A monthly newsletter of

Indian Association of Energy Management Professionals

www.iaemp.org

THE URJA WATCH

August 2008, Issue 2

It is about "Conscience Keeping on Energy Matters"

INDEPENDENCE DAY SPECIAL

On the occasion of India's 62nd Independence Day, the editorial board of "The Urja Watch" is pleased to bring out this special edition.

The Indian Association of Energy Management Professionals (IAEMP) believes that energy efficiency has a critical role in the country's development and economic growth.

In this special edition, we have included many articles contributed by talented professionals across the country. Besides being packed with a variety of information updates, this issue highlights some of the current energy-related issues in the country.

Much effort has gone into compiling this publication. We are aware that the contents of this edition far exceed the size of a typical newsletter but hope these would provide an opportunity to consider the scale and urgency, as well as the economic opportunities of India's transition to an energy efficient nation.

Through this forum, we seek the cooperation of governments, energy agencies, corporate bodies, professionals and others towards achieving the goal of India's energy independence.

We are grateful to the authors for their precious time and committed support in bringing out this issue at short notice.

Editorial Board

S. Subramanian, Sunil Sood, Amit Gupta, R.V. Ramana Rao

What's inside!!

From the Editor's Desk...

The Path to Energy Independence

Dear Readers,

Happy Independence Day! It is indeed a pleasure to see "The Urja Watch" taking off! The responses that I received to the very first issue were overwhelming. Let me begin this *"Independence Day Special Edition"* by thanking all of you for your interest and encouragement!

After decades of slow growth, India has made rapid strides in the last few years. At the same time, the stunning economic growth has stimulated greater appetites for a bewildering range of products and services pushing up energy needs sharply; a need that must be supported by adequate supply.

How do we to meet this rapidly growing hunger for energy? Do we hasten building more coal-based power stations? Or expand other modes of power generation such as nuclear and wind? What are the new technologies to be explored? Many such questions need to be examined keeping in mind that our environment has to be safeguarded at the same time.

To plan for the future you need to know about the present. Currently, India's annual per capita energy consumption, one of the lowest in the world, is around 700 kWh. Over the last five years, it has already grown by about 25 per cent. The National Electricity Policy (NEP) 2005 recognizes electricity as a "basic human need" and targets a rise in per capita availability to 1000 units per annum by the end of 2012.

When India achieved freedom in 1947, the country had an installed capacity of 1,360 MW. Since then, both supply and demand have grown significantly. Currently, the installed power generation capacity in the country is around 145,000 MW. This is forecasted to increase to about 400,000 MW by 2030. A capacity addition of 78,577 MW is proposed for the Eleventh Five Year Plan. Currently, capacities of over 50,000 MW are said to be under construction.

Capacity additions are undoubtedly essential. Along with it, we also require new means to use energy efficiently – a goal that cannot be achieved without active government policies and cooperation. Adding new generation capacities is capital intensive, require long gestation periods and have historically lagged behind the targets. With fossil fuel prices soaring, and climate change issues scaring us, it is about time to explore other options to increase energy availability. Planet-friendly energy resources like the sun and the wind are making progress at their own pace. Nuclear power is a clean option but has issues like proliferation risks, safety, security and radioactive waste disposal.

A simpler and quicker strategy is to stretch the country's available energy resources through planned "Demand Side Management" measures.

How can we reduce our energy usage? As the Chinese say, a journey of a thousand miles might well start with a little step. To begin with, we can reduce energy demand through many simple steps such as switching off lights, air-conditioners, and appliances when not needed; cutting back on water usages by minimizing wastages and so on. However, these voluntary steps are often unappealing to many people. Fortunately, many available technologies provide desired levels of comfort at reduced energy levels. Typical examples include energy-saving lamps and appliances, hybrid cars, timers and sensors.

The path to energy independence is long and arduous. While more power plants are being built, the merits of energy efficiency and its worthiness must be fully recognized by governments, corporations and other stakeholders.

Agenda for Action

No nation can keep on wasting its resources, and still expect to have sustainable development in the long run. As a first step, the government has taken a good initiative to save energy through the Energy Conservation Act 2001. The implementation of this act should be accelerated to achieve results.

Being exposed to international competition, Indian industries will undoubtedly face new management challenges so also greater growth opportunities. To reap the twin benefits of saving energy and cutting costs, industries should accept and implement voluntary energy-saving projects.

Governments should stimulate interest in energy efficiency projects by providing more incentives for energy-savings and penalize inefficient use of energy. Working with other concerned agencies and industry, government should take the lead to set energy efficiency standards for consumer products through energy labeling programs.

What happens to the nation eventually is the sum of all individual actions. Energy professionals in the country have a clear role to play. They have to be adaptive, resilient and innovative to meet the energy challenges. Today, there is a wide range of technology options with varying cost benefits. The energy professional must be equipped to make smart choices that are cost-effective, environmentally sound, and reliable. Professional standards for energy audits must be raised and training needs addressed through well-designed programs.

Let us refine our attitude to the energy fundamentals and march confidently on the long path to energy independence. To invoke John F. Kennedy's famous line, "Ask not what your country can do for you; ask what you can do for your country". As committed professionals working together, we can make a distinct difference to the nation's energy-saving efforts. Are you ready?

Best regards,

S. Subramanian
Editor, The Urja Watch

Letters to the Editor…

We are pleased to publish some of the e-mails received from readers in response to the First issue of "The Urja Watch" in July 2008. – Editor

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Needless to say, you have done a very good job!

Dharmendra Agrawal

Really appreciated information in the first edition. I am also very much interested to work for this magazine.

Venkata Ramana Reddy

First of all hearty congratulations to all who have contributed to the publishing of the first issue of Urja Watch which has been very nicely designed. I am personally very thankful to you, as you have selected my ideas about the model "Combined Energy cum Environmental Audit" report in the member's speak area.

I am highly motivated and shall help you submit other interesting technical articles relevant to the newsletter. Thanks once again.

FT Kanpurwala, Ahmedabad

I think we should add one section on Introduction of members, where 5 or so members per newsletter can be covered and their profile can be added. This will give opportunity to all of us to know each other.

Our endeavour should be to make this newsletter a true picture of the knowledge goldmine we have in our members.

Amit Gupta, Bangalore

Congrats on bringing out an excellent and well edited inaugural issue of our magazine.

I would like to suggest setting a link on our website wherein a visitor can subscribe to the e-magazine which many newsletters do. That way we will have more people getting the magazine on their desktop/mail box and need not visit the website for reading it.

Prakash Magal, Bangalore

Congrats. Our first magazine it self it is excellent. It reminds me of one more suggestion. We can invite our members to send photographs and information on the events taking place in the local chapters to consider publishing.

R.V.Ramana Rao, Dallas, USA

Letters to the editor should be e-mailed to: tellsubi@gmail.com. Please include your name and your city. All letters are subject to editing.

Energy Inefficiency -A Drag on India's Economic Growth

By G. G. Dalal, Vice-President, IAEMP

India loses about 40 % of electricity generated in transmission & distribution systems due to the inefficient set up of State Electricity Boards (SEBs) & power distribution companies. No baseline data is available to detect location-wise energy losses. Thefts & pilferage of electric power siphon off what could otherwise enhance output to economy, employment & growth.

Similarly the energy waste is high in designated industries. However, no targets are fixed for reducing energy intensity i.e. energy consumption per unit of GDP which for India is 1.5 times world average. This is the factor by which the planners keep on multiplying the rate of targeted economic growth to get the projected rate of energy growth.

Improvement in "energy efficiency" lowers the energy intensity by preserving resource base and cutting down pollution. Despite these benefits, "energy efficiency" is not made a national priority as yet nor it figures anywhere in major public debates. Every year several expert committees are set up to cater to vested interests and to subordinating the public interest, which hardly prevail in the country.

In 2006, the then President of India, Hon'ble Dr. APJ Abdul Kalam, gave highest priority for making India, "Energy Independent by 2030". He gave valuable directions that included cutting down energy losses, utilizing technologies to provide a diverse supply of environment friendly energy, increasing the power generated through renewable energy sources from 5% to 25% and others. Dr. Kalam also gave a mission mode programme for energy conservation by indicating quantified targets like saving 25 Billion units per year from the present 3.2 Billion units through government steps so as to wipe out existing shortage within next few years.

What do we mean by Energy Security & Independence?

Energy Security: Using least amount of energy without sacrificing comfort & services and securing access to all energy sources viz. coal, oil, gas supplies worldwide till the end of fossil era.

Energy Independence: means total freedom from oil, gas or coal and relying on renewable energy viz. solar, hydro, wind, bio-fuel, reducing energy losses by avoiding waste, stopping misuse of energy & improving energy efficiency bench marking. Due importance need to be given for innovative self-powered gadgets, and conservation at par with production or generation

As per projections of planning commission, the demand for power will soar from present installed capacity of 140 GW to 415 GW, by 2017. It implies a tripling of present installed capacity and requires capacity addition annually of 20-40 GW, as against a meagre average of 4 GW per year, during the last 10 years. Rapid reforms are necessary to avoid the serious power deficit by 2017.

Several states are facing acute energy shortfall, with increasing load shedding, and heavy power cuts from 5 to 15 Hrs daily throughout the year, from urban to rural areas respectively. For cutting down CO_2 emissions, social enthusiasts all over the world, seek to observe "earth hour" or "world earth day" by stopping energy use once in a year. It is ironical that in India, power famine forces to celebrate this ritual almost daily.

India's Energy Crisis

Power utilities lose Rs. 20,000 Crores every year due to out-of norm "Aggregate Technical & Commercial" losses of 40 to 55 % as against 15%.

India spends about 30 % of national budget to meet energy demand. Even pit-mouth Thermal Power Plants of NTPC, one of the Nava-Ratna industries in the country, have recently started importing costly coal for generation of power!

Annual budget size is of Rs. 5.6 lakh Crores, considering Tax / GDP ratio as 13 % (with 2.5 as budget deficit). In order to avoid public outcry, government pays huge subsidy of Rs. 2,45,000 Crores (43%) for artificially keeping prices of petro-products low, instead of spending on ever-starving social sectors like providing clean water for drinking, primary health, education in rural areas, Rs. 65,000 Crores for loan waiver to farmers, ultimately balance goes to create infrastructure.

Key growth inputs of alternate technologies are essential such as conservation of energy, water and land, use of fuel-efficient vehicles and public transport, retiring older less fuel-efficient vehicles, green buildings, new forms of renewable energy at lower cost than today are essential for national economy.

In India, government appears to be not sensitive to the need of oil & energy conservation. This is substantiated by the fact that instead of subsidizing fuel efficiency or energy efficiency, government is subsidizing energy & oil prices.

It is high time that even during last seven years of steadfast focus on creating so-called road maps after enacting Energy Conservation Act, 2001 for stopping energy misuse & waste, the Government is unable to implement it till today, leading to trivializing of the grave power crisis in the country. Energy inefficiency is a greatest proven threat to Energy Security. This obviously gives a feeling whether India is moving from "dream to reality" or "dream to disaster"!

Why Government Apathy?

All daily operations are electricity dependent, making it intolerable for even moments' interruptions. Cost of one unit of un-served power results in a loss of output to the economy ranging from Rs. 15 to Rs. 25 i.e. more than 5 times the cost of available power. One unit (KWhs) of energy saved at the consumption level avoids 2.5 to 3 times the fresh capacity addition due to lower end-use-efficiency. Further such saving through efficient use of energy can be achieved at less than one-fifth of the cost of fresh capacity creation.

It was also estimated in 2002 that implementing "end-use energy efficiency" and "Demand Side Management" measures, could save nearly 25,000 MW, however all these were used to fill pages of history.

Most of the Acts and Policies related to Energy remain only on paper without effective implementation mostly due to political & bureaucratic delays.

Oil shock calls for efficient use of energy, as it pays to conserve. It is too late to realize that energy audit is yet not made compulsory at least in government services. No lowering of the house tax is effected for energy efficient buildings. No beginning is made for mandatory energy audit of high-rise Buildings. No incentives are initiated by the government to use energy-efficient transport, since taxpayers foot oil bills.

