

Assessment of Perform Achieve and Trade (Pat), Cycle in India and Conceptualization of its Future Performance

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ABSTRACT: In this paper, we have a tendency to analysed the experiences gained from section one of PAT theme and extract some policy lessons that may support policy manufacturers whereas coming up with future PAT theme. we have a tendency to conduct the analysis by addressing key analysis criteria i.e. price issue, energy saving certificate mercantilism, body burden for the authority and PAT cycle two outlook. It's not in our objective to point out to the reader a normative facet of coming up with PAT theme. Rather, we have a tendency to establish some key policy lessons which might be summarized as: Targets to be achieved should be clearly expressed and government ought to give subsidies to selected shoppers to require up some major energy economical ways requiring vast monetary investment, industrial sectors to be enclosed whereas deepening of PAT has been mentioned, widening and deepening of PAT ought to be supported 2 criteria i.e. energy consumption and impact of the sectors on the setting, correct market should be discovered for ESCert's mercantilism in terms of policy timeframe, energy potency targets mustn't solely cowl "low hanging fruits" however it ought to promote innovation.

Keywords: *Energy Efficiency, PAT Scheme, Tradable Certificates.*

I. INTRODUCTION

In environmental and energy policy sectors, several energy economical ancient policy instruments address numerous problems and realizable targets. within the recent years, there's associate increasing interest in market-based energy saving instruments. the most advantage of implementing this kind of market-based instrument is that they'll take full advantage of economic process and to require energy saving initiatives to a better level. Market schemes like these are attracting the eye of policy manufacturers.

The structure of this paper is as follows. In "Analytical framework" section we tend to gift the strategy used in our analysis. "Perform succeed and Trade (PAT) theme overview" section consists of an outline of PAT theme and its journey from 2012. what is more, successive section "Lessons learned from the PAT theme" refers principally the analysis of the scheme supported sure criteria or characteristics. In "Discussion" section we tend to assess the teachings learned from the theme which may be relevant for PAT theme. we'll determine some characteristics of PAT theme and supply some recommendations for policy manufacturers. Finally, "Conclusion" section may be a windup of the complete paper light the foremost vital findings

II. ANALYTICAL FRAMEWORK

The method we tend to use during this paper to extract results from PAT cycle1 for predicting PAT cycle2 result and developing the structure of future PAT cycle3 consists of 3 steps. Initially, we are going to analyse this activities below the theme, reveal a relationship between cycle1 and cycle2 and value the performance of PAT theme. Finally we are going to predict the doable outcome of PAT cycle2 and develop PAT cycle3 structure and supported the relationships of the previous step we tend to extract some policy lessons.

III. PERFORM ACHIEVE AND TRADE (PAT) SCHEME

Perform achieve and trade scheme was a major step to achieve this objective. It is market-based mechanism to improve energy efficiency in energy-intensive industries. The scheme covers 478 designated consumers from 8 energy intensive sectors.. The scheme includes the following project steps:

- Goal setting: Setting a specific energy consumption reduction target for 478 designated consumers.
- Target achieve/ reduction phase: In this phase designated consumers undertake measures to reduce their specific energy consumption by developing action plans.
- Trading phase: Consumers who exceed their target will be credited with tradable energy permits. These permits can be sold to designated consumers who

failed to achieve their target. Table 1 below shows Key features of PAT scheme.

Table 1: Key Features of PAT scheme

PAT Scheme 2012- 2015, 2015-2019, 2019....	
Obligated parties	Industrial sectors, second phase electricity distributors + Railways + Refineries.
Compliance period	2012 –2015 (PAT cycle), 2015 - 2019 (PAT cycle) and 2019 - (PAT Cycle)
Obligation	6.6 mtoe cycle 1 then 8.89 mtoe in cycle 2
Project evaluation	Target achieves declaration by the DC's. monitoring and verification phase
Certificates	Energy saving certificates that are tradable
Trading parties	Energy distributors, producers and traders
Penalty	DC's not achieving SEC target have to pay penalty.
Targets achieved	Target reduction 6.686 mtoe
	Actual saving : 8.67 m toe

IV. RESEARCH METHODOLOGY

In addition to the Indian and English literature review on different energy efficiency measures to save electricity, the study is also relied on one primary methodological tool, **observation**, and other secondary methodological tool, **web based data** and print media.

