KARNATAKA'S POWER SECTOR: IMPORTANT POLICY MILESTONES

- (1) DECISION TO DE-METER IPS TO MEET METER SHORTAGE
- (2) TARIFF REVISION PROCESS RESULTING IN DIFFERENTIAL PRICING AND CROSS-SUBSIDY
- (a) ELECTRICITY TO IPS ON A HP BASIS (1981)
- (b) VIRTUALLY "FREE" ELECTRICITY (1990)

KARNATAKA'S POWER SECTOR: IMPORTANT POLICY MILESTONES

- (3) DECISION TO CAP SUPPLIES TO POWER-INTENSIVE HT USERS AND TO SHIFT KEB'S EMPHASIS TO ENERGIZATION OF IPS (1983-84)

ENERGIZATION OF IPS EQUATED TO GRID ELECTRIFICATION

- GRID ELECTRIFICATION --> ONLY ONE OPTTION FOR IPS
- MORE SUSTAINABLE OPTION --> ENERGIZATION VIA DECENTRALIZED SOURCES (WOOD GASIFIERS AND PV MODULES)

ENERGIZATION VS GRID ELECTRIFICATION

- UNFORTUNATELY, TIME WAS NOT RIPE FOR DISTINCTION BETWEEN ENERGIZATION AND GRID ELECTRIFICATION
- WOOD GASIFIERS BECAME PROVEN TECHNOLOGY ONLY A DECADE LATER
- PV MODULES WERE STILL TOO PROHIBITIVELY EXPENSIVE

(1983-84) ANTI-HT & PRO-IPS DECISION

- ADVANCED INTERESTS OF IPS-OWNING FARMERS AT EXPENSE OF LARGE INDUSTRY
- "CONSOLIDATING & STRENGTHENING POLITICAL POWER THROUGH ELECTRICAL POWER"

KARNATAKA'S POWER SECTOR: IMPORTANT TECHNICAL MILESTONES

- (1) ENDING OF COMPLETELY HYDRO SYSTEM IN 1985
- (2) RAICHUR CAME ON LINE WITH HIGHER COST ELECTRICITY
- (RELATIVE TO CHEAP HISTORICAL COSTS OF HYDRO POWER)
- THUS KEB'S AVERAGE COST ENTERED NEW REGIME

KARNATAKA'S POWER SECTOR: IMPORTANT TECHNICAL MILESTONES

- (3) INTRODUCTION OF DIESEL GENERATION --> STILL HIGHER COST-REGIME FOR KEB
- (4) WHAT WILL HAPPEN WHEN IPPs (COGENTRIX) ENTER PICTURE WITH STILL HIGHER COSTS?

SOURCE-MIX MILESTONES WITH PERFORMANCE IMPLICATIONS

- MU/MW AND PLF OF SYSTEM HAVE DECLINED
- COMPLICATIONS IN LOAD DISPATCH PROBLEM -- WHICH SOURCE TO USE FOR MATCHING DAILY/ANNUAL LOAD CURVE
- COMPUTERIZED SYSTEM FOR SUPPLY MANAGEMENT HAS NOT YET EVOLVED

SITUATION IS GOING TO GET EVEN MORE COMPLICATED

- WHEN IPPs COME INTO PICTURE AND ARE REWARDED IN PROPORTION TO PLF ABOVE CERTAIN MINIMUM PLF
- THEN, CHEAPER BASE-LOAD THERMAL PLANTS OF RAICHUR MAY HAVE TO BE BACKED DOWN

SITUATION IS GOING TO GET EVEN MORE COMPLICATED

- AND STILL CHEAPER PEAKING HYDRO PLANTS MAY HAVE TO BE IDLED
- IN ORDER TO PROVIDE PROFITS FOR EXPENSIVE COUNTER-GUARANTEED INDEPENDENT POWER PLANTS

WHO ARE THE WINNERS?

- (1) FARMERS OWNING IPS
- (2) POLITICIANS/POLITICAL PARTIES CHAMPIONING INTERESTS OF IPS-OWNING FARMERS
- (3) SOME SECTIONS OF KEB (GRID CONNECTIONS FOR IPS COULD BECOME LUCRATIVE)

WHO ARE THE WINNERS?

