

The Challenge of Grid Rural Electrification: Experience of Successful Programs

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Well Known Problems To Be Solved

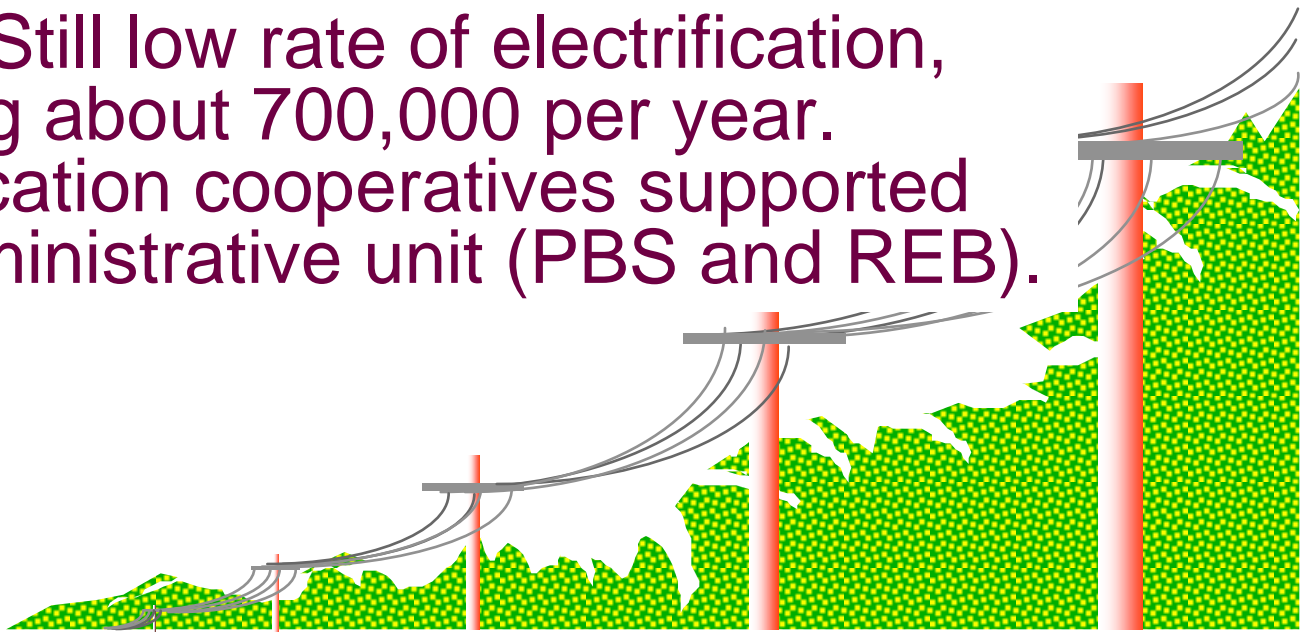
- Rural areas involve dispersed populations and difficult terrain: High capital costs and high operating costs
- Customers are often poor: Cannot afford full upfront lump sum connection costs; poor load profiles (evening)
- Political interference in operation of rural distribution company: Distorts electrification extension and interferes with pricing, bill collection, disconnection policy
- Main power companies have institutional difficulty meeting special demands of rural distribution
- Local community level problems often are not addressed (rights of way etc.)
- Power sector reform poses unique problems for rural electrification--potential for “skimming the cream” and leaving rural people without service

Countries in Study

Country	\$ GNP /Cap	Initial Program	Initial Coverage	Recent Coverage
Costa Rica	4,280	1961	15%	95%
Philippines	1,080	1969	8-19%	80%
Bangladesh	400	1978	8%	35%
Thailand	2,190	1973	20%	98+%
Mexico	6,230	1950	44%	98+%
Tunisia	1,990	1973	6%	95+%
China	1,100	1958	40-45%	95+%
Chile	4,390	1990	50%	90+%
Uganda	240	2005	LT 10%	NA

