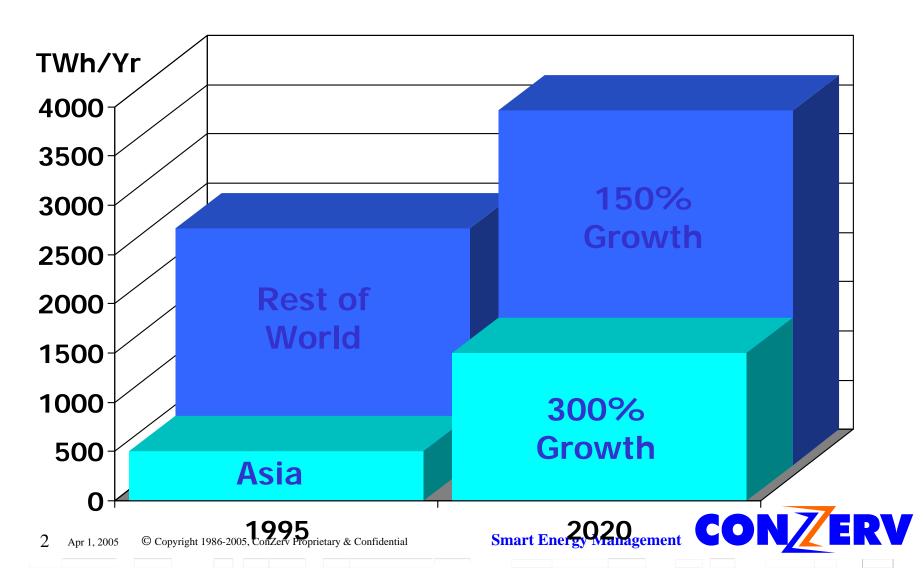
Technological Issues in

Demand Side Management

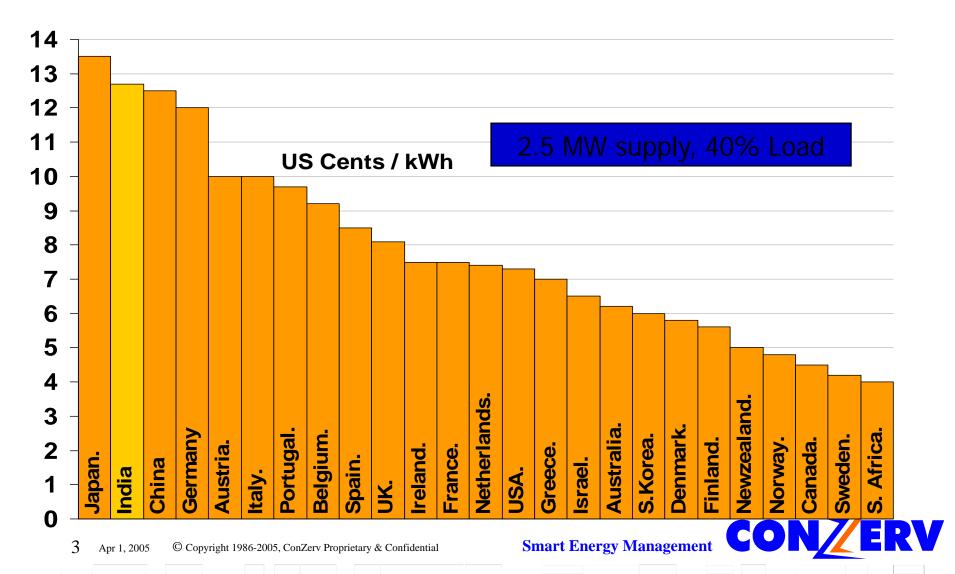


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Expected Growth Of Electric Energy Demand



Industrial Power Costs Worldwide



Current Shortages in Western Region

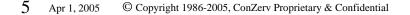
(Source: energylineindia.com)

| Shortfall Estimated by WRPC | Mar 08 | Apr 08 | | | |
|-----------------------------------|----------|----------|--|--|--|
| Maharashtra | 5016 MW | 5417 MW | | | |
| Gujarat | 3581 MW | 4112 MW | | | |
| Goa | 47 MW | 11 MW | | | |
| W Region Overall | 11441 MW | 12041 MW | | | |
| | | | | | |

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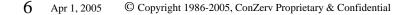
Demand Side Management – Present Status

- Demand side management has come to mean tracking of consumer billing thru various methods including GPS
- The main aim is energy accounting so that all consumers are metered and billed
- Due to various reasons utilities do not have accurate information about the energy supplied and revenue collected
- Consequently all efforts are focussed on that area in distribution



Demand Side Management of Load

- Utilities carry out DSM thru penalties and incentives in tariff structure
- Penalties are levied for exceeding contract demand
- Low PF is also penalised and high PF is incentivised
- Consequently, customers play safe and contract for more than required KVA
- Others with genuine need may have to rely on DGs



Smart Energy Management

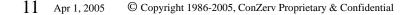
Demand Side Management of Load

- Existing OFF LINE monitoring system suffers from many disadvantages:
 - >> Measurements are carried out thru devices storing data with a periodicity of 30 minutes which imposes severe limitation on the parameters to be monitored.
 - >> This data has to be physically accessed from meter every month by a meter reader who downloads this storage and only at the month end it enters the system.
 - >> This method only enables imposition of penalties and does not contribute to load management in real time.
 - >> The system can only do post mortem or operate post facto.



