Power sector reform:
drivers for change, reform models, regulatory challenges

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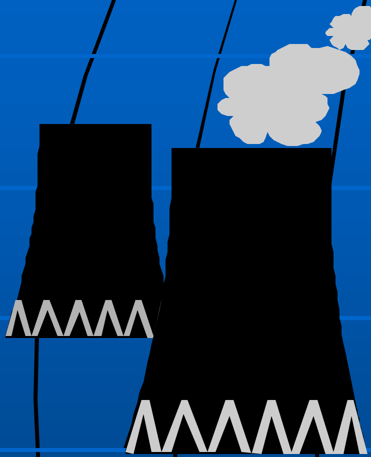
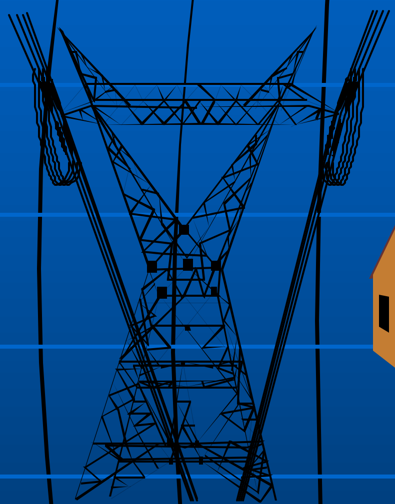
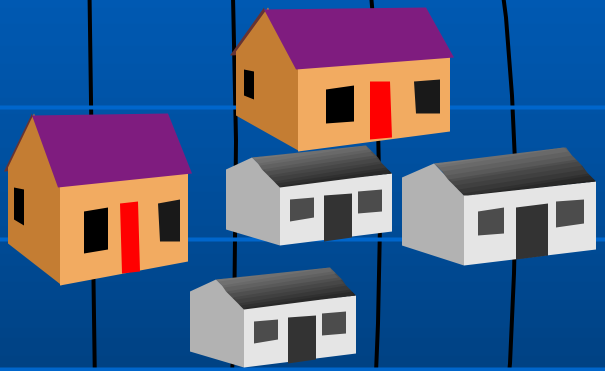
Overview

- Technical features of power sector
- Historical industry/institutional model
- Drivers for power sector reform
- Key power sector reform steps
- Linkages between political-economy and utility reform and regulation
- Final observations