No mandatory fuel efficiency norms are set up by BEE for transport vehicles, so far. Waste of precious human resource is not uncommon, by rendering redundant more than 3000 trained energy auditors since 2005, due to absence of EC Act implementation.

Electricity is lifeline of every common man in our country. Power interruption of even fraction of seconds is enough to cause serious failures in hospitals, IT Data Centres, Banks etc. Consumers are made to tolerate non-availability of power to the extent of 200-1000 Hrs in a year (as against 0.1 Hr in developed countries). Commercial losses are above 20 % (Vis-à-vis less than 1 %) & Technical losses are 20 to 30 % (Vis-à-vis 7 to 9 % from 440 kV to 220 V). Voltage fluctuation are10 to 40 % (Vis-à-vis 5-10 %); Frequency fluctuation is 2 Hz (Vis-à-vis 0.1 Hz).

Our country's policy seems to be to "first pollute, then purify at excessive cost", "create disaster, then mitigate", and "produce dying thirst, then dig wells", as end-of-pipe treatment. Why is the Bureau of Energy Efficiency (BEE) delaying the implementation of EC Act, 2001 over the last seven years, when the country is reeling under acute energy famine? How does a weak institutional framework with six energy experts can do justice to country having a population of100 Crores?

State Designated Agencies, who are considered as facilitators & motivators for energy saving projects, are showing extra keenness in charging heavy registration fees even for Certified Energy Auditors (CEAs), while their technical staff intended to review energy audits is exempted from qualifying as CEAs!

Lofty but deceptive buzzwords like road map, accelerated power development programs, fast track power projects, power packed plants, fast–forward power reforms, mega power projections are meant to baffle the gullible, which are easily being tricked daily even by Mega power deficits.

In such an uncertain set up, can anyone realistically hope that the country can achieve "Energy Independence" by the year 2022, the Platinum Jubilee Year of our political independence" or even by 2030 at the latest?

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Take up one idea; make it your life mission. Think of it, dream of it, Live on that idea.

Let your brain, muscle, nerves and every part of your body be full of that idea.

This is the only way to succeed.

- **Swami Vivekananda**

There are many in IAEMP who believe in Swamy Vivekananda's above words and made IAEMP what it is today. Besides the authors, whose names appear in the newsletter, there are many who have contributed in spreading the mission of IAEMP. To name a few, will be injustice to others but I can't help myself in mentioning names of members like **Mr B.Satyanarayana,Mr S.Khandekar,Mr Vikas Apte,Mr Bhupal Singh,Mr Prakash Magal, Mr RN Kamdin,Mr M.Krishna Murty,Mr S.P.Nanda, Ms.Pratiksha Porwal, Mr T.Srinivas, Prof.K.R.Ramana, MrG.H.Iyer,Mr Sunil Jadhav, Mr MP Sinha, Mr KVP Vidya Sagar, Mr Johny P.A.,Mr Nitin Sharma, Mr N. Ravishankar, Mr KD Bairagi,Mr Levine,Dr.IPS Paul,Mr.R.S. Hiremath,Mr B.Shukla & Mr Arvind Thukral.I thank them all.**

- Sunil Sood, President, IAEMP

AT A GLANCE
THE ENERGY CONSERVATION ACT, 2001

By Sunil Sood, President, IAEMP

"The EC Act 2001 - An Act to provide for efficient use of energy and its conservation and for matters connected therewith or incidental thereto"

Realizing the need for statutory measures to encourage efficient utilization of energy, the Government of India had initiated drafting of a law sometime in the year 1999. The draft legislation was introduced as Energy Conservation Bill in the Parliament in the year 2000 and passed as 'The Energy Conservation Act, 2001 sometime in sept'2001. It received Presidential consent on 29th Sept.'01 and was notified on 1st Oct'2001.The Act was virtually non-effective till 1st March'2002 when section 1 to 29 and 46 to 62 were notified and concurrently Bureau of Energy Efficiency (BEE) was established under Ministry of Power (MoP) to oversee the implementation of the Act. The following pages give the clause-wise status of implementation of the Act.

For your ready reference, the author has provided a colour-coded table listing the chapters, sections, subsections and clauses of the Energy Conservation Act 2001.

- **Sections shown in green colour are notified but are general in nature**
- **Sections shown in pink colour are also notified and are very important**
- **Sections shown in blue colour are not yet notified (i.e. sections 30 to 45)**

At the end of the table is a summary of progress of the E.C. act over the last six years.

Section	Sub-Section	Clause	Brief Description of Provision
			CHAPTER I ***PRELIMINARY***
1	**1-2**	**2(a) to 2(u)**	***Short title, extent and commencement***
1	1	-	Section 1 covers short title, extent and commencement
2	-	(a) to (u)	Section 2 covers "Definitions"
			CHAPTER II ***BUREAU OF ENERGY EFFICIENCY***
3	**1-4**	-	**Establishment and incorporation of Bureau of Energy Efficiency**
3			Section 3 covers provisions relate to Date of notification, BEE being a corporate body with head office at New Delhi and that it may establish offices at other places
4	1-5	2(a) to 2(r)	Section 4 describes about management of BEE through Governing Council (G.C.) comprising of not less than 20 and not more than 26 members
5	1-3	-	Section 5 covers manner of conduct of G.C.meetings
6	-	6 (a) to (c)	Section 6 provides that vacancies shall not invalidate proceedings of G.C
7	-	7(a) to (d)	This section covers points related to removal of members from G.C.
8	1-3	-	This section provides for constitution of advisory committees etc.
9	1	-	This section specifies qualification of Director General of Bureau (DG) and appointment of Secretary and also other conditions of appointment of DG.
10	1-2	-	This section covers terms and conditions for appointment of officers and employees in BEE
11	-	-	This section provides for authentication of orders and decisions of bureau

Section	Sub-Section	Clause	CHAPTER III *TRANSFER OF ASSETS, ETC. OF EMC TO BUREAU*
12	1-2	1(a) to 1(g)	This section covers details of merger of erstwhile Energy Management Centre (EMC) with BEE
			CHAPTER IV ***POWERS AND FUNCTIONS OF BUREAU***
13	1	-	BEE shall effectively co-ordinate with Designated Agencies and Consumers etc.
13	2	(a)	BEE shall recommend norms for processes and energy consumption standards
13	2	(b)	Particulars required on label on equipment and appliances.
13	2	(c)	Recommend for notification .of users of energy as Designated Consumers
13	2	(d)	Guidelines for ECBC under 14 (p)
13	2	(e)	Create awareness and Disseminate Info
13	2	(f)	Training of personnel and specialists
13	2	(g)	Strengthen Consultancy Services
13	2	(h)	Promote R&D in Energy Conservation
13	2	(i)	Develop testing and certification procedure and promote facilities required
13	2	(j)	Pilot projects and Demo Projects
13	2	(k)	Promote use of energy efficient processes, equipment, devices and systems
13	2	(l)	Promote innovative financing of energy efficient projects.
13	2	(m)	Give financial assistance to institutions
13	2	(n)	Levy fee for services provided
13	2	(o)	Maintain list of accredited Energy Auditors (EAs)
13	2	(p)	Specify qualifications for the accredited EAs
13	2	(q)	Specify the manner and interval for EA
13	2	(r)	Specify certification procedure for Ems
13	2	(s)	Prepare Education curriculum
13	2	(t)	Implement international co-operation programmes
13	2	(u)	Perform such other functions as prescribed
			CHAPTER V ***POWER OF CENTRAL GOVT. TO FACILITATE AND ENFORCE EFFICIENT USE OF ENERY AND ITS CONSERVATION***
14	-	(a)	Specify the norms for processes and energy consumption standards
14	-	(b)	Specify equipment or appliances for the purpose of the Act
14	-	(c)	Prohibit manufacture, sale, purchase, import of equipment and appliances
14	-	(d)	Direct display of label on equipment and appliances
14	-	(e)	Specify having regard for intensity etc any user or class of users as DC
14	-	(f)	Alter the list of EII specified in Schedule
14	-	(g)	Norms and Stand for D C for energy con
14	-	(h)	Direct EII to get E A conducted by A E A
14	-	(i)	Dire any DC to get E A conducted by A E A
14	-	(j)	Specify. The matters to be incl. For inspect.
14	-	(k)	Direct DC to furnish info to DA on energy consumption
14	-	(l)	Direct DC to designate or appoint EM
14	-	(m)	Pres min qualifications For EM
14	-	(n)	Direct DC to comply with energy consumption norms/ standards
14	-	(o)	Direct DC who does not fulfil norms /std to prepare a scheme for efficient use of

Table continued on the next page…

14	-	(p)	Prescribe. ECBC
14	-	(q)	Amend ECBC to suit regional and local
14	-	(r)	Dire owners of bldg to comply with ECBC
14	-	(s)	Direct (r) if necessary to get EA by AEA
14	-	(t)	Take measures to create awareness and disseminate information
14	-	(u)	Arrange and organise training programmes
14	-	(v)	Take steps to encourage preferential treatment for use of EE Equipment/
			CHAPTER VI ***POWER OF STATE GOVT. TO FACILITATE AND ENFORCE EFFICIENT USE OF ENERY AND ITS CONSERVATION***
15			Power of state govt. to enforce certain provisions of the Act
15	-	(a)	Amend the ECBC
15	-	(b)	Direct owner of bldg to comply with ECBC
15	-	(c)	Direct (b) to get EA conducted by A EA
15	-	(d)	Designate any agency as D A
15	-	(e)	Take measures to create awareness and disseminate information
15	-	(f)	Arrange and organise Training
15	-	(g)	Take steps to encourage preferential treatment for EE Equipment/Processes
15	-	(h)	Direct any DC to furnish to DA info en co
15	-	(i)	Specify matters for inspection
16			Establishment of Fund by State Govt.
16	1	-	The state govt to constitute SEC Fund
16	2	-	All grants/loans shall be credited to SECF
16	3	-	State Energy Conservation Fund (SEFC) to meet implementation expenses.
16	4	-	SECF to be admin. by any authority as specified
17	1-4	2(a),(b)	Power of inspection
17	1		The DA may appoint after 5 years inspecting officers (IOs)
17	2	(a)	Inspect any operation under 14 (a) , (b)
17	2	(b)	Enter any place of DC to inspection of equipment/ process etc
17	3	(a)	I O may enter any place of DC where energy is used for any activity
17	3	(b)	I O may enter any place of DC where any equipment or appliance notified under 14(b) is kept
17	4	-	I O shall not remove any equipment appliance /books of accounts or other documents
18	-	-	Power of Central or State Govt to issue directives
			CHAPTER VII ***FINANCE,ACCOUNTS AND AUDIT OF BUREAU***
19	-	-	Grants and loans by Central Govt
20	1-2	-	Est. of Fund by Central Government
21	1-2	-	Borrowing powers of Bureau
22	-	-	Budget
23	-	-	Annual Report
24	-	-	Annual Report to be laid before parliament
25	1-4	-	Accounts and Audit

Table continued on the next page…

			CHAPTER VIII ***PENALTIES AND ADJUDICATION***
26	1-2	-	Penalty up to Rs.10,000 and Rs.1,000 per day of non-compliance
27	1-2	-	Power to adjudicate to state commission
28	-	(a) , (b)	Factors to be taken into account by AO
29	-	-	Civil court not to have jurisdiction
			CHAPTER IX ***APPELLATE TRIBUNAL FOR ENERGY CONSERVATION***
30	-		Establishment of Appellate Tribunal to hear appeals against the orders of AO, CG, SG or any other authority
31			Appeal to AT
32			Composition of AT
33			Qualifications for appointment of Chairperson and members of AT
34			Term of office
35			Terms and conditions of service
36			Vacancies
37	1-2		Registration and Removal
38	1-2		Member to act as Chairperson
39	1-3		Staff of AT
40	1-5		Procedures and Powers of AT
41			Distribution of business amongst Benches
42			Power of Chairperson to transfer cases
43			Decision to be by majority
44	1-2		Right of appellant to take legal help etc
45			Appeal to Supreme Court
			CHAPTER X ***MISCELLANEOUS***
46	1-2		Power of Central Government (CG) to issue directions to Bureau
47	1-4		Power of C.G to supersede Bureau
48	1-2		Default by companies
49			Exemption from tax on income
50			Protection of action taken in good faith
51			Delegation
52			Power to obtain information
53			Power to exempt
54			All employees of BEE To be public servants
55			Power of CG to issue directions to state governments and the Bureau
56			Power of Central Government to make rules
57			Power of State Governments to make rules
58			Power of BEE to make regulations
59			This section provides for rules and regulations to be laid before Parliament and State Legislature
60			This section clarifies that application of other laws is not barred.
61			This section provides that Provisions of Act shall not apply in certain cases
62			This section provides for power to remove difficulty.