Role of DSM in GDP Growth of 8.50% in 10 years

- 12.75%pa growth of installed generating capacity
 - Investment in Power Sector
- Macro DSM for Power utility systems
- Micro DSM thru energy efficient load management at factory level - medium & large industrial units
- Energy Efficiency Improvements in Public Utilities and Agriculture must also begin



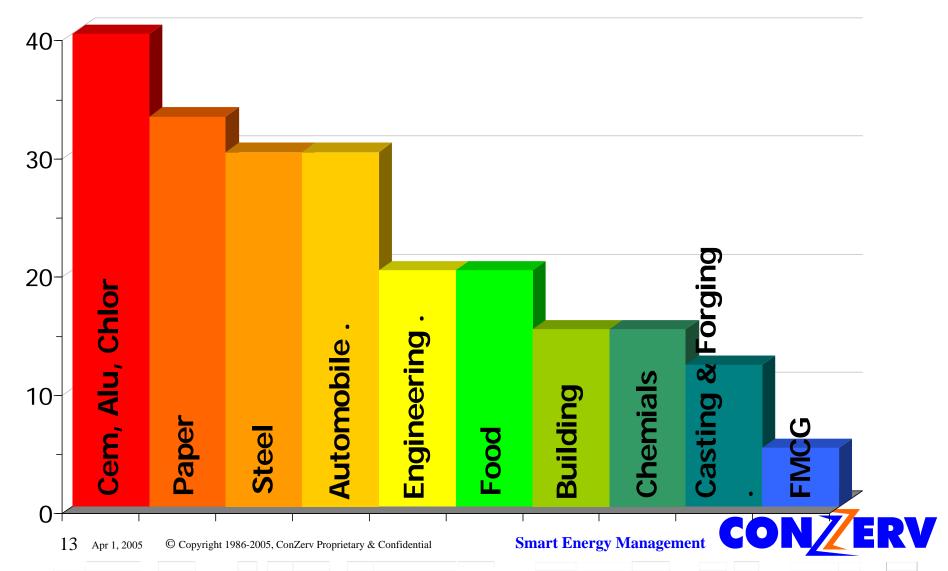
Smart Energy Management

Value of Energy Efficiency

- One KWH saved thru energy efficiency is said to be eqvt to several times one KWH generated
- There is no T&D loss
 - No capital expenditure in generation and transmission
 - No environmental damage or CO2 emission Available immediately



% Energy of Total Manufacturing Cost



Global Power Productivity 2000-01

Source : World Development Report 2003

| Country | Electricity Used Bn kWh | | GDP | Mfg Industry Value Add | |
|-----------|----------------------------|----------|-------------|------------------------|----------|
| | Total | Industry | Rs. Cr | Rs. Cr | Rs / kWh |
| India | 510 | 179 | 22,912,416 | 3,149,952 | 18 |
| China | 1,356 | 452 | 55,633,488 | 17,896,128 | 40 |
| Malaysia | 69 | 23 | 4,225,968 | 1,424,256 | 62 |
| Singapore | 31 | 16 | 4,111,104 | 1,195,008 | 76 |
| Germany | 567 | 284 | 88,611,312 | 19,338,528 | 68 |
| Japan | 1,082 | 541 | 198,788,688 | 49,408,128 | 91 |
| Korea | 283 | 127 | 20,264,016 | 8,308,224 | 65 |
| USA | 4,003 | 2,002 | 483,132,720 | 75,196,800 | 38 |
| UK | 372 | 186 | 68,356,512 | 11,273,136 | 61 |

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Smart Energy Management

RV

CON

Demand Side Management – Wider Canvas

- Energy Efficiency not yet being driven by utilities
 - Energy Efficiency in designated industries- Pvt sector, Power plants, Railways?
 - Energy audits of non designated industries-Only commercial considerations are relevant
 - Energy efficiency in residences

DSM – Wider Canvas

Power Quality

Uninterrupted supply- Problems of alternatives in use by consumers, costs?