ESI Structural Components

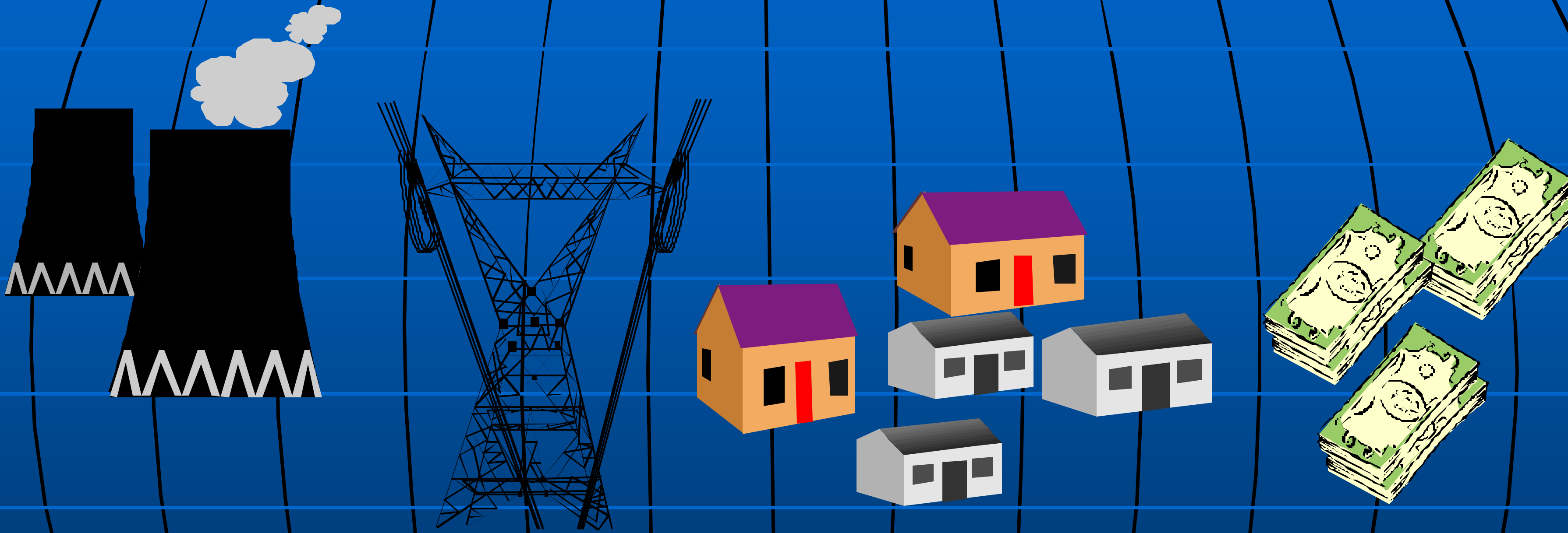






Generation Transmission Distribution Supply / retail

ESI Structural Components



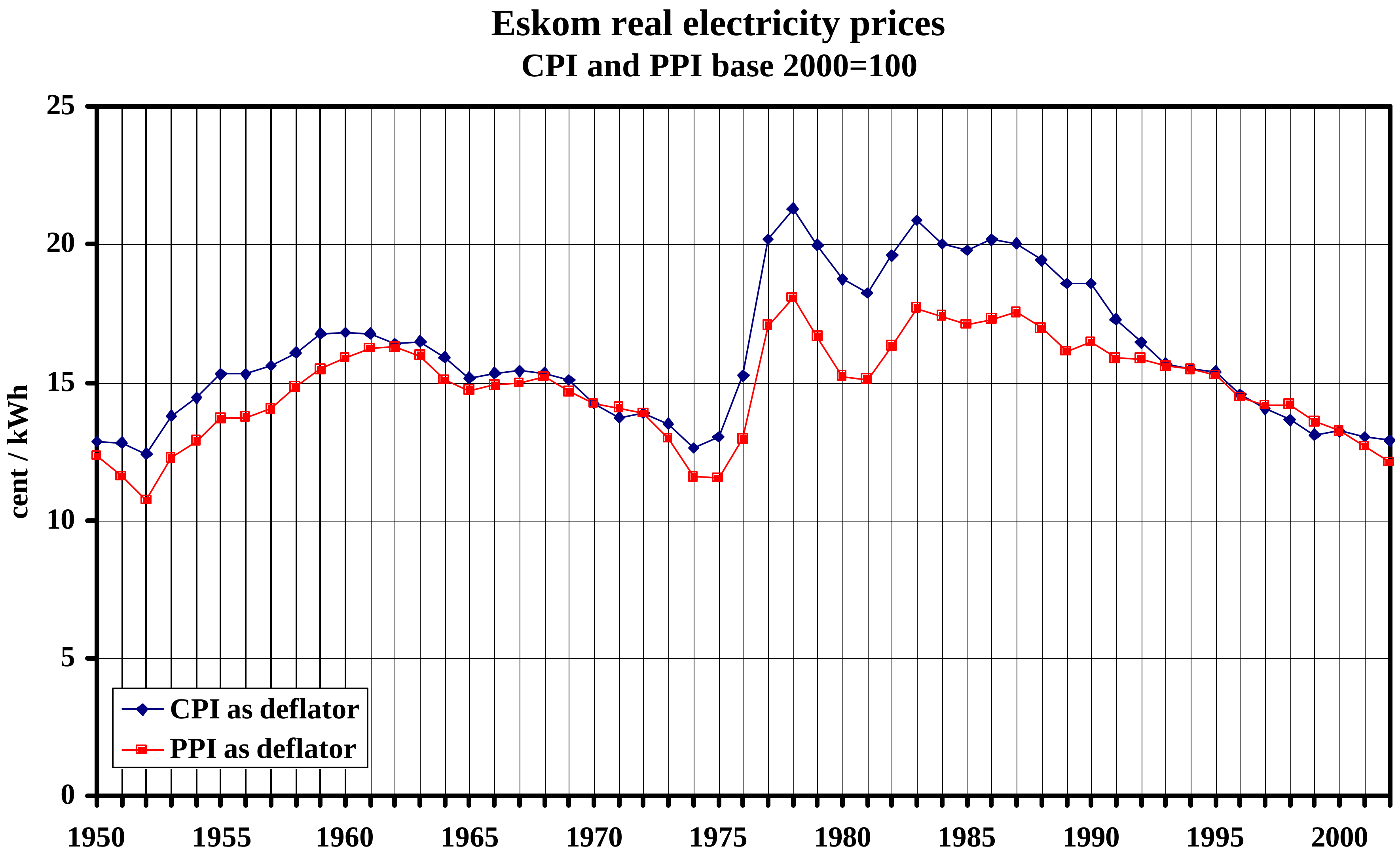
Generation	Transmission	Distribution	Supply / retail
competition	natural monopoly	natural monopoly	competition

