

Privatisation and Unbundling of Generation and Transmission and Distribution

The Trinidad and Tobago Experience

H.S Atwal

Executive Director

Regulated Industries Commission

Trinidad and Tobago

Structure of Presentation

- Circumstances leading to Reform
 - Circumstances in the local power sector
 - Political circumstances
- Characteristic of the Partial Divestiture
- Costs and Benefits of Reform
 - Effects of reform on generation performance
 - Welfare effects – winners and losers
- Conclusions and Lessons

All figures in TT\$ except where stated otherwise

1US\$ = TT\$6.25

Circumstances leading to Reform (General)

■ Overview

- Critical role of infrastructure services
- Between 1990-2000 over US\$680 billion investment in developing countries
- Main forces behind reform included:
 - Poor performance
 - Inability to finance investment
 - Need to remove subsidies

Circumstances leading to Reform (General)

- Overview (cont'd)
 - Performance under Public Ownership
 - Tariffs below full cost of Supply
 - Lack of maintenance and expansion
 - Poor service
 - Weak incentives to maintain commercial discipline, innovate and to be responsive to consumers

Circumstances leading to Reform (General)

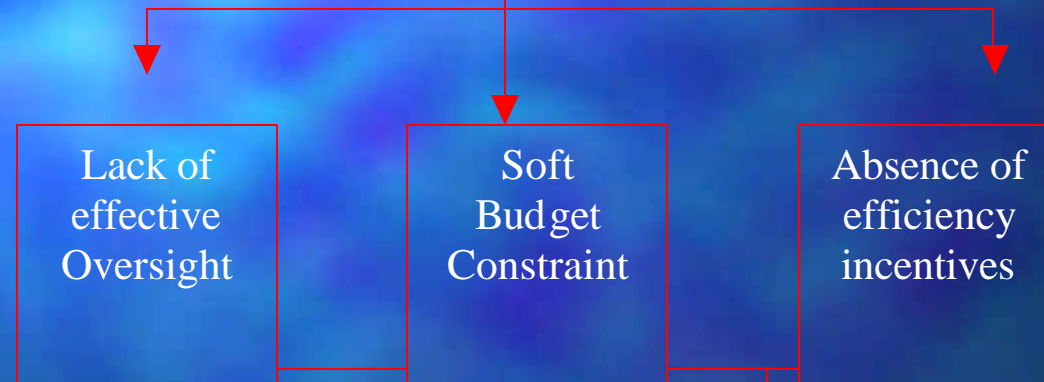
- Overview (cont'd)
 - Private Sector solution
 - Credible commitment from Gov't to cost covering tariffs
 - Stronger incentives to minimise costs and to ensure collection
 - Stronger incentives to comply with quality standards

Failure of the Current State-owned Enterprise Model

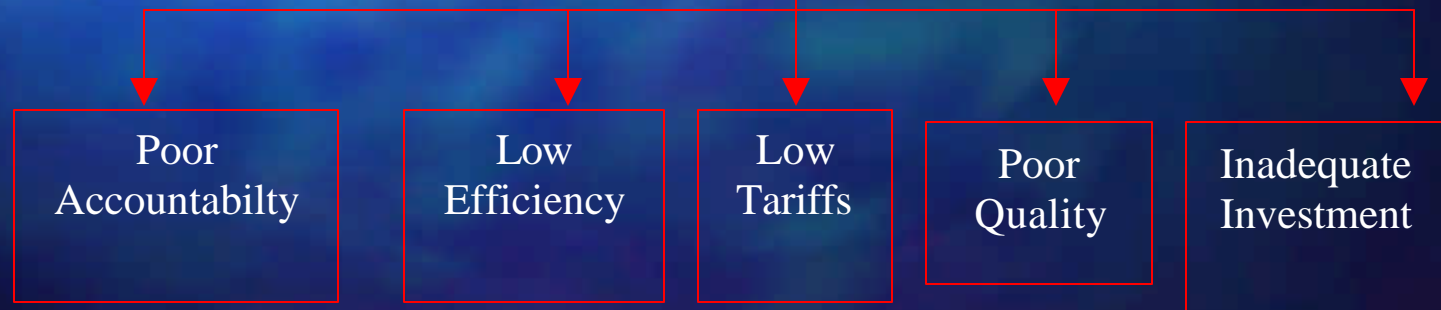
Main Causes :