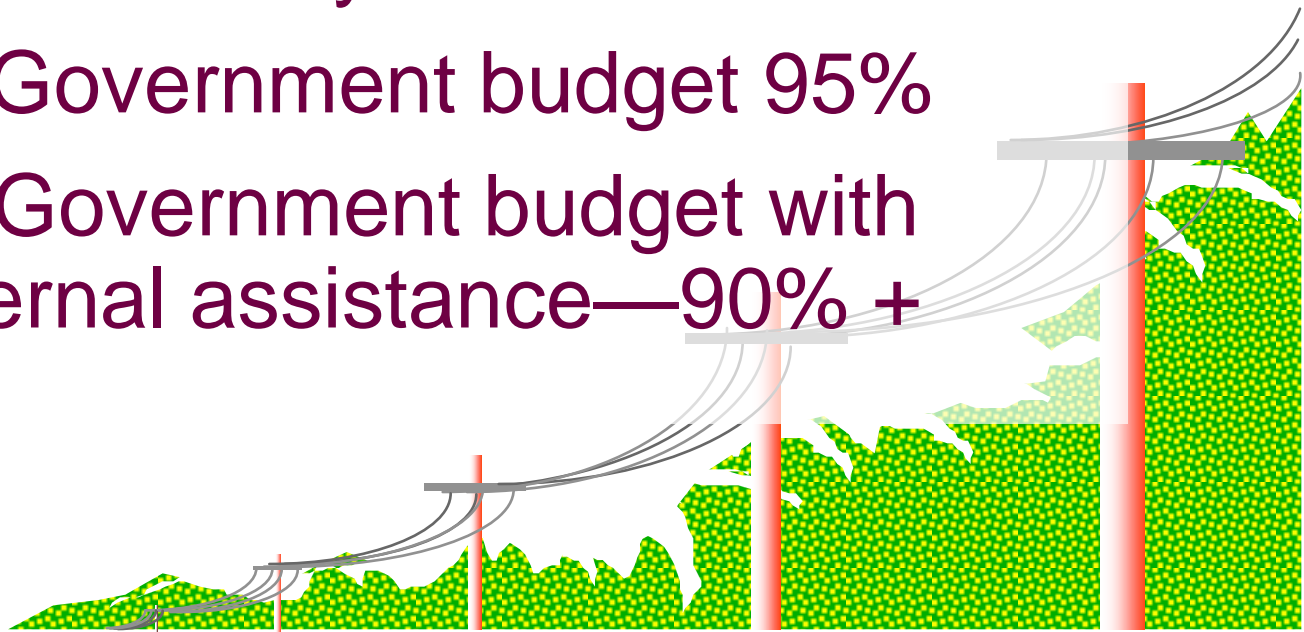
Successful Cases of RE-Cooperatives

- Costa Rica-- USAID/NRECA assistance; 90% of rural HH have electricity; Cooperatives developed when private sector would not enter.
- Philippines--Initial USAID assistance, then WB 65-70 %
- Bangladesh—Assistance from USAID and World Bank. Still low rate of electrification, but connecting about 700,000 per year. Rural electrification cooperatives supported by central administrative unit (PBS and REB).



Successful Cases of RE Public Companies

- Thailand--Government initiated with initial help from USAID. Bi-lateral, WB & government; 98+% of rural HH have electricity; National distribution company financially viable
- Mexico—Government budget 95%
- Tunisia—Government budget with some external assistance—90% +



Successful Cases of RE Decentralized Companies

- China—Decentralized Power Companies-- A local approach Reaches Over 800 million rural households or 90 % of the population; Currently want ways to reach remaining 60 million
- Chile—Private sector companies supplemented with poverty type subsidy fund reaches 75 percent of population and growing

