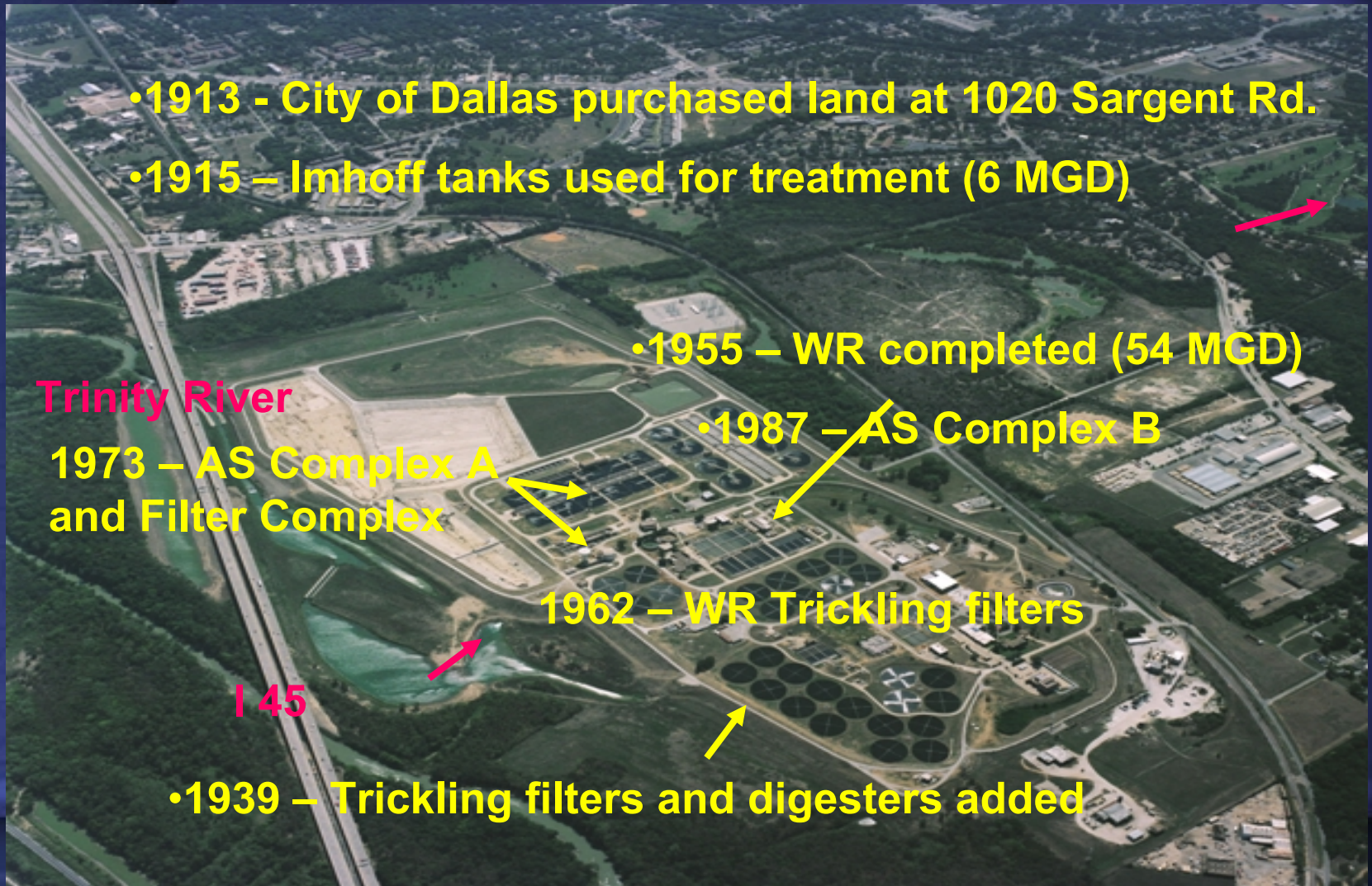


Our electrical bill is how much?