Transmission Mechanisms :



Consequences:



Circumstances in the Local Power Sector

- Reform more likely when sector in crisis
- Sector Problems:
 - Low tariffs (3 increases between 1966 and 1992)
 - Between 1970-1987 real tariffs fell by 80%, costs rose by 104%
 - Accumulated deficit \$477.9M by end of 1991
 - Lack on maintenance and new investment
 - Plant availability averaged 65%
 - Needed additional capacity of 100MW by 1995 to meet growing demand

Circumstances in the Local Power Sector

- Options for Reform considered:
 - IPP
 - BOO-BOOT arrangements
 - Co-Generation
 - Interconnection with Venezuela
 - Vertical separation

Circumstances in the Local Power Sector

■ Why Equity Participation

1. Maintenance and Plant Availability Issues:

■ Cash constraints:

- Limited ability to stock parts
- Forced to wait until unit failed
- Waiting time over 12 months
- Ideally \$140M in parts needed on continuous basis

Circumstances in the Local Power Sector

- Why Equity Participation (cont'd)
 - Extended Planned Overhaul Duration
 - Steam units – 20 weeks major, 6 weeks minor
 - No second shift during overhauls
 - Loss of 100MW of generating capacity
 - 5-7 years to improve overhaul durations (5 yr cycles)

Circumstances in the Local Power Sector

- Why Equity Participation (cont'd)

- 2. Funding Needs

– 1993-95 Rehabilitation of 200MW	US\$ 20M
– 1993-95 Restock inventories	US\$ 30M
– 1993-95 Expand Dispatch Centre	US\$ 20M
– 1993-95 Loss reduction project	US\$ 5M
– 1995-97 New generating plant	US\$ 95M
– 1995-97 Transmission expansion	US\$ 5M
Total	US\$ 175M

- 3. Financing Scenarios:

- Equity rather than debt
 - Timeframe too short to consider local private participation
 - Immediate needs for additional capacity

Political Circumstances

- Part of larger privatisation programme:
 - State enterprises divestment in 1992
 - Removal of protection tariffs in 1992
 - Floatation of TT dollar in 1993
- Political Desirability of reforms in utility sector
 - Telecom – 1989 – 49%
 - Generation 1994 – 49%
 - Water management contract – 1995
 - Postal services management contract - 1999

Characteristics of the Partial Divestiture

- Competitive Bidding Process:
 - List of 52 companies for pre-qualification stage
 - 15 firms pre-qualified
 - 6 firms submitted proposals
 - 2 highest ranked for due diligence
 - Selection of joint venture partner

Characteristics of the Partial Divestiture

- Joint Venture Partners:
 - T&TEC – 51% 'A' Shareholder – 5 Board members, 3 Management Committee
 - SEI & AMOCO – 49% 'B" Shareholders – 4 Board members, 3 Management Committee
 - Contract duration – 15 years
 - Purchase prices - \$US 107.5M, \$US 35.9M for refurbishment
 - Take or pay

Characteristics of the Partial Divestiture

- Obligations under the Contract:
 - Fixed Capacity and spinning reserve levels with penalties
 - Quality of supply requirements: (frequency, voltage, power factor, harmonic distortion)
 - Loss of load payment
 - Heat rate bonuses and penalties
 - Load shed payments