Salient points of the methodology adopted for this research are discussed here.

a. Identifying Respondents:

PAT may be a Market primarily based mechanism to reinforce energy potency measures in energy intensive industries. twelveIndustrial sectors are lined everywhere Republic of India together with Thermal power, Aluminium, Cement, Fertilizer, Iron& Steel, Pulp& Paper, Textile and Chlor-Alkali, Railways, Discoms and Refineries. These sector along account for regarding twenty fifth of India's gross domestic product and forty fifth of India's primary energy consumption. we'll try and meet folks from these sectors therefore on perceive the PAT thought and measures taken by them to attain energy reduction targets given to them beneath the theme. Interviewing the respondents to find out their reviews, positive and negative impacts of PAT cycle can facilitate United States to induce clear plan regarding the results of PAT cycle one at the top of 2019.

b. Sources/Tools of Data Collection:

Industrial sectors underneath PAT theme can bear watching and verification section. This section forms the

backbone of the assessment method of PAT theme. In this project assembling actual information relating to pat cycle from industrial sectors is tough as a result of industries being government adjusted, they may or they will not share there company information thanks to its confidentiality. On the oppositehand we will interview individuals from industries United Nations agency worked underneath PAT theme therefore on get clear image of PAT cycle once enforced much and thereby serving to achieving objectives of the project.

c. Method of Data analyzing:

Data analyzing may be a method of with the goal of discovering helpful data. knowledge is collected by interviewing folks from varied industrial sectors underneath PAT cycle and analyzing it'll facilitate United States to predict the results of PAT cycle a pair of currently, that goes finish by 2019.

5. RESEARCH OUTCOME

The aim of this study isn't simply to investigate the work done beneath PAT cycle one however to administer our suggestions and to develop structure which will increase energy potency. With this study the main focus is to place forward our greatest ideas and values of energy conservation and moderation. this is often additionally necessary within the context that, typical sources square measure running out of offer and sooner are going to be exhausted. thence energy potency live like PAT theme is vital.

5.1 Field work

To analyze the assorted aspects related to the PAT cycle it's vital to satisfy those that have gained expertise during this field. For this project study, we have a tendency to visited industries particularly Century material and JSW Steel, Railway diesel fruity shed situated in Kalyan and Discom Organization in Mysore state and a consultation agency that has conducted over one thousandenergy audits. By interviewing these folks we have a tendency to came to grasp however and every and each trade is attemptingto realize their specified targets. Details concerning the businesses visited square measure given below;

Company name: Chamundeshwari Electricity Supply Corporation Ltd (CESC)

Chamundeshwari Electricity provide Corporation restricted may be a company incorporated underneath the Distribution and retail provide of electrical power for 5 districts and has been enclosed underneath PAT in DISCOM sector and has given the energy reduction target thirteen.49%. During our visit to the present discom organization in Mysore, we have a tendency to interviewed the deputy manager, Mr. Anne Gowda Sir, he explained however helpful this theme goes to be. Earlier energy saving measures were followed however with the introduction of this type of theme, everybody can work with rather more efforts and energy to avoid coming back underneathindustries WHO fail to fulfill the targets and to pay penalty.The organization has already created Associate

in Nursing action arrange, that they're going to begin implementing so as to realize PAT cycle two targets. Energy potency improvement measures taken by CESC to realize

the reduction target as mere by BEE ar shown below in Figure one.

Action Plan reporting format for PAT Cycle-II (2016-19)

Sl. No.	Energy efficiency improvement measures (EEIM)	Investment Rupees (Lakh)	Date of completion of measure/ likely completion	Life cycle year1	Energy Consumption (TOE)		Annual Energy saving				
					Before Measures	After Measures	Electricity (kWh)	Oil (Tonne)	Gas (SCM)	Coal (Tonne)	Other (if any)
1	UJALA	By M/s EESL (Bulb)	-	2016-17	43243467	13999684	29243784				
		By M/s EESL (Tube Light)			310548	155274	155274				
2	BELAKU Yojane	By GoK (KREDL)	2016-17	2016-17	10116456	2782025	7334431				
3	UNIP works	17500	2017-19	2017-19	-	-	51284563				
4	E&I works	20000	2017-19	2017-19	-	-	62331289				