PROGRESS AT A GLANCE

THE ENERGY CONSERVATION ACT, 2001

(From 1st March, 2002 till 4th Aug, 2008)

WHAT IS DONE?

1 National Campaign on Energy Conservation conducted in the year 2005 to 2007.

2 Painting Competitions for children of standard IV and V conducted in the year 2005, 2006 and 2007. In the year 2005, 343,526 students from 17,560 schools from all over India took part. Out of this Uttranchal State alone accounted for 10,800 schools and 240,000 students.

3 The Energy Conservation Awards are being organised every year.

4 Several Life Long Learning Programmes on chargeable basis organized with the help of GTZ.

5 3 meetings of the Governing Council held in last 6 years. Under chairmanship of 3 different ministers. First meeting on 5th July, 2002 under the chairmanship of Mr Suresh Prabhu,second meeting was held on 28th July,2003 under the chairmanship of Mr Anant G.Geete and the third meeting was held on9th May,2006 under the chairmanship of Shri. Sushil Kumar Shinde.

6 9 members Executive committee formed to take decisions on general matters.

7 NPC was 'nominated' as the sole "National Certifying Agency" to conduct certification examinations. 6 national examinations for certification of energy auditors and energy managers have been conducted. BEE made a profit of Rs. 10 crores from first 4 examinations.

8 Several EOIs invited to collect data and to prepare reports. Consultancy contracts awarded to chosen few.

9 6 rules out of 22 under section 56 and 1 regulation out of 12 regulations under section 58 are notified.

10 ECBC Launched in a 5 star hotel on 27th May, 2007.An amount of Rs. 11.45 Lakhs was spent on its launch. 800 people attended the launch.

11 BEE celebrated it 5th Foundation Day on 1st March, 2007 in a 5 star hotel.

12 26 officials from MoP, State Designated Agencies, CEA, and BEE went to Japan on 15 days study tour on how EC Act can be implemented in India.

13 Director General, BEE went abroad 10 times in 13 months, and other officials of BEE toured several countries.

14 Voluntary programme for Labelling of refrigerators, A/Cs, tube lights, transformers appliances and motors etc was launched. An amount of Rs. 12.28 crores was spent on media publicity. Rs. 11.05 crores in Electronic media and Rs.1.23 crores in Print Media.

15 Bachat Lamp Yojana Launched to promote ESCOs and manufacturers of CFLs.

16 Identity Cards to CEAs/CEMs who applied for the same issued.

WHAT IS NOT DONE?

1. The Sections 30 to 45 of the Act, which deals with establishment of Appellate Tribunal for Energy Conservation, are still not notified. Because of this, provisions related to powers of inspection and levy of penalty are ineffective since without an appellate tribunal in place, the Central and State Governments cannot exercise the powers under these clauses. The reasons cited for non-implementation–*"We don't want Inspector Raj".*
2. No state government has been able to act on the provisions under sections 15 and 57 due to lack of proper guidance/follow up from BEE.
3. None of the state regulatory commissions have appointed adjudicating officers due to lack of any directions from BEE.
4. The relevant regulations under section 58 (2) (e), (f), (j) and (k) are still not notified.
5. The notification of 8-1/2 sectors (out of original 15 sectors in the Act) is still ineffective because of the point 4 above.
6. ECBC, 2007 issued by BEE has many flaws and inadequacies because of which, no state government has been able to take any action to make amendments. The ECBC is still voluntary and may take many years for it to become mandatory.
7. BEE has conducted 6 examinations through NPC to certify energy auditors and energy managers but there is no accredited energy audit firm in the country eligible to conduct mandatory energy audit of designated consumers. Candidates for the certification examinations were charged between Rs. 10,500 to Rs. 20,500. BEE has made a net profit of more than Rs.10 crores from first 4 certification examinations. However, most of the certified energy auditors and managers are lying redundant.
8. No mandatory energy audit has been reported till date. As on date, no energy firm has been accredited by BEE.
9. BEE does not have the list of DCs who fall under the notification of Designated Consumers. How many DCs have appointed Energy Manager is not known.
10. Norms for processes and energy consumption standards have not been notified.
11. No action has been taken to identify energy inefficient equipment/appliances to prohibit manufacture, sale, purchase or import of such equipment and appliances
12. BEE has not come out with any innovative financing scheme to promote use of energy efficient equipment/processes.
13. The Central Government has not constituted Central Energy Conservation Fund.
14. None of the states have constituted State Energy Conservation Funds.
15. BEE has not tried to utilize the services of qualified CEAs/CEMs.
16. No educational curriculum for energy conservation has been prepared.
17. BEE has not promoted any R&D work as required under the EC Act,2001
18. No pilot projects/demonstration projects have been set up till date.

Lifeline Energy – A Fundamental Need

By Burra Satyanarayana

Having no access to LPG and Electricity, our rural women folk use firewood for cooking and kerosene for lighting their hutments after sundown. Both these fuels pollute their humble dwellings. Can they claim availability of clean energy as their fundamental right?

While energy shortages continue to plague India's growth rate, the insatiable urge for consumerism of the "haves" (nouveau riche) is indirectly robbing those who hover around the poverty line in India. This article looks at the Indian energy scenario and examines whether the country's legislative provisions could be moulded into suitable "Laws of the Land" to provide succour to the poor.

CONCEPT OF LIFE LINE ENERGY

As per the "Draft Integrated Energy Policy-2006", lifeline energy needs of all households must be met even if that entails directed subsidies to vulnerable households. Energy security is the "sine qua non" for all – especially the rural population given their poor paying capacity and the limited availability of local resources. Such steps are required to achieve universal primary education (Article 21A) especially for the rural girls and promote gender equality and empower women who withstand the worst of domestic drudgery especially in rural households.

Ensuring this means electrification of all households and cleans cooking energy like LPG/Bio-gas. The best way for providing subsidy is to entitle targeted households to 30 units of Electricity per month and LPG, Biogas equivalent to 6 Kg of LPG per month.

CONSTITUTIONAL GUARANTEES

The preceding paragraphs prompt the author to suggest that the noble "Life – Line Energy" concept be moulded into a Directive Principle of state policy under Part IV of the Constitution of India. A Directive Principle, by definition and reasoning 'Lays down the route' of a state action for a social need and the "Lifeline Energy" qualifies for inclusion in the Directive Principles.

JUSTIFICATION

Directive Principles relate to social needs as they lay down the route of state action while Fundamental Rights are individualistic in that they protect individuals.

Reverting to the recommendation of the Planning Commission's policy document which runs "Provide a monthly entitlement of 30 units of power (electricity) and 6 kg of LPG", it could be interpreted as a Directive Principle because - (a) it is a positive statement as a "DO" (b) it seeks the "State" to provide (see para above for example). Initially the Directive Principles were treated as "Jural postulates" by judiciary but of late (since 1970's) the Supreme Court of India has been invoking the "Directive Principles" while implementing the Fundamental Rights.

THE ALCHEMY

Promotion of Directive Principles into Fundamental Rights

DIRECTIVE PRINCIPLE	+	ARTICLE 32	=	FUNDAMENTAL RIGHT
The state shall endeavour to secure		Generally through a public interest litigation		Mostly under Article 21. See the following example on the right to education

Directive Principles converted into Fundamental Rights -Illustrations

S. No.	Directive Principle Article	Converted to a Fundamental Right under Article	Citation of case	Remarks
1.	41.45	21A Education	Mohini Jain Vs State of Karnataka AIR 1992, Supreme Court 1858 Unnikrishnan Vs State of Andhra Pradesh AIR – 1993 Supreme court 2178	Educational Institutions (prohibition of capitation fee) Act 1993 Constitution. 86th Amendment Act 2002. Right to Education under Article 21A.
2.	39A	21 Free legal Assistance	M.H. Hoskot vs. State of Maharastra AIR 1978. S.C. 1548	Legal assistance is implicit in Article 142 read with Article 21 Krishna Iyer J.
3.	47	21 Provision of medical Assistance	Paschim Bang Khet Mazdoor Sangh vs. State of West Bengal (1996), 4 SCC 37	Article 21 imposes obligation on state to provide medical assistance to every injured person.
4.	48A	21 Drinking Water and pollution free Air.	Subhash Kumar vs. State of Bihar AIR 1991, SC 420 the M.C. Mehta cases etc.	Under the Environmental law, this right is a 'carte blanche'. All cases come under the umbrella of Article 21.

SOCIOLOGICAL CONCERNS

WHERE TO INSERT LIFELINE ENERGY CONCEPT AS A DIRECTIVE PRINCIPLE?

Since Article 47 states" The state shall regard the raising of the level of nutrition and the standard of living of its people and the improvement of public health", it is felt that the provision of "Life line energy" be inserted in Article 47 with the caption "Life line energy". Appropriate amendment should be carried out in Article 51A (Fundamental Duties) also. Article 47 and 47A both will remain.

The benefits of "Lifeline energy" include raising the standard of living of the marginalized, their children would be able to study late into the nights under electric lights and the whole household would get access to the outside world through the TV media. The health of women–folk will definitely improve as they are the primary sufferers of the impact due to the use of Bio-mass fuels (24 million adults suffer from T.B., Bronchitis). Hence it is proposed an additional Article 47A be introduced through an amendment similar to Article 43A, which got inserted through 42nd amendment as also 48A through the same.

REASONING: ANALOGOUS ARTICLES 43A AND 48A

Article 43 portrayed "Living wage for workers" when it was framed in 1950. This reads "The state shall endeavour to secure, by suitable legislations ……. or in any other way, to all workers …. A Living Wage, conditions of work ensuring a decent standard of living". Article 43A was inserted by the 42nd amendment in 1976 which relates to "Participation of workers" in management of industries as this idea relates to "Living wage of workers" and to their conditions of work. The reason is 43A is an off shoot of 43 as both speak of conditions of work for the work force.

Similarly Article 48A too was included by the 42nd amendment in 1976. Whereas Article 48 concerns "Organization of Agriculture and Animal husbandry", 48A speaks of "Protection of environment and safeguarding of Forests and Wild Life". Here there exists a nexus between "Agriculture" and "Forests" and also between "Animals" and "Wild Life".

ROTI, KAPDA, MAKAN AUR URJA

It is a fact that *"Roti, Kapda aur Makan"* (Food, Clothing, and Shelter), a slogan coined by the ruling party of yesteryears to emphasize essentials for living, set the legal ball rolling and the process culminated in many a landmark decisions. To this slogan, one might as well add another essential element *"Urja" (Energy).*

As no legal presentation can be bereft of a case–law, the author has done some cherry picking amongst the huge number of cases decided in tune with the *"Roti, Kapda, aur Makan"*concept.

In the case of Olga Tellis vs. Bombay Municipal Corporation also known as the "Pavement Dwellers" case, the petitioners were slum and pavement dwellers facing the threat of forcible eviction. They asserted that their eviction would mean deprivation of their means of livelihood. The court agreed that no person could live without the means of livelihood. Chandrachud, J. said that if the right to livelihood is not treated as a part of the constitutional right to life, the easiest way of depriving a person of his right to life would be to deprive him of his means of livelihood to the point of abrogation. Means of livelihood is found in Article 39(A) and that principle must be regarded as equally fundamental in the understanding and interpretation of the meaning and content of fundamentals rights.