Sequencing of Reform Stages and Risks

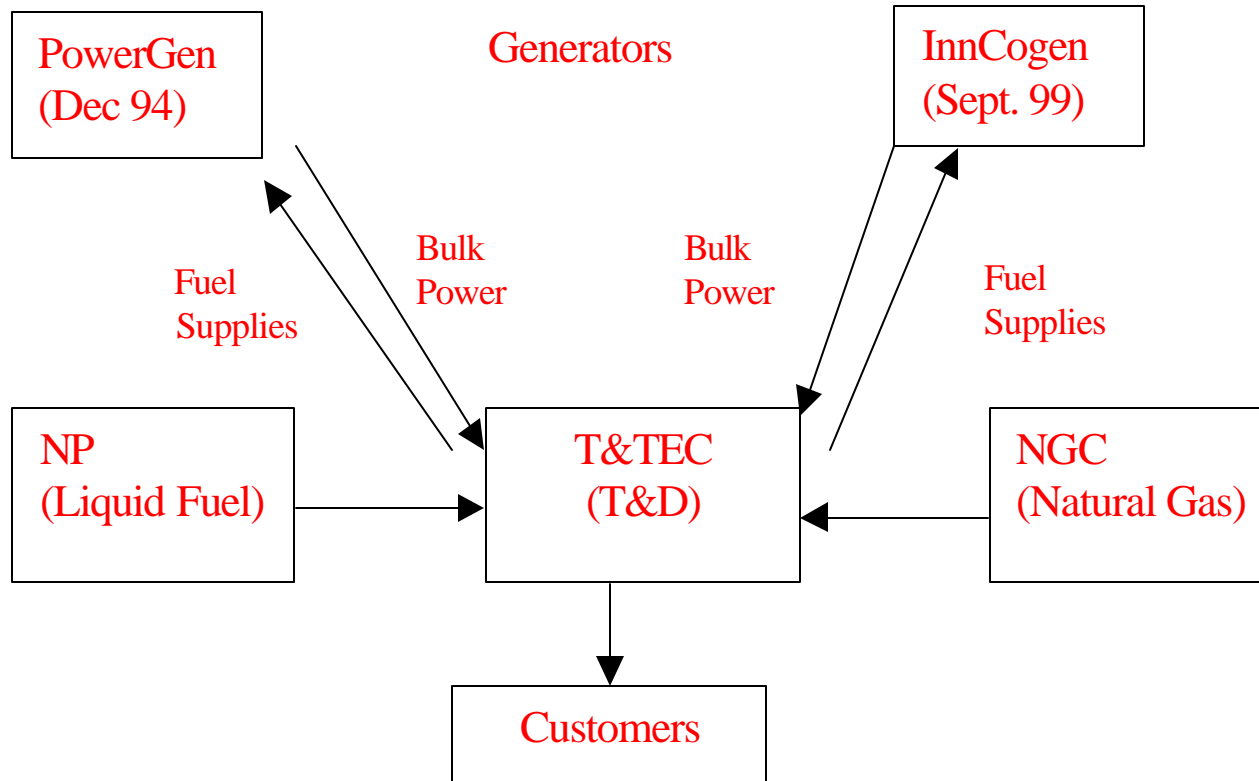
- **Worldwide sequencing of reform programmes:**
 - Formulation and approval of a power policy by Government and enactment of legislation.
 - Development of a transparent regulatory framework
 - Unbundling of the integrated structure of the industry
 - Divestiture of the state's ownership
 - Of 115 countries worldwide:
 - 20% - privatization of assets
 - 40% - corporatisation & commercialisation

Sequencing of Reform Stages and Risks

- **Sequencing in Trinidad and Tobago**
 - Joint venture firm selected and negotiation completed
 - Legal obligations entered into without the participation of the Regulator.

Organization of Sector Post-Reform

Figure 1: Organization of Sector Post-Reform



Transfer of Risks

■ Risk Sharing

- Powergen – Operating Risks

- Off-taker (T&TEC):

- Risks for fuel prices and fuel availability
- Market risks protected by take-or-pay contract
- Currency risks covered by denominating prices or indexing them to US dollar
- Political risks (including environmental laws) guarantee

Costs and Benefits of Ownership Change

- Operational efficiency
- Allocation efficiency gains or losses from changes in prices
- Fiscal Impact
- Labour and Productivity
- Costs and benefits of vertical separation