A general pattern of utility development in the 20th century

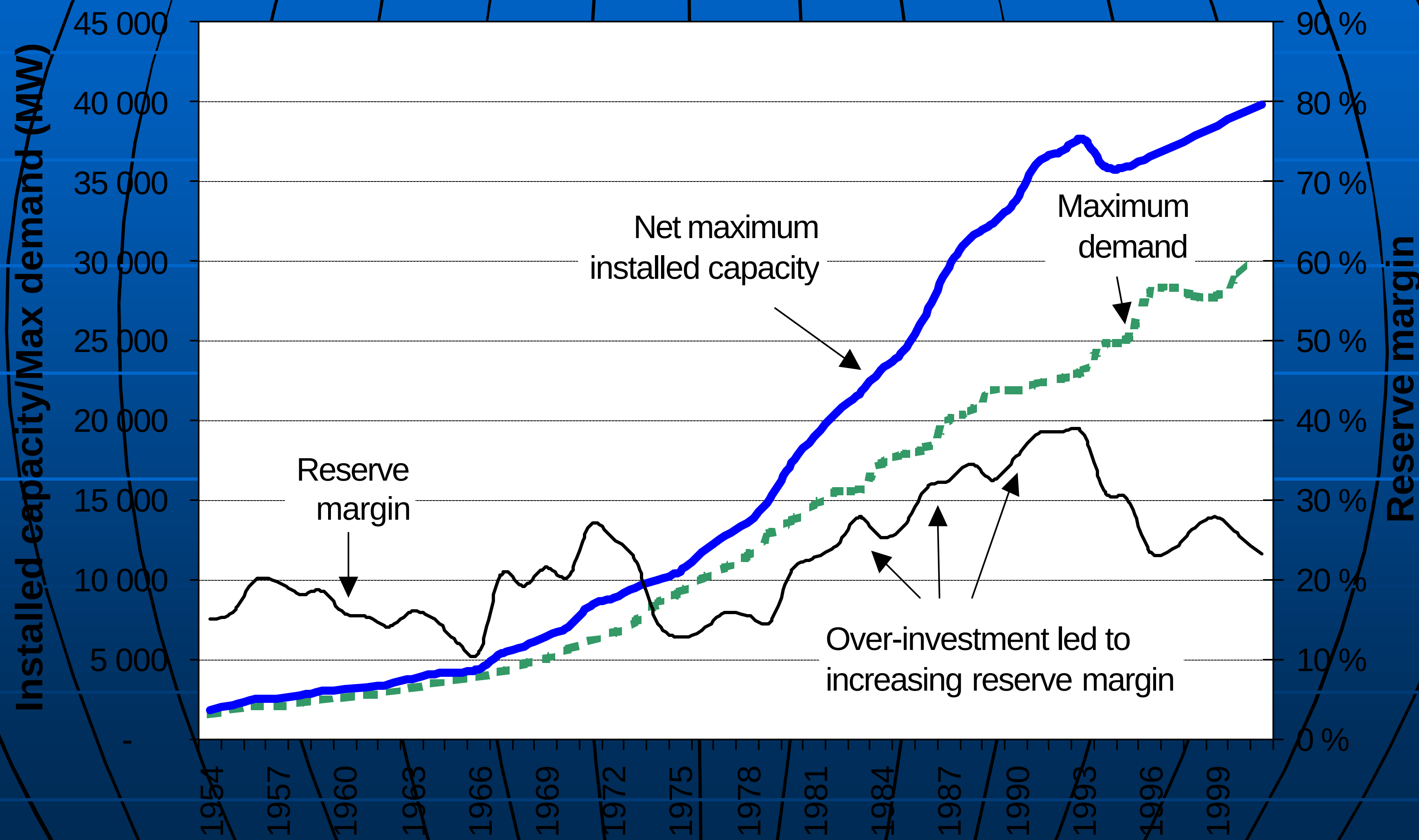
- Early and rapid technology transfer
- First investments mainly by private sector
- Public sector increasingly involved, especially after 1920s
- Infrastructure seen as “strategic” and essential for industrial development
- Network industries seen as natural monopolies, increased economies of scale, large investment requirements
- Public sector (especially in developing countries) takes over private investment
- By 1950s, competition mostly extinguished
- Problems of inefficient use of capital and overbuild evident in 1970s and 1980s, also poor operational performance
- Industrialised countries begin to restructure and reform their infrastructure industries in 1980s and 1990s:
  - unbundling
  - introduction of competition
  - private sector participation
  - re-regulation
- Developing countries follow in 1990s and 2000s


Gabon
Congo
Dem Rep of the Congo
Kenya
Nairobi
Rwanda
Burundi
Brazzaville
Kinshasa
Tanzania
Dar es Salaam
Luanda
Angola
Malawi
Zambia
Mozambique
Lilongwe
Lusaka
Harare
Namibia
Zimbabwe
Botswana
Windhoek
Gaborone
Pretoria
Johannesburg
Maputo
Mbabane
South Africa
Swaziland
Lesotho
Cape Town
Hydro station
Pumped storage scheme
Thermal Station
Eskom thermal station

