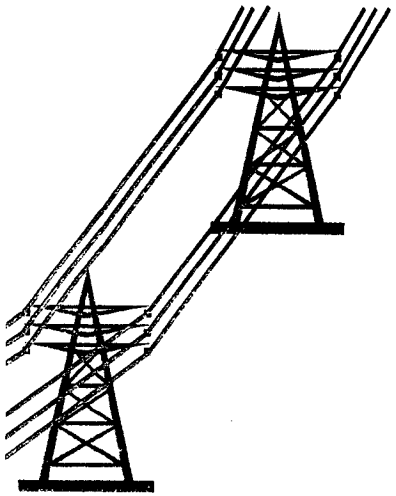
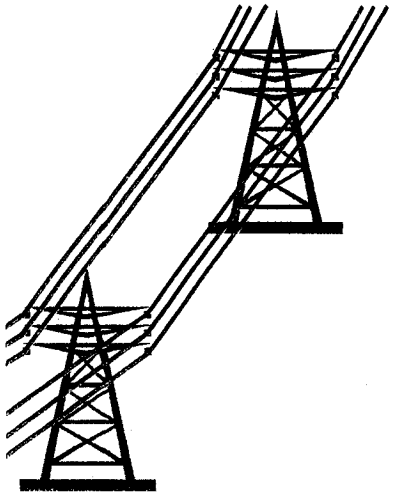


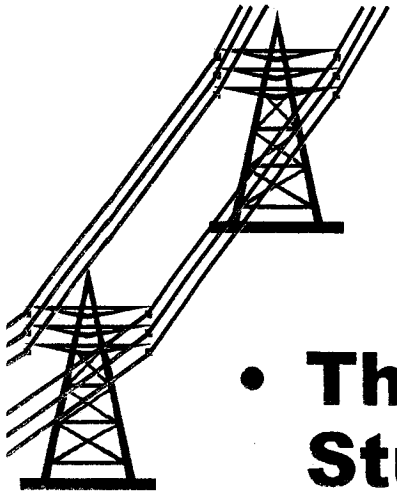
Electric Transmission Constraint Study

Division of Market Development
Federal Energy Regulatory Commission
December 19, 2001



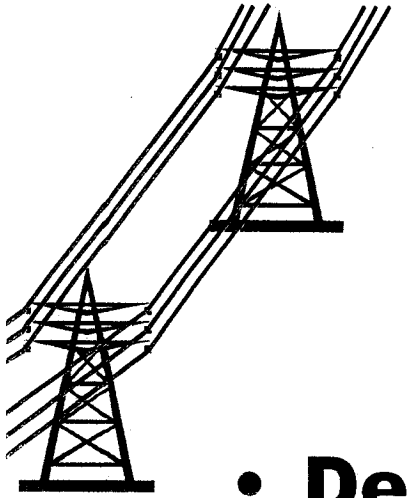
Members of the Team

- Thanh Luong (Team Lead)
- Kumar Agarwal
- Meesha Bond
- Charles Faust
- George Godding
- Udi Helman
- Raymond Montini
- Camilla Ng
- Cynthia Pointer
- Ron Rattey
- Dean Wight
- William Meroney (Advisor)



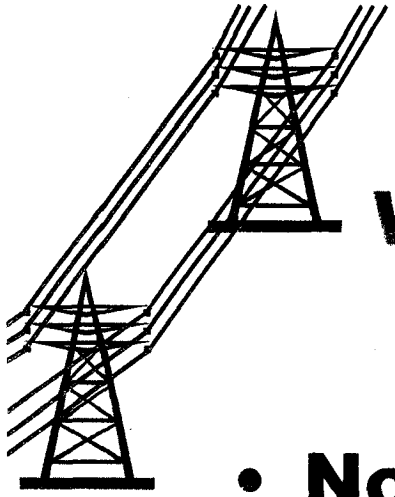
Introduction

- The Electric Transmission Constraint Study is an attempt to provide some point of reference on transmission congestion
- Limited data restricted the study period to the Summer months of June, July and August of 2000/2001
- Congestion during the Summer months has greater impact because the demand is high; however, transmission congestion often occurs during the shoulder months