Operational Efficiency

■ Plant Availability Improvements

- From 64% to 83%, leading to potential saving of new capacity of 200 MW, estimated cost US \$95 million.
- Reduction in Equivalent Forced Outage Factor (EFOF) from 26% to about 5%
- Average declared capacity increased consistently
- Reduction in wasteful overcapacity (reserve margins)
- Little change in the time taken for major and minor overhauls durations but significant change in the number of plants down for a major overhauls at the same time.
- Double shift system introduced in 1997
- Little change in Heat Rate (contract terms 13300-14700)

Availability Factor, Declared Capacity and Reserve Margin

Year	Availability Factor	Reliability (EFOF)	Average Declared Capacity	Contracted Capacity	Reserve Margin
1995	82.15	5.40	852	745	107
1996	77.9	9.72	876	764	112
1997	77.77	10.92	901	781	120
1998	79.14	9.80	926	793	133
1999	81.88	4.51	935	819	116
2000	82.78	4.72	943	819	124
2001	83.69	3.23	954	819	135
2002	82.74	4.85	932	819	113

Labour Productivity

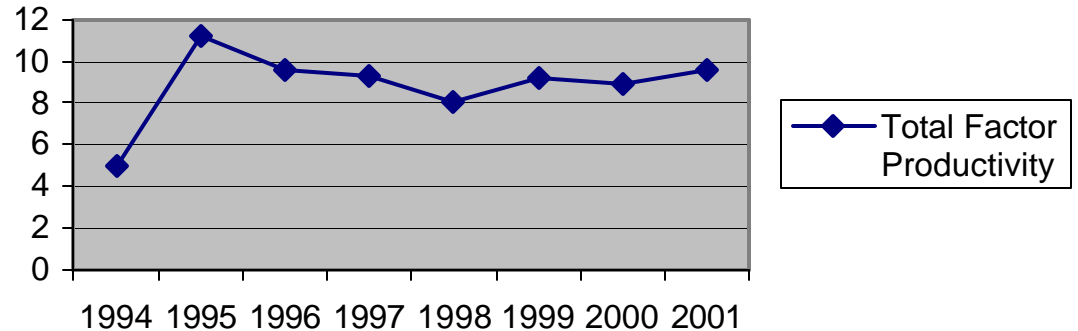
- Employees declined from 513 to 433 between 1995 and 2002
- 21% increase in salaries between 1997-2002
- Absenteeism rate (inclusive of emergency leave and sick leave) fell from 18.94 days to 9.4 days per employee between 1995-2002
- Enhanced training and safety procedures
- Two productivity indicators improved significantly:
 - Partial productivity indicator (output per worker)
 - Total factor productivity

Employees and Output per Worker and Total Factor Productivity

Employees and Output per Worker

Year	No. of Employees	Output per Employee
1995	513	8,241
1996	448	10,014
1997	427	11,294
1998	426	10,006
1999	427	11,435
2000	426	9,670
2001	431	10,228