Note: 1) For the year 2016-17: 14,81,448 nos. of LED Bulbs and 7394 nos. of Tube Lights were distributed in CESC area. 19W is the power saving considered for calculation for each LED bulbs and 20W for each Tube Light.
2) For the Year 2016-17: 2,40,868 nos. 11W CFL bulbs were distributed in CESC Area.
3) For UNIP and other E&I works, the deemed annual energy savings is calculated as per DPR's

Signature _____

Name of the energy manager:
Regd. No.: _____
Mob. No.: _____
Email ID: _____

Name of the company: Chamundeshwari Electric Supply Corporation Limited
Full address: No.29, Vijayanagar 2nd stage, Mysore-570017
Contact person: Mr. Annegowda.M.S.
Email address: dgndum@cescmysore.org
Mobile/ Fax numbers: 9480637505
Plant address: No.29, Vijayanagar 2nd stage, Mysore-570017

Signature _____

Name of the organisation (Technical section) head: _____
Mob. No.: _____
Email ID: _____

Seal _____

General Manager (Technical)
Corporate Office,
CESC, Mysuru

Figure 1 Action Plan Report for PAT cycle II (Source: Reference CESC Company data shared via email dated 29 April 2017)

Company 2: Railway diesel loco shed Kalyan

Loco shed is Associate in Nursing engine shed set in Kalyan within the Indian state of Maharashtra. It falls below urban centermetallic element railway division Here, we tend to met senior divisional applied scientist, they need began to attain conferences, meeting relating to PAT theme and area unit springing up with concepts with that they will come through the target. the corporate took the assistance of external advisor to undertake energy audit to spot areas for reduction of energy consumptions. because of confidentiality, they weren't ready to share the report with U.S.A..

Company 3: Century Rayon

Established in 1952 century cloth is that the division of century textile and business restricted of the renowned Bk Birla cluster of firms Here we have a tendency to met Mr Hedge Sir United Nations agency is oversight the complete PAT activity and he shared with U.S. a number of the reports relating to PAT theme. He explained century cloth is often conducting internal and external energy audits. Services of the supposed authority like bureau and CII –Energy Cell ar taken time to time, to utilize the expertise of different industries, system network, compressed gas network, air con system and pumping systems ar the important areas, wherever we've got found hiring external consultants terribly helpful.

Century cloth was made in achieving their PAT cycle one target and grab 12420 energy saving certificate.

Figure 2 below shows ENCON projects and investment details of the company and Figure 3 below

shows a glimpse of energy efficiency measures taken by them to achieve targets.



Figure 2 ENCON projects and investment details of the company (Source: Century Rayon Company data)

c.	Replacement of two nos condenser water pump (380m3/hr X 2NOS & 150m3/hr -69.60kw) with new pump (650m3/HR 58.49 kw)	2012-13	1.72	6.50	14
d.	Replacement of mist condenser in evaporator no.3&5	2012-13	1.98	6.50	20
e.	Energy efficient chilled water pump	2012-13	1.57	6.50	13
f.	Optimization of Spinning HF Freq uency Stage-1	2012-13	2.77	6.50	9
g.	Replacement of river pump no 2 with energy efficiency	2012-13	1	6.50	15
h.	Replacement of Existing Reciprocating Water Chilling unit with Energy Efficient Screw Chiller	2012-13	3	6.50	18.75
i	F.O.Steam booster modification	2013-14	86 MT Coal	5355	12
J	Enhancement in calcined salt production capacity for reducing the energy cost on RSB to Tyre cord by off.diff.in Rayon & T/C division.	2013-14	1.68 Lakh Kwh & 215 MT Coal	Rs. 5.45 /kw And Rs 5355	0.4
K	Optimisation of spinning HF frequency(no.2)	2013-14	1.12	5.45	3
L	Mist condenser for Calcination in Spinbath – Tyre cord Plant	2013-14	1.43	5.45	6.34
m	Energy efficient pumps for Cooling water system in Spinbath - 3 Nos in TC	2013-14	4.63	5.45	32
N	Acid Absorption Crystallizer in Spin Beth	2013-14	3060 MT Coal	6355	450
O	Replacement of cast Aluminium rotor with FRP blade Rotor in axial flow fans in Rayon Plant	2014-15	3.95	6.60	12.6
P	Optimization of pot motors power cons. by segregation of high wattage motors in Rayon	2014-15	2.16	6.60	10.5