Example: Thailand's PEA--Public

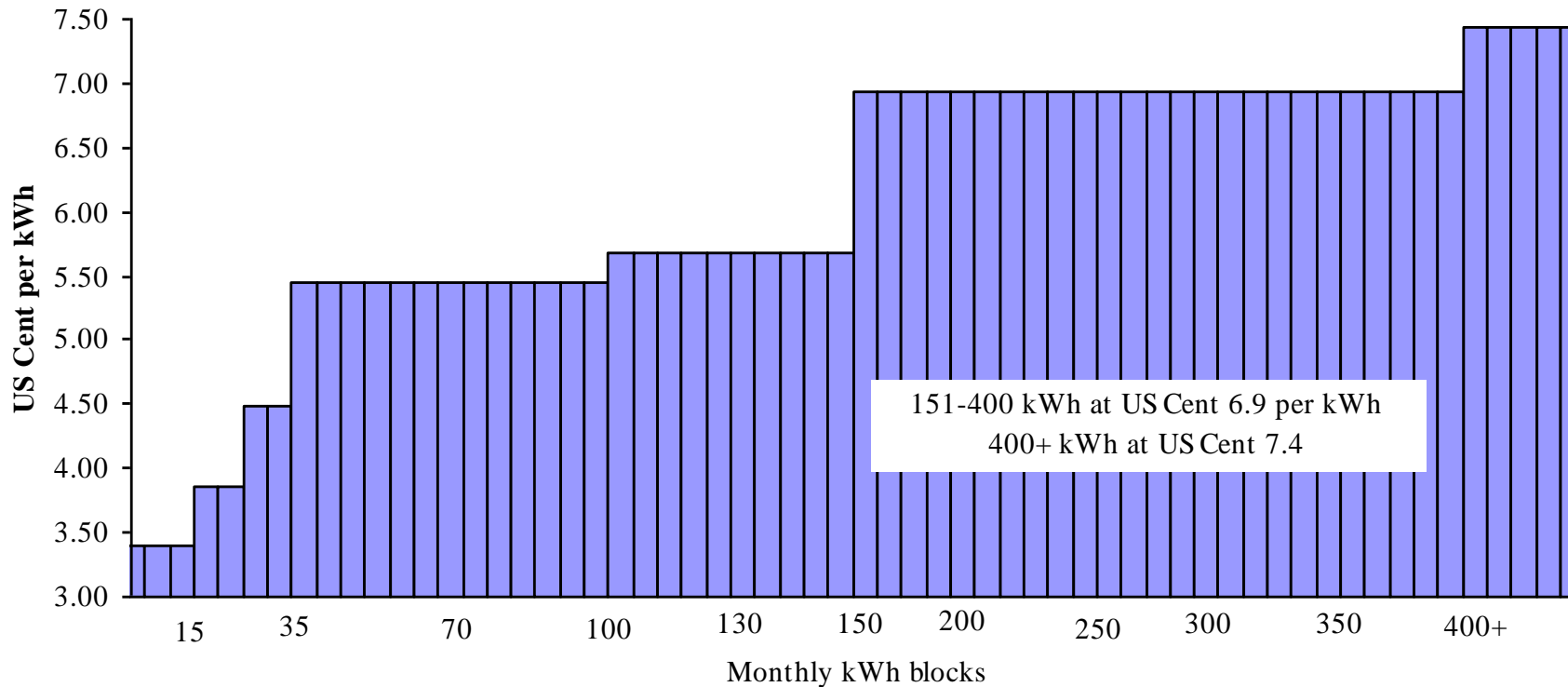
- Initial grants from USAID for feasibility study
- Soft loans from WB, Japan, Saudi Arabia, and several other donors.
- Lower bulk supply rate from EGAT (one-third lower), but all electricity companies are financially viable
- Contributions from rural communities such as, concession on rights of way, and social fund to be put on priority list for being connected to the grid system
- Pricing carefully base on the system load characteristics, national tariffs, and bills are collected



Example: Thailand's Rate Structure, Circa 2002 (Residential)