The right to residence and settlement is a fundamental right under Article 19 (e) and is a facet of inseparable meaningful right to life under Article 21. Food (discussed supra) Clothing (= Kapda) and Shelter (= Makan) are the minimal human rights and, therefore, it is the state's duty to provide permanent housing accommodation to the poor in the housing schemes undertaken by it or its instrumentalities within their economic means so that they (poor) can repay the cost in easy instalments – P.C. Gupta Vs State of Gujarat.

Also, in Chameli Singh Vs State of U.P, Ramaswamy J tried to develop the right to shelter as an essential requisite to the right to live including adequate living space, safe and decent structure, clean and decent surroundings sufficient light, pure air and water, electricity, sanitation and other civic amenities like roads etc., so as to have easy access to one's daily avocation.

In view of the importance of the right to shelter, the mandate of the Constitution and the obligation under the universal declaration of human rights, the court held that it is the duty of the state to provide housing facilities to dalits to enable them to join the mainstream of national life.

With this the Supreme Court made room for "Right to Shelter" in the "Basket of Fundamental Rights". Also this is a pointer towards the sanctioning of the right to Urja (Energy) coined under the present slogan "Roti, Kapda, Makan aur Urja".

The right to livelihood has taken 40 years to mature into a fundamental right after our Independence vide Olga Tellis case and the right to shelter another 10 more vide Chameli Singh. The right to "energy" may emerge as a fundamental right say by 2016 if the government makes sincere efforts. Considering the "Fast forward" growth of India, this right may catapult itself into a Fundamental Right even earlier.

JURISPRUDENTIAL ASPECTS

The function of the 'state' may be divided into 2 parts: Primary (constituent), and Secondary (Ministrant).

Primary functions pertain to defence against external aggression and to the establishment of organs to ensure just enjoyment of each member's legitimate interests within the community.

Briefly put, under the secondary functions fall the various welfare activities – education, sanitation, communication services, roads, development of mines and forests, and the CARE OF THE POOR.

Thus considering from the jurisprudential flank also the right to energy falls under the secondary functions of the state and, therefore, this deserves to be finally wrapped up in the package of Fundamental Rights beginning its sojourn from Directive Principles of state policy.

CONCLUSION

Access to energy is a burgeoning right for the 'Aam Aadmi'. A modest beginning should be made by the parliament to insert this right in the Directive Principles of state policy. In due course of time, from the Directive Principles, this right will find its way up the ladder and establish itself as a Fundamental Right. As an example, one can see what happened in the case of the guarantee provided for primary education for children up to the age of 14 years under Article 21A.

The author hopes that the right to lifeline energy will be granted before long.

Hindi Poet Muktibodh said:

"Ab tak kya kiya, Jivan kya jiya, Jyada liya aur diya bahut-bahut kam,

Mar gaya Desh (paryavaran), Are, jivit rah gaye tum"

"What have you done till now, How have you lived your life? You have taken more & given much less. In the process you continue to live while the country is dying"

Energy Consumption in HVAC Systems

By R.V. Simha

Heating, Ventilation and Air conditioning (HVAC) systems

Considerable attention is being turned these days on energy aspects of Heating, Ventilation and Air conditioning (HVAC) systems in the country. Efforts have been made to stipulate limits for Energy Consumption in Buildings including the Air Conditioning system in them. The widely held perception is that about 40 to 50 per cent of Annual Global Energy consumption is due to buildings and further that, air conditioning consumes about 60% of the total building energy consumption. This leads to a figure of 24 to 30 per cent of global consumption as debitable to building air conditioning – widely and generally regarded as an unacceptably high figure. Therefore, all over the world, efforts are being made to cut down the energy consumption of building Air Conditioning systems.

HVAC Energy Consumption Estimates

However, do the patterns of Global Energy Consumption outlined above apply to our country also? The question arises as to whether Building Air Conditioning in our country also accounts for some thing like 24 to 30 per cent of India's total energy consumption. To answer this question, we need to have relevant data. Such data are however, not available. An attempt is made in this article to get at the likely Energy Consumption figures by calculation based on the total existing air conditioning capacity in the country. Please see the attachments for the results.
In case of Chillers, the available data for "Capacities Sold" over the last 5 years is fairly reliable. The remaining data have been extrapolated backwards based on assumed growth rates. These data span a period of about 13 years. It has not been considered necessary to go further back; as it appears that the cumulative capacity applicable period is negligibly small.

Calculation Methodology

Chilled Water Plant

The methodology of calculations for Chiller plants is furnished below. It is believed that it represents, what might be regarded as plants designed on good prevailing practices.

a. Design Data

b. Outside Design Conditions

   i. 24 hour weather data (db & wb) for a typical day in each month is the starting point.

   ii. The day in turn is divided into several time segments.

   iii. The heat gain is calculated for the median hour in each segment leading to TR of cooling produced in each segment.

c. Chiller Energy Consumption

   i. The performance of the chiller for the varying ambient weather conditions is obtained from the manufacturer and is used for conditions characterizing appropriate selected segment.

   ii. Chiller KWH is thus calculated for each segment and thereafter the total KWH consumed/day of 24 hours.

d. Chilled Water Pump Energy Consumption

i. Calculate TR, TRH – and applicable flow rate for each segment and express it as a percent of full load flow.

ii. Calculate the pressure drops in the system for the applicable flows and arrive at the system resistance for each and every flow.

iii. Steps (i) & (ii) will serve to furnish the duty point of the pumps. Locate the duty point on - fig. 25 on page 39.8 (Chapter 39 – Centrifugal Pumps in HVAC Systems and Equipments – ASHRAE Hand Book 2004) and read percent power consumption; obtain power consumption itself thereafter.

e. Fan Energy Consumption

i. Determine the air flow rate for the known partial load TR assuming that the room temperature minus supply air temperature is identical to the full load value.

ii. Determine the resistance of the system at the flow rate arrived at the step i above.

iii. Obtain percent power consumption from normalized performance curves or from manufacturer's data relating to percent pressure, percent flow, percent speed and percent power consumption. Percent efficiency is also acceptable in lieu of percent consumption.

Packaged Units, Split Units and Room Air Conditioners

For Packaged Units, Split Units and Room Air Conditioners, the methodologies adopted are more simplistic and are explained in the foot notes to the tables.

Methodology & Approach

The methodologies adopted may not be satisfactory, but it is hoped that they constitute the initial steps in what could undoubtedly be a major exercise.

Vapour Absorption Machines (VAMs), small capacity chillers (10TR & below) and the unorganized markets are not included in the estimate. Also excluded are refrigeration equipment for applications such as General Cold Storages, Cold Storages for Agricultural Produce, Food Processing Equipment, and Industrial Refrigeration.

Thus, the coverage is far from being comprehensive. It is obvious that there will be several different approaches to carrying out this exercise - starting from the initial data and a whole lot of intermediate steps. Improvements are possible in the approach and methodology adopted for calculations that depend a great deal on available data.

It is possible that several users have recorded Energy Consumption data for their own use. If such data turns out to be acceptable - in terms of volume, types of plant, format, reliability and a no. of other attributes, it would indeed provide a strong foundation and platform for efforts of this kind.

And finally, the purpose of this exercise is to invite users and the HVAC & C community to offer their suggestions and observations – and, of course, come forward with any useful data that they might have to improve the reliability and usefulness of the undertaking.

HVAC consumption in India

Not withstanding the limitations of methodology and approaches adopted herein, it will be interesting to check the figures arrived at with respect to the total annual total HVAC energy consumption of the country (see attachment. Figures are based on information in Oct-Dec 2007 issue of the Air Conditioning & Refrigeration Journal and those provided by its editor to the author).

According to data furnished by US Energy Information Administration, India's annual consumption was $3,575X10^9$ KWH. The estimated energy consumption of Building Air Conditioning (for Comfort) as shown in the attachments – $62.56X10^9$ KWH - works out to about 1.75 per cent.

One must assume that the missing fields of HVAC & R noted, will be duly accounted for and the methodology & approaches improved – hopefully, in the near future; even so, the change in percentage value of energy consumption by the HVAC &R sector is not likely to lift it up above 2 digit nos.- leave alone, reach the dizzying range of 24-30% in a global scenario. It is nobody's case that inefficient and lavish use of energy should be over looked, but at the same time, a breakup of energy consumption in the individual energy consuming sectors must be arrived at to get a more realistic perspective, before painting an adverse image of the industry to the public – as it is indeed happening today. Likewise, arriving at realistic figures will help to provide a more realistic and better perspective to those who frame and legislate on energy consumption standards & codes and their enforcement in our country. The Green Building movement (in this country) can not also remain unaffected by the implications that a realistic assessment of energy consumption in the country, will pose to all those involved in the vitally important fields of Climate Change, Global Warming, Energy Consumption & Pollution and other related fields.

About the author: Mr.R.V.Simha is the Chief of Airtron, HVAC Consultants and a Past President of ISHRAE, and ASHRAE India Chapter.

Editor's note:

According to the U.S. Green Building Council, offices consume 70 percent of the electricity load in the United States. They account for roughly 38 percent of all greenhouse gas emissions in the U.S. and over the next 25 years, carbon dioxide emissions from those structures are projected to grow faster than any other sector, at 1.8 percent a year. Simple moves for offices might include cycling the air conditioning so that it turns off at night or does not go full blast if rooms are only sparsely populated.

Global Air Conditioning Humour

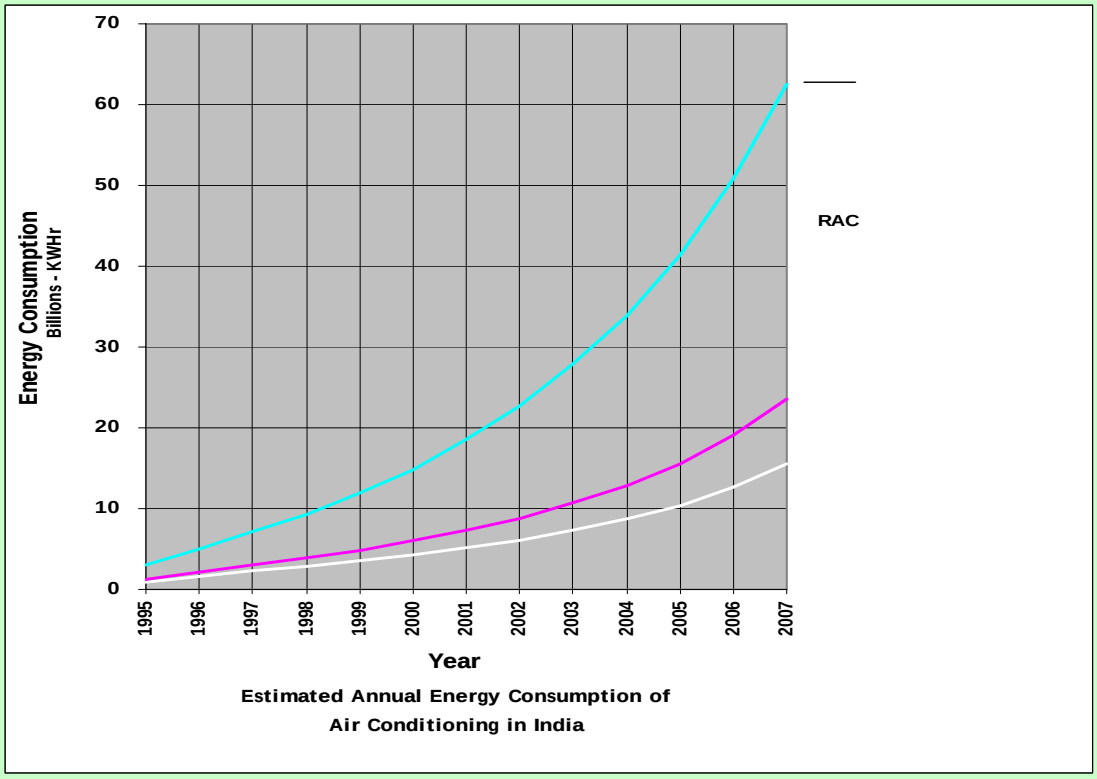
Cool Anniversary

Today is the 106th anniversary of the invention of air conditioning.

Or as President Bush calls it, "The solution to global warming."

