

## Indian Energy Saving Certificate (ESCert) Scheme Towards Addressing Climate Change Issues

Piyush Verma<sup>1</sup>, Alka Verma<sup>2</sup>, Mrinal Saurabh Bhaskar<sup>3</sup>  
<sup>1,3</sup>Bureau of Energy Efficiency, Ministry of Power, New Delhi  
<sup>2</sup>Graphic Era University, Dehradun

### Abstract

Climate change is a global threat which alters the distribution and quality of natural resources worldwide and adversely it also affects the livelihood of its people. As the Indian economy is strongly linked with the natural resources and the major sectors which affects the economy such as agriculture, water and forestry are the climate sensitive sectors, the country may face a major threat in future because of the projected changes in the climate. The Indian National Action Plan on Climate Change has identified several key areas for addressing the climate change related issues and came out with different national missions. The Energy Saving Certificate Scheme under the National Mission for Enhanced Energy Efficiency program of Government of India would help the energy intensive industrial sectors in raising their efficiency standards as well as helping in addressing the climate change issues through the reduction of carbon di-oxide emissions. The present paper will explain about the innovative concept of energy saving certificate and the potential of the scheme in reducing the carbon di -oxide emissions under the first cycle of the scheme.

*Keywords: Climate, Emission, Energy, Efficiency, Policy, Industry*

### 1. INTRODUCTION

The Indian National Action Plan on Climate Change (NAPCC) identified several measures to tackle the climate change issues. These measures will promote our development objectives while also yielding co-benefits for addressing climate change effectively. The plan outlines eight national missions covering different areas of the economy and keeping in mind the climate change-related objectives of adaptation and mitigation. To deal with the climate change challenges the country should act with a multi pronged approach and this is the reason the NAPCC has started with an institutional mechanism for effective delivery of each individual mission's objectives.

The National Mission for Enhanced Energy Efficiency is one of the mission which is being implemented by Bureau of Energy Efficiency and the main focus of the mission is to reduce the carbon di-oxide emissions by increasing the efficiency standards of different energy intensive industrial sectors of the country and by some other innovative schemes like financing mechanism or any other efficiency improvement programs.

### 2. ENERGY SAVING CERTIFICATE SCHEME

The scheme is also known as Perform, Achieve and Trade (PAT) scheme. The PAT scheme is developed in national interest, which is not only a benefit to the government for earning revenues or such, but the positive effects of this scheme would be realized at the broader level by easing the pressure on the power-sector infrastructure and reducing the need for the primary energy resources. The mechanism is designed to facilitate the Designated Consumers (DC) to not only achieve their legal obligations under the Energy Conservation Act, 2001, but also to provide them with necessary market based incentives in the form of energy saving certificates in response to target overachieved. The notification for the first PAT cycle was issued on 30th March 2012 by the Government of India (GoI) and for the first cycle (2012-2015), 478 Industries have been identified as designated consumers from 8 different industrial sectors. The Industries under these eight industrial sectors who have become a Designated Consumer are having more than minimum annual energy consumption specified by the Government of India. It is a mandatory requirement for the industries who are consuming more than the prescribed minimum annual energy consumption to report to Bureau. These industries will be qualified as a DC and thus, have to participate in PAT mechanism. The threshold limit and the number of identified DCs in each sector are given below in Table 1:

Table 1: Reported energy consumption and target energy saving for different industrial sector

S. No.	Sector	Threshold limit (ton of oil equivalent)	No. of identified DCs	Reported energy consumption (in million ton of oil equivalent)	Target energy saving (in million ton of oil equivalent)
1.	Aluminium	7500	10	7.71	0.456
2.	Chlor-Alkali	12000	22	0.88	0.054
3.	Textile	3000	90	1.20	0.066
4.	Pulp & Paper	30000	31	2.09	0.119
5.	Iron & Steel	30000	67	25.32	1.486
6.	Fertilizer	30000	29	8.20	0.478
7.	Cement	30000	85	15.01	0.816
8.	Thermal Power Plant	30000	144	104.56	3.211

The state-wise numbers of designated consumers along with the total target energy saving for their designated consumers is also listed in table no. 2. The target energy savings for the states have been calculated from the targeted energy savings of all the DCs from all the sectors of a particular state.

Table 2: Target energy saving and number of identified DCs from different states

S. No.	State	No. of identified DCs	Target Energy Saving (in ton of oil equivalent)
1.	Andhra Pradesh	39	370789
2.	Assam	7	83177
3.	Bihar	3	47473
4.	Chhatisgarh	38	641897
5.	Delhi	4	62937
6.	Goa	5	14387
7.	Gujarat	54	592781
8.	Haryana	7	269734
9.	Jharkhand	11	521098
10.	Karnataka	20	223964
11.	Kerala	9	14685.2
12.	Madhya Pradesh	24	500453
13.	Maharashtra	45	790354
14.	Odisha	28	541192
15.	Puducherry	2	1146
16.	Punjab	22	337123
17.	Rajasthan	58	358656
18.	Tamil Nadu	41	395365
19.	Tripura	3	7050
20.	Uttar Pradesh	27	395225
21.	Uttarakhand	2	7090
22.	West Bengal	17	472740
23.	Himachal Pradesh	10	29044
24.	Meghalaya	2	6035

### 3. TARGET SETTING MECHANISM

Target setting for the industries was one of the challenging jobs among the different activities under the PAT scheme. Sector specific studies for each of the sector were undertaken and it revealed that each sector is having a wide bandwidth of specific energy consumption (SEC) which has indicated a large energy-savings potential in the sector. This bandwidth is a reflection of varying vintage, production capacity, raw material quality, and product-mix of the industries. Such wide variation makes it difficult to specify a single benchmark SEC for the sector as a whole because the older plants would have been found the benchmark impossibly high if it is set at the level of newer plants while as the newer plants would have been found it trivial if it is set at the level of older plants. The broad bandwidth of SEC within a sector, and the inability of all plants to achieve a sectoral benchmark SEC, lead to the adoption of unit specific approach in each sector wherein each DC in a sector is

mandated to reduce its SEC by a fixed percentage, based on their current SEC (or baseline SEC) within the sectoral bandwidth.