- (4) MANUFACTURERS & SUPPLIERS OF CAPTIVE GENSETS, UPSs, BACK-UP SUPPLIES, VOLTAGE STABILIZERS, ETC.
- (5) KARNATAKA'S POWER SECTOR (IPS PACKAGE USED TO HIDE TECHNICAL & COMMERCIAL SHORTCOMINGS (E.G., THEFT)

IMPLICATIONS OF "SHORTAGES" AND "CRISES"

- FERTILE GROUND FOR MALPRACTICES IN PROVISION OF CONNECTIONS, CONNECTED LOAD AND (LEGAL AND ILLEGAL) ELECTRICITY CONSUMPTION)
- THEY "JUSTIFY" INVITATIONS TO PRIVATE POWER WITH ALL ASSOCIATED BENEFITS INCLUDING JUNKETS

IMPLICATIONS OF "SHORTAGES" AND "CRISES"

- UNSUBSTANTIATED "CONSPIRACY THEORY" --> LOAD-SHEDDING (EVEN THOUGH SUPPLY CAN MANAGE DEMAND) JUST TO CREATE A FAVOURABLE CASE FOR MEGA-PROJECTS

IS THERE A FARMER-POLITICIAN NEXUS RE: ELECTRICITY

- SOME POLITICIANS/POLITICAL PARTIES
- (a) HAVE PLEASED IPS-OWNING FARMERS & OBTAINED SUPPORT OF VOTE-BANKS UNDER AEGIS OF THESE FARMERS
- (b) HAVE EVEN ENSURED THAT GOVERNMENT IS NOT FULLY COMPENSATING SUBSIDY TO IPS OWNERS

GOVERNMENT HAS PROMOTED INTERESTS OF IPS-OWNERS

- GOVT HAS ARRANGED THROUGH TARIFF REVISIONS TO GET SOME USERS (HT, LT, COMMERCIAL AND TO A SMALL EXTENT AEH USERS) TO PAY THE BILL FOR "FREE" ELECTRICITY THAT IT HAS ORDERED FOR IPS

WHO ARE THE LOSERS?

- (1) HT, LT AND COMMERCIAL CONSUMERS --> CROSS-SUBSIDIZE "FREE RIDERS" AND/OR SUFFER BECAUSE THEIR DEMAND CANNOT BE MET
- THEY ARE DIRECT LOSERS WITH HIGH TARIFFS AND SEVERE ENERGY & POWER CUTS FORCING THEM TO EITHER CUT PRODUCTION/SERVICES OR INSTALL CAPTIVE POWER GENERATION.

WHO ARE THE LOSERS?

- (2) AEH USERS PROVIDE A MINOR AMOUNT OF CROSS-SUBSIDY
- (3) NON-AEH HOUSEHOLDS MAY RECEIVE A VERY SMALL AMOUNT OF CROSS-SUBSIDY, BUT ALL HOUSEHOLDS HAVE NOT BEEN ELECTRIFIED.

NON-ELECTRIFICATION OF POOR HOUSEHOLDS

- ROUGHLY HALF THE POPULATION OF THE STATE (IN 1990) DID NOT BENEFIT DIRECTLY FROM ELECTRICITY.
- THUS, POWER SECTOR HAS BEEN EXPANDED IN THE NAME OF THE POOR, BUT IT HAS BYPASSED THE POOR
- OBVIOUSLY, UNELECTRIFIED HOUSEHOLDS LACK A POLITICAL LOBBY AND LEADERS TO PRESS FOR ELECTRIFICATION OF THEIR HOMES.

WHAT IS A CRISIS IN THE POWER SECTOR?

- A "NO-SOLUTION REGIME"
- A SITUATION IN WHICH
- (a) NO IMMEDIATE MEASURES WILL REMEDY THE SITUATION AND
- (b) NO LONG-TERM PROJECTS WILL HAVE ANY IMMEDIATE IMPACT

GOOD NEWS

- KARNATAKA POWER SECTOR WAS NOT IN A CRISIS IN 1994-95
- AND PERHAPS EVEN NOW
- A NUMBER OF IMMEDIATE MEASURES CAN REMEDY THE SITUATION

SOME IMMEDIATE REMEDIES

- (A) REDUCE OUTFLOWS ON IPS --> DEBTS --> T & D --> ARREARS
- (B) INCREASE INFLOWS ON GRANTS FROM GOVERNMENT --> WHEELING

