

MEMO - hand-out

Project Asia Pro Eco LTA project "Implementing Voluntary Approaches on Urban Environmental Management in China"
To Participants of Kelamayi workshop 27-28 April 2009
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Monitoring & Supervision of progress of Voluntary Long-Term Agreements in China

1. Introduction

The EU Asia Pro Eco LTA project "Implementing Voluntary Approaches on Urban Environmental Management in China" promotes the implementation of energy efficiency improvement and emission reduction measures and projects in Chinese industrial companies by means of constructive co-operation between local government and companies. This LTA implementation project started end December 2006 for large energy-intensive companies and will be extended to Chinese SMEs in the near future.

The overall objective for Chinese companies within 11th Five-Year-Plan is to achieve a reduction of their energy intensity by 20 percent in five years compared to the energy intensity in the year 2005. Also there are overall objectives for annual 2% additional emission reductions in the same period. In this memo three calculation methods for energy targets are described. These Monitoring & Supervision procedures could also be used to some extent for evaluation of environmental targets by means of corresponding and partly simplified calculation methods. LTAs have to rely on sound and transparent Monitoring & Supervision procedures in order to assess whether companies will be or have been successful in meeting or exceeding their energy and environmental targets.

Different calculation methods can be used for evaluating changes in energy intensity. Three principal approaches are presented in this memorandum:

- a) The first method is based on the calculation and interpretation of a Monetary Energy Intensity indicator;
- b) The second method is based on the calculation and interpretation of a Physical Energy Intensity indicator;
- c) The third method focuses on assessing the results of the implementation of projects included in the Energy Efficiency Improvement Plan elaborated by the company.

Further this memorandum discusses briefly the advantages and limitations of each method and indicates their main fields of application.

2. Three methods for Monitoring & Supervision of energy intensity

In this section three methods are described that have to be used for the interim and final evaluation and assessment of Chinese LTA progress on energy-efficiency improvement.

2.1 Monetary energy intensity indicator

The formula for the calculation of the energy intensity is based on the ratio between the energy consumption (in tce or TJ) and the economic value of the goods produced (in Chinese Yuan). The difference in monetary energy intensity between the start and the end of the monitoring period is the result of the cumulative effect of all factors impacting the energy use as well as the economic value of production of a company within this period. These factors can be classified in five main categories.

Factor	Main cause producing the effect of the factor considered
Volume	Variations in the total amount of goods produced
Structure	Variations in the types of goods produced
Economy	Variations in the price index per sector and in the exchange rate of the Chinese Yuan
Energy efficiency	Effect of the implementation of energy saving measures and projects
Other factors	Other factors are generally external factors. These factors are mainly outside of the influence of a company (for instance the effect of extreme climate conditions in a specific year and in specific sectors)

The effects of the factors volume, structure and economy vary frequently with more than 10% from year to year. Other factors can also have a large effect, in particular in years where extreme conditions occur. The effect of the implementation of energy saving measures and projects is generally between 0 and 5% per year on average.

As a consequence, a monetary energy intensity indicator is in many cases not adequate for evaluating the effect of the implementation of energy saving measures and projects at company level. Monetary energy intensity indicators are frequently used at a higher (e.g. provincial/national) aggregation level (for instance for comparing the energy intensity of industry in different countries). However, it is generally difficult to separate the energy-efficiency improvement effect from all other effects included in a monetary energy intensity indicator.

2.2 Physical energy intensity indicator

The physical energy intensity indicator (often called Specific Energy Consumption or SEC) is a ratio between energy use and production, where production is expressed in physical terms (for instance tonnes of product per year, m² or m³ of product per year, etc.).

When using a physical indicator, the difference in energy intensity between the start and the end of the monitoring period is the result of the effect of only four main categories of factors (the same categories as above but without the "Economy" factor).

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Volume	Variations in the total amount of goods produced
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Energy efficiency	Effect of the implementation of energy saving measures and projects
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The calculation of the physical energy intensity indicator can be improved by using two specific monitoring techniques:

- indexing with respect to a reference year, and
- splitting total production into homogeneous product groups.

