**Thailand’s Experience in Making Energy Balance**

**The reasons for making energy balance**

Thailand uses energy balance to present country’s energy situation in each year due to all types of energy use are shown in terms of commodity account and energy unit. For commodity account, the commodity balance is used for checking the completeness of the data on energy supply, energy transformation and final energy consumption. Energy balance in terms of energy unit is important for checking on conversion processes and also for making energy indicators such as a proportion of alternative energy consumption and energy intensity etc.

**Concept**

It is essential to make energy commodity balance in terms of physical unit which means that the amount of primary energy supply equal the amount of energy transformation plus the amount of final energy consumption before making energy balance in terms of energy unit. To make energy balance, the quantity of energy commodity account is multiplied by conversion factors equal the quantity of energy balance.

**Processes**

Data put in energy balance is collected from various sources such as government/enterprise agencies, private energy companies and other related agencies.

*Coal/lignite*

For primary coal/lignite supply, data production is collected from the Department of Primary Industries and Mines (DPIM) whereas data import and export are collected from the Customs Department (CD) and Department of Trade Negotiations (DTN).

For coal/lignite transformation, a data of coal/lignite used in power sector is collected from government agencies, power enterprise and private power companies.

For final coal consumption, a data of coal/lignite used in industrial sector is collected from factories by survey, questionnaires and estimation.

*Natural Gas*

For primary natural gas supply, data production is collected from the Department of Mineral Fuels (DMF), whereas data import is collected from the PTT Public Company Limited (PTT).

For natural gas transformation, a data of natural gas used in power sector and natural gas processing plant is collected from PTT, power enterprise and private power companies.

For final natural gas consumption, a data of natural gas used in industrial, commercial and transport sector is collected from PTT.

*Crude oil and Petroleum Products*

For primary crude oil supply, data production is collected from the Department of Mineral Fuels (DMF), whereas data import and export of crude oil and petroleum products are collected from the Department of Energy Business (DOEB) and DTN.

For crude oil transformation, a data of crude oil used in refineries is collected from DOEB and private companies.

For petroleum products produced from crude oil, a data of petroleum products is collected from DOEB.

For final petroleum products consumption, a data of petroleum products used in all economic sectors is collected from DOEB, private companies, survey, questionnaires and estimation.

*Alternative/Renewable Energy*

For alternative/renewable energy supply, data production is collected from government agencies and estimating from a volume of alternative/renewable energy be used in power and economic sectors, whereas data import and export are collected from DTN.

For alternative/renewable energy transformation, a data of alternative/renewable energy used in power sector is collected from government agencies, power enterprises and private companies.

For final alternative/renewable energy consumption, a data of alternative/renewable energy be used in all economic sectors is collected from government agencies, factories, survey, questionnaires and estimation.

*Electricity*

A data of electricity generated from power sector by types of fuel (physical unit) and by types of energy sources (Gwh) is collected from government agencies, power enterprises, and private power companies.

A data of electricity be used in all economic sectors is collected from power enterprises.

*Other energy*

Other energy such as condensate, natural gasoline as well as methane, ethane and propane (produced from natural gas processing plant) which be used as raw materials in petrochemical industries are collected from government agencies and PTT.

*Stock Changes/Statistical Differences*

The data of stock changes/statistical differences in Thailand‘s energy balance show the volume of stock changes and/or statistical differences and also illustrate the differences of the volume of primary energy supply and energy consumption (energy transformation plus final energy consumption).The volume of these data should not more than 10% of primary energy supply, except that data availability of stock changes is more than as possibility.

**Problems**

Thailand faces to the problems on making energy balance such as :

*Data Availability*

For energy transformation, especially for power sector, it is difficult to gather an amount of energy use in private power sector. This is sometimes to estimate by using data of the latest year, for example, an amount of coal is used for producing 1 Gwh of electricity. In order to complete data on a part of energy transformation, a data of each power plant is prepared in details of install capacity (MW), electricity generation (Gwh) and fuel use for producing electricity (physical/ktoe unit).

For Industrial sector, survey of using coal is very important but this is not able to do every year. Therefore, coal consumption is estimated by sending questionnaires to producer/importer and cross-checked by using data of coal production and import from government agencies.

*Renewable Energy*

There are many problems on renewable energy issues due to the methodology using for calculating and collecting data which are put in energy balance is very complicated as well as, at present, there are no regulations for reporting on renewable energy consumption.

- Solar and wind energy

It is necessary to know energy potential of solar and wind in order to use for cross-checking of electricity generated from such energy. For solar heating, there are some missing data due to the lack of data on solar collector distributers, survey on the use of solar collectors is, therefore, very important to verify data of solar heating.

- Biomass

The calculation for energy potential of biomass which consist of fuel wood, charcoal, paddy husk, bagasse and agricultural waste is used for cross-checking of biomass consumption in industrial and residential sectors.

- Garbage or Municipal Solid Waste (MSW)

The calculation for energy potential of Garbage/Municipal Solid Waste (MSW) used for cross-checking of MSW consumption in industrial sector is very complicated due to it is used as fuel directly (combustion waste) and also as gaseous fuel (landfill waste).

- Biogas

It is very difficult to calculate energy potential of biogas due to biogas is produced from animal waste and industrial waste, this is, therefore, necessary for using of survey on biogas consumption in industrial and other sectors.