Figure 3 Energy Efficiency measures taken by Century Rayon(Source: Century Rayon Company data)

Company 4: JSW Steel

The Iron & industry in Asian country is one in all the necessary industries within the country from many points of view. This business accounts for thirty six Million MTOE, concerning V-J Day of Indian Industrial energy consumption. Under PAT theme there are unit sixty seven selected customers each from integrated steel plants and sponge iron. Target of one.48 million MTOE has been given to the selected consumer's for total iron and steel sector. Here we tend to meet Mr. Anish Karahe Sir World Health Organization initial went to head the PAT cycle and he

showed North American country the work they're doing for triple-crown implementation of the theme. we tend to additionally had an opportunity to satisfy energy manager of the corporate Mr. Sanjay Kumavat Sir World Health Organization currently heads the complete PAT comes and showed North American country the action arrange ready for PAT cycle a pair of however he didn't share the document with North American country thanks to their company policy. Table a pair of below shows energy reduction target for JSW Company and baseline energy consumption details shown below as elaborated in PAT book [Reference 5].

Table 2: Energy reduction target specified for JSW

Name address and state	Baseline Energy Consumption norms (TOE)		Energy consumption norms
	Specific energy consumption (Toe/ ton of product)	Product output	Specific energy consumption (Toe/ ton of product)
JSW Ltd. Vasind Maharashtra	0.0527	0.0527	0.0511

Though SEC target was 0.0511, due to the shutdown of their rolling plant it was reduced and therefore normalized. JSW Steel Company was successful in achieving their PAT cycle 1 target and gain 1875 energy saving certificate.

Company 5: Senergy Consultant

It is the energy conservation and property consultants collaborating with industries, trade associations non-profit and government bodies. Here we tend to meet Mr. Ravindra Datar Sir WHO may be a certified likewise as licensed energy auditor by Bureau of Energy potency (BEE).

The practice has been concerned in final analysis energy audits needed for PAT cycle and has abundant expertise in energy audit field. Sir explained concerning PAT cycle situation and gave his review that "PAT cycle may be a 1st positive initiative taken by the govt. of Asian country which can have a positive impact in long run". Visiting industries, interviewing those that really work beneath the theme was an excellent expertise to be told however well the theme has been adopted in industries to realize the targets given to them. when we tend to had associate interaction session on Pat theme with the trade folks we {will|we are able to} say that industries WHO have planned their work consequently and have already ready action plans will bring positive lead to part two of the theme

5.2. Discussion

In this phase, we have a tendency to draw results from our analysis of PAT theme love characteristic some characteristic relevant for PAT theme, providing some recommendations for policy manufacturers that they'll think

about whereas evaluating varied choices for coming up with and implementing the longer term PAT cycle. PAT theme throughout its initial section has each positive and negative reviews. totally {different|completely different} folks with different opinions and perceptions relating to the results of PAT theme exist; thus it's not in our objective to indicate to the reader a normative side of coming up with PAT theme. On the contrary facet, we have a tendency to limit ourselves to a general framework of the theme and lightness findings which will draw the eye of policy manufacturers throughout deciding} process relating to style and implementation of PAT theme.

5.2.1. Target setting

The nature of targets of each PAT cycle one and PAT cycle a pair of are completely different. Target laid out in section one was over achieved with eight.67 Mtoe saving of energy. Energy reduction target for phase1 was half-dozen.686 Mtoe and national target for phase2 is eight.869 Mtoe, therefore there's clearly a rise of two.183 Mtoe compared with phase1. Most of the DC's throughout phase1 of theme targeting affordable areas to realize the desired target and smaller share of organizations did some technological changes, method modification and instrumentation. An obvious conclusion from PAT cycle1 is that whereas setting the target in future PAT cycles the govt ought to offer some subsidies to the selected shoppers in order that they will take up some major energy economical ways requiring vast monetary investment that otherwise would be unfeasible. Another side is that every one DC's beneath PAT ought to take up ways of energy potency with longer payback amount and set needed business ways to traumatize new policy demands.