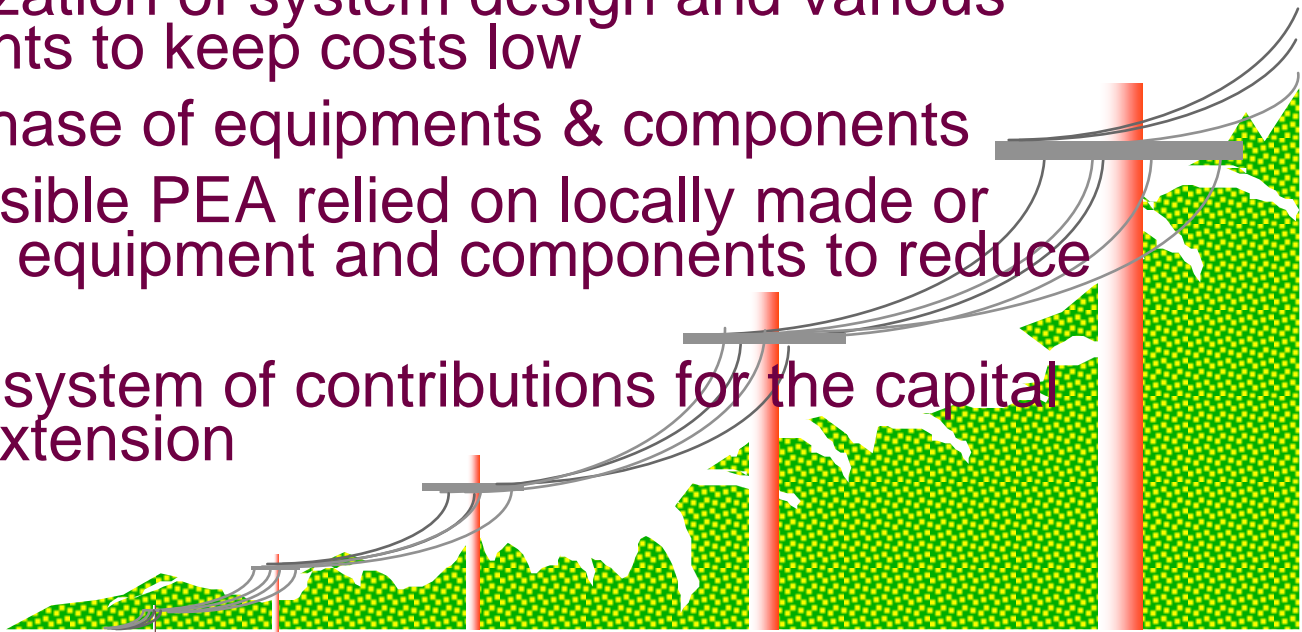
- Fixed charge of US\$0.20 cents for <150 KWh
- Fixed charge of US\$1.02 for >150 KWh

Exchange Rate 40 Baht = 1 US\$



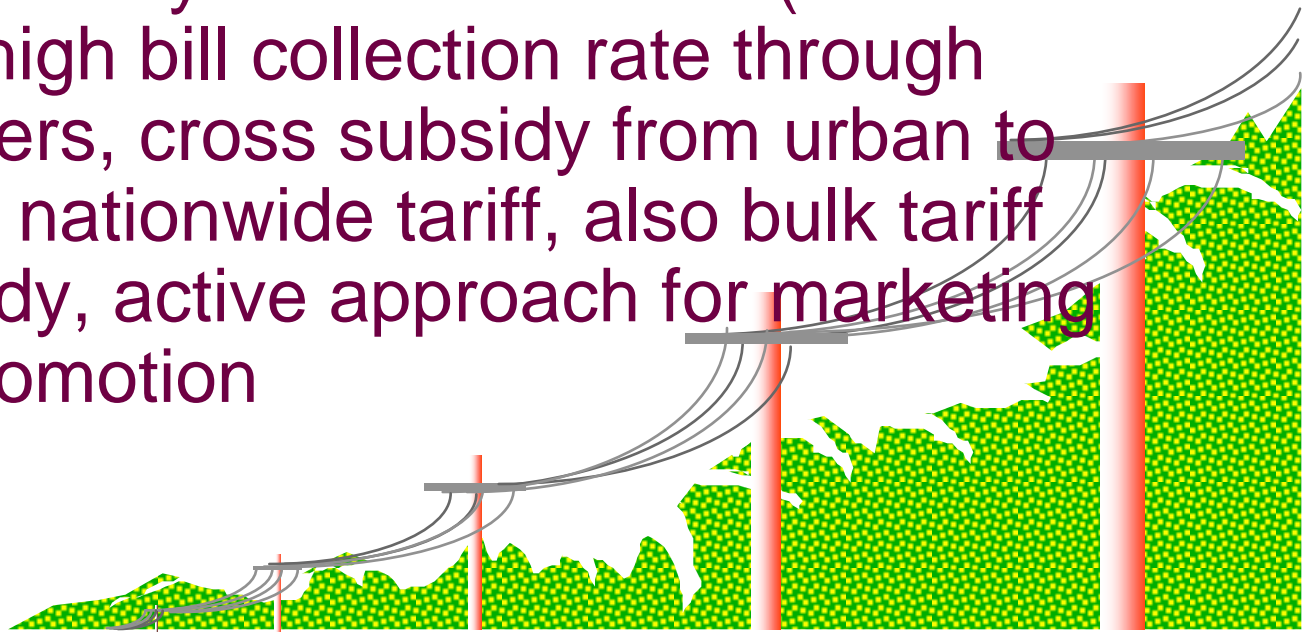
High Capital Cost of RE

- Costa Rica--Concessional borrowing, low cost system design (single phase), and consumer connection fees required
- Thailand—Blending concessional with commercial borrowing, cross-subsidies from bulk power rate, and
 - standardization of system design and various components to keep costs low
 - bulk purchase of equipments & components
 - when possible PEA relied on locally made or assemble equipment and components to reduce costs
 - voluntary system of contributions for the capital costs of extension