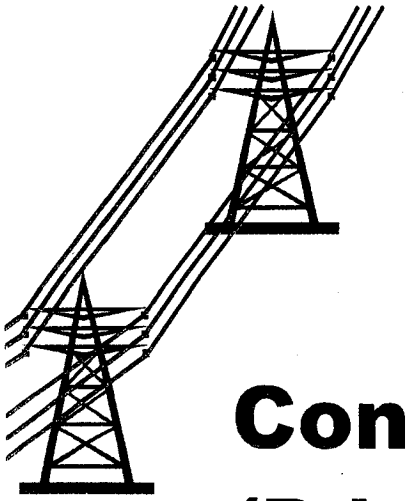
What is our Objective?

- Demonstrate various effects of transmission congestion
- Stimulate serious discussion on what to do
- Recognize that even with the high estimated cost of transmission investment, or other remedies, the overall savings in energy could significantly benefit Customers



Why Does Congestion Happen?

- Not enough transmission capacity to meet demand in a particular area
- Not enough generation to meet load within a particular constrained area
- More generation competing to sell than lines can handle
- Congestion varies over time and location as a function of system conditions



How Did We Calculate Cost of Congestion?

Congestion Rent

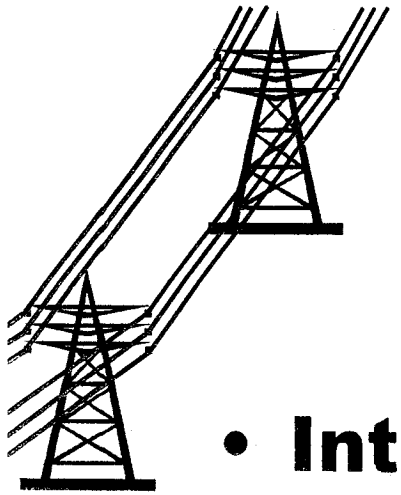
(Price difference between sides of constraint times the flow across the constrained interface)

+

Replacement Energy Costs

(Additional cost of energy generated within the constrained area to replace energy that could not be imported across the constraint)