Electricity prices have followed investment cycles, but are today no lower in real terms than in 1950 or 1970 in South Africa



State-owned utilities can allocate capital inefficiently – cf power sector in South Africa



Drivers for reform of the power sector in Africa

- Inefficiencies in investment and operations
- Financing for capacity expansion
  - public resources insufficient -> private
- Part of overall economic restructuring
  - state redefines relationship to SOE’s
- Power sector reform as a fad?
  - international role models

International trends in electricity market reform

Vertically-integrated, publicly-owned monopoly

▼

Commercialisation and corporatisation

▼

Independent regulation

▼

Unbundling to separate potentially competitive elements from non-competitive elements

▼

Introduction of competition

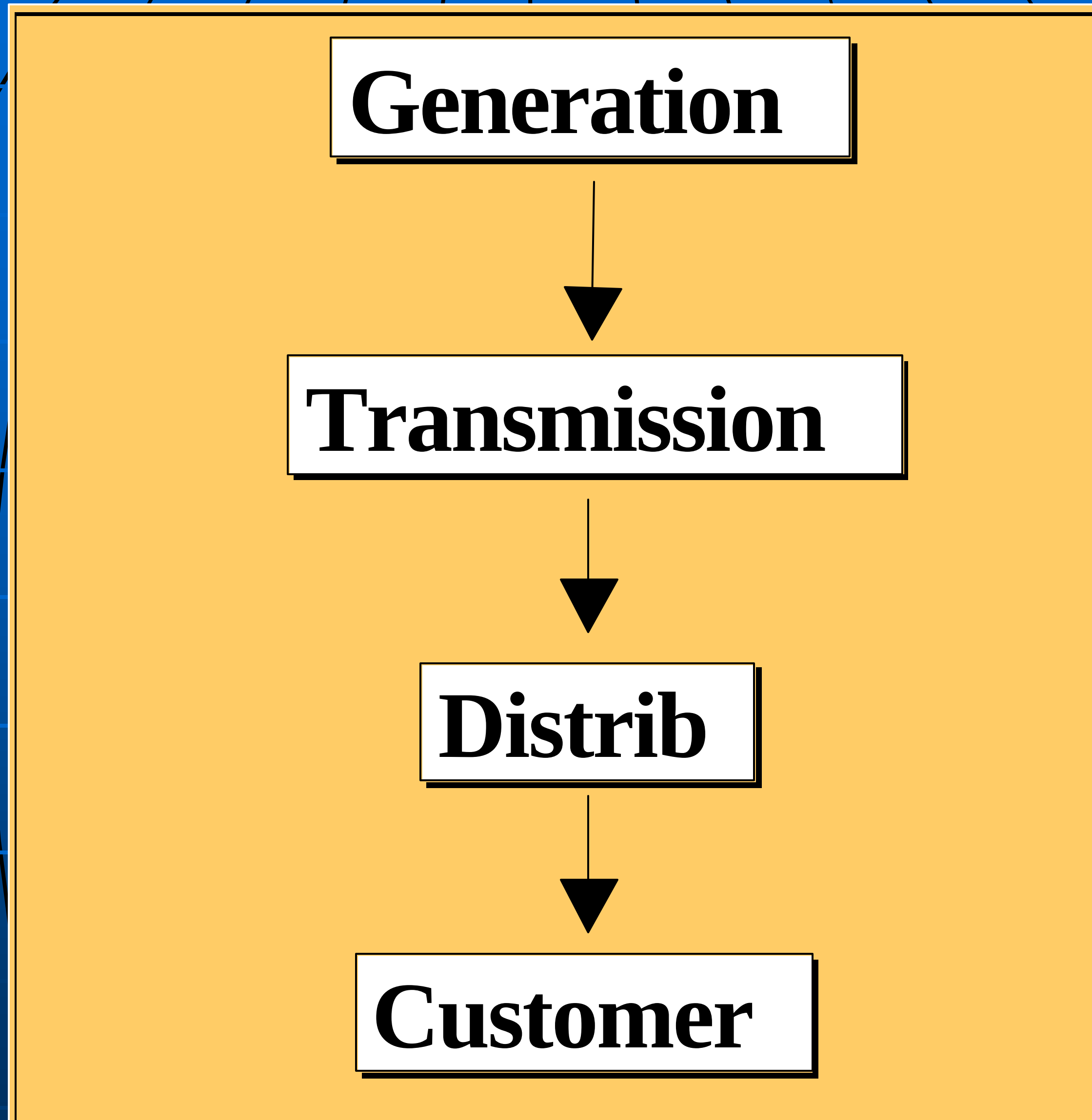
IPPs for the market

or wholesale competition in the market

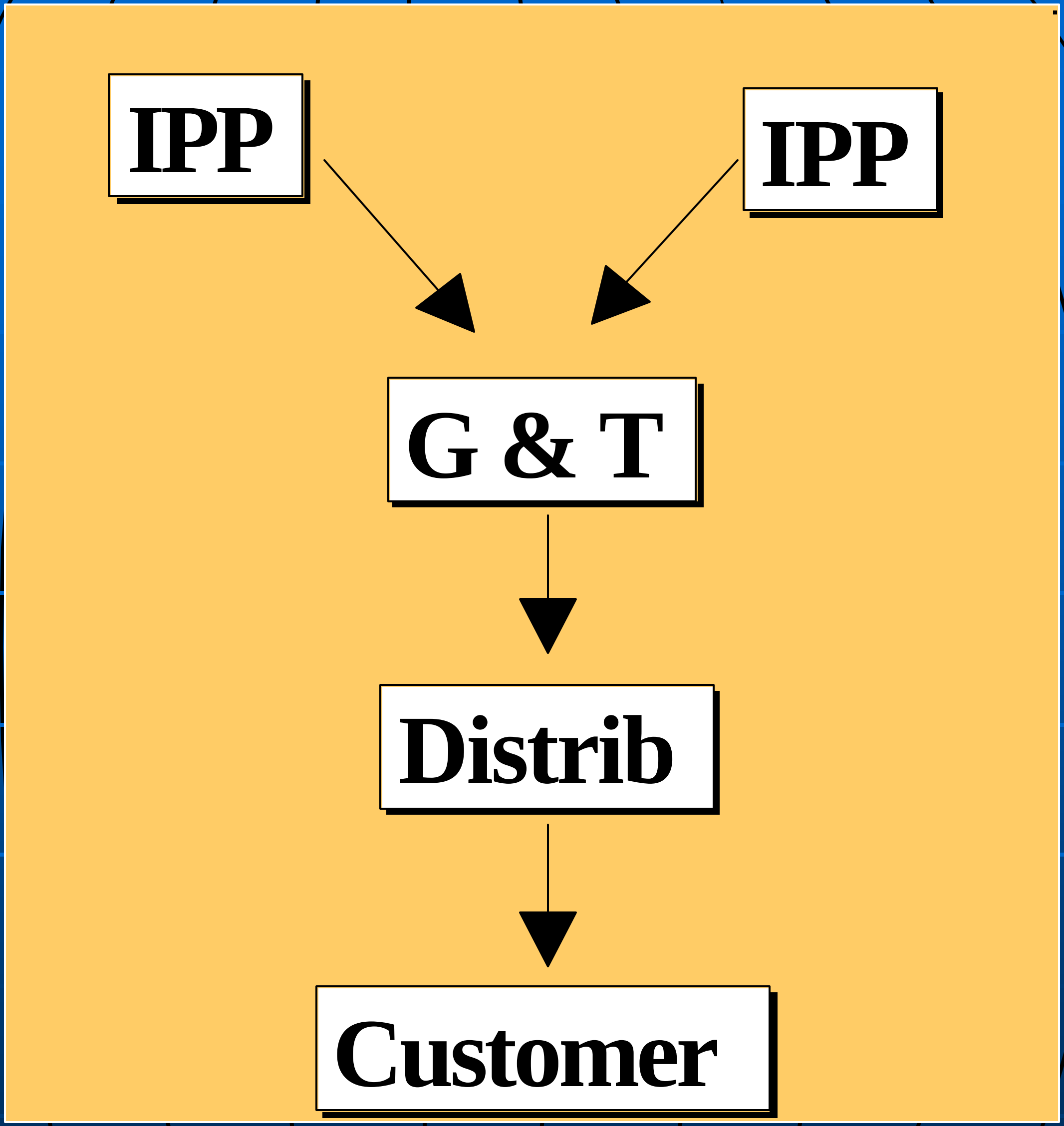
eventually customer choice and retail competition