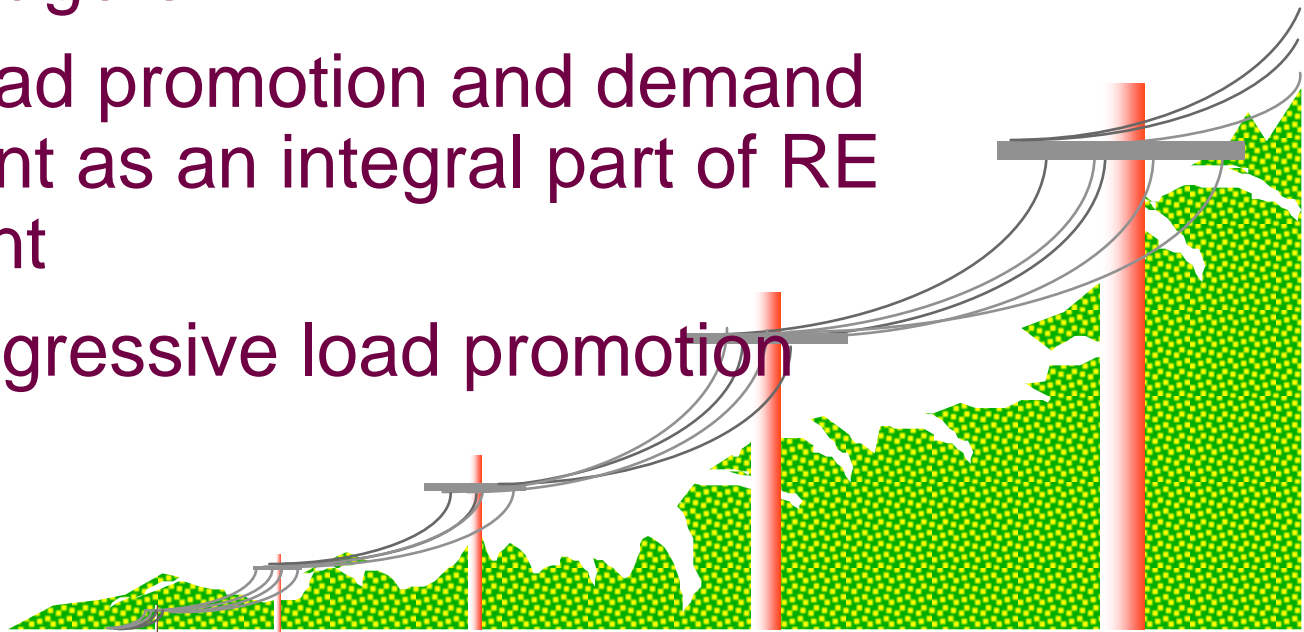
High Operating Cost of RE

- Philippines--actively minimize losses, high tariff, barangay bill collection (meter banks), urban areas are in service territory, cross bulk power subsidy for isolated island systems
- Thailand--actively minimize losses (Tech & non-tech), high bill collection rate through village leaders, cross subsidy from urban to rural due to nationwide tariff, also bulk tariff cross subsidy, active approach for marketing and load promotion



