Annexure - IV

Sustainability Energy Indicators of Economic Dimension

The publication "*Energy Indicators for Sustainable Development: Guidelines and Methodology, Vienna, 2005, IAEA*" presents a list of indicators on Social, Economic and Environment dimensions associated with sustainability in Energy.

While the importance of these various indicators is recognized and since Social and Environmental indicators require additional levels of detail than that are presented in Energy Statistics this report is restricted to the economic dimension only.

The economic indicators have **two themes: Use & production patterns and Security**. The first has the sub theme of Overall Use, Overall Productivity, Supply Efficiency, Production, End Use, Diversification (Fuel Mix) and Prices. The second has the sub themes of Imports and strategic Fuel stocks.

List of Sustainability Energy Indicators of Economic

Theme	Sub-theme	
Use and Production Pattern	Overall Use	Energy use per capita
	Overall Productivity	Energy use per unit of GDP
	Supply Efficiency	Efficiency of energy conversion and distribution
	Production	Reserves-to-production ratio
		Resources-to-production ratio
	End Use	Industrial energy intensities
		Agricultural energy intensities
		Transport energy intensities
	Diversification (Fuel Mix)	Fuel shares in energy and electricity
		Non-carbon energy share in energy and electricity
		Renewable energy share in energy and electricity
	Prices	WPI of energy sources

Security	Imports	Net Energy Import Dependency
	Strategic fuel stocks	Stocks of critical fuels per corresponding fuel consumption

Theme: Use and Production Pattern

This theme is further sub classified into sub themes as

- Overall Use,
- Overall Productivity,
- Supply Efficiency,
- Production,
- End Use,
- Diversification (Fuel Mix) and Prices.

SUB THEME: OVERALL USE

Energy Indicator: Energy Use per Capita

Purpose and Measurement method**:** This indicator measures the level of energy use on per capita basis and reflects the energy-use patterns and aggregate energy intensity of a society. It is calculated as the ratio of the total annual use of energy to the mid-year population. It may be further classified as follows:

a) Total Primary energy supply per capita
b) Total Final consumption of energy per capita
c) Electricity use per capita

SUB THEME: OVERALL PRODUCTIVITY

Energy Indicator: Energy Use Per Unit of GDP

Purpose and Measurement method: This indicator reflects the trends in overall energy use relative to GDP, indicating the general relationship of energy use to economic development. This indicator is calculated as the ratio of energy use to economic output. Here Energy Use indicates Total Primary Energy Supply (TPES), Total Final Consumption (TFC) and final electricity consumption and Output is taken as GDP measured in thousand INR. It may be further classified as follows:

a) Total Primary energy supply per 000' rupees
b) Total Final consumption of energy per 000'rupees

c) Electricity Use per 000′ rupees

SUB THEME: PRODUCTION

Energy Indicator: Reserve-to-Production Ratio

Purpose and Measurement method: – The purpose of this indicator is to measure the availability of national energy reserves with respect to corresponding fuel production. Reserves are generally defined as identified (demonstrated and inferred) resources that are economically recoverable at the time of assessment. The indicator provides a basis for estimating future energy supplies in years with respect to current availability of energy reserves and levels of production.

It is computed by dividing the proven energy reserves of a commodity at the end of a year by the total production of that commodity in that year.

Energy Indicator: Resources to Production Ratio

Purpose and Measurement method: – The purpose of this indicator is to measure the availability of national energy resources with respect to corresponding fuel production. Total resources include reserves, and hypothetical and speculative undiscovered resources. It provides a relative measure of the length of time that resources would last if production were to continue at current levels.

The lifetime of fuel resources in terms of years by using resources-to-production ratio is computed by dividing the total energy resources of a commodity at the end of a year by the total production of that commodity in that year.

SUB THEME: END USE

Energy Indicator: End Use Energy Intensities

I. Industrial Energy Intensities-

Purpose and Measurement method: – This set of indicators measures the aggregate energy use of the industrial sector and selected energy intensive industries per corresponding value added. Intensities provide information about the relative energy use per thousand units of output. The set is used to analyze trends in energy efficiency and evaluating trends in technological improvements. It is measured as Energy Use per thousand units of value added by industrial sector and by selected energy intensive industries.