But there are data limitations

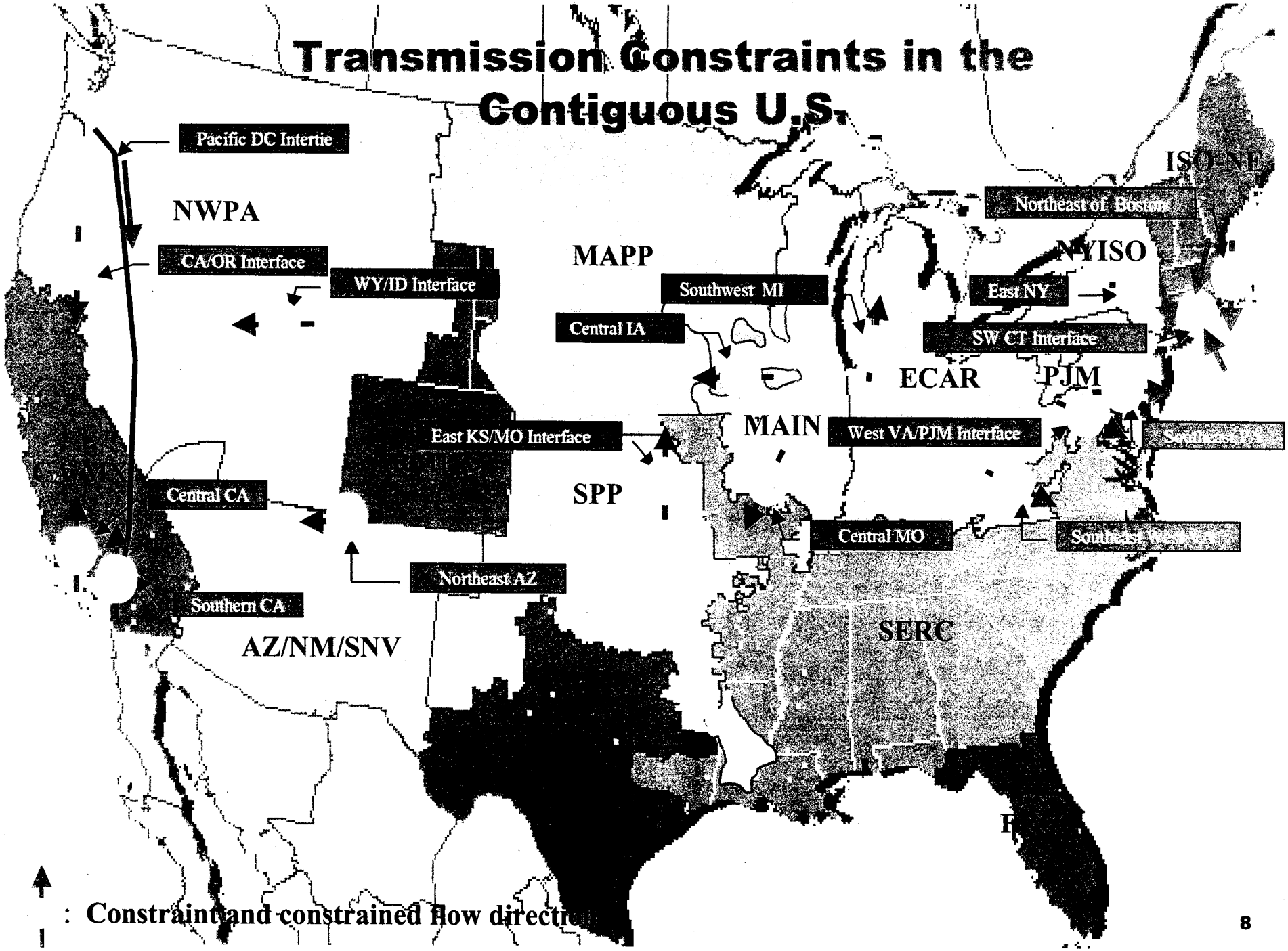


How Were The Transmission Lines Selected?

- Interface is frequently constrained
- Significant price differences exist across the constrained interface