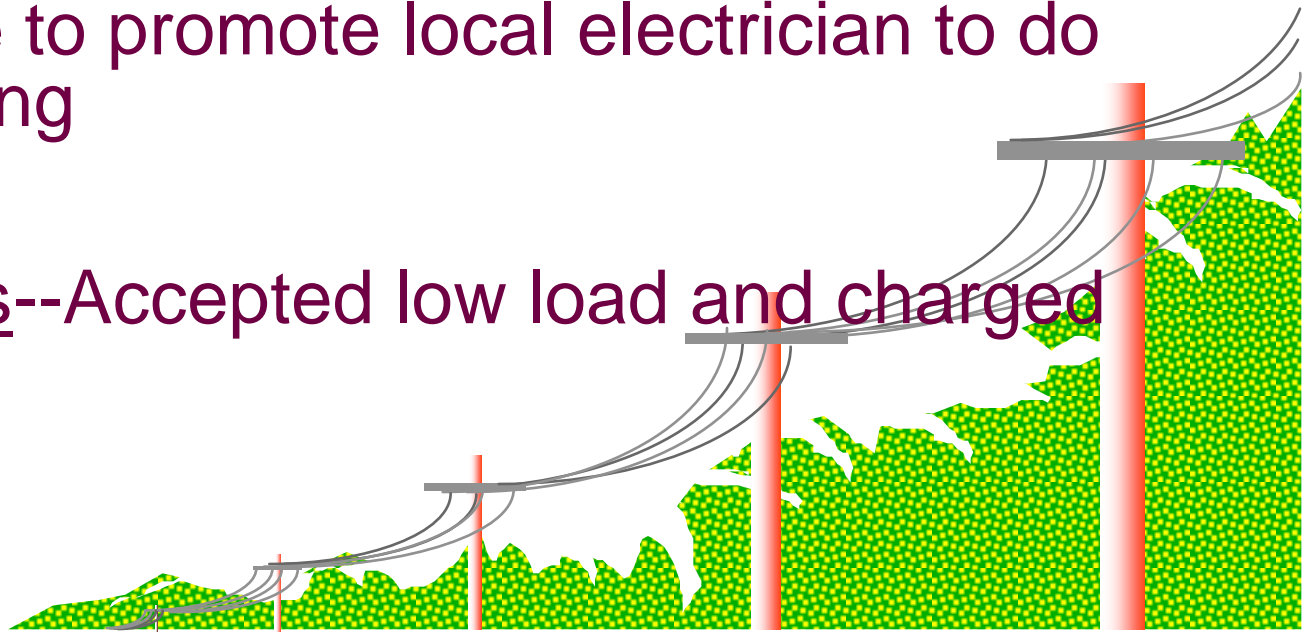
Thailand Practical Strategies to Overcome Operating Cost of RE

- Every year management set target to reduce technical and non-technical losses especially delinquent/non-payments and illegal connection
- PEA hired local/village leaders collect the bills from the villagers
- Integrate load promotion and demand management as an integral part of RE development
- Adopted aggressive load promotion strategies



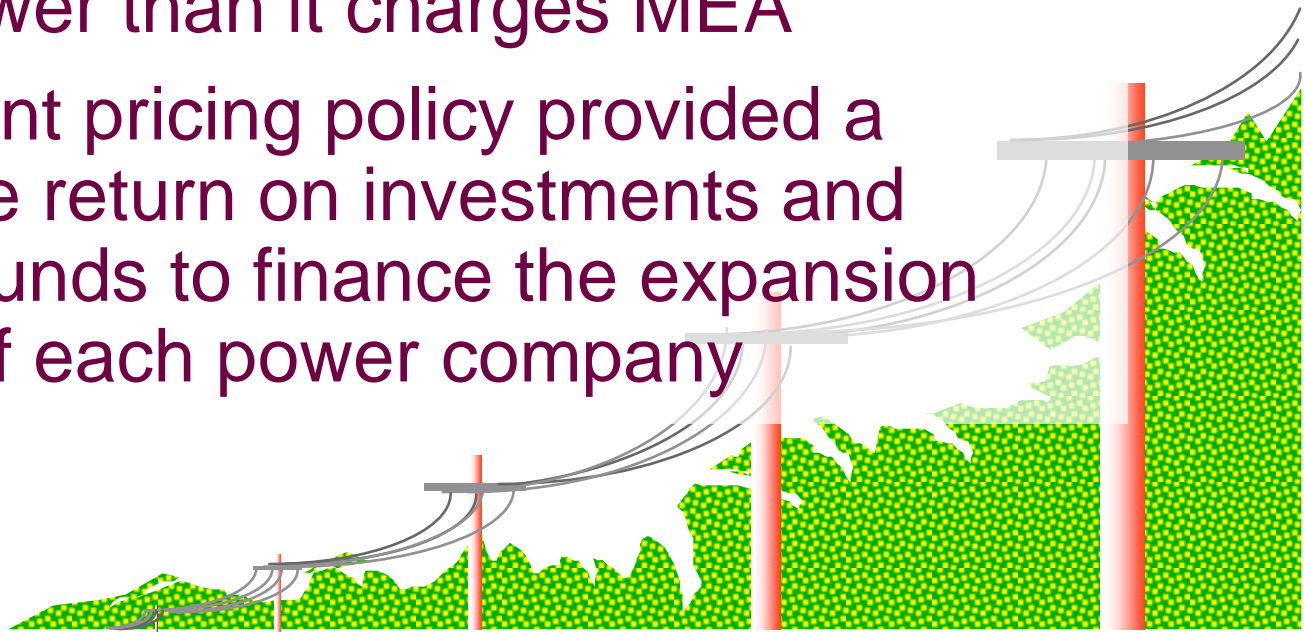
Customers Are Poor: Keep Upfront and Operating Costs Low