▼

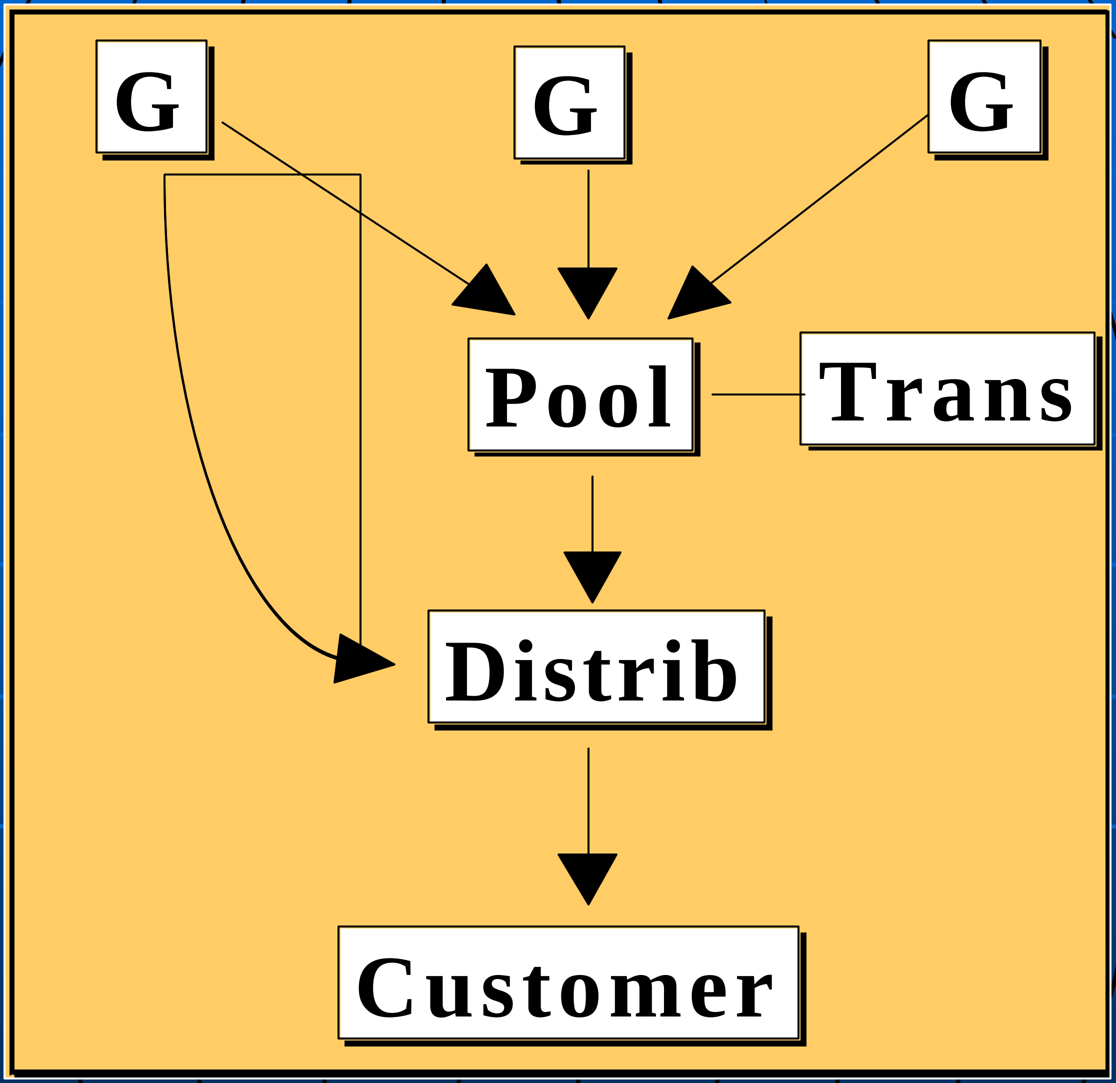
Private sector participation



Monopoly Model



Single-Buyer Model



Wholesale Competition Model

Competition for the market or in the market

- Competitive entry of independent power producers (IPPs)
- Competitive bidding for concessions
- Wholesale competition
- Retail competition

