FROM CRISIS TO OPPORTUNITY THROUGH A NEW ENERGY PARADIGM

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CRISIS

= a situation that does not permit continuation of old patterns of behaviour

ELECTRICITY SYSTEMS
OF MOST DEVELOPING COUNTRIES
are trapped in 4 crises:-

- capital crisis
- performance crisis
- access or equity (= distribution) crisis
- environment crisis

ESSENCE OF CAPITAL CRISIS

- "UNBRIDGEABLE GAP" BETWEEN CAPITAL DEMAND AND SUPPLY
- FINANCIAL REQUIREMENTS ARE SEVERAL TIMES MORE THAN WHAT CAN BE PROVIDED BY SUPPLIERS OF CAPITAL

ANNUAL INVESTMENT, I, REQUIRED FOR CAPACITY EXPANSION

I = E (0) x g(CAP) x UCOP

= E(0) x a x g(GDP) x UCOP

E(0) =CAPACITY (IN MW) IN BASE YEAR

g(GDP) = GROWTH RATE OF GDP

g(CAP) = GROWTH RATE OF CAPACITY

a = RATIO OF GROWTH RATES OF CAPACITY & GDP

UCOP = UNIT COST OF CAPACITY(RS/KW)

OPTION#1 : INVITE FOREIGN PRIVATE SECTOR

- Take { a . UCOP} as given/unchangeable
- E(t-1) is also given

= > I(t) = constant x g(GDP)

If there is a g (GDP) target,

then a certain minimum investment I(t) is required

OPTION #2 BELT - TIGHTENING

- Take {a.UCOP} as given
- E(t-1) is also given
- Accept I(t) = I(G) + (I(ES) + I(NPS) + I(ML)

Then live with g(GDP) = I/(t) / Constant

ENVIRONMENTAL CRISIS

CONVENTIONAL ENERGY PRODUCTION IS ASSOCIATED WITH LOCAL AND GLOBAL IMPACTS THAT DEGRADE THE ENVIRONMENT

ENVIRONMENTAL CRISIS

- HYDROELECTRIC PROJECTS --> DISPLACE PEOPLE AND SUBMERGE FORESTS
- THERMAL POWER PROJECTS --->

EQUITY CRISIS

- ELECTRICITY SYSTEMS EXPANDED IN THE NAME OF DEVELOPMENT
- BUT, THEY BYPASS THE POOR
- ONLY 51% OF THE 1988

ORIGIN OF THE CRISES

CONVENTIONAL ENERGY PARADIGM OR MIND-SET DETERMINING THE THINKING OF VIRTUALLY ALL ENERGY DECISION-MAKERS AND PLANNERS

CONVENTIONAL PARADIGM FOR ENERGY PLANNING

DEVELOPMENT = GROWTH = ENERGY=

ELECTRICITY = CENTRALISED GENERATION

= GRID TRANSMISSION & DISTRIBUTION

SO-CALLED ENERGY-GDP CORRELATION

- EVERY ECONOMY CONSISTS OF A

  NUMBER OF ENERGY-UTILIZING

  ACTIVITIES
- EACH ACTIVITY INVOLVES AN

TOTAL ENERGY DEMAND E =

SUM OF ENERGY DEMANDS

OF VARIOUS ACTIVITIES

E = SUM Ej = SUM [Cj x Ij]

= SUM [fj(GDP) x Ij]

= [SUM fj x Ij] x GDP

HENCE, ENERGY DEMAND

IS PROPORTIONAL TO GDP

IF AND ONLY IF
THE TERM (SUM fj x Ij)
IS A CONSTANT

SO-CALLED ENERGY-GDP

CORRELATION IS VALID
ONLY DURING PERIODS
WHEN THERE IS NO CHANGE
IN THE ECONOMY'S
(1) ENERGY EFFICIENCY AND
(2) STRUCTURE

E-GDP PROPORTIONALITY

BREAKS DOWN W.CHANGES

- IN ENERGY INTENSITY DUE TO

  EFFICIENCY IMPROVEMENTS, PROCESS

  CHANGES OR PRODUCT CHANGES

DECREASE OF [SUM fj x Ij]

- CAN OFFSET AN ICREASE IN GDP
- REDUCE THE COUPLING BETWEEN

  GDP AND ENERGY
- THERE CAN EVEN BE DECOUPLING

CONVENTIONAL APPROACH TO ENERGY

- is based on a Gowth-oriented Supply -Sided CONsumption-biased (GROSSCON) Paradigm
- magnitude of energy consumption is deemed to be the indicator of development