- Thailand--careful system extension planning prioritized high consumption areas, encouraged productive loads, load promotion, lifeline rates based on load profile (i.e. less than 35 kWh) low line drop and connection fees, provide technical assistance to promote local electrician to do house-wiring
- Philippines--Accepted low load and charged high tariff



Thailand System of Cross Subsidy

- Both PEA and MEA were required to use the same electricity retail rate structures, and electric retail tariff rate structures were designed to charge larger users at much higher rate than small users)
- EGAT was required to charge PEA at 30 percent lower than it charges MEA
- Government pricing policy provided a reasonable return on investments and sufficient funds to finance the expansion program of each power company



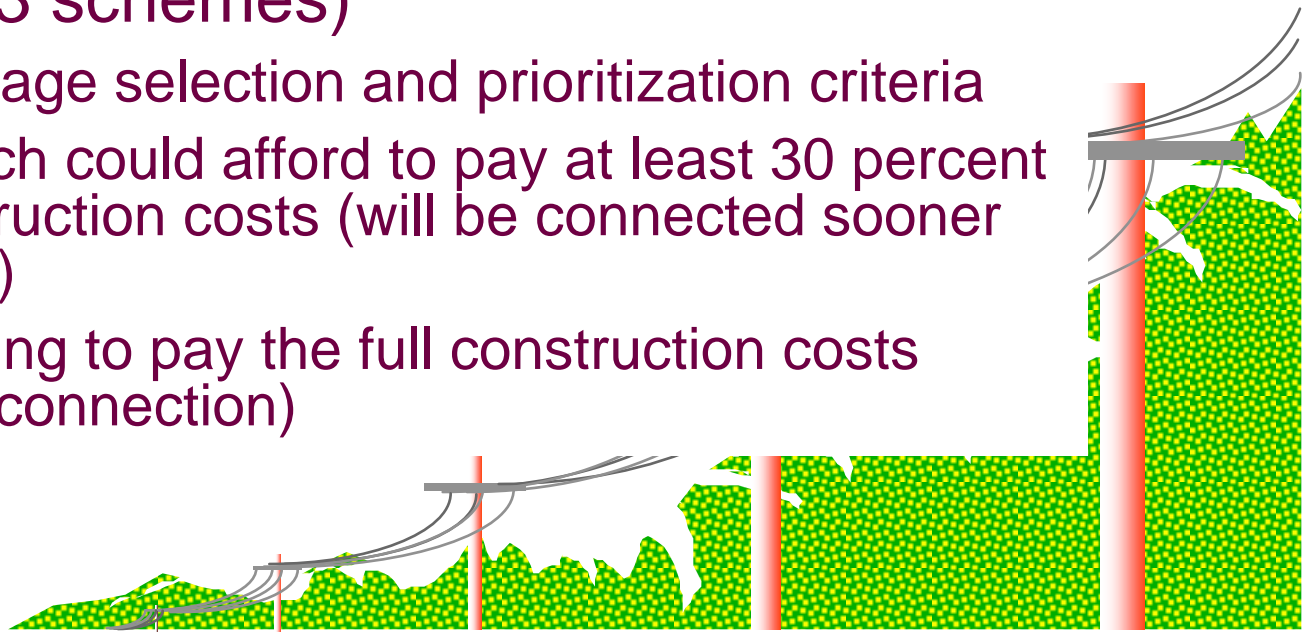
Political Interference: Resist Distortion of Electricity Connection Plan

- Thailand--Developed objective selection criteria to rank villages, allowed communities to jump to higher rank if they paid for part of village connection charges, village selection plan was included in national economic development plan
- Costa Rica--Standard procedures for least cost expansion overseen by regulatory agency, customers have to pay for extension cost if too far away from system