5.2.2. Obligated Parties

In the initial part of PAT theme, eight energy intensive industrial sectors were thought of, particularly aluminium, cement, chlor-alkali, fertilizer, iron & steel, pulp & paper, textiles and thermal power plants. the explanation to think about these eight sectors was owing to excess energy consumption with not several activities been meted out for saving energy and therefore the total energy saving target being half dozen.686 Mtoe, 3 industries i.e. thermal power plants, cement and iron & steel covers eightieth of the on top of such target. This part has received each positive and negative comments however it got completed with success.

In the second part PAT theme, additional DC's were adscititious to the economic sectors enclosed in Pat cycle one together withthe introduction of three new sectors particularly crude refineries, Discoms and railways. crude refineries have AN annual energy consumption of ninety,000 Mtoe or on top of, Discoms have annual AT&C loss of one thousand Mu/86,000 Toeor on top of. In railway sector 2 units were considered; zonal railways having traction annual energy consumption of seventy,000 Mtoe and workshop/ production units with annual energy consumption of thirty,000 Mtoe. We suggest the below mentioned sectors shown in Table three to be thought of in future PAT cycle..

Table 3: Deepening of PAT Scheme

Sr. No	Sector
1	Sugar industry
2	Chemical industry
3	Milk Dairy industry
4	Printing &publishing Industry

5.2.3 Sugar industry

India is that the second largest agriculture land within the world. There ar twenty agro climatical regions and fifteen of the most important climate regions within the world, exist in India. The importance of energy potency in sugar industries in India is incrediblylow and also the reason for together with sugar sector in our study is as a result of there ar several sugar plants that ar active in-effective energy potency measures. The technologies getting used ar out dated. If this sector is taken into account beneath PAT theme, the plants can have to be compelled to follow energy saving measures attributable to the rigorous rules of the theme, thereby reducing the energy consumption. Figure four below shows prime 5 sugar manufacturing countries along side their sugar cane production rate.

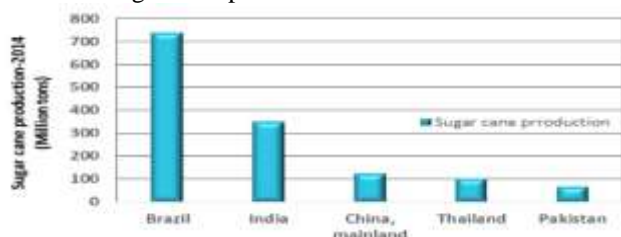


Figure 4 top five sugar producing countries in the world [12]

Why Sugar sector to be included under PAT:

- India is a land of agriculture with an estimated production of around 300 million tons. It has more than 500 sugar manufacturing industries along with 300 molasses based alcohol distilleries
- It is energy intensive industry, listed under Energy Conservation Act 2001.
- Since in phase 2 of PAT scheme, energy intensive industries with less energy consumption were added, this sector is pretty good option as it has potential for energy saving
- In India, there are 527 total sugar plants with 99 plants having installed capacity 5000 TCD (Tons of crushing/day) thereby plants above 5000TCD should be considered in the future cycle of PAT scheme.
- The estimated annual energy consumption of these plants vary between 45,000 toe per year to 90,000 toe per year. Therefore we suggest that these 99 large sugar plants to be considered with threshold limit of 30,000 toe as the minimum annual energy consumption per plant.
- Sugar industries are included under Red category which means industries not favouring environment which is another reason why this sector should be included while designing future PAT scheme.

5.2.4 Chemical sector

Indian industry is that the third largest producer in Asia and stands at sixth place at world level.it has been foreseen that this trademight grow at St Martin's Day p.a. to succeed in the scale of USD224 Billion by 2017. This trade accounts for regarding two.11% of gross domestic product (GDP). the explanation for considering industry to be enclosed in our study is as a result of PAT themeuntil currently have thought of industries as DC's solely on one basis i.e. energy consumption, no factors are thought of relating toenvironmental problems. The industry may be a sector with each energy consumption and having venturesome effects on the atmosphere.

There area unit five major segments of Indian chemical sector, Base chemicals, speciality chemicals, prescription drugs, agro chemicals and bio technology. If every phase is taken into account to be enclosed within the future cycles of PAT theme, rather more energy savings will be achieved.

According to a report discharged on five March 2016 by Govt. of India Ministry of Environmental, Forest and global climate change(MoEFCC), industries are re-categorized counting on their pollution index. This categorization relies on the subsequent factors inflicting pollution; they're emission, effluents, unsafe waste generated and consumption of resources.