Voltage Stability- many industrial users avoid utility power due to fluctuations

Harmonics free voltage



Demand Side Management System

- To infuse necessary dynamism in load management the system should function in real time.
- Input power available as well as consumption pattern should be on line.
- System should be available to supplier as well as consumer.
- Ultimately, it should be an integrated system from Receiving stations to consumer end.
- System should contribute to energy management and conservation for the consumer.

DSM for Utilities

- For dynamic situation in distribution use on line monitoring for accounting
- Integrate the system from receiving end to substations, DTs.
- Make it available for supplier as well as consumer by having subsystems
- System to be used for energy management and energy efficiency



Energy Efficiency in Industries

- Some attention for energy productivity in procurement for plant utilities like motors, air compressors, HVAC, pumps & blowers etc.
- All talley plate data determined from 'standard/controlled/lab' conditions. Actual operating conditions are always different.
- Subsequently:

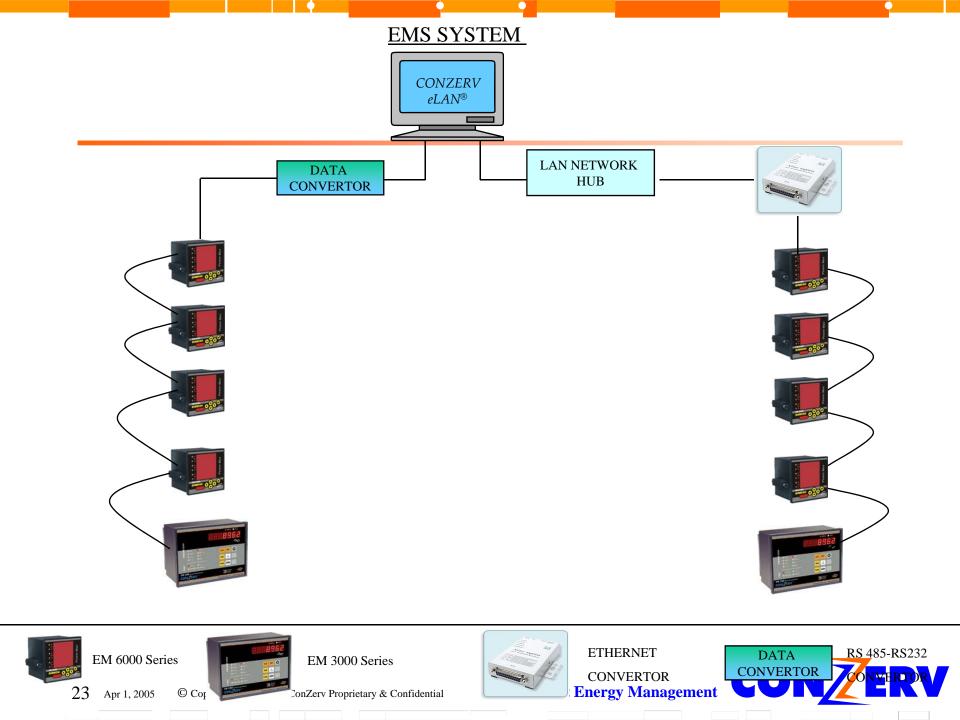
Motors are frequently rewound

Air compressors efficiency goes even lower

HVAC efficiency deteriorates

Need for continuous monitoring of energy consumption





Substation Monitoring

On Line Monitoring of each substation which can provide

>> Power from Incomers as well as outgoing feeders

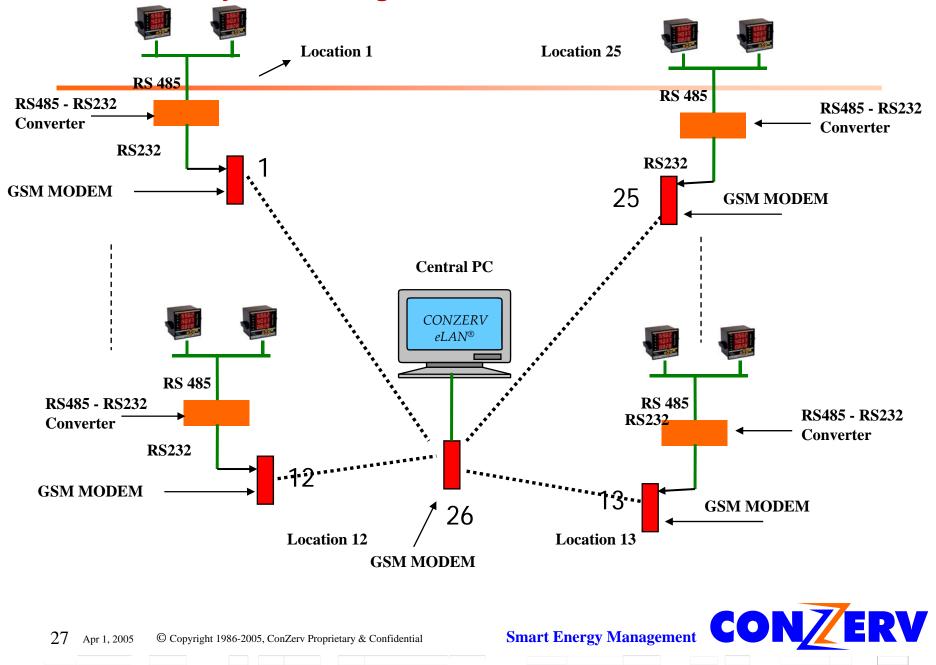
>> Energy output from each feeder which can be used for energy / revenue accounting