- Jay Leno

Year	Chilled Water Plant	Package Units + Split Units	Room Air Conditioner	PU+S	RAC
	a	b	c	d	e
				a + b	c + d
1996	961670013	343959525	1816393137	1305629538	3122022675
1997	1604090606	548817772	2862981564	2152908378	5015889942
1998	2246511200	784404756	4077902117	3030915956	7108818073
1999	2888931793	1055329787	5402490594	3944261580	9346752174
2000	3531352387	1366893573	6991996767	4898245960	11890242727
2001	4270136069	1740770116	8899404174	6010906185	14910310360
2002	5119737304	2189421968	11188293063	7309159272	18497452336
2003	6096778724	2727804190	13934959730	8824582914	22759542644
2004	7269228429	3373862857	17230959730	10643091286	27874051016
2005	8676168073	4149133257	21186159730	12825301330	34011461060
2006	10434842630	5118221257	25932399730	15553063887	41485463617
2007	12721119553	6329581257	31786095730	19050700810	50836796540
2008	15600000000	7904349257	39063663730	23504349257	62568012987



Estimated Annual Energy Consumption of Air Conditioning in India

Attachment to "Energy Consumption in HVAC systems" By R.V. Simha

Heat Pumps for Energy Efficient Water Heating

By F. T. Kanpurwala

What is a “Heat Pump”?

A heat pump is a device that moves heat from one location (the 'source') to another location (the 'sink' or 'heat sink'), using work. Most heat pump technology moves heat from a low temperature 'heat source’ to a higher temperature ‘heat sink’. Common examples are food refrigerators and freezers, air conditioners, and reversible-cycle heat pumps for providing thermal comfort.

Heat pump can be thought of as a heat engine that operates in reverse cycle. One common type of heat pump works by exploiting the physical properties of an evaporating and condensing fluid known as a refrigerant. In heating, ventilation, and cooling (HVAC) applications, a heat pump normally refers to a vapor-compression refrigeration device that includes a reversing valve and optimized heat exchangers so that the direction of heat flow may be reversed. Most commonly, heat pumps draw heat from the air or from the ground.

Applications

The heat pump has a wide range of applications such as: vapor-compression refrigeration device in HVAC systems, heating water for swimming pools and domestic purposes, and several others. Heat pumps are used to heat and cool homes and also to heat water — either as stand-alone water heating system, or as a combination of water heating and space conditioning system.

Heat sources

Most commonly, heat pumps draw heat from the air (outside or inside air) or from the ground (groundwater or soil). The heat drawn from the ground is in most cases stored solar heat, and it should not be confused with geothermal heat, though the latter will contribute in some small measure to all heat in the ground. Other heat sources include water; nearby streams and other natural water bodies that have been used, and sometimes domestic waste water which is often warmer than the ambient temperature.

Types of heat pumps

A number of sources have been used for the heat source for heating private and commercial buildings. The two main types of heat pumps are compression heat pumps and absorption heat pumps.

Compression heat pumps use mechanical energy (through electricity), while absorption heat pumps may also run on heat as an energy source (through electricity or fossil fuels).

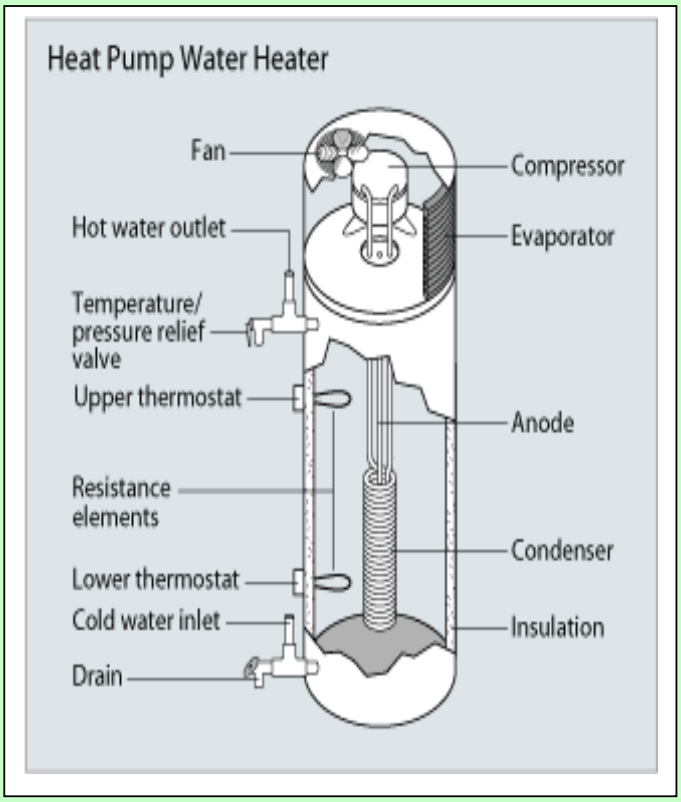
Air source heat pumps

Air Source Heat Pumps are relatively easy to install and inexpensive too. Since they use outside air as a heat source, higher temperature differential during periods of extreme cold or heat leads to a lower efficiency of the pump.

In mild weather, the Co-efficiency of Performance (COP) may be around 3.5, while at temperatures below around −5°C an air-source heat pump's COP will drop below 2. The average COP over seasonal variation is typically 2.5-2.8.

Geothermal heat pumps

Geothermal Heat Pumps typically have higher efficiencies than air-source heat pumps. This is because they draw heat from the ground or groundwater which is at a relatively constant temperature all year round below a depth of about 2.5 m. This means that the temperature differential is lower, leading to higher efficiency. Ground-source heat pumps typically have COPs of 3.5 - 4.0 with little seasonal variation. The tradeoff for this improved performance is that a ground-source heat pump is more expensive to install due to the need for the digging of wells or trenches in which to place the pipes that carry the heat exchange fluid. When compared versus each other, groundwater heat pumps are generally more efficient than heat pumps using heat from the soil.



How does Air Source Heat Pump Water Heater Work?

Heat pump water heaters use electricity to move heat from one place to another instead of generating heat directly. Therefore, they can be two to three times more energy efficient than conventional electric resistance water heaters. To move the heat, heat pumps work like a refrigerator in reverse.

While a refrigerator pulls heat from inside a box and dumps it into the surrounding room, a stand-alone air-source heat pump water heater pulls heat from the surrounding air and dumps it—at a higher temperature—into a tank to heat water. It can come as stand-alone heat pump water heating system or as an integrated unit with built-in water storage tank and back-up resistance heating elements. It can also be retrofitted to work with an existing conventional storage water heater**.** Locations for installation should be in the 6º–50ºC range year-round and provide at least 28.3 cubic meters of air space around the water heater.

You can also install an air-source heat pump system that combines heating, cooling, and water heating. These combination systems pull their heat indoors from the outdoor air in the winter and from the indoor air in the summer. Because they remove heat from the air, any type of air-source heat pump system works more efficiently in a warm climate.

Selecting a Heat Pump Water Heater

Heat pump water heater systems typically have higher initial costs than conventional storage water heaters. However, they have lower operating costs that can offset initial costs. Before buying a heat pump water heating system, one has to consider factors such as size, first hour rating, energy efficiency and overall costs.

Sizing Storage and Heat Pump (with Tank) Water Heaters

To properly size storage water heater—including a heat pump water heater with a tank—for your home, use the water heater's first hour rating (FHR). The first hour rating is the amount of hot water in litres the heater can supply per hour (starting with a tank full of hot water). It depends on the tank capacity, source of heat (burner or element), and the size of the burner or element. In order to estimate your peak hour demand, determine times of day (morning, noon, evening) you use the most hot water in your home keeping in mind the number of people living in your home. Based on average water consumption per person, calculate the peak hourly hot water demand.

Energy Efficiency of Storage, Demand, and Heat Pump Water Heaters

When used for heating a building on a mild day, a typical air-source heat pump has a COP of 3 - 4, whereas a typical electric resistance heater has a COP of 1.0. That is, one joule of electrical energy will cause a resistance heater to produce one joule of useful heat, while under ideal conditions, one joule of electrical energy can cause a heat pump to move much more than one joule of heat from a cooler place to a warmer place. Sometimes this is inappropriately expressed as an efficiency value greater than 100%, as in the statement, "XYZ brand heat pumps operate at up to 400% efficiency!" This is inaccurate, since the work does not make heat, but instead moves existing heat "upstream"; otherwise, this would be a perpetual-motion machine. The effective heating per watt of electric energy used can be up to 450% as much as resistance heating however, making this more an issue of semantics than science.

Note that when there is a wide temperature differential, e.g., when an air-source heat pump is used to heat a house on a very cold winter day, it takes more work to move the same amount of heat indoors than on a mild day. Ultimately, due to Carnot efficiency limits, the heat pump's performance will approach 1.0 as the outdoor-to-indoor temperature difference increases. This typically occurs around −18 °C (0 °F) outdoor temperature for air source heat pumps.

Also, as the heat pump takes heat out of the air, some moisture in the outdoor air may condense and possibly freeze on the outdoor heat exchanger. The system must periodically melt this ice. In other words, when it is extremely cold outside, it is simpler to heat using an electric-resistance heater than to strain an air-source heat pump.

In cooling mode a heat pump's operating performance is described as its energy efficiency ratio (EER) or seasonal energy efficiency ratio (SEER), and both measures have units of BTU/(h·W). A larger EER number indicates better performance. The manufacturer's literature should provide both a COP to describe performance in heating mode and an EER or SEER to describe performance in cooling mode. Actual performance varies, however, and depends on many factors such as installation, temperature differences, site elevation, and maintenance.

Heat pumps are more effective for heating than for cooling if the temperature difference is held equal. This is because the compressor's input energy is largely converted to useful heat when in heating mode, and is discharged along with the moved heat via the condenser. But for cooling, the condenser is normally outdoors, and the compressor's dissipated work is rejected rather than put to a useful purpose.

For the same reason, opening a food refrigerator or freezer heats up the kitchen rather than cooling it because its refrigeration cycle rejects heat to the indoor air. This heat includes the compressor's dissipated work as well as the heat removed from the inside of the appliance.

The COP for a heat pump in heating or cooling application, with steady-state operation, is:

$$COP_{\text{heating}} = \frac{\Delta Q_{\text{hot}}}{\Delta A} \leq \frac{T_{\text{hot}}}{T_{\text{hot}} - T_{\text{cool}}} = \frac{1}{\eta_{\text{carnotcycle}}}$$

$$COP_{\text{cooling}} = \frac{\Delta Q_{\text{cool}}}{\Delta A} \leq \frac{T_{\text{cool}}}{T_{\text{hot}} - T_{\text{cool}}}$$

wherein

- ΔQ_{cool} is the amount of heat extracted from a cold reservoir at temperature T_{cool},
- ΔQ_{hot} is the amount of heat delivered to a hot reservoir at temperature T_{hot},
- ΔA is the compressor's dissipated work.

CoP and Lift

The CoP increases as the temperature difference, or "Lift", decreases between heat source and destination. The CoP can be maximised at design time by choosing a heating system requiring only a low final water temperature (e.g. underfloor heating), and by chosing a heat source with a high average temperature (e.g. the ground). Domestic Hot Water (DHW) and radiators require high water temperatures, affecting the choice of heat pump technology.

Cost Comparison - Heat Pump with other Water Heating Systems

Attached tables provide a sample comparison of heat pump with other water heating systems like electric geysers and solar water heaters. Data for heat pump is based on equipment manufactured by M/S. Nalamwar Energy Systems Pvt. Ltd., Aurangabad.

Conclusion

From the above discussion and looking to the facts and figures available, it can be concluded that compared to other systems like electric geyser heaters, and solar water heaters, air heat pumps offer better options in terms of power consumption, energy efficiency, and costs. Hence, this product needs to be uplifted in the coming future and made more user-friendly.

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1. "Heat Pump", Wikipedia.
2. "A Consumers Guide to Energy Efficiency and Renewable Energy" – US Department of Energy – Energy Efficiency and Renewable Energy.
3. Air Water Heater data by Nalamwar Energy Systems Pvt. Ltd., Aurangabad.