These two techniques allow to filter out a large part of the volume effect (indexing) and of the structure effect (splitting). However, the resulting indicator still includes, next to the energy saving effect, also remaining volume and structure effects as well as eventually also the effect of other factors. Depending on the industrial sector and the period considered, the effect of energy saving represents a larger or smaller fraction of the difference in energy intensity between the start and the end of the monitoring period. Therefore, additional analysis is almost always needed for a correct evaluation of the real impact of energy saving projects on the improvement of the physical energy intensity of companies.

Within the Dutch Long Terms Agreements, this approach (via relative Energy-Efficiency Index EEI) is principally used for Monitoring & Supervision as well as reporting at sector level. For assessment at company level, the physical energy intensity indicator EEI is combined with measures and projects implementation monitoring.

2.3 Measures and projects implementation monitoring

Measures and projects implementation monitoring is also called 'mirroring'. This technique compares the energy-efficiency target, as specified in the Energy-Efficiency Improvement Plan of a company, with the results of the implementation of the measures and projects included in the plan.

Within the Dutch Long Terms Agreements, the 'mirror image' of the implementation might differ to some extent from the plan. This is allowed as long as the target is achieved or even surpassed. It happens in particular when:

- the implementation had to be adapted with respect to provisions as specified in the plan (such changes need to be well documented during the monitoring & supervision as well as to be accepted by the competent authority);
- additional measures and projects are executed, next or in substitution to measures and projects previously included in the plan.

Measures and projects implementation monitoring focuses on measuring and/or calculating the effect of good housekeeping measures and specific energy saving projects. For this reason the impact of volume, structure and other factors on the resulting energy intensity are much smaller than with the two approaches described above. Also, specific monitoring techniques (indexing with respect to the reference year of the plan, and splitting total production into homogeneous product groups) can contribute to a more precise mirroring of the plan with the results of the implementation.

This implementation monitoring approach is particularly useful when combined with the EEI-calculation as executed within the Dutch Long Terms Agreements for Monitoring & Supervision as well as reporting at company level. This combination of EEI Monitoring & Supervision with at least 80% validation or coverage of calculated energy-efficiency improvement by independent list of measures and projects has also been trained and advised for application in Chinese LTAs.

3. Field of application of the three different approaches

All three approaches described above present a number of advantages and limitations. The most important are listed in the following table. This table indicates also the best fit between each type of indicator and different fields of application ranging from national energy statistics to monitoring of energy intensity at the level of individual companies.

Method	Advantages	Limitations	Field of application
Monetary energy intensity	Economic data are available from sector statistics	Influence of many factors which are poorly related to energy-efficiency	National or sectorial energy statistics
	Economic data of different product groups can be added	Price index per sector might not be specific enough at company level	Identification of priority sectors in terms of energy
Physical energy intensity	Less influence of external factors (like economy) on differences in energy intensity	Additional analysis needed for assessing energy saving effect	Trends in energy intensity at sector or at company level
			Benchmarking at subsector or at company level (SEC)
Projects monitoring	Precise assessment of energy saving effects	Information needed at project and measure level	Energy intensity assessment at company level
	Adequate for monitoring in SME sectors	Filter techniques needed in order to avoid additional analysis for separating the volume and structure effect	Project monitoring within subsidy scheme

4. Kelamayi workshop discussion on Monitoring & Supervision results using these three methods

Some aspects discussed in this memorandum have already been introduced during the Monitoring & Supervision (EEI) training last year in Nanjing workshop by SenterNovem. During the Kelamayi workshop the Monitoring and Supervision findings and results related to 14 pilot companies in Nanjing, Xian and Kelamayi will be discussed for the year 2008 compared to reference year 2005 between European and Chinese project partners at the same time. Sufficient time has been allocated for constructive discussion on progress of Chinese LTA results up to now as well as ideas and suggestions aimed at cross-fertilisation between EU and Chinese Monitoring & Supervision experiences. The improvement of Monitoring and Supervision activities is a continuous process and this process will last up to end of 2009 for this EC Asia Pro Eco LTA project. These LTA evaluation and assessment experiences will be digested in China-specific LTA manual and presented during Beijing Final LTA Dissemination Conference in November 2009.