THE WAY OUT: THROUGH A NEW PARADIGM FOR ENERGY

- WHAT HUMAN BEINGS AND THEIR ACTIVITIES REQUIRE IS NOT ENERGY *PER SE* BUT THE WORK THAT ENERGY

INCREASING ENERGY SERVICES

- NOT ONLY BY INCREASING THE
  SUPPLY OF ENERGY TO THE
  DEVICES(LAMPS, HEATERS, MOTORS
  VEHICLES, ETC)
- BUT ALSO BY INCREASING

SWITCH FROM KEROSENE

WICK LAMPS TO 20 W
FLURESCENT TUBELIGHTS

- ILLUMINATION INCREASES ABOUT
  19 TIMES THROUGH UTILIZATION OF

THIS DRAMATIC

ACHIEVEMENT IS THE
RESULT OF THE 420 TIMES
GREATER EFFICIENCY OF 20
W FLUORESCENT
TUBELIGHTS COMPARED TO
KEROSENE WICK LAMPS

BEFORE SWITCH TO

FLUORESCENT TUBELIGHTS,
HOUSEHOLDS CONSUMED
FAR MORE ENERGY BUT
ENJOYED FAR LESS LIGHTING
ENERGY SERVICE

THIS ADVANCE IN THE

PROCESS OF
DEVELOPMENT HAS BEEN
ACHIEVED ALONG WITH A
DECREASE IN THE
CONSUMPTION OF
ENERGY

GENERAL PARADOX OF

ENERGY IN DEVELOPING
COUNTRIES:
HIGH LEVELS OF ENERGY
CONSUMPTION WITH LOW
LEVELS OF ENERGY
SERVICES

IT IS THE LEVEL OF ENERGY

SERVICES -- AND NOT THE MAGNITUDE OF ENERGY CONSUMPTION -- THAT MUST BE TAKEN AS THE INDICATOR OF DEVELOPMENT

REDUCTION OF INVESTMENT

(WITH E(0) AND g(GDP) AS GIVEN)

- DECREASE a, THE COUPLING FACTOR,

  THRU EFFICIENCY IMPROVEMENTS

  AND/OR

OPTION#3--> IRP APPROACH

- E(t-1) GIVEN
- Minimum growth rate of GDP given
- Scrutinize { a.UCOP} in order to decrease

  a and/or decrease UCOP

To improve the level of energy services

by increasing energy consumption through an

increase of energy supplies (CENTs or

DECENTs)

and/or

LEAST - COST MIX

- INCLUDE SAVING OPTIONS
- DON'T RESTRICT GENERATION OPTIONS TO CENTRALIZED OPTIONS AND FOSSIL-FUEL/NON-RENEWABLE OPTIONS

N.B.

COSTS OF ELECTRICITY FROM SOURCES SUCH AS BIOMASS, WIND, SMALL HYDEL, PHOTOVOLTAICS, ETC., ARE FALLING RAPIDLY

THREE OPTIONS FOR INDIA

- "COPYING THE WORST" (EARLY INDUSTRIALIZERS WITH THE HIGHEST MAXIMA)
- "COPYING THE BEST" (LATEST

THE NEW CHALLENGE

- REDUCING THE COUPLING BETWEEN GDP GROWTH AND ENERGY CONSUMPTION
- BY IDENTIFYING & IMPLEMENTING A LEAST-COST MIX OF GENERATION & SAVING OPTIONS FOR INCREASING ENERGY SERVICES.

POWER SECTOR MUST

- ACQUIRE A HUMAN FACE
- BECOME AN INSTRUMENT OF SUBDEVELOPMENT
- ASK: ELECTRICITY FOR WHOM? WHAT? HOW (EFFICIENTLY)?
- EMPHASIZE ENERGY SERVICES FOR THE POOR

POWER SECTOR MUST

ACQUIRE A DEVELOPMENT FOCUS AND AN END-USE ORIENTATION DIRECTED TOWARDS ENERGY SERVICES.

WHAT IS REQUIRED

- A NEW PARADIGM FOR ENERGY
- A DEvelopment-Focussed END-use-
  oriented Service-directed or
  DEFENDUS paradigm to rescue us