The following criteria on "Range of pollution Index" is been finalized and it has 4 categories.

- Industries with pollution index score of 60 and above - Red category
- Industries with pollution index score of 41 to 59 - Orange category
- Industries with pollution index score of 21 to 40 – Green category

- Industries with pollution index score incl. and up to 20 – White Category

Table 4: List of RED Category Industries

Sl No	Industry Sector	Sl No	Industry Sector
1	Isolated storage of hazardous chemicals	39	Wine, brandy processing
2	Automobile manufacturing (assembled)	40	Oliver Aharis
3	Hazardous waste recycling (except closed circuit)	41	Ship building
4	Leathering oils and grease/salt	42	Oil and gas extraction
5	PU foam (Y/NON)	43	Steel surface treatment
6	Carbon black & dust	44	Textiles
7	Lead acid battery	45	Paints, surface (other)
8	Plastic/leak processing	46	Synthetic fibres
9	Power generation plant	47	Thermal Power Plants
10	Hazardous waste incineration (open circuit)	48	Lighting houses
11	Chlorinated hydrocarbons	49	Aluminium smelter
12	Waste	50	Copper smelter
13	Wine glass production	51	Fertilizer (solid)
14	Wine condenser	52	Integrated Iron & Steel
15	W-Waste Recyclers	53	Pulp & Paper (Manufacturing)
16	Milk and dairy products	54	Steel foundry
17	Pharmaceuticals	55	Oil Refinery
18	Pulp & Paper	56	Pharmaceuticals
19	Color mixing	57	Pharmaceuticals
20	Explosives (Manufacturing)	58	Pulp & Paper (Lignin-Ash + wood)
21	Power generation, pipelines	59	Iron/steel
22	Organic chemicals	60	Railway locomotive work shop, service centers
23	Airports and Commercial Air Terminals		
24	Aluminium		
25	Basic chemicals		
26	Cement		
27	Chemical production of pesticides		
28	Chemicals, dyes, pigments, inks		
29	Dyes and dye intermediates		
30	Health care pharmaceuticals		
31	Hydro (H2O)		
32	Lead acid battery recycling		
33	Waste electrical and electronic equipment		

From Table 4 above, we can see that all major segments of chemical industry has been included in Red category list because their pollution index score is 60 or above thus making it a potential sector to be included under PAT and the industries will become much more responsible and active in reducing their energy consumption and start considering appropriate ways that will reduce the energy consumption thereby slowing down its hazardous effects on the environment.

5.2.5. Milk Dairy Industry

India is that the world's largest producer of milk with 156 million metric tons and for the year 2017 fluid milk product is forecast at 160million metric tons (mmt). Energy consumption in a very farm business sometimes refers to utility generation and consumption appreciate refrigeration, water, steam and electricity. the explanation for considering farm business to be enclosed in future PAT theme is as a result of this sector is Indian agriculture's single sub-sector generating annual revenue of over USD 70billion. In these kinds

of industries easy plant improvement will cause energy savings. electricity is employed from the instant milk enters within the business i.e. from reception moment to sterilization, packaging and crate laundry. Figure five below shows electricityconsumption for process completely different milk merchandise.

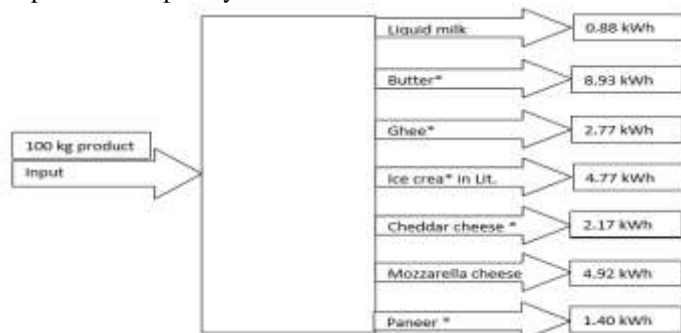


Figure 5 Electrical Energy Consumption for different milk products [5]

The data shown below has been calculated by Shakti sustainable energy foundation.