REDUCTION OF OUTFLOWS ON IPS

- REQUIRES TARIFF REVISION.
- FARMERS MAY PREFER PRICED RELIABLE ELECTRICITY TO "FREE" UNRELIABLE ELECTRICITY
- BUT CREDIBILITY PROBLEM: FARMERS ARE UNLIKELY TO BELIEVE THAT KEB CAN EVER DELIVER RELIABLE ELECTRICITY

REDUCTION OF OUTFLOWS ON IPS

- DEMONSTRATION PROJECTS FOLLOWED BY PILOT EXPERIMENTS
- TO PROVE THAT PRICED AND METERED RELIABLE ELECTRICITY BENEFITS FARMERS MORE THAN UNRELIABLE "FREE" UNMETERED ELECTRICITY

REVISION OF TARIFFS

- PRESENT TARIFF COMMITTEE
  - (A) IS SUBORDINATE TO GOVERNMENT
  - (B) DOES NOT HOLD PUBLIC HEARINGS
  - (C) PROCEDURES ARE NOT OPEN AND TRANSPARENT

REVISION OF TARIFFS

- REQUIRED A DIFFERENT TYPE OF TARIFF COMMITTEE IS NECESSARY WITH
- (a) REPRESENTATION OF VARIOUS USER GROUPS -- HT, LT, COMMERCIAL, DOMESTIC, ETC.
- (b) INDEPENDENCE FROM GOVERNMENT

REDUCTION OF OUTFLOWS ON DEBTS

- REQUIRES A HIGHER EQUITY-DEBT RATIO
- GOVERNMENT DECISION TO CAPITALIZE PART OF THE KEB'S DEBT

REDUCTION OF COMMERCIAL T & D LOSSES (THEFT)

- (1) UNWISE TO LEGITIMIZE DERELICTION OF DUTY AND ROBBERY OF PUBLIC REVENUES
- (2) ESSENTIAL TO CREATE A FAVOURABLE ENVIRONMENT
- (3) INSTITUTIONAL CHANGES MAY BE REQUIRED

A FAVOURABLE ENVIRONMENT

- IN WHICH TYPICAL EMPLOYEE OF KEB TENDS TO BE HONEST
- (1) A COMPONENT OF REWARD FOR HONESTY (INCENTIVES FOR BILLING AND COLLECTION WITH AN APPROPRIATE COMMISSION)
- (2) SEVERE PUNISHMENT FOR DISHONESTY BASED PERHAPS ON CRIMINAL PROCEEDINGS.

POSSIBLE INSTITUTIONAL CHANGES

- EMPLOYEE-OWNED DISTRIBUTION COMPANIES
- DISTRIBUTION COOPERATIVES INVOLVING CONSUMERS
- PRIVATE-SECTOR DISTRIBUTION COMPANIES
- (PERHAPS IN THAT ORDER)

REDUCTION OF ARREARS

- MANY OF OUTSTANDINGS ARE FROM MAJOR PUBLIC-SECTOR UNDERTAKINGS DEBTS OF KEB ARE TO OTHER PUBLIC-SECTOR UNDERTAKINGS LIKE KPCL
- HENCE, GOVERNMENT-MODERATED CONFERENCE OF POWER-SECTOR DEBTORS AND CREDITORS

INCREASE OF INFLOWS ON GRANTS

- GOVERNMENT MUST BE SCRUPULOUS ABOUT REIMBURSING LOSSES THAT IT INITIATES THROUGH ITS TARIFF INSTRUCTIONS
- FINANCIAL DISCIPLINE ON THE PART OF GOVERNMENT.

INCREASE OF WHEELING REVENUES

- POWER CAN BE TAPPED FROM CAPACITY OF CAPTIVE GENERATION SETS NOW BEING USED AT A LOW PLF
- PUBLIC UTILITIES REGULATORY POLICY ACT (PURPA) IN USA HAS MADE IT MANDATORY FOR UTILITY TO BUY-BACK DECENTRALIZED ELECTRICITY GENERATION AT AVOIDED COSTS.