About the Author

Mr. F. T. Kanpurwala is is an Associate Director "Environment Sustenance Centre", Ahmedabad, offering Environmental Testing and Consultancy Services. He is a member of IAEMP, a Certified Energy Auditor and Post Graduate Gold Medalist Chemical Engineer.

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Attachment to Heat Pumps for Efficient Water Heating – Table 1

Heat Pump Power Consumption and Savings per Annum comprising 1 No. of Heat Pump Module as against a typical Electric Geyser – Minimum Capacity Module				
Water Heating Capacity in Litres per Day – 1445			Heat Pump Model – 2.4	
Sr. No.	**Description**	**Unit**	**Formulae /Remarks**	**Result**
A	Ambient Temp	Deg C		30
B	Water Inlet Temp	Deg C		28
C	Water Outlet Temp	Deg C		60
D	Temp rise	Deg C	(C - B)	32
E	Specific Heat of Water	KJ/Kg°C		4.18
F	Heat Pump Module	Kw		2.40
G	Heat Pump Power Input	KwH		0.63
H	COP wrt Ambient Temp		(Pl refer Sh - COP	3.95
I	Heat Pump Module Heating Capacity at Ambient Temp	Kw	(G x H)	2.49
J	COP = Ratio of Output Energy in terms of hot water to Input Energy			
K	Quantity of water that can be heated using Heat Pump	Litre/Hr	(I x 3600)/	66.92
L	Operating Hours per day(say 90%)	Hr/Day		21.60
M	Water heating capacity per day per Heat Pump module	Litres/Day	(K x L)	1445
N	Minimum Input reqd. in case of Electric Heating element for water heating w.r.t. Heat Pump heating	Kw/Day	(M x E x D)/3600	54
O	Losses in Electric Heating Elements due to:	%	(O1 + O2)	25
O1	Efficiency of Electric Heating Elements	%	(Pl refer sh-	10
O2	Thermostat location in Electric Geyser- Average	%	(Pl. refer sh.-	15
P	Total power required to supply minimum input including losses in Conventional Electric Heating	Kw/Day	(N x O%) + N	67.50
Q	Heat Pump power consumption per day	Kw/Day	(G x L)	13.60
R	Saving per day	Kw/Day	(P - Q)	53.90
S	Saving per annum	Kw/Year	(R x 365)	19674
T	SEB Power rate/unit (Kwh)	Rs./KWh		5.00
U	**Saving per annum in monetary terms**	Rs.	(S x T)	**98370**

Note: Red letters indicate variables

Attachment to Heat Pumps for Efficient Water Heating – Table 2

Comparison between Heat Pump, Solar Water Heater and Electric Geyser for Water Heating Capacity equivalent to 1 No. Heat Pump of minimum capacity				
Water Heating Capacity in Litres per Day – 1445			Heat Pump Model – 2.4	
Sr. No.	Description	Unit	Formulae /Remarks	Result
A	**Solar Water Heater**			
1	Design Considerations for working days of solar water heater in a year	Days/Yr.		300
2	No. of Pumps for forced loop circulation	No.	For 300 days	1
3	Power consumption of each pump	Hp		0.50
4	Pump running hours per day	Hours		5
5	Pump power consumption in a year	Kw	A1 x A2 x A3 x A4 x 0.746	560
6	No. of days in which Electric Geyser is used	Days		65
7	Electric Power Consumption per year	Kwh	P x A6	4388
8	Total Power Consumption per year by Solar Water Heater	Kwh	A5 +A7	4948
9	Power Cost per Year	Rs./Year	A8 x T	24740
10	Total Water Heating Capacity per year	Litres	M x 365	527425
B	**Electric Geyser Water Heater**			
	Power Cost per Day	Rs./Day	P x T	337.50
C	**Heat Pump Water Heater**			
	Power Cost per Day	Rs./Day	Q x T	68
V	Cost per Litre of Water Heating Using:			
A	Solar Water Heater	Rs./Litre	A9/A10	0.047
B	Electric Geyser Water Heater	Rs./Litre	B/M	0.233
C	Heat Pump Water Heater	Rs./Litre	C/M	0.047

Attachment to Heat Pumps for Efficient Water Heating – Table 3

Sr. No	Description	Unit	Formulae /Remarks	Result
W	**Space required (Excluding Storage Tank) for Solar Water Heater**			
1	Capacity of BIS Approved Std. Solar Collector	Litres/Day		125.00
2	No. of collector panels required	No.	M/W1	12.00
3	Space required for BIS Approved Solar collector	Sq.m.		3.00
4	Total Space Required for Solar Panel Collector	Sq.m.	W2 x W3	36.00
5	Space required for Heat Pump Water heater	Sq.m.	Y2 x Y4 /(1000 x 1000)	1.20
6	Space requirement for Heat Pump wrt Equivalent Solar water Heater	%	(W5/W4) x 100	3.33
X	Weight of Solar Water Heater			
1	Wt. of 1 No. of Solar panel collector, approx.	Kg		50.00
2	So, Total Wt. of Empty Solar collectors	Kg	W4 x X1	1800
3	Weight of Empty Heat Pump	Kg	Y5	145
4	Weight of Empty Heat Pump with respect to equivalent Solar Water Heater	%	(X3/X2) x 100	8.05

A Glimpse of IAEMP Activities

IAEMP is engaged in many activities such as:

- Active Yahoo Group discussions and exchange of information on energy matters at iaemp@yahoogroups.com
- Follow-up on implementation of existing laws and policies on energy
- Demonstrations of practical Home /Office energy saving ideas
- Organizing interactive workshops..
- Training of Home/Office Energy Managers.
- Partnering with other organizations to support energy-related activities
-

'The Urja Watch' provides a glimpse of some of these activities.

Mr. Sunil Sood and Mr. R.N.Kamdin at the road show in Bangalore. The road show was organized by IAEMP to create public awareness of its Vision Document

IAEMP Stall at an exhibition organized by the Institution of Engineers, Hyderabad.

Prof. Ajay Chandak, an active member of IAEMP

with Kitchen Waste Bio-Gas Plant at Dhule, Maharashtra

IAEMP supported

DATACENTER 2008 in Mumbai & Bangalore

By Ms. Shaheen Meeran

IAEMP supported the DataCenter 2008 conference held on 15th July at Hyatt residency in Mumbai and on 17th July 2008 at the Leela Palace, in Bangalore.

Mr G.G.Dalal, VP, IAEMP was invited to the Lamp Lighting Ceremony in Mumbai conference and also participated in the panel discussion. Mr Vikas Apte, Treasurer, IAEMP also attended the conference.

Mr. Sunil Sood, President of IAEMP, participated in panel discussions at Bangalore. He suggested promoting of the concept of dedicated "data cities", with the use of CHP technology.

Ms. Shaheen Meeran, Chairperson of the Expert Group on Energy Efficient Data Centers (EGEED) within the IAEMP, was also a part of the same panel discussion.

During her speech, Ms. Shaheen Meeran elaborated on the various metrics used today to measure the "greenness" of data centers, including DCiE, PUE, IT-PEW and the LEED rating system. She mentioned that the most comprehensive metric emerging is the TCE (Technology Carbon Efficiency). She also stressed to the audience the need for energy conservation in data centers, giving Opex optimization and Corporate Social Responsibility as the key drivers.

The event was attended by over 350 CIOs, CTOs and Data Center Managers.

Photo taken at the DataCenter Conference

The expert panel seen at the conference exchanging views

"Why people fail to achieve their full potential, the primary reason is that they lacked communication and leadership skills. Because they did not have those skills, they did not have the courage to change themselves and society. Of course, without change, progress was impossible. So it is very important to learn the vital skills of communication and leadership. By becoming better speakers, listeners and thinkers, people could achieve self-actualization and contribute to the betterment of mankind".

ENERGY WITS

- What is common between politics and electrical distribution?

  Both need 'power' transformers.

- Why is wind power very popular?

  Because it has a lot of fans.

- What is a fuel cell?

  It is a jail that keeps gas guzzlers.

- What would you call a power failure?

  A current event.

- Who is an energy-wise man?

  One who knows what's watt

- From the editor's collection

Energy Conservation News: "Only eight & half Designated Consumers are notified in the last six years"

Common man: Why is the vehicle of "Energy Conservation" moving so slowly like a bullock cart, covering only eight & half milestones in last six years?

Minister's response: "Durghatna se Daer Bhali"

Common Man: Why "Earth Hours" are observed by creating total darkness on the Earth?

Energy Expert: Because we are short of energy and only during total darkness on Earth, the energy-yielding stars can be explored in the sky.

....Contributed by G.G. Dalal

Calculations

1. Average connected load in selected 200 house holds, with GLS Lamps (100W & 60W) is 64.397 W. Average CFL load calculated is (15W and 20W) is 15.55W.

2. Considering 5 operating hours per day during the first monitoring period, energy saved when the GLS lamps are replaced with CFL lamps is 6833 GWH'

3. CERs on energy saved is 6833 x 0.85 kg CO2/kwhx1000 = 5808 tons of CO2

Similarly the overall Carbon Emissions Reductions estimated for the entire period up to year 2018 is 3,83,342 tons of CO2.

The number of operating hours is determined by measurement of lighting hours of GLS lamps during the base line study (study of parameters with GLS lamps before the replacement) and that of the CFL lamps during project period (i.e. after replacement of CFL lamps). The whole data of all the consumers under study are provided in the project database.

Distribution of CFLs

How are the CFLs proposed to be distributed in the area of 43 mandals in entire District of Visakhapatnam?

The distribution of CFLs is proposed to be done by a pre-trained team of members who will explain and convince the consumers about the project and its benefits to the country a well as to the individual consumers.

The distribution and installation of CFL lamps will be done after verification of the electric circuitry in the individual houses and subject to the following norms:

1. CFLs shall be installed immediately on the date of distribution.

2. CFLs shall be fixed in the house in places such as living rooms but not bath rooms, and store rooms with less consumption.

3 Only 60 W and 100W GLS lamps shall be replaced with 15w and 20w.

4. On replacement, the removed GLS lamps shall be collected from the consumer immediately so that it shall not be used again.

Metering Equipment: The metering equipment including electric circuitry shall be installed for the both the base line (during GLS lighting period) and that of project period (CFL lighting period) for measurement of energy in both periods. The meter ID together with name, addresses and consumer ID will be recorded. Each meter will send the data such as lamp operating hours via SMS to a server. On this server the data of all operating parameters will be stored as daily data per meter.

For every monitoring period, a review will be done to determine the extent to which distributed CFLs in the project area are still functioning and arrange replacement as necessary.

Project data base: The project data base shall consist of all required parameters and formulae for arriving at final figures of energy consumption, CERs etc., during the currency of project.

Main steps for the database include:

1. Setting up the database.
2. Selection of areas of house holds of CFLs distribution
3. Selection of installing the meter & metering equipment
4. Base study results with GLS and spot results of CFLs
5. Intervals of energy meter calibration
6. Calculations of Emission reductions during project period.
7. Generating the monitoring plan.

Reservations

While the project design and plan seem to be satisfactory, the proposed execution of the project raises some doubts. Retired seniors engineers of APEPDCL have expressed the following reservations:

1. If CFLs are issued at free of cost or at a minimal charges, consumers may not be seriously interested in handling the lamps. They may sell the lamps in the open market at a little higher cost as it happened in the case of free gas cylinders distribution scheme that was adopted by the State Government to attract the people especially voters.

2. Though the CFLs are to replace GLS lamps in high consumption areas, the consumer may tend to change the place in the same house or any other houses., or use for other purposes other than intended.

3. As major part of households are selected from rural areas, people with poor education may not fully understand the purpose of the project intentions, though sufficient information and training is given before hand.

4. It is a well-known fact that in rural distribution, problems like loose sags in the over head lines cause short circuits, low voltages, frequent power failures and interruptions, may lead to incorrect energy consumption figures.

5. Consumers interest may reduce over the project period of 10 years, as it becomes a routine matter and the consumer may not complain about failure of CFLs in his house to the concerned team members or by the time team members notice the failure, there is considerable lapse of time. Thus, energy consumption figures may not be accurate.