- At 5% reduction Energy Saving of overall sector = 0.0145 million MTOE
- Suggested threshold limit if considered in PAT scheme = 3,000 MTOE
- Estimated number of designated consumers = 50
- Estimated energy saving from designated consumers if included under PAT with 5% reduction target = 0.0035 million MTOE

We understand that this is not a potential sector to be considered when compared with the DC'S included in PAT cycle 1 and 2. There is a fact that that in both cycles only energy consumption was the criteria based on which industries were added and this sector also comes under red category with high pollution index shown in the report released by the ministry of environmental forest and climate change, a preview of which has been shown while discussing chemical sector.

5.2.6. Printing and publishing industry

There area unit completely different sectors within the printing business in Republic of India admire newspapers, books, catalogues, packaging product and every sector consumes energy in several type and price, therefore we will say that there's a large scope of energy saving in these industries. There area unit five most ordinarily used printing process; lithography (offset), letter press, flexography, gravure and screen printing. Among these, in India, the printing covers 12 months of the entire print businessand may be thought-about for energy saving. If we tend to think about a typical press that encompasses a originated for printingmachine, great power consumption area unitas are press with seventy eight, utilities 8 May 1945, lightweight 6 June 1944 and air conditioners eight to eighteen. Table five below shows regional wise print share in Republic of India.

Table 5: Print market regional wise share (%)

Region	Share (%)
Northern	33
Western	28
Southern	27
Eastern	12
Total	100

From the above table, we can clearly say that Northern India is the largest market for printing newspapers, books and magazines. South and west region also contribute large share and eastern region has a minimum share of 12%. North, south and west region together contribute 90% of the printing market with an equal share of commercial printing.

The reason for considering printing business in our study is thanks to 2 factors; initial, there's an enormous market of publication that's sanctioning the quicker growth of those sorts of industries. every business has their sort of characterization on energy consumption. a lot of printing industries mean a lot of energy consumption, therefore, this business ought to be thought of below PAT theme. Second, we are able to say that print industries have a control on the setting, with completely different [the various] stages of printing and every stage contributes different sort of dangerous gases and waste. Figure half-dozen below shows the environmental impact of a sheet fed printing process machine.

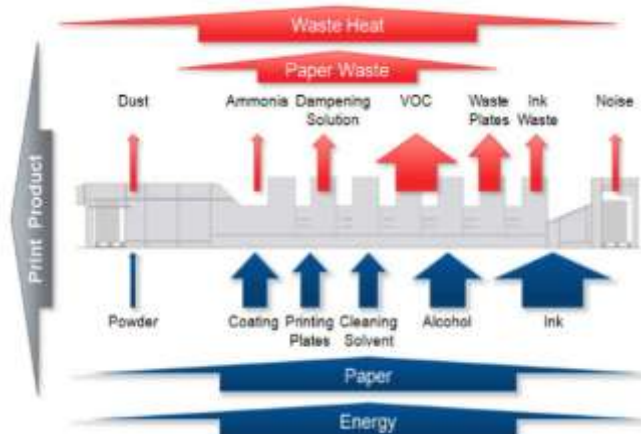


Figure 6 Environmental impact of a sheet fed offset printing machine [35]

5.3. INSTITUTIONAL SET UP

PAT theme could be a distinctive mechanism essentially a market-based policy and it's the primary expertise for the Indian government. The theme involves many procedures, we are able to say that whenever there's loads additional documentation to be done and numerous processes to be followed and there's an opportunity for bad and thereby increasing body value. so few public bodies ought to be enclosed besides SDA and AEA, WHO will lookout of a number of the procedures

thereby reducing the load from the one authority. Finally, within the initial part of designing for the longer term PAT cycle, discussions ought to be created with the relevant stakeholders so as to line additional clear and proper rules. additionally, Energy Managers and Auditors ar less in variety whereas this theme demands additional of them, therefore, important awareness programs should be meted out in order that an outsized variety folks [of individuals] can try and opt for a unique career path and with these forms of programs people can get intended to become energy auditors and managers.

5.4. Trading Rules

Trading rules square measure the many a part of market-based schemes. PAT scheme's mercantilism rules square measure straight forward and fewer sophisticated. section one of PAT got with success completed in 2015 however there was a delay in supplying of ESCert's to the DC's. Nearly when two years of completion, tradable certificates were issued thus mercantilism rules ought to be pre-set throughout the initial section of coming up with. BEE has discharged an in depth procedure explaining the DC's however ESCert's ought to be listed.