Thailand Practical Strategies to Avoid Political Interference

- Uses sound methods for village extension priority (favored high load villages)
- Provide flexible alternatives for those--including politicians--who wanted to have electricity connected at their request (RE extension consisted of 3 schemes)
 - standard village selection and prioritization criteria
 - villages which could afford to pay at least 30 percent of the construction costs (will be connected sooner than normal)
 - Villages willing to pay the full construction costs (immediate connection)



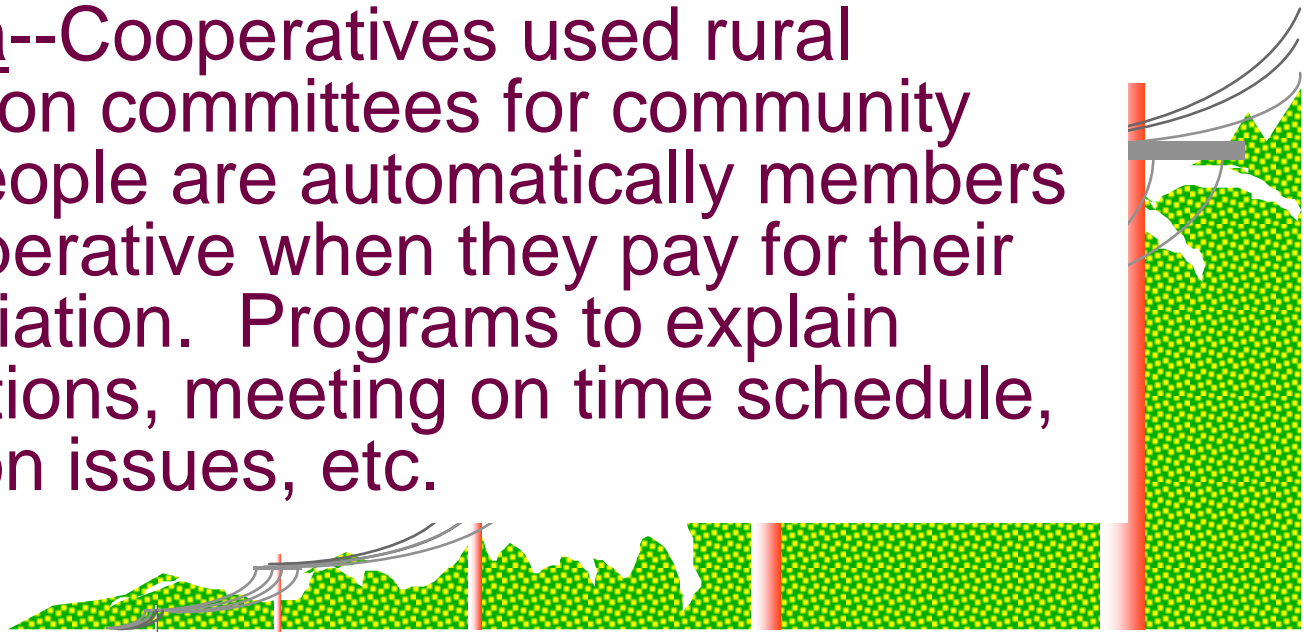
Institutional Issues: Focus on Solving Problems

- All case studies countries had special institution for RE because main power companies had difficulty implementing program
- Thailand--PEA is a separate agency responsible for distribution to rural area and provincial cities (PEA also has a special office (ORE) for RE projects
- Costa Rica--Development of rural cooperatives specializing in distribution. They could raise their own funds through loans and grants.
- Chile--National office to qualify communities for grants and provide them with technical assistance; regional offices do actual selection



Community Level Problems: Rights of Way, Theft, Vandalism, Low Load

- Thailand--Community meetings concerning electricity plan well before electricity came to community, local leaders to collect bills and report problems, had community agree to provide right of way and settle disputes internally
- Costa Rica--Cooperatives used rural electrification committees for community liaison. People are automatically members of the cooperative when they pay for their service initiation. Programs to explain service options, meeting on time schedule, construction issues, etc.



Conclusion:

Do Public Policies Matter—Yes, but certain guiding principles necessary

- Set up effective institutional structures
- Deal with the political dimension
- Criteria for rural electrification: Have expansion plan or criteria for inclusion
- Importance of cost recovery: subsidies should encourage not destroy business incentives
- Charge the right price for electricity, but help with upfront costs
- Benefits of community involvement
- Reduce construction and operating costs