Total Factor Productivity

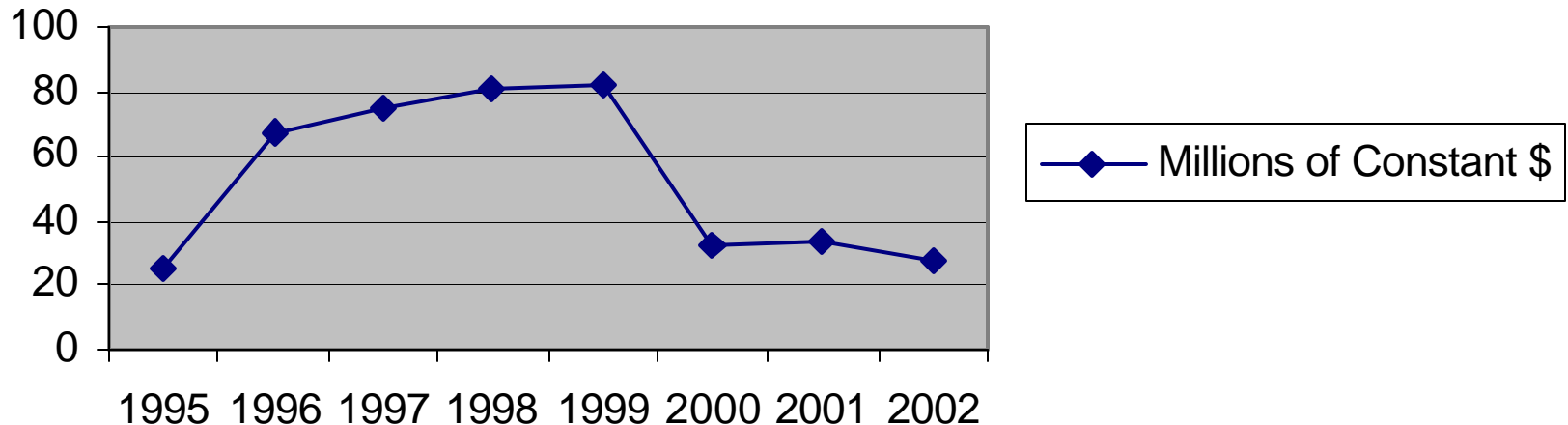


Investments

Significant Improvement in Investment:

- Average Annual Investment \$27.5M 1990-94
- Average Annual Investment \$53M 1995-02

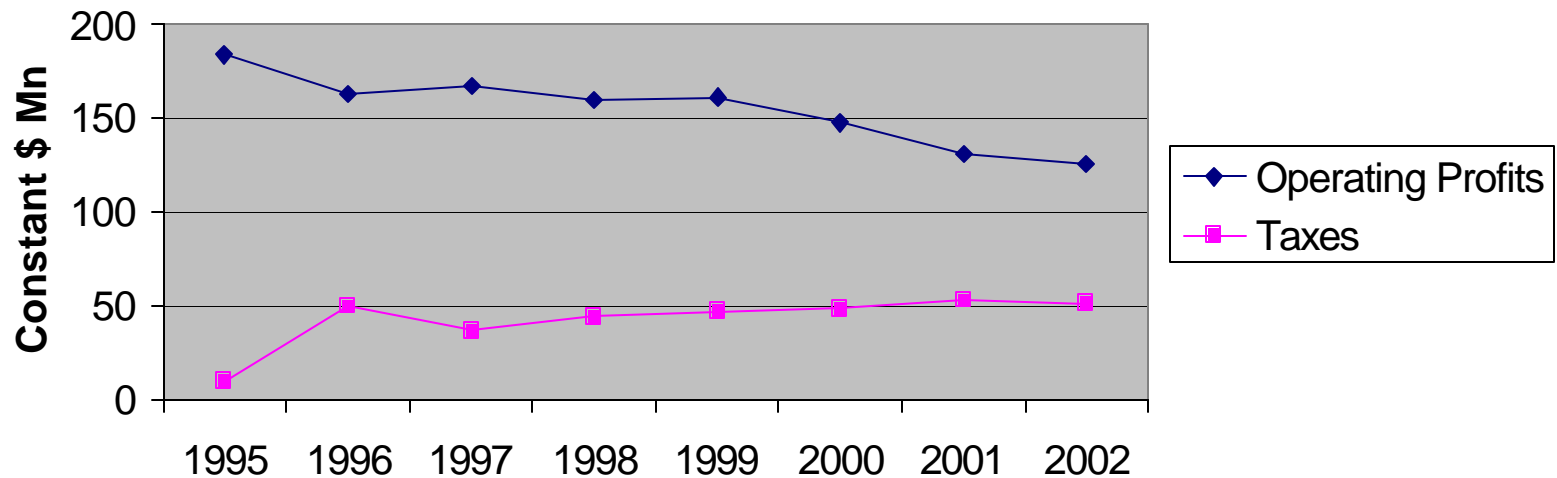
Millions of Constant \$



Profit and Profitability (\$)