Electricity trading mechanisms

Power pool model

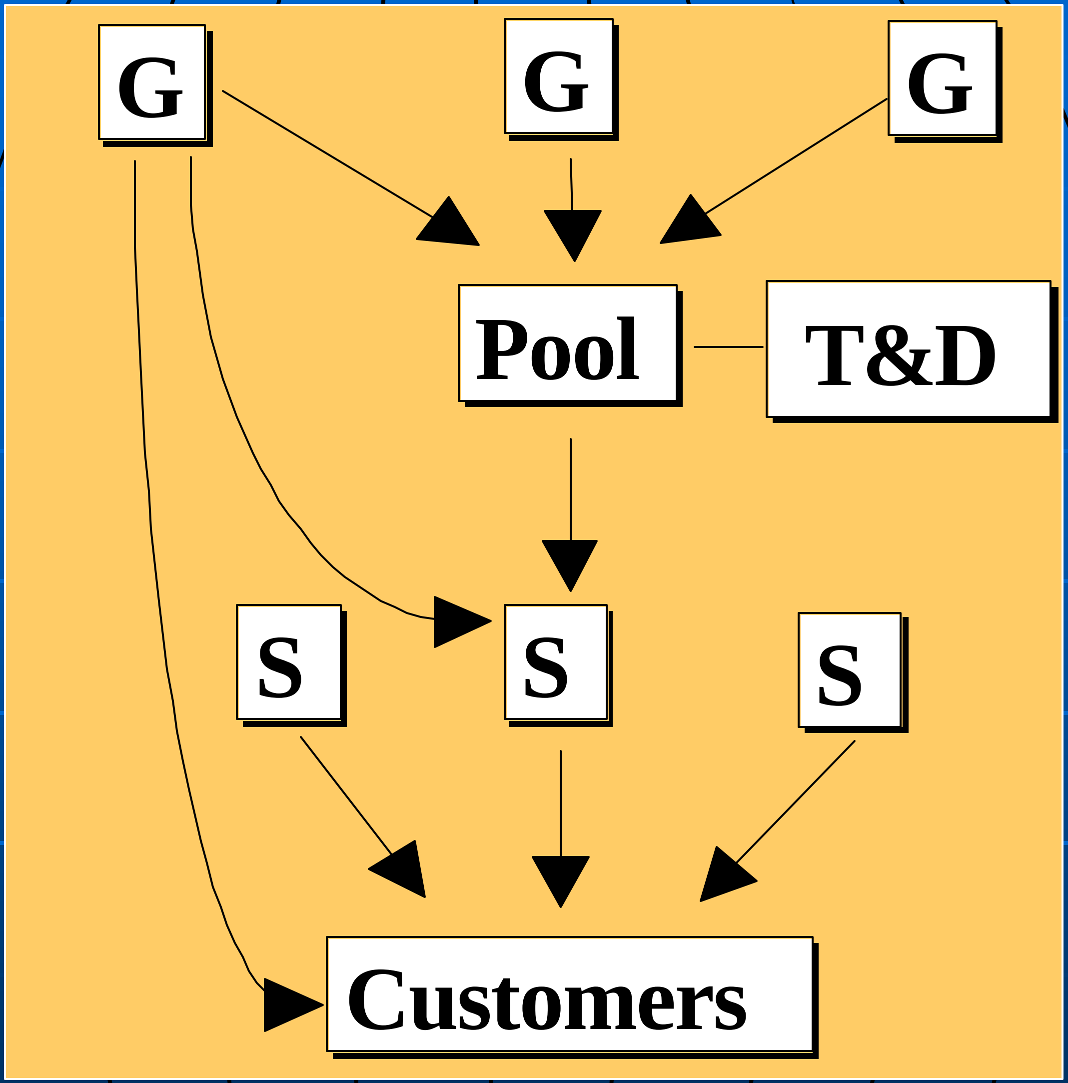
- Generators bid their power into a pool, usually a day ahead
- Bids stacked from lowest to highest
- Pool operator prepares a day-ahead dispatch schedule based on lowest bids
- Price based on last dispatched plant plus any capacity payment plus uplift payment for system operation and balancing & ancillary services
- Pool can be mandatory
- Demand-side can be weak

Multi-market model

- Not all power through a single pool
- Bi-lateral contracts also possible
- A range of financial hedges

Electricity trading mechanisms

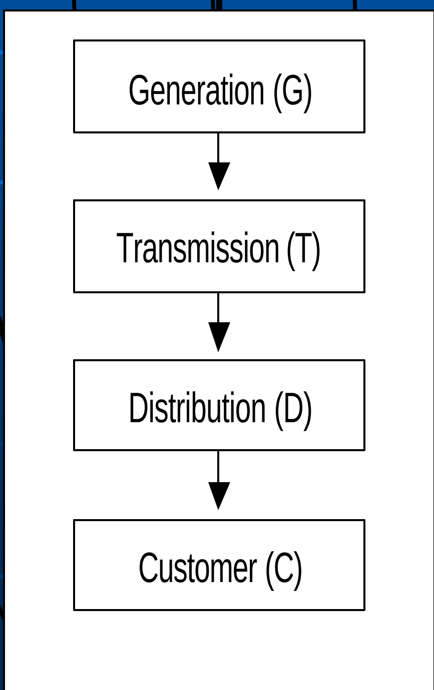
Bilateral trades	Futures market	Short-term market	Balancing market	Settle-ment
Long/medium	Long/medium	Day-ahead	Real-time	Ex-post
Bilateral contracts for physical delivery	Typically year-ahead & month-ahead markets through a power exhange	Typically a day-ahead market through a power exchange	Market for varying supply & demand in order to balance the system	Financial settlement for each market platform



Retail Competition Model

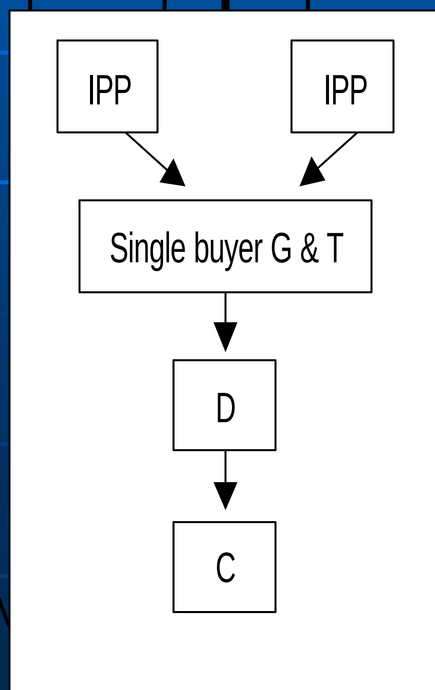
MODEL 1: NATURAL MONOPOLY

- Utilities are vertically integrated
- Generation, transmission and distribution are not subject to competition
- No-one has choice of supplier