- Interface had significant curtailments (TLR events)
- Hours of loading close to capability
- Hours of phase shifter operation

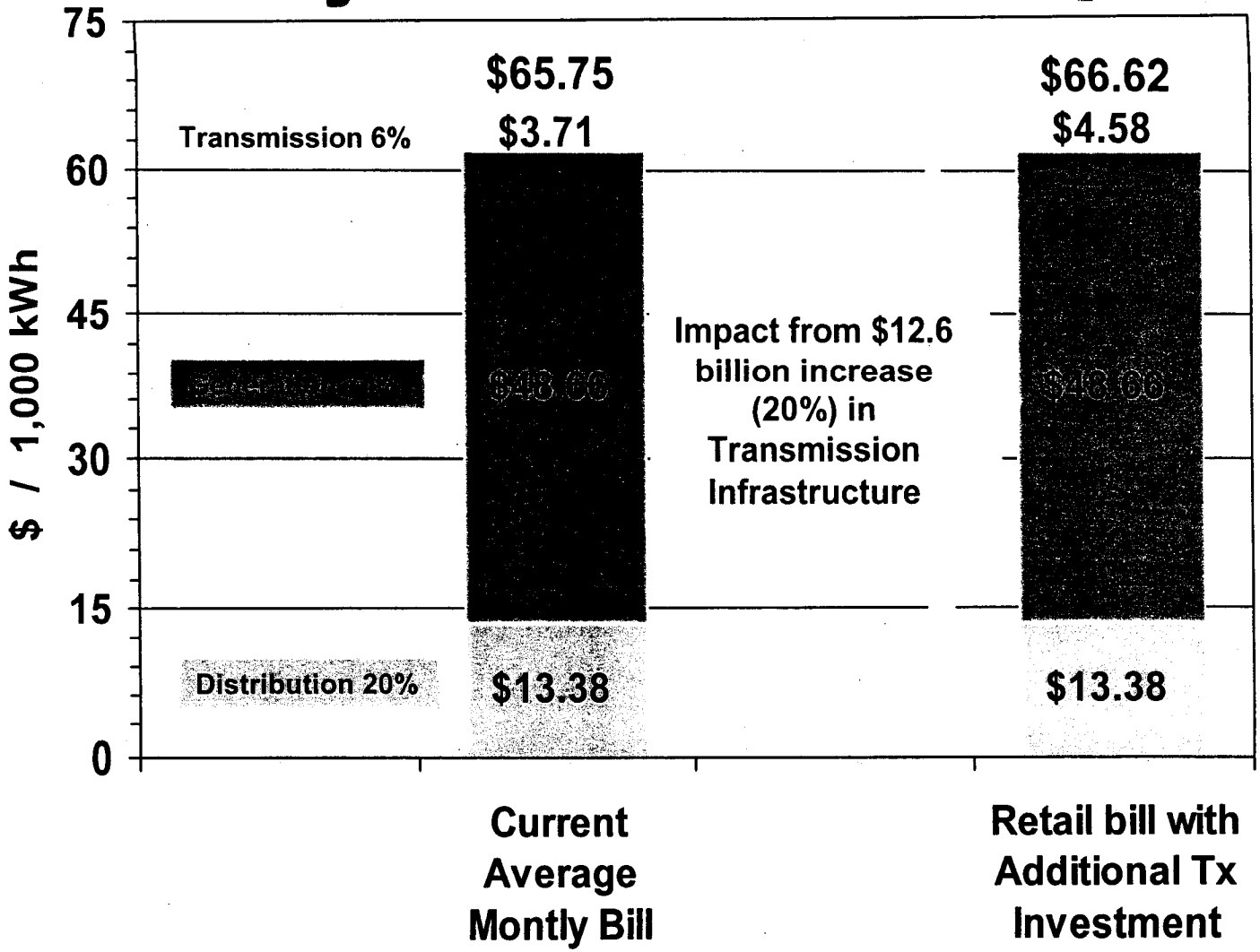
Criteria are region-specific and not used in every case