>> System can capture data from feeders and DTs <u>ON LINE</u> thru networking not offline thru MRIs

Smart Energy Management

>> System can be extended down the line

System Configuration for Time Interval based

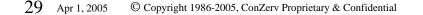


Distribution Monitoring - Advantages

- Energy account reconciliation on daily basis no need to wait till month end or accumulate large unaccounted gaps.
- Centralisation of system is possible ie data of all substations can be brought to Discom HQ.
- System can provide T&D losses within primary distribution from Main Load despatch stations to substations and DTs.

Smart Energy Management

System is simple and cost effective.



DSM thru Technology

- Standards and Labelling Program of BEE
- Incentives for Development of Energy Efficient Domestic appliances
- HVAC development
- PF improvement in distribution



Pune Industrial Power Scenario

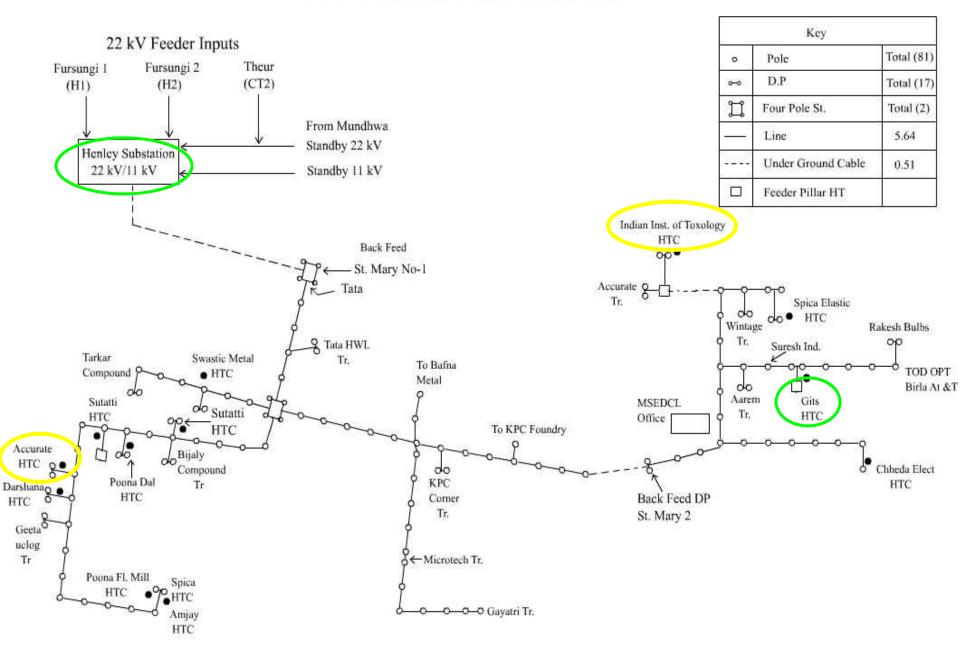
- 389 Feeders
- 1000 Industries
- **425 MW**
- 20% = 85 MW Reduction
 - To meet Peak Demand Shortage

DSM Pilot Hadapsar Indl Area

- Henley, Gits initial success
- Institute of Toxicology
- 3 more



22 kV Industrial Feeder (Hadapsar)



Gits Foods Case Study

12 months

CON

V

data

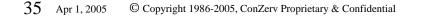
| Savings | Savings Rs | Investment Rs | |
|---------------------------|------------|---------------|---|
| By DSM | 151,200 | 140,000 | For Recording and Controlling (Metering) Mechanism |
| By Illumination Survey | 90,006 | 108,500 | For Tube Ligths |
| By Motor Survey | 80,833 | 165,054 | For Motor |
| | | 240,000 | Performance Charges |
| TOTAL | 322,039 | 653,554 | |

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Demand Side Management – Delhi

case

- To reduce load shedding Delhi Govt made announcement for closing all shops by 7 pm.
- Due to strong reaction from shopkeepers the notice was quickly withdrawn.
- As shops use maximum electricity for lighting it is possible to reduce consumption by use of 'Lighting Energy Saver'.
- Saving of power by upto 20% in lighting can help in avoiding load shedding for shopping areas.



Thank you

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