	1995	1996	1997	1998	1999	2000	2001	2002
Return on Capital Employed	0.22	0.20	0.22	0.23	0.22	0.21	0.22	0.23
Profit Margin	0.62	0.54	0.55	0.54	0.57	0.56	0.55	0.55
Gearing Ratio	1.11	1.25	1.21	1.15	1.06	1.06	1.00	0.87

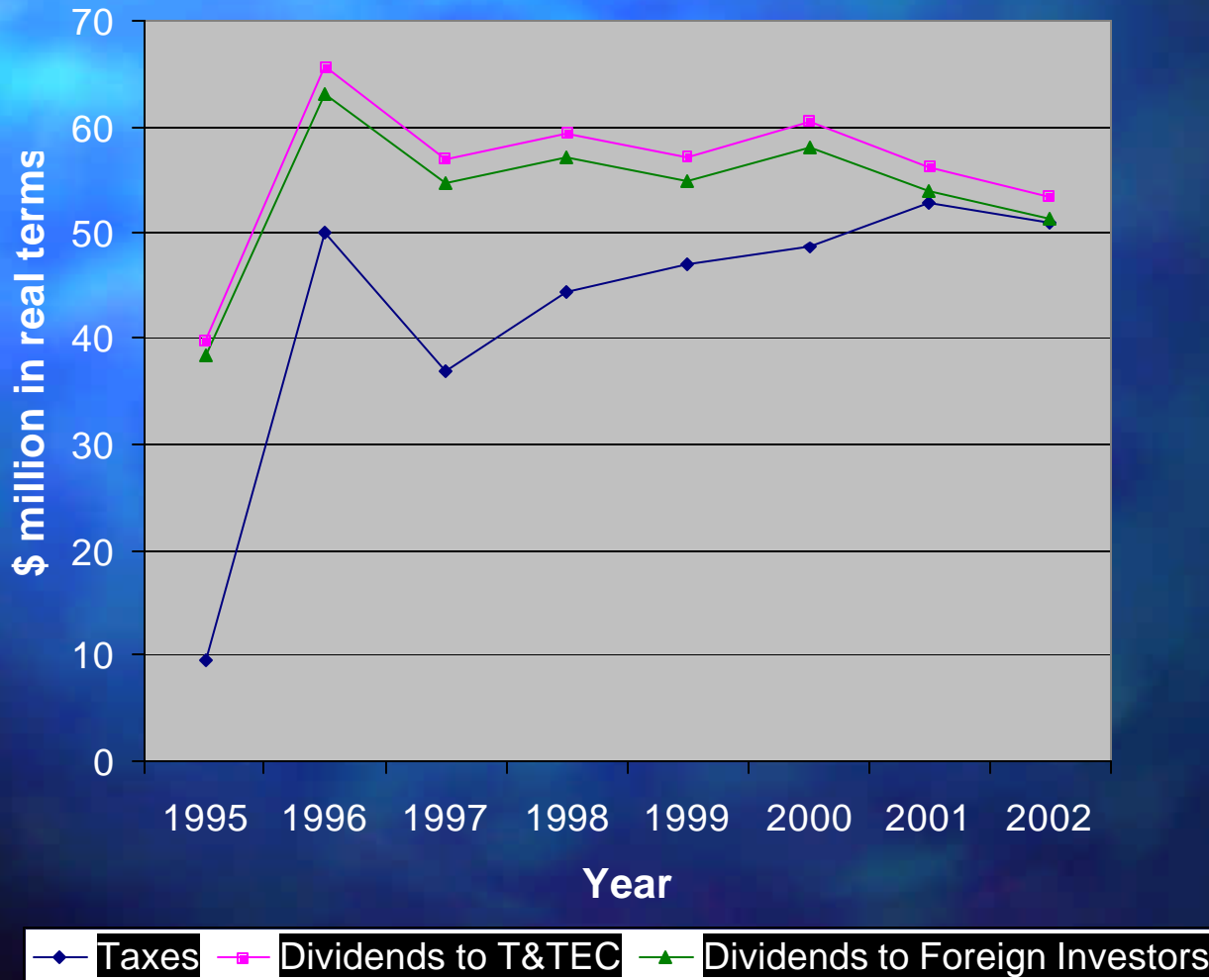
Operating Profits and Taxes Paid



Fiscal Impact

- Immediate impact of sale of 49% - US\$ 107.5M
- Taxes contribution
- Dividends to T&TEC
- Dividends to foreign investors
- Cost of financing:
 - Low for Government
 - Does not mean superior capabilities to choose or manage projects
 - Government has recourse to taxpayers
 - Under private projects risks borne by users via cost-covering prices
 - Social cost of private finance not higher than social cost of public finance.