HOUSEHOLD-LEVEL COGENERATION

- A HOUSEHOLD CAN RUN A SMALL 7.5 HP ENGINE-GENSET
- USE THE WASTE HEAT FOR HEATING THE HOME IN COLD WEATHER
- MAKE THE GENERATED ELECTRICITY RUN THE HOUSE METER BACKWARDS
- ALL WITH THE APPROVAL AND BLESSING OF THE UTILITY.

INSTITUTIONAL MEASURES TO RESCUE KEB

- INCLUDE FOLLOWING ELEMENTS BEING URGED BY THE WORLD BANK
- (1) AN INDEPENDENT AUTONOMOUS REGULATORY AGENCY
- (2) TARIFF REVISION SO THAT THE NET REVENUES ARE POSITIVE
- (3) CORPORATIZATION SO THAT KEB RUNS ON COMMERCIAL LINES
- (4) INVOLVEMENT OF INDEPENDENT PRIVATE POWER GENERATORS

IS TOTAL RESTRUCTURING PACKAGE OF WB ESSENTIAL FOR SEB REVIVAL?

- NO! REVIVAL DOES NOT APPEAR TO REQUIRE
- (1) REMOVAL OF ALL SUBSIDIES TO USERS
- (2) PRIVATIZATION OF ALL GENERATION
- (3) PRIVATIZATION OF T & D
- (4) LEAVING UTILITIES TO THE MARKET WITHOUT IMPOSING ON THEM OBLIGATION TO SERVE THE COMMUNITY

DEMAND-SIDE MEASURES

- (1) PEAK SHAVING
- (2) EFFICIENT LIGHTING
- (3) SOLAR WATER HEATERS
- (4) EFFICIENT IPS
- (5) EFFICIENT MOTORS

DAILY PEAK SHAVING

- FLAT DAILY DEMAND CURVE WITHOUT PEAKS IS IDEAL
- HENCE, STEPS ARE REQUIRED TO MOVE TOWARDS SUCH A CURVE
- TIME-OF-THE-DAY METERING
- DIFFERENTIAL TARIFFS (HIGHER ELECTRICITY PRICES TO DISCOURAGE UTILIZATION OF ELECTRICITY DURING PEAK HOURS)

SEASONAL PEAK SHAVING

- SEASON-OF-YEAR ELECTRICITY PRICING (LOWER PRICES IN THE LOW-DEMAND MONTHS JUST AFTER THE SOUTH-WEST MONSOON, AND HIGHER PRICES IN THE HIGH-DEMAND PRE-MONSOON MONTHS)

EFFICIENT LIGHTING

- REDUCING THE EVENING PEAK ARISING FROM THE LIGHTING LOAD
- NEW LIGHTING DEVICES (E.G., COMPACT FLUORESCENT LAMPS)

EFFICIENT LIGHTING

- CFLs HAVE HIGHER INITIAL COSTS, BUT CONSUME ONLY ABOUT 25% OF THE ELECTRICITY USED BY CONVENTIONAL LAMPS, AND ALSO LAST MUCH LONGER.
- CFLs ARE NOW BEING MANUFACTURED IN INDIA BY A NUMBER OF FIRMS.

SOLAR WATER HEATERS

- TO REDUCE THE MORNING PEAK DUE TO WATER HEATING FOR BATHING SWH IN HOMES & APARTMENT BUILDINGS, AS WELL AS IN HOSPITALS, HOTELS, RESTAURANTS, CANTEENS, AND OTHER ESTABLISHMENTS
- A 100 LITRE/DAY CAPACITY SWH CAN SAVE ABOUT 1,000 UNITS/YEAR

SOLAR WATER HEATERS

- IF 250,000 HOUSES/APARTMENTS ARE FITTED WITH 100 LITRE/DAY SWH, SAVING IN PEAK CAPACITY WOULD BE ABOUT 270 MW
- (C.F., ONE KAIGA-TYPE NUCLEAR REACTOR IS 235 MW).

EFFICIENT IPS

- FRICTIONLESS FOOT-VALVES & HDPE-PIPING INSTEAD OF GI DELIVERY PIPES CAN SAVE ABOUT 35% OF ENERGY
- IF 250,000 IPS ARE FITTED WITH HDPE PIPES, RESULTANT SAVING WILL BE ABOUT 780 MUS ANNUALLY (CORRESPONDING TO ABOUT 320 MW).