#### 4. CALCULATION OF ESCERTS:AN EXAMPLE

A methodology for calculation of energy saving certificate is as given below:

SEC in Baseline year:	10 TOE/unit of production
Baseline Production:	10000 units
Target:	4% reduction in SEC
SEC in the target year:	9.6 TOE/unit productions

The industry has to save the energy equivalent to the amount of 4000 TOE. Now, there may be two types of cases:

Scenario 1 (Achieved SEC = 9.4): +2000 TOE

Scenario 2 (Achieved SEC = 9.8): -2000 TOE

In the first scenario, the designated consumer is eligible for getting the energy saving certificates but in the second scenario, the designated consumer is liable for the penalty. Here it is also to be noted that 1 no. of energy saving certificated will be equivalent to the amount of 1 ton of oil equivalent so in the first scenario the designated consumer is eligible for getting 2000 nos. of energy saving certificate. The designated consumers can also bank their energy saving certificates up the next PAT cycle. Apart from this there is a facility of getting advanced energy saving certificates in between the PAT cycle and at the end of each financial year but at the same time the targets assigned to them will also be revised.

#### 5. METHODOLOGY FOR CO<sub>2</sub> CALCULATION

An analysis has been undertaken to calculate the CO<sub>2</sub> emission reductions for six sectors covered under the scheme. The target energy savings has been apportioned in different forms of energy exactly in-line with the apportionment of the baseline energy figure of the individual designated consumers. For each designated consumer, CO<sub>2</sub> emissions reductions with respect to the apportioned targeted total energy saving is calculated and for the whole sector the similar process has been adopted. By adding the CO<sub>2</sub> emissions reductions of the different sectors covered under this scheme the total CO<sub>2</sub> emissions reduction can be calculated.

##### 5.1 Formula for calculations

For calculation of CO<sub>2</sub> emission reduction a very simple formula has been used. In the method adopted, the amount of energy saved by reducing the usage of the fuel is multiplied by the emission factor of that same fuel. The following formula has been used for the calculations of emission savings by reducing the usage of electricity in (kWh).

CO<sub>2</sub> emission reduced (tons of CO<sub>2</sub>) = Avoided Electricity Purchase (kwh) \* Grid Emission Factor (Tons CO<sub>2</sub>/kwh)

##### 5.2 Emission factors for calculation

The emissions factors for various fuels/processes can be calculated as well as can be referred from the resources as well, for the project the emission factors has been referred from the CEA (Central Electricity Authority) While for fuels it has been referred from IPCC EFDBS (Emissions Factors data Base)

The Table no. 3 shows the emission factors values which have been referred for emissions savings calculation for PAT framework

However while using the emissions factors for calculations the special consideration were given to unit consistency and hence used accordingly.

Table 3: Emission factors for different fuels

Fuels	Emission Factors
Coal (gCO <sub>2</sub> /MJ)	92.5
Lignite (gCO <sub>2</sub> /MJ)	102.5
Gas (gCO <sub>2</sub> /MJ)	49.4

Oil (gCO <sub>2</sub> /MJ)	71.9
Diesel (gCO <sub>2</sub> /MJ)	69.1
Naphta (gCO <sub>2</sub> /MJ)	66
NEWNE Grid (tCO <sub>2</sub> /MWh)	0.83
South grid (tCO <sub>2</sub> /MWh)	0.75

For grid emission factor the value is different for the NEWNE Grid and southern grid, because the locations of DCs are different and across the nation so the different emission factors value has been considered.

### 5.3 Assumptions

There are various assumptions have been made before doing the calculations

- Every Industries meet the specified target under PAT 1<sup>st</sup> Cycle
- The specified target will reduce portioned to the energy profile of the industry.
- The emission factors for liquid fuels like LSHS & HSHS are assumed to be same.
- Various fuels like hydrogen, biomass, MLSS pith are not included in calculating the emissions savings.

### 5.4 CO<sub>2</sub> emission reduction

Based on the above methodology, the CO<sub>2</sub> emission calculation has been done and it is expected that this energy saving certificate scheme will be able to reduce the CO<sub>2</sub> emission by more than 24 million tons per year.

## 6. CONCLUSION

Considering the need of CO<sub>2</sub> emission reduction in the world, India has announced a target reduction of carbon intensity of GDP by 20% to 25% of 2005 levels by 2020 and to achieve this target the Indian National Action Plan of Climate Change (NAPCC) consisting of eight national missions was launched in the year 2008. These eight national missions are taking care of the issues of CO<sub>2</sub> emissions considering different sectors of India. Among the different initiatives, this energy saving certificate scheme will be one of the potential player in reducing the CO<sub>2</sub> emissions through innovative mechanism of market based incentives for energy efficiency in industries which will really boost up the national commitments towards CO<sub>2</sub> reduction.

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