Taxes and Dividends Paid (\$million in real terms)



Prices

- Overall trend in real prices difficult to judge (only increase to industrial consumers)
- Private participation will affect level or prices differently:
 - to the extent prices are held below cost-covering levels, prices might increase
 - to the extent efficiency improvements reduce costs, prices might decrease.
 - to the extent private finances increase cost of borrowing, prices might increase
 - prices may adjust differently for different class of customers
- Trend in real operating revenues per KWH suggests: prices rose by 8.6% between 1995-2001 and RPI by 5.7%
- Tested T&TEC'S capacity to cover T&D costs.

Costs and Benefits of Vertical Separation

- Costs of separation:
 - Central Dispatching
 - Economies of scope and scale:
 - Separate Accounting and legal departments
 - Additional costs of building, personnel and materials.
 - Reduces flexibility for staff advancement and skilled staff may leave.
 - Head office costs increased by about \$0.761M annually
- Benefits of separation:
 - Transparency of transactions, therefore pressure on managers to perform
 - Focused decision-making

Welfare Effects – Winners and Losers

- Comparison of the performance of Powergen vs. what would have been without reform.
- Actual public operation used to construct counterfactual
- Methodology based on Jones, Tandon & Vogelsang.

Welfare Effects – Winners and Losers

- Data utilized is from 1995 to 2004 as follows:

1991 1994 -----2002-----2004

Actual
Public

Counterfactual

Projected
Public

Actual Private

Projected
Private



Welfare Calculation Period

Construction of Counterfactual

- Problems:
 - Powergen's performance as Generator compared with vertically integrated company.
 - Quality improvements are omitted.
- Assumptions:
 - Availability factor would have remained about 64% under public ownership
 - Reform removed investment constraint
 - Productivity gains achieved would be lower under public ownership
 - Government would have increased subsidies

Welfare Effects – Winners and Losers

	Total Gains	
	TT\$ Million (real terms)	%
<u>Total Domestic:</u>	2,064.3	
Government	2,223.5	80
Consumers	(167.3)	
Labour	8.1	0.3
<u>Foreign Investors</u>	539.8	19
Total Gains	2,771.4	
<i>No sensitivity analysis done</i>		

Conclusion

- Large welfare benefits:
 - Government gained most
 - Industrial consumer lost
 - Labour gains minimal
 - Foreign investors gained
- **Significant improvement in operational efficiency:**
 - Plant availability improvement significantly
 - Forced outage rate declined
 - Average annual investment increased 100%
 - Initial productivity gains significant, then modest:
- **Financial Performance improved significantly:**
 - Consistent improvement in revenue
 - Return on capital employed consistently about 22%
- **Fiscal Impact substantial via taxes, dividends.**

Lessons

- Main improvements came from removing Government involvement rather than restructuring:
 - Removal of Government influence in tariff setting
 - Removal of government intrusiveness in management
 - Removal of government in employment/staffing policy
- Introducing private participation in generation without undertaking deeper sectoral reforms is potentially problematic as it reduces pressure to implement cost-covering retail tariffs.
- Commitments and concessions afforded to private sector, if given to public enterprises, could achieve positive results.

Lessons

- Introduction of competition at the generation level may not bring about significant advantages in small power systems.
- Foreign managers not necessarily superior to local counterparts.
- Sequencing of reforms is important for long term sustainability. Legal and regulatory framework should be in place before restructuring, including the enshrining in law less ad hoc procedures for setting tariffs.