II. Agricultural Energy Intensities

Purpose and Measurement method: – This indicator is a measure of aggregate energy intensity in the agricultural sector that can be used for analyzing trends, particularly in renewable and non-commercial energy use. It is measured as Energy Use per thousand units of value added by Agriculture sector.

III. Transport Energy Intensities

Purpose and Measurement method: – This indicator is used to monitor trends in energy use in the Transport sector. It is measured as Energy Use per thousand units of value added by Transport sector. The transport indicators measure how

much energy is used for moving both goods and people. Transport is a major user of energy, mostly in the form of oil products, which makes transport the most important driver behind growth in global oil demand.

It is evident from the value of the indicator that industrial sector and transport sector are energy intensive. It must be noted that changes in the aggregate indicator can also be due to change in relative output of the sector. Hence we can say that the difference seen across the time development do not necessarily reflect differences in energy efficiency.

SUB THEME: DIVERSIFICATION

Energy Indicator: Fuel share in energy and electricity

I. Fuel Share in Energy
II. Fuel Share in Electricity

Purpose and Measurement method: – This indicator provides the share of fuels in TPES, TFC and electricity generation. This indicator is computed by calculating the ratio of consumption or production of the specific energy fuels identified above to total energy use or production with respect to:

a. TPES,
b. TFC and
c. Electricity generation

Energy Indicator: Non-carbon energy share in energy and electricity

I. Non-Carbon Energy Share in Energy
II. Non-Carbon Energy Share in Electricity

Purpose and Measurement method: – This indicator measures the share of non-carbon energy sources in TPES and electricity generation. Share of non- carbon energy in TPES is computed by calculating the ratio of primary supply of non-carbon energy to TPES. The share of non-carbon in electricity generation is the total electricity generated from non-carbon energy sources divided by total electricity generated.

Energy Indicator: Renewable energy share in energy and electricity

I. Renewable Energy Share in TPES
II. Renewable Energy Share in TFC
III. Renewable Energy Share in Electricity

Purpose and Measurement method: – This indicator measures the share of Renewable energy in TPES, TFC and electricity generation. This indicator is computed by calculating the ratio of the consumption and production of renewables

to total final energy supply and production. The share of renewables in electricity is the electricity generated from renewables divided by total electricity generated.

SUB THEME: PRICES

Energy Indicator: WPI of Energy Sources

Purpose and Measurement method: – This is a price indicator of energy sources and reflects the price change with respect to base year 2011-12. It is to be noted that energy prices are driving forces for incentive or conservation, or efficiency improvements. Also, it shows affordability and therefore is one of the factors responsible for fuel diversification.

SUB THEME: SUPPLY EFFICIENCY

Energy Indicator: **Efficiency of energy conversion and distribution**

Purpose and Measurement method: – This indicator measures the efficiency of energy conversion and distribution systems in various energy supply chains including losses occurring during electricity transmission and distribution, and gas transportation and distribution. Due to constraint of data availability only the losses in transmission of electricity are used. The indicator is calculated as ratio of losses in transmission of electricity to electricity generated.

Theme: Security

SUB THEME: STRATEGIC FUEL STOCKS

Energy Indicator: Stock of Critical Fuels per Corresponding Fuel consumption

Purpose and Measurement method: – The purpose of this indicator is to measure the availability of national stocks of critical fuels, such as oil, with respect to corresponding fuel consumption. Many countries maintain stocks of oil in anticipation of disruptions in oil supply. For some countries, the critical fuel might be natural gas or other types of fuel. In Indian context we have taken coal as critical fuel. The indicator provides a relative measure of the length of time that stocks would last if supply were disrupted and fuel use were to continue at current levels. This indicator is defined by dividing the stocks of the critical fuels maintained by countries by the corresponding annual fuel consumption.

SUB THEME: IMPORTS

Energy Indicator: Net energy import dependency

Purpose and Measurement method: – This indicator measures the extent to which a country relies on imports to meet its energy requirements. This indicator is computed by calculating the ratio of net imports to consumption. Petroleum products are excluded as India is net exporter of them and have considered only the import value of different energy sources to calculate the indicator.