EFFICIENT MOTORS

- INDUSTRY ACCOUNTS FOR ABOUT 30% OF THE CONSUMPTION
- ABOUT 70% OF THE ENERGY USED IN INDUSTRY GOES FOR DRIVES, PUMPS, COMPRESSORS, ETC.,
- ABOUT 25-35% OF THE ENERGY CAN BE SAVED WITH EFFICIENT MOTORS
- IF 10% OF THE MOTORS ARE IMPROVED, SAVING CAN BE AS MUCH AS ABOUT 410 MUS (ABOUT 110 MW)

SUPPLY-SIDE MEASURES

- (1) ENVIRONMENTALLY SOUND HYDROELECTRIC PROJECTS
- (2) REDUCING T & D TECHNICAL LOSSES
- (3) CAPTIVE GENERATION
- (4) SUGAR COGENERATION
- (5) COGENERATION IN OTHER INDUSTRIES

SUPPLY-SIDE MEASURES

- (6) BIOMASS-BASED RURAL ENERGY & WATER SUPPLY UTILITIES (REWSUS)
- (7) SMALL HYDEL
- (8) WIND
- (9) PHOTOVOLTAICS

ENVIRONMENTALLY SOUND HYDROELECTRIC PROJECTS

- STILL CONSIDERABLE HYDROELECTRIC POTENTIAL LEFT IN STATE
- OVER 1,600 MW CAN BE OBTAINED FROM "ENVIRONMENTALLY BENIGN" PROJECTS

REDUCING T & D TECHNICAL LOSSES

- CONSIDERABLE REDUCTION POSSIBLE IN TECHNICAL T & D LOSSES
  - (a) STRAIGHTENING OF OTHERWISE HIGGLEDY-PIGGLEDY LINES
  - (b) MINIMIZING OF THE LOW-TENSION LINES, ETC.

CAPTIVE GENERATION

- WITH SUITABLE INCENTIVES (WHEELING), A LARGE FRACTION OF INVESTMENT CAN BE HARNESSED BY GRID
- IF ONLY 25% OF THE 1,100 MW CAPTIVE GENERATION INSTALLED CAPACITY IS AVAILABLE TO THE GRID --> 270 MW.

SUGAR COGENERATION

- IF BAGASSE LEFT AFTER EXTRACTING THE SUGARCANE JUICE IS BURNED IN HIGH-PRESSURE BOILERS, SURPLUS ELECTRICITY CAN BE PRODUCED. ROUGHLY ABOUT 10 MW OF SURPLUS ELECTRICITY CAN BE PRODUCED PER SUGAR FACTORY
- HENCE, ABOUT 200 MW IN KARNATAKA
- KEB SHOULD OFFER WHEELING ARRANGEMENTS AND LONG-TERM GUARANTEES TO OFF-TAKE THE SURPLUS POWER.

BIOMASS-BASED RURAL ENERGY AND WATER SUPPLY UTILITIES (REWSUs)

- KARNATAKA HAS PIONEERED IN DEMONSTRATING BIOMASS-BASED RURAL ENERGY AND WATER SUPPLY UTILITIES (REWSUS)
- DECENTRALIZED ELECTRICITY FOR LIGHTING & DOMESTIC WATER CAN RELIEVE GRID OF BURDEN OF SUPPLYING VILLAGES

BIOMASS-BASED RURAL ENERGY AND WATER SUPPLY UTILITIES (REWSUs)

- IN THE FUTURE, VILLAGES CAN USE FUTURISTIC BIOMASS-BASED ELECTRICITY-GENERATION TECHNOLOGIES (E.G., FUEL CELLS) TO EXPORT BASE-LOAD ELECTRICITY WITH GRID TRANSMISSION FROM VILLAGES TO CITIES

SMALL HYDEL

- THERE IS CONSIDERABLE POTENTIAL FOR SMALL HYDEL
- AS MUCH AS 200 MW IN KARNATAKA

WIND

- CONSIDERABLE SCOPE FOR WIND TURBINES
- ESTIMATES OF A POTENTIAL FOR 50 MW

PHOTOVOLTAICS

- ULTIMATELY, A NICHE FOR PHOTOVOLTAICS FOR IRRIGATION AND SYSTEMS FOR ISOLATED HOMESTEADS

EACH OF MEASURES MAY NOT CONTRIBUTE MORE THAN TENS OR HUNDREDS OF MEGAWATTS *BUT WHOLE PACKAGE CAN YIELD AS MUCH AS, IF NOT MORE THAN, ONE OF THE MEGA-PROJECTS BEING TALKED ABOUT*.