6 .The CFLs are designed to operate in the power factor (PF) range of 0.5 to 0.6. The project design is silent on the low power factor caused by the CFLs and further problems connected with low power factor in distribution system.

7. When the facts and failures are assessed there will be a lot of difference between theoretical energy consumption and actual power consumption by the CFLs and this may defeat the very purpose of the project.

Though the calculated figures shown by OSRAM are attractive, doubts are expressed on whether the company would be successful to achieve the results at the end of the project period.

Reference: APEPDCL web site.

The author of this article, Er R.V.Ramana Rao is a Divisional Engineer (Retd). APEPDCL, and a Certified Energy Auditor. He can be reached at: ramana1948@yahoo.co.uk

HOW ENERGY CONSUMPTION CAN BE REDUCED IN PRODUCTION PROCESSES

By R.A. Sharma, Founder President, IAEMP

INTRODUCTION

Among all the organizational processes, the production process is a key element as it generally consumes maximum energy. Hence, if this process is controlled and monitored properly, energy consumption can be reduced significantly.

This article is an extract from a detailed paper of the author. It provides broad guidelines on how to use energy smartly in plant and machinery, and utilities. Important factors that impact production processes, and energy consumption are briefly discussed.

DEFINITIONS

Let us first understand the definitions of Process and Management. There are different available definitions but we refer to international definitions as per ISO 9000:2000.

Process: Set of interrelated or interacting activities that transform inputs into outputs. Please note that:

- Inputs to a process are generally outputs of other processes.
- Processes in an organisation are generally planned and carried out under controlled conditions to add value.
- A process where the conformity of the resulting product cannot be readily or economically verified is frequently referred to as a "Special Process".

Management: Coordinated activities to direct and control an organisation.

Management System: To establish policy and objectives and to achieve those objectives. A Management System of an organization can include different systems**,** such as a quality Management System, a financial Management System or an environmental Management System.

Energy Smart (ES): Energy Efficiency is achieved through improvements. Energy Smart is achieved through innovation.

Energy Consumption Centres

Generally in Industries there are two major Energy Consumption Centres.

a) **Main Production Centres-Plant and Machinery:** For example, Crushers, Mills, Kilns in a Cement Plant; Reactors, Condensers in a Pharma Plant. These are for main production processes.

b) **Utilities and Services:** Such services support processes and include equipments like – Compressors, Compressed Air System, Water Pumping Systems / Water Works in Cement Plants and Boilers, Compressors and Water pumps in Pharma Plants

Production Processes and Energy Consumption

Manufacturing Processes: There may be large scope of energy savings in this area which consumes by and large highest energy in Industry. Production processes need proper understanding and detailed checking.

Mostly for such processes especially in Chemical, Cement, Steel, Paper industries professional experience and expertise is required for assessment and audit. Through a few days of study it may be difficult to identify improvements and innovations.

Process Control: All parameters such as temperatures, pressures, draughts, and process time will have great bearing on production outputs as well as energy consumption. Hence acceptance criteria should be fixed, monitored and recorded. For any deviation, corrective and preventive actions have to be taken.

Production: Energy consumption is related to production. There are direct consumption and indirect consumptions. Overhead is almost independent of production. Hence if production is higher for same level of total energy consumption, specific energy consumption or Unit Consumption per Ton of Product comes down.

Objectives & Targets: Measurable objectives must be fixed for all performance parameters such as – Production, Energy, Process, and Materials Consumption.
Comparison, measurements, monitoring must be done for all targets on a regular periodical basis. For any deviation from targets, root cause analysis must be done followed by corrective and prevention actions.

Action Plan: A plan has to be made for all corrective and preventive actions. The plan should include activity, responsibility and a schedule. It must be monitored for effective results.

Bench Marks: Must be fixed. They can be based on International, National, or company's best norms achieved. All must be reminded of the bench marks at meetings.

Responsibility & Authority: Must be clearly defined for production and energy. Sometimes it is vague and no one or two persons are responsible.

Incentives: For achieving higher production and lower energy consumptions, author feels incentives may be fixed to encourage and motivate the people. It can be either department wise or process wise or by any other appropriate method.

Flow Sheet: For total manufacturing a flow sheet must be made indicating every process, and sub process. Energy consumption must be monitored section wise and process wise.

Non-Value Adding Processes: It is very important to identify processes that do not add value to the organisation. Such processes should be either eliminated or controlled to save energy and other resources.

Maintenance: Proper maintenance has a great role to play in controlling energy consumption. For example – if there are leakages in a kiln or furnace, fuel consumption will be higher. If the shell liners and grinding media are worn out in a cement plant power consumption will be higher.

To save energy, industries must adhere to the following:

a) Systematic maintenance systems such as Preventive Maintenance (PM) shutdown maintenance, and proactive maintenance.

b) Use of PM Checklist.

c) Breakdown maintenance and analysis of corrective and preventive actions.

d) Spares planning

e) Maintenance of Log Book and records.

Water Management – Reduction In Water Consumption: Water is an important commodity which is used in almost all industries for various purposes including Processes, Cooling, Washing, Cleaning, Drinking, Bathroom and Toilets. Author's experience indicates that in most of facilities measurement is not done. During project stage, some norms are fixed but with several expansions later, water management goes haywire and actual quantities are hardly known. It is essential to install water meters to know exact consumptions.

Waste Management & Reduction: Waste is a misplaced resource, existing at a wrong place at a wrong time. All wastes must be listed and action taken to minimize or eliminate them systematically. Waste reduction can be done in different ways such as: Good house keeping, process change, recycling, product modification.

Production Cycle Time Reduction: If cycle time is reduced, production can be increased and hence energy consumption can be reduced. With author's experience in cement industry the residence time in Rotary kilns have been reduced to half an hour from several hours. The speed of kilns used to be 1 rpm approx, now it is 4 rpm. This has increased production several fold and energy consumption has come down drastically. Such innovative methods will lead to achievement of energy smartness.

Checklist For Production Processes: The author has two types of checklists:

(A) **General:** This will guide assessors, energy auditors and implementers to understand what questions to be asked.

(B) **Specific checklist on critical points of production:** This checklist is mandatory. Energy Auditors/Assessors have to ask these questions, see relevant records, make notes and award marks/points.

Conclusion:

If the guidelines are followed, there is a good possibility of reducing energy consumption and increasing energy efficiency leading to Energy Smartness.

About the author: Mr. R.A. Sharma is the Managing Director of Master Consultancy and Productivity Pvt. Ltd., Secunderabad. He is a qualified lead assessor, and a certified energy and safety auditor.

IAEMP Debate on

Incorporating Energy Efficiency During Design Stage

In order to reap long-term economic benefits from any project, energy efficiency principles should be considered during the design stage itself. Recently, IAEMP members debated on this issue and several views surfaced. Members also discussed other factors that will have impact on improving overall energy efficiency. For your interest, we provide excerpts from this lively debate.You are most welcome to share your experiences too. Please email to the editor at "tellsubi@gmail.com" -Editor

Start of debate

While we are all talking of implementing provisions of the Energy Conservation Act (EC) without further delay, can anybody tell me under which clause of the EC Act, selection of inefficient processes, equipment, and over sizing by project consultants can be checked?

Everyday new projects are coming up without any consideration for incorporating energy efficiency. Should it not be the top most priority for the Bureau of Energy Efficiency (BEE) to issue necessary guidelines to Architects, Project Planners, and Engineering Consultants? Besides ECBC, there are provisions in the EC Act, 2001 under which BEE could have ensured this. These provisions relate to giving preferential treatment to energy efficient equipment/processes and also introducing innovative financing schemes to promote energy efficiency.

Your views are invited.

S.K. Sood

Response 1

The issue raised by Shri. Sood is a very serious one.

I am basically an Electrical consultant and a Contractor. During execution of works, especially in the government sector, I have observed a criminal waste of money and energy due to lack of professionalism. One of the reasons is that in many buildings, the electrical and lighting design is carried out by architects who are neither professionally qualified to do this job nor have any concern about energy bills of the clients.

The cable manufacturers too are apparently taking advantage of this. Many of the manufacturers are supplying undersized cables knowing fully well that the design is bound to have a high safety factor. They also know that due to the peculiar shape of the conductors no one will be able to determine the exact size. I have managed to check the area of cable in one particular instance, and for a 70 sq.mm cable, I found the area to be only 58 sq.mm! I hope that we will be able to address such problems also.

S. Khandekar

Response 2

I provide consultancy services in the field of process engineering to many leading Petroleum and Petrochemical companies of India.

Recently, I was a panelist in a major international seminar on energy efficiency improvement in Petroleum Refineries. During the deliberations the following points came out clearly:

1. The technology selection for new processes in public sector companies like Indian Oil or private sector companies like Reliance, is rarely done on the basis of energy efficiency of competing designs. Factors like initial cost, project completion time etc often dominate the energy efficiency factor. In fact, I know of cases where existing process designs have been duplicated to meet specified target dates for project completion even though the company is undertaking retrofits of existing plants to improve their energy efficiency.

2. The process licensors are very reluctant to re-engineer their designs to optimize them for Indian conditions. For example, most large multi-plant petrochemical sites have three or four steam pressure levels for the steam grid. I invariably find that individual plant licensor selects his own steam pressure level rather than selecting one of the existing levels in the site steam grid. This leads to bizarre situations where I have seen pressure being let down from 100barg to 40 barg, whereas 38 barg steam available at the site could have been used.

I feel that pre-audit of energy consumption of alternate process designs by accredited energy audit firms will be very beneficial for the nation.

Alok Saboo

Response 3

In this context, let me share my experience as an equipment manufacturer.

I fully agree with what Mr. Alok said about duplicating 15-20 year old designs for expansion without hiring consultant for re-engineering the project. The justification given is to operate familiar equipment and to have same spares.

One more interesting aspect of retrofitting is:

It costs Rs.10 - if envisaged at design stage
It costs Rs.50 - if added during manufacturing stage
It costs Rs.200 - If added during field erection and commissioning stage
It may cost more than 100 times to change any component to more energy efficient component if the plant is already running (considering the down time costs).

In view of above, I fully agree with the view that a pre-engineering design stage energy audit by an energy consultant is imperative to save plant costs and future energy costs.

B.Satyanarayana
Gas Turbine Designs , BHEL, Hyderabad.

Response 4

In this context, let me narrate my experience of selecting energy efficient equipment in design stage.

Ours is an engineering industry manufacturing "Fuel Injection Equipment" for diesel vehicles. Top Management has directed all equipment suppliers to make supplies equipped with energy efficient motors. Suppliers accept all terms/conditions and after acceptance of order revert back to say that the equipment delivery will be affected in case we opt for energy efficient motors.

Motor manufacturers also do not bother since the quantity involved is only 4 or 5.

I am sure many of us will be facing the similar situation. One reason for the long delivery is less demand and hence rarely taken up for manufacture.

In case anyone has a solution, please help.

Prem Kumar

Response 5

The aim is to improve the efficiency of all equipment, operating procedures and building ergonomics.

This can be emphasized through the "GREEN BUILDING CONCEPT" which will go very well with the CEOs and Finance Managers who have the power in sanctioning the required funds.

Pandurangam.

Response 6

The points mentioned by Mr. Pandurangam are very relevant and are implemented in Godrej CII building Hyderabad.

We can visit the platinum rated Green Building in Hyderabad.

R.Gopalakrishna

Response 7

Energy inefficiency is incorporated during design stage due to following golden rules and considerations:

1. Extra capacity as margin of safety (or margin of ignorance?)
2. Extra capacity to care of future expansions (in future expansions, hardly any retrofitting is done; everything is replaced)

Vikas Apte

Response 8

Incorporating energy efficiency in a new project is extremely important as we know fully well that the energy crisis is going to get worse day by day.

During the project development stage, people mostly involved are from construction and erection groups. The project may be headed by a finance person. For them the objectives are:

- Faster or timely completion
- Lower than the budgeted cost
- Avoid flexibility to cut down cost
- Negligence on long term strategy for the future and look for short term gains.

This issue becomes especially important for a project having life of 25 years or more.