Transmission Constraints in the Contiguous U.S.

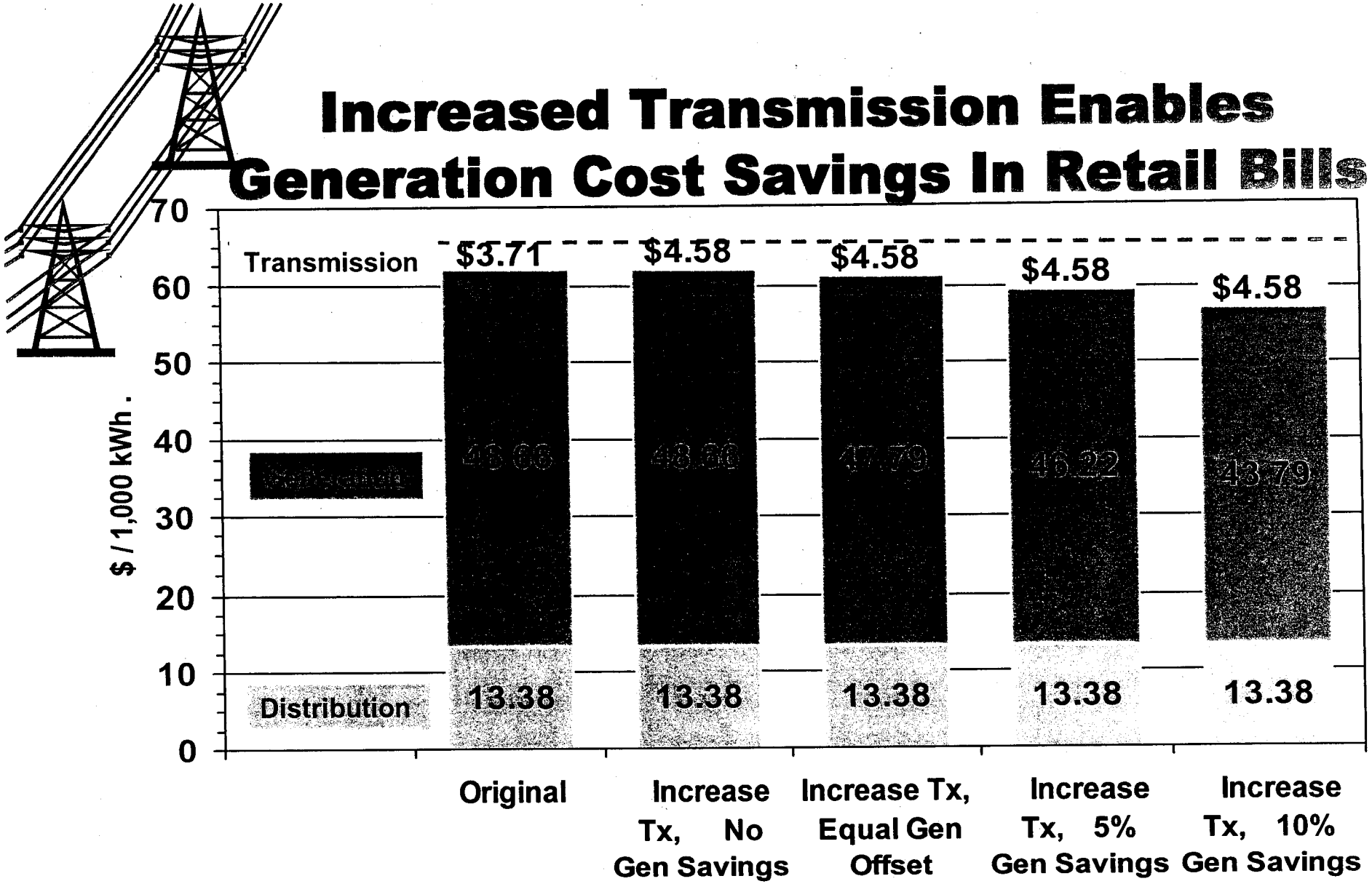


		Est. Cost (in Millions of Dollars)	
Region	Constraint	Summer 2000	Summer 2001
Northeast	Southeast PA (PJM)	$ 10.8	$ 16.0
	East NY (NYISO)	724.7	64.6
	SW CT Interface (ISO-NE)	8.4	4.0
	Northeast of Boston (ISO-NE)	16.1	16.0
Eastern Interconnection	Southwest MI (ECAR)	0.0	0.3
	West VA/PJM Interface (ECAR)	0.0	20.0
	Southeast West VA (ECAR)	1.5	3.0
	Central MO (MAIN)	1.2	0.6
	Central IA (MAPP)	0.0	0.5
	East KS/MO Interface (SPP)	0.0	1.7
West	Central CA (CAISO)	20.0	0.6
	Southern CA (CAISO)	77.6	0.3
	WY/ID Interface (WSCC)	17.3	18.0
	Northeast AZ (WSCC)	2.4	0.8
	Pacific DC Intertie (WSCC)	7.5	0.0
	CA/OR Interface (WSCC)	11.0	0.0

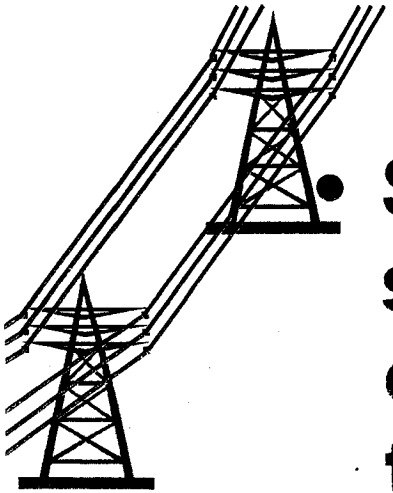
Large Transmission Investments Have Very Small Retail Bill Impacts



Increased Transmission Enables Generation Cost Savings In Retail Bills



Net Retail Bill Impact	Total	$65.75	$66.62	$65.75	$64.18	$61.75
	Net Impact	$0.00	+ $0.87	$0.00	- $1.57	- $4.00
	Change	0%	+ 1.5%	0%	- 2.4%	- 6.1%



Conclusions

- Staff has identified a number of significant transmission constraints that increase costs to Customers
- Exact costs are difficult to quantify and are generally underestimated
- Costs to add new transmission are relatively small for average retail bill
- Benefits in overall energy bills are potentially quite large