A NEW ENERGY PARADIGM

- SOLUTION FOR THE LONG TERM
- EMPHASIS MUST SHIFT FROM ENERGY CONSUMPTION TO ENERGY SERVICES AS AN INDEX OF DEVELOPMENT
- WHAT HUMAN BEINGS WANT IS NOT ENERGY PER SE (KWH, KILOCALORIES) BUT SERVICES THAT ENERGY PROVIDES (HEAT FOR COOKING, ILLUMINATION, WARMTH, MOBILITY, ETC.)

SHIFT FROM ENERGY CONSUMPTION TO ENERGY SERVICES

- NOT A SEMANTIC TRICK
- ENERGY SERVICES CAN BE INCREASED BY INCREASING ENERGY SUPPLIES AND ENERGY CONSUMPTION OR/AND BY IMPROVING EFFICIENCY
- WHICH IS A BETTER OPTION DEPENDS UPON THE RELATIVE COSTS, CONVENIENCE ETC.

IMPORTANCE OF DECENTS & EUEIs

- BUT DECENTS & EUEIs MUST BE BROUGHT INTO THE SCOPE OF INCREASING ENERGY SERVICES
- DISCUSSION MUST NOT BE RESTRICTED TO EXPANSION OF ENERGY SUPPLIES.

ENERGY "FUNDAMENTALISM"

- EXCLUSIVE FOCUS ON CONVENTIONAL/FUTURISTIC CENTRALIZED TECHNOLOGIES
- OR NON-CONVENTIONAL RENEWABLE/DECENTRALIZED TECHNOLOGIES
- OR ENERGY SAVING OPTIONS THROUGH EFFICIENCY IMPROVEMENTS

LEAST-COST PLANNING

- RATIONAL APPROACH IS TO IDENTIFY A LEAST-COST MIX OF THESE THREE POTENTIAL CONTRIBUTIONS TO THE EXPANSION OF ENERGY SERVICES

ROLE OF DECENTRALIZED RENEWABLES & END-USE EFFICIENCY IMPROVEMENTS

- DECENTS & EUEIs, SINGLY OR TOGETHER, CANNOT MEET ENERGY REQUIREMENTS
- CENTRALIZED SOURCES ARE ESSENTIAL
- BUT INCORPORATION OF DECENTS & EUEIs IN SUPPLY MIX REDUCES MAGNITUDE OF CENTRALIZED SOURCES REQUIRED

METHODOLOGY OF IDENTIFYING THIS LEAST-COST MIX

- BASED ON INTEGRATED RESOURCE PLANNING (IRP)
- REGULATORY COMMISSIONS HAD MADE IRP MANDATORY FOR 40 OUT OF 50 STATES IN THE USA

LEAST-COST ELECTRICITY PLANNING

- FIRST EXERCISE FOR KARNATAKA WAS DONE IN 1991.
- IEI IS REFINING THIS EXERCISE
- HOPEFULLY, THIS UPDATED EFFORT WILL NOT BE IGNORED AS THE FIRST ONE WAS.

ELECTRICITY IS CRUCIAL

- (1) A WAY OF IMPROVING THE QUALITY OF LIFE
- (2) AN INPUT TO INDUSTRIALIZATION AND AGRICULTURAL DEVELOPMENT
- (3) A PROVIDER OF SERVICES

THE POWER SECTOR IS TOO IMPORTANT

- TO BE LEFT TO ELECTRICAL ENGINEERS AND ELECTRICITY ORGANIZATIONS (KEB, KPC, ENERGY MINISTRY, ETC.)
- EDUCATION, SCIENCE AND TECHNOLOGY INSTITUTIONS, LEGISLATORS, MEDIA, PUBLIC INTEREST GROUPS, NGOS, USER GROUPS FROM INDUSTRY, COMMERCE, ETC., VILLAGE-LEVEL INSTITUTIONS MUST BE ALSO BE INVOLVED

THE MORAL:
LOOK AFTER THE PEOPLE AND ELECTRICITY WILL LOOK AFTER ITSELF!