An important feature of ESCert's commerce is that in the present cycle of PAT DC's might sell them through power exchange alternatively use them for banking purpose till next consecutive compliance cycle that creates a positive atmosphere concerning the theme.

Another touch agonize of whereas discussing commerce rules is that BEE has not mentioned until however long certificates will be used i.e. there's no data concerning the ESCert's termination date which can cause issues in end of the day.

5.5. NEED OF SUBSIDY

Subsidies play vital role in economy of any country. Developed, developing and underneath developed countries have completely different varieties of subsidies. Having aforementioned that, why the grant is needed in an exceedingly market-based policy like PAT, one has to perceive the role and importance subsidies can play, if enclosed underneath PAT in conjunction with some demanding rules. little doubt for a developing country like Bharat, subsidies square measure required however before providing it the govt. needs to do plenty of ground work and thinking as a result of subsidies square measure thought-about as negative taxation.

Designated customers underneath PAT need to deliver the goods the energy reduction target given to them instead they need to pay penalty as compliance. Some industries square measure capable to create large investments to avoid wasting energy thus me [and a few] might not be ready to do so no matter bright ideas. Government needs to contemplate these styles of industries and supply grant for a brief term in order that the industries will bring changes in method or develop some

new technology. The act of providing grant can boost the morale of DC's thereby increasing overall performance of them underneath the theme.

The question ahead of policy manufacturers is that they must assume, do subsidies square measure very needed; for this, they need to appear into negative effects of subsidies that square measure much more vital than positive effects.

CONCLUSION

In this paper, we tend to analysed the experiences gained from section one of PAT and extracted some policy lessons which will support policy manufacturers whereas coming up with future PAT theme. we tend to did a general assessment for phase I clinical trial and II of PAT theme on the grounds of the subsequent analysis criteria: price issue, energy saving certificate mercantilism, body burden for the authority and PAT cycle a pair of outlook. we tend to highlight some vital options that policy manufacturersought to take into thought whereas coming up with future cycle of PAT theme.

The following recommendations can be drawn from the assessment carried out:

- while setting the target in future PAT cycles the government should provide some subsidies to the designated consumers so that they can take up some major energy efficient methods requiring huge financial investment which otherwise would be not possible.
- These targets in all DC's under PAT should bring methods of energy efficiency with longer payback period and set required business strategies to deal with new policy demands.
- We identified some energy intensive industrial sectors like sugar industry, chemical industry, milk dairy industry, printing and publishing industry, non ferrous industry, automobile industry and commercial sectors, which policy makers can take into consideration while deepening of PAT scheme.
- In initial phase of planning, rules regarding ESCert's trading should be taken care of like exact date to issue ESCert's and most importantly ESCert's expiry date should be made transparent to the DC's to avoid problems that occurred during phase 1 causing delay in issuance of ESCert's that is nearly 2 years after the end of first cycle and after the second cycle already begun.
- Industries to achieve energy efficiency target should not only address low hanging fruits, that can be easily diffused in the market; government should think of providing subsidies for industries which have the potential in terms of developing innovative technologies, modifications in the process etc.
- we stress the need for long-term research and development department to be established shed which will take care of any technical developments to be made. For developing R&D dept. the government may face financial problems but this problem can be solved by directing the amount

collected from penalties and not utilized in general state budget.

- Policy makers while designing PAT scheme phase I and II considered only one criteria i.e. Energy consumption, whereas the obliged parties discussed in the paper covers two criteria's; Energy consumption and Impact of the sectors on the environment.

ACKNOWLEDGEMENT

I would like to thank our professors for giving suggestions and to keep me in the right direction. I also appreciate the time devoted and information shared by the interviewees. For providing me various information resources, I am thankful to Mr. Annegowda (Dy. General Manager CESC Karnataka); Sanjay Bhandare and Babji Chaudhry (Sr. manager, Safety, Health & Environment dept. Century Rayon); Rajdeep Hegde (Dy. General Manager, Boiler house Century Rayon); Senior divisional Engineer (Railway diesel loco shed Kalyan); Mr. Anish Karahe and Sanjay Kumavath (Energy Manager JSW); Mr. Ravindra Datar (Director and Energy Auditor SENERGY) for the kind availability and support. Finally, I gratefully acknowledge the support to my thesis advisor Dr. Santosh d. Dalvi, for consistently allowing this paper to be my own work and steered me in the right direction.

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