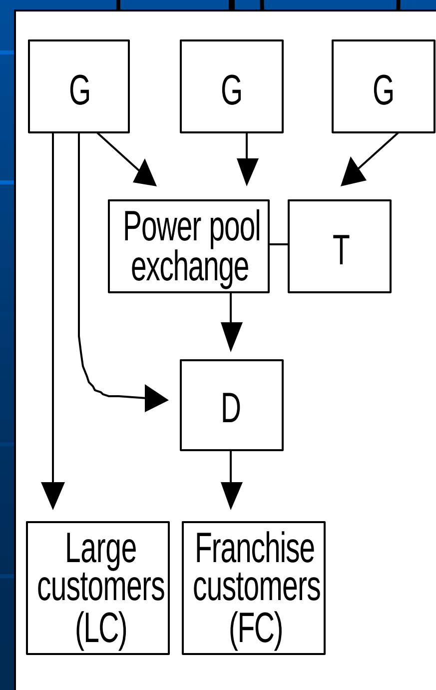
MODEL 2: SINGLE BUYER

- Single buyer chooses from various generators (IPPs)
- Access to transmission xxx not permitted for sales to final customers
- Single buyer has monopoly over transmission networks and over sales to final customer



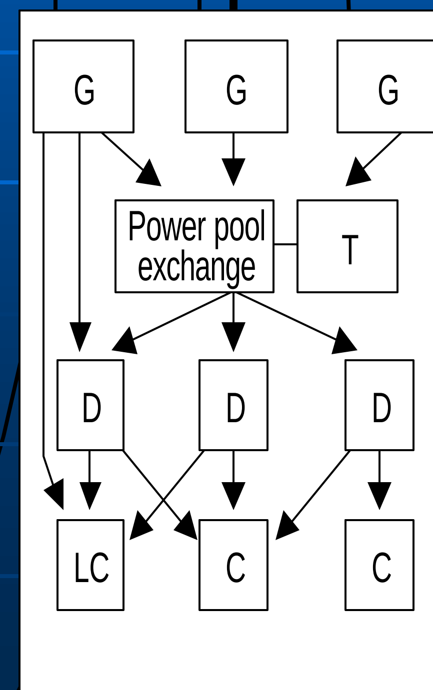
MODEL 3: WHOLESALE COMPETITION

- Distribution companies buy direct from generator (IPPs)
- Distribution companies have monopoly over final customers
- Open access to transmission wires
- Generators compete to supply power
- Power pool established to facilitate xΔ



MODEL 4: RETAIL COMPETITION

- All customers have choice of supplier
- Open access to T & D wires
- Distribution is separate from retail activity
- Retail industry is competitive



Some observations

- No simple transition from state-centred utilities to fully private competition
- Power sector reform is embedded in a slow process of complementary reforms
- IPPs emerge to deal with capacity and investment shortage
- Complex hybrid models are likely
  - (Part of) state-owned utility remains
  - New investment enters with different governance and financial imperatives

    Joint- ventures or politically-connected firms
  - Huge challenges to the overall governance and regulation of the sector

Lesson

- Need to understand political-economy to understand nature and pace of reform and regulatory challenges
  - Understand which issues assume political importance and why: some issues may be of concern to analysts but are either not appreciated by stakeholders or are not expressed politically
  - Understand the effects of finance, governance, legal systems, and industrial organisation on the "hybrid power market"

(Obvious) observation

Key to improved utility performance (for investors and consumers)

is

appropriate market structure

and

effective regulatory oversight

Final observations

- “cookbook solutions for power sector reform clearly have to be avoided”
- “competition, unbundling, private participation are not ends in themselves”
- “power sector reforms should be designed to ...promote poverty alleviation and economic growth”
- “it is important to consider the full range of options for public-private partnerships”
- “the possibilities for different levels of private participation depend on political-economy factors”
- “the extent of vertical and horizontal unbundling should be assessed on a case by case basis”

Public and private sector roles in the supply of electricity services
New operational guidance for World Bank Staff
February 2004

Final observation

"At the heart of most power sector reform efforts are a set of interrelated challenges: changing the manner in which new investments are financed, increasing the efficiency and development effectiveness of those investments, and increasing operational efficiency, while addressing equity concerns as the sector expands"

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