WHAT SOURCE MIX FOR GENERATION?

- BEFORE 1985, 100% GENERATION FROM HYDRO
- AFTER 1985 --> RAICHUR THERMAL STATION
- AFTER 1993 --> DIESEL-BASED GENERATION ALSO
- HENCE, DECISION REQUIRED RE: HYDRO-THERMAL-DIESEL MIX

A STRATEGY FOR GENERATION

- STRATEGY FOR SOURCE MIX SHOULD BE FORMULATED:
  - CLEARLY AND TRANSPARENTLY
  - SUBJECTED TO PEER REVIEW
  - AND PREFERABLY COMPUTERIZED.
- DOES KARNATAKA HAVE A STRATEGY DOCUMENT?

KARNATAKA'S HYDEL RESERVOIRS

- RAIN-FED; NOT CONTINUOUSLY REPLENISHED BY PERENNIAL RIVERS
- INFLOW FROM SW MONSOON OCCURS IN A FEW MONTHS
- ONCE MONSOON IS OVER, NO POSSIBILITY OF FURTHER REPLENISHMENT UNTIL NEXT SW MONSOON
- HENCE, KARNATAKA'S HYDEL --> RENEWABLE RESOURCE ONLY ON A YEAR TO YEAR BASIS

HYDEL IS NON-RENEWABLE DEPLETABLE RESOURCE WITHIN ANY YEAR

- SO, WATER IN RESERVOIR HAS A COST BASED ON ELECTRICITY GENERATION FORGONE BY DISCHARGING WATER THROUGH TURBINES
- THUS, WATER IN RESERVOIR IS LIKE COAL FOR THERMAL POWER PLANTS

DIFFERENCES BETWEEN HYDEL & THERMAL POWER PLANTS

- (1) IF COAL-MINES & RAILWAYS COOPERATE, COAL SUPPLIES CAN BE PROCURED AT ANY TIME
- BUT, "PROCUREMENT" OF MONSOON WATER IS POSSIBLE ONLY ANNUALLY

DIFFERENCES BETWEEN HYDEL & THERMAL POWER PLANTS

- (2) HYDEL STATIONS CAN BE TURNED ON/OFF TO A GREATER EXTENT AND MORE OFTEN
- BUT COAL-BASED THERMAL PLANTS CANNOT BE TURNED DOWN WITH IMPUNITY
- HENCE, COAL-BASED THERMAL STATIONS --> BASE LOADS
- HYDRO STATIONS --> PEAK LOADS

REQUIRED --> AN INTEGRATED STRATEGY

- (1) MINIMIZING HYDRO DURING LOW-DEMAND MONTHS JUST AFTER SW MONSOON AND MAXIMIZING IT DURING HIGH-DEMAND PRE-MONSOON MONTHS
- POSSIBLE INSTRUMENT --> SEASON-OF-YEAR ELECTRICITY PRICING

REQUIRED --> AN INTEGRATED STRATEGY

- (2) MEASURES TO REDUCE EVAPORATION IN RESERVOIRS
- (3) EXPLOITATION OF STATE' SHARE OF CENTRAL POWER
- (4) MAINTENANCE SCHEDULES & COAL INVENTORY CONTROL FOR RAICHUR

DECISION-MAKING RE: LOAD SHEDDING

- (1) SUPPLY SCENARIO UP TO NEXT MONSOON (JUNE 15) (+ 15 DAYS SAFETY MARGIN) BY ADDING ESTIMATES OF IMPORTS (FROM OTHER STATES & CENTRE) TO GENERATION EXPECTED FROM STATIONS IN STATE

DECISION-MAKING RE: LOAD SHEDDING

- (2) TOTAL SUPPLY DIVIDED BY NUMBER OF DAYS TO NEXT JULY 1 = AVERAGE DAILY AVAILABILITY IN MU/DAY
- (3) DAILY AVAILABILITY VS DAILY REQT. (IN MU/DAY) EXPECTED TO NEXT YEAR JULY 1 = PREVIOUS YEAR'S AV. DAILY CONSUMPTION + 10% ANNUAL ESCALATION