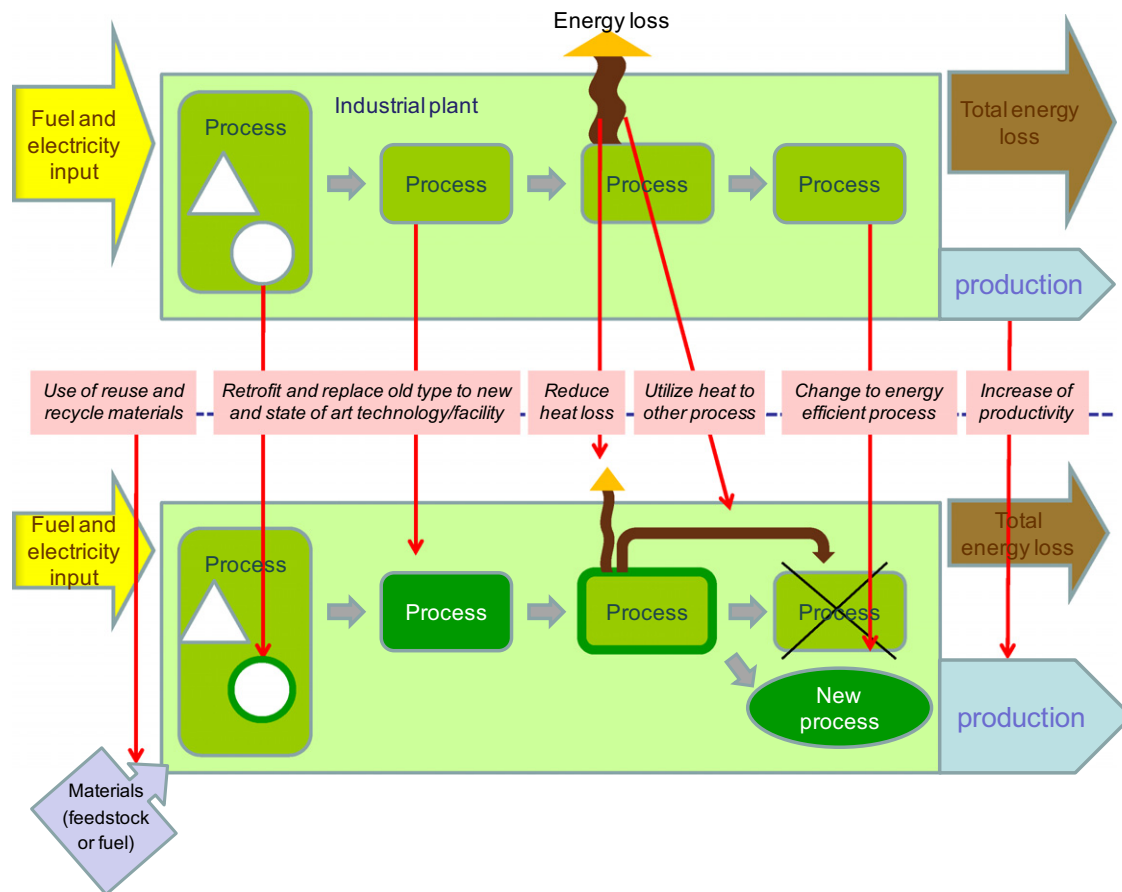


Fig. 1. Sample of technical means of energy efficiency improvement.

This paper presents a contextual framework for analyzing the operation of industrial energy efficiency policies within these diverse circumstances. It portrays “how and where policies provide incentives to industry to promote energy efficiency”. It covers: policies and measures which directly and indirectly influence energy (fuel and electricity) consumption and efficiency of manufacturing process of IEA member countries and Brazil, China, India, Mexico, Russia and South Africa.¹

1. Overview of energy efficiency policy in industry

1.1. Policy objectives

The number of energy efficiency and conservation-related policies is growing and shifting in focus. Fig. 2 shows the transition of the policies' primary purposes. One trend has been the shift from energy conservation (aimed at absolute energy savings) to energy efficiency (aimed at reducing the energy used per level of production output). Another trend has been the increasing emphasis on climate change and sustainable development objectives in recent years, especially since the Rio Summit² in 1992, and COP3 in 1997. International initiatives such as G8 Gleneagles Summit in 2006

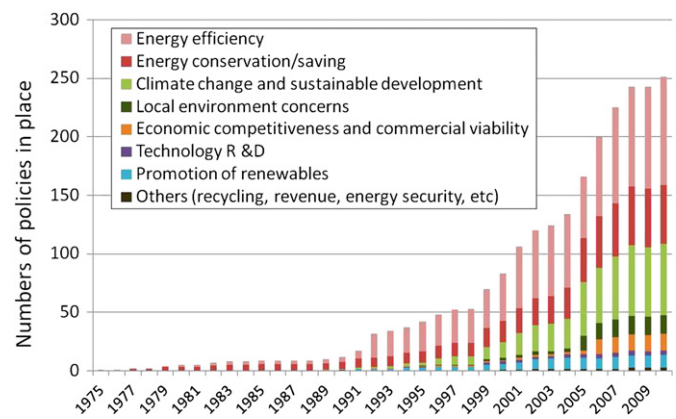


Fig. 2. Transition of objectives of policy which contribute energy efficiency improvement in IEA countries and plus 5 countries. Note: these numbers show numbers of policies being implemented in each year, but does not show the year of introduction. In case that one policy has multiple objectives, number is equally distributed. Sources: IEA policies and measures database (IEA, 2010), supplemented with information from the web site of each country's energy efficiency authority and published reports.

have also influenced the recent increasing focus on energy efficiency/conservation and climate change.

1.2. Various policy targets for energy efficiency in industry

Governments use two general policy approaches and various streams of influence to encourage industry to improve its energy efficiency (see Fig. 3). The general approaches are: (1) company- or

¹ The paper excludes policies focused industry's use of appliances/equipment, such as lighting, office equipment and space heating/cooling/ventilation, in its buildings and on its use of automobiles, trucks and other modes of transport to convey raw materials, products and employees. Policies that encourage on-site combined heat and power (CHP) by industry are included, but those related to CHP in the power generation industry are excluded.

² UNCED: UN Conference on Environment and Development.

Download English Version:

<https://daneshyari.com/en/article/993090>

Download Persian Version:

<https://daneshyari.com/article/993090>

[Daneshyari.com](https://daneshyari.com)