Study of technology trends, fuel availability, other industries coming up in the neighbourhood and market development for associated product mix is also important.

Nanda Kumar Parulekar

Laugh a while..

Oil Drops

The price of oil is coming down. It's dropped from $147 a barrel all the way down to $118 a barrel today.

The oil companies said they will pass those savings on to you ... as soon as hell freezes over.

Jay Leno

Pillow Charge

JetBlue is now charging $7 for a blanket and a pillow.

So now you'll be able to get a solid eight hours' sleep on the runway.

David Letterman

Airline Charge

Earlier today, US Airways began charging passengers on its flights for water.

Even worse, the oxygen masks are now coin-operated.

Conan O'Brien

Inspirational Quotes

1) Nothing is particularly hard if you divide it into small jobs. - Henry Ford

2) Failure is simply the opportunity to begin again, this time more intelligently.

- Henry Ford

3) Effective people are not problem minded, they're opportunity minded.

- Stephen R. Covey

4) Every time words are spoken, something is created. Be conscious of what you say and how you say it. Use words that build up, appreciate, encourage and inspire.

- Lucy McDonald

5) Life is not measured by the number of breaths we take, but by the moments that take our breath away. - Hillary Cooper

6) You can never cross the ocean unless you have the courage to lose sight of the shore.
- Christopher Columbus

7) The time is always right to do what is right. - Martin Luther King Jr.

8) You can complain because roses have thorns,

Or Rejoice because thorns have roses. - Ziggy

9) Never mistake knowledge for wisdom. One helps you make a living, the other helps you make a life. - James Dean

10) Love for books is a permission to enter into God's kingdom,

The peace and happiness that you get from good books cannot be obtained from the best of riches and palaces of the world.

- Swami Vivekananda

11) What is the Secret of Success? - Right Decisions.

How do you make right decisions? - With Experience.

How do you get the experience? - With Wrong Decisions.

–Unknown

12) Lucky means who gets the opportunity!

Brilliant means who create the opportunity

And Winner means who use the opportunity

-Unknown

Contributed by F.T. Kanpurwala

Sunil Kumar Biswal

gets 'Best Conscience Keeper on Energy Matters' award

for the year 2007-08

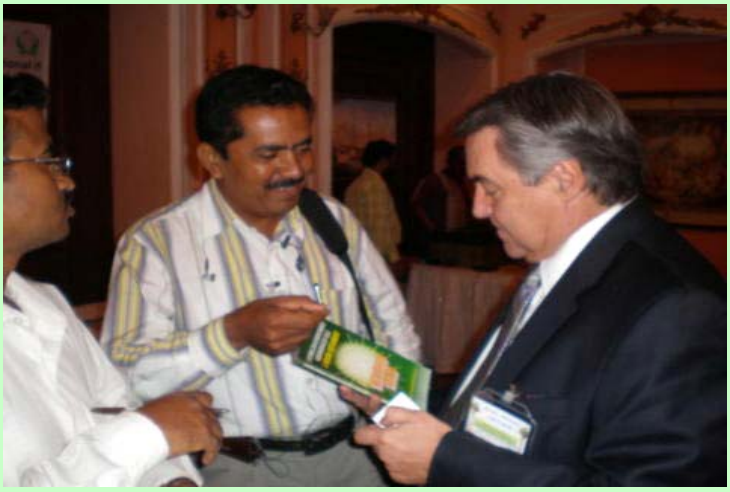
****

Sunil Kumar Biswal, Aged 43 years joined IAEMP on 20th October,2006.A Graduate in Electrical Engineering, he is managing his own Electrical Contacting and consulting firm in Orissa, He is a Certified Energy Auditor (2006 batch) Organizing Secretary of Orissa State Centre of IAEMP, Corporate Member of Institution of Engineers (India) and a Fellow of Institution of Valuers.

As an eastern zone co-coordinator of IAEMP, he has contributed immensely towards the growth of IAEMP in the eastern region. Due to his untiring efforts, IAEMP Orissa State Centre could be established in the year 2007.He has also contributed greatly in finalizing and promoting IAEMP's Vision Document. A very dedicated member and firm believer in IAEMP's Mission-2022, he takes regular part in IAEMP yahoo group discussions.

For his self-less contribution to the growth of IAEMP and for taking active part in realizing the objective of IAEMP, he is being awarded with the "Best Conscience Keeper on Energy Matters" award for the year 2007-08.

His Hobbies: Amateur Radio (Ham Radio) Call Sign: VU2MBS, Amateur Astronomy, Listening to Music, Reading Books.



Mr Sunil Kumar Biswal is seen (Centre) handing over a copy and explaining the contents of IAEMP Vision Document to an official from the "World Bank during a workshop held in Orissa

UPCOMING ENERGY EVENTS

Renewable Energy India 2008 EXPO August 21-23, 2008
New Delhi, India
www.renewableenergyindiaexpo.com

23rd European Photovoltaic Solar Energy Conference and Exhibition September 1-5, 2008
Feria Valencia Convention & Exhibition Centre, Valencia, Spain
www.photovoltaic-conference.com

Carbon Markets India September 29-30, 2008
Mumbai, India
www.greenpowerconferences.com/carbonmarkets/carbonmarkets_india_2008.html

World Energy Engineering Congress (WEEC) October 1-3, 2008
Washington, D.C. USA
www.aeecenter.org/weec

India Energy Conference - Oil, Gas & Alternatives October 3-4, 2008
New Delhi, India
www.teriin.org/iec

Cleantech Forum XIX October 7-8, 2008
Mumbai, India
www.cleantech.com

Green Energy Summit 2008 October 16-19, 2008
Bangalore, India
www.greenenergysummit.com

POWER-GEN Asia October 21–23, 2008
Kuala Lumpur Convention Centre
Kuala Lumpur, Malaysia
www.powergenasia.com

Sustainable Manufacturing Summit Europe November 17-18, 2008
Brussels, Belgium
www.greenpowerconferences.com

Green build International Conference & Expo November 19-21, 2008
Boston, USA
www.greenbuildexpo.org

12th Annual Conference on
Clean Air, Mercury, Global Warming & Renewable Energy
Energy & Environment Conference & Expo February 1-4, 2009
Phoenix Convention Center, Phoenix, Arizona, USA
www.euec.com

INVITATION TO CONTRIBUTE TOWARDS INDIA'S ENERGY INDEPENDENCE

Vision Document for "India's Energy Independence"

Announcement for publication of second edition of Vision Document on "How India can achieve Energy Independence by 2022".

Indian Association of Energy Management Professionals (IAEMP) is an all India association of committed energy management professionals. We intend to work as the *'Conscience Keepers to the Nation on Energy Matters.'*

Our mission is to make India Energy Independent by the year 2022 for which we have prepared a Vision Document. Called as 'Mission-2022', this Vision Document contains 10 Chapters including a time bound action plan. Released on 14th August 2007 at Bangalore, the document was well appreciated for its approach and many libraries and institutions including US Library of Congress and World Bank have sought its copies.

We are now planning to add sector-wise information and other details to make it more comprehensive. The new title of the Vision Document will be **"Towards India's Energy Independence by 2022 – An Action Plan".** A soft copy of the Vision Document can be sent to you on request. The hard copy is available on a donation of Rs. 200/- by DD, payable to IAEMP-Bangalore. For this, we are seeking your support in the following manners:

- By sending your views and ideas on how your company/institution can help India achieve Energy Independence
- By providing us your feedback on the Vision Document 2007
- By joining us as an Organizational Member. The benefits offered by us include free one page advertisement (Black & White) in next edition of vision document. A copy of the Vision Document is also given free to all members
- If you do not wish to join as organization member, you may place an advertisement to highlight your achievements or re-affirm your commitment to the cause of India's Energy Independence. The last date for sending advertisement is 15th sept.'08

We request you to go through the detailed proposal attached along with, and look for various possibilities to contribute to this noble mission for India's Energy independence.

Sunil Sood,
President, IAEMP
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Encl: Invitation for advertisement

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- The document will be distributed free of cost to government organizations/leading educational institutions/libraries especially related with EERE sector
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- Being a reference guide, the document has a long shelf life
- Complimentary copies will be given according to tariff plan
- Free subscription for forthcoming E-newspaper
- Above all, it will be your contribution towards making India Energy Independent

How to Reach Us?

Contact Details

Please send your advertisement to:
Indian Association of Energy Management Professionals (IAEMP)
#304, 20th Cross, 6th Block,
Jayanagar, Bangalore-560082
Karnataka, India
Tel: +919241778871
Email: sunilsolar@yahoo.co.in
Website: www.iaemp.org
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Launch of the first edition of our Vision Document

Indian Association of Energy Management Professionals

Towards India's Energy Independence by 2022 – An Action Plan

Launch of Second Edition of The Vision Document

Who we are?

Indian Association of Energy Management Professionals (IAEMP) is a group of energy professionals striving to achieve their mission of making India Energy Independent by 2022. IAEMP's mission is named 'Mission-2022'.

From a humble beginning of 16 energy conscious experts joining hands, the idea of bringing energy professionals soon became a revolution all over India. Today, IAEMP boasts of being a strong association of more than 150 Energy Managers/ Auditors/ Professionals.

IAEMP has experts spanning across the age groups from 25 years to 70 years, thus providing the association all the necessary elements required: i.e. Knowledge, Energy, Dynamism and Commitment. The members are also from variety of industrial sectors. Some of the members have almost 20-25 years of experience in the field of energy audits; some members are self-employed; some are in government services; some are handling CDM projects; and some are business consultants.

What do we mean by Energy Independence?

- Energy modesty – without sacrificing comfort & safety
- Energy efficiency bench marking
- Appropriate applications of renewable energy
- Large scale tree plantation
- Due importance for human and animal power
- Development of local water bodies
- Negawatts at par with megawatts
- Conservation at par with production/generation
- Total self-reliance to meet basic needs
- Imports only for export oriented activities

Why India needs Energy Freedom?

Why India needs Energy Independence?

- India gets almost 95% of its power from primary sources of hydrocarbons such as Coal, Oil and Natural Gas
- More than 70% of India's crude oil is imported
- Our net oil import bill has crossed Rs 200,000 Crore mark
- We spend about 30% of our budget to meet energy demand
- One $ per barrel rise of crude oil price puts an additional burden of almost Rs. 2,500 crore
- We are also dependent for our nuclear energy needs
- Now we have even started importing Coal!
- Most of the 'Navratna' companies are energy availability dependent and need huge funds for growth
- 46% of our households do not have access to electricity
- 30% of the world's population without electricity lives in India

How India can achieve Energy Independence by 2022 – A Vision Document

The Vision Document was published keeping in mind the requirement of a road map and to increase awareness about need for energy independence. The first edition of Vision Document was released in August 2007. The book has following major chapters:

- History of Energy Efficiency & Renewable Energy Sectors
- A Road Map to Energy Independence
- Rational Use of Energy & Demand Management
- Recommendations for R&D on energy efficient processes
- Recommendations on policy matters
- Important excerpts from Dr. Abdul Kalam's speeches
- Recommendations of 'Integrated Energy Policy – 2006'
- Estimation of Energy Requirements
- Time Bound Action Plan

What is our Vision?

Why the Second Edition?

Launch of Second Edition of The Vision Document

With the overwhelming response and encouragement received from successful first edition and to update and add new chapters, the need for publication of second edition was felt. This will also give others an opportunity to understand our mission and join hands with us. The second edition will be more exhaustive document with colored pages.

Additional chapters covered in the second edition:

- Green building concepts
- Sector-wise status of energy efficiency
- Brief coverage of government bodies working in EERE sector
- How each one of us can contribute for energy independence?
- Recycling, reuse and harvesting of water
- Energy conservation in solid waste management
- Clean Development Mechanism (CDM)

We are planning to publish the document in two phases with 5,000 copies in the first phase and 20,000 copies in the second phase.

Target Audience

- All establishments consuming large amounts of energy
- All firms involved in energy efficiency & energy conservation
- All professionals working in the field of energy management
- All educational and professional institutions such as premier engineering and management institutes
- Government and Public Sector Undertaking in power sector
- Individuals with conscience for energy matters