Central Wastewater Treatment  
Plant Electrical Evaluation

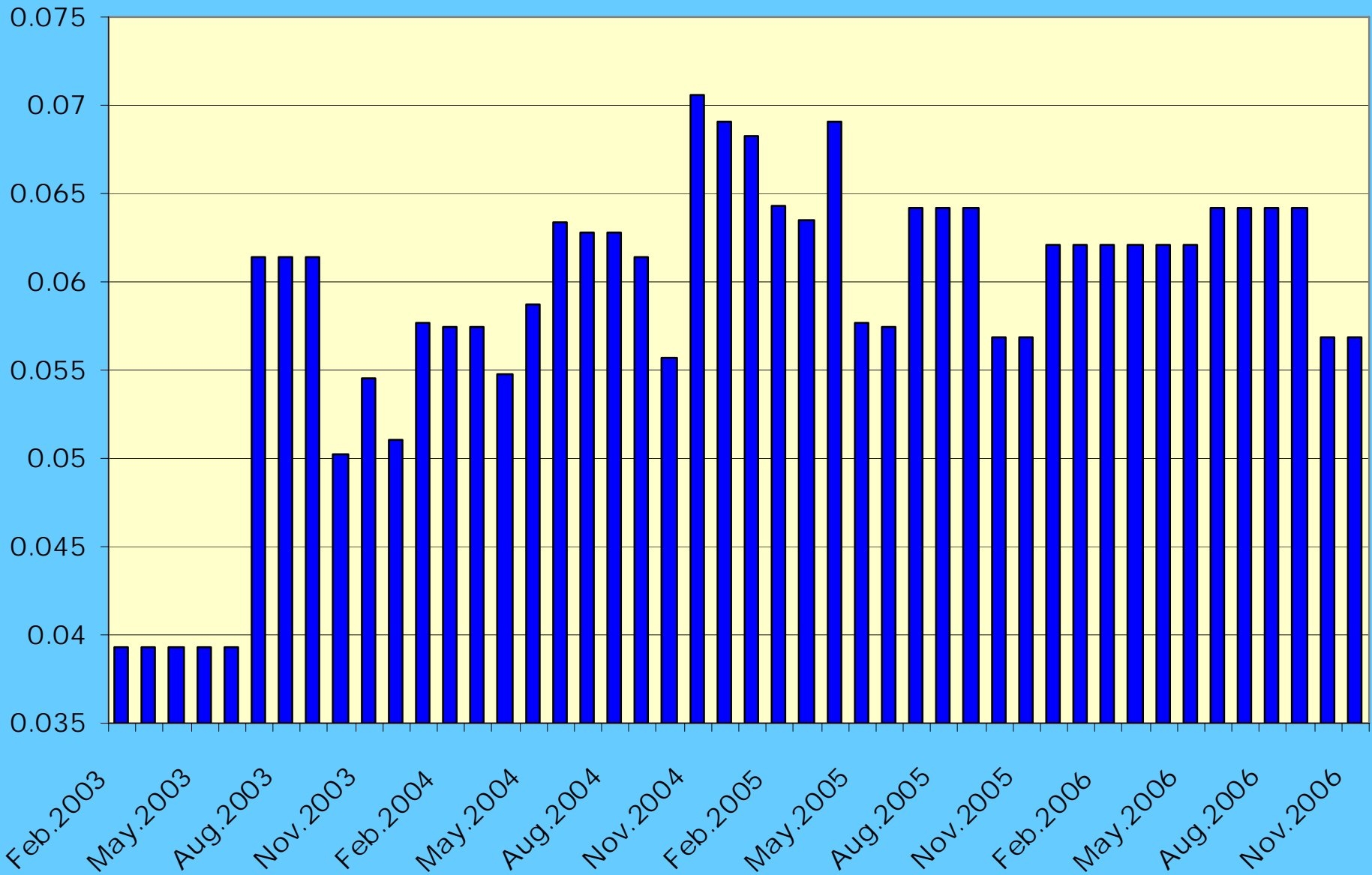
# Central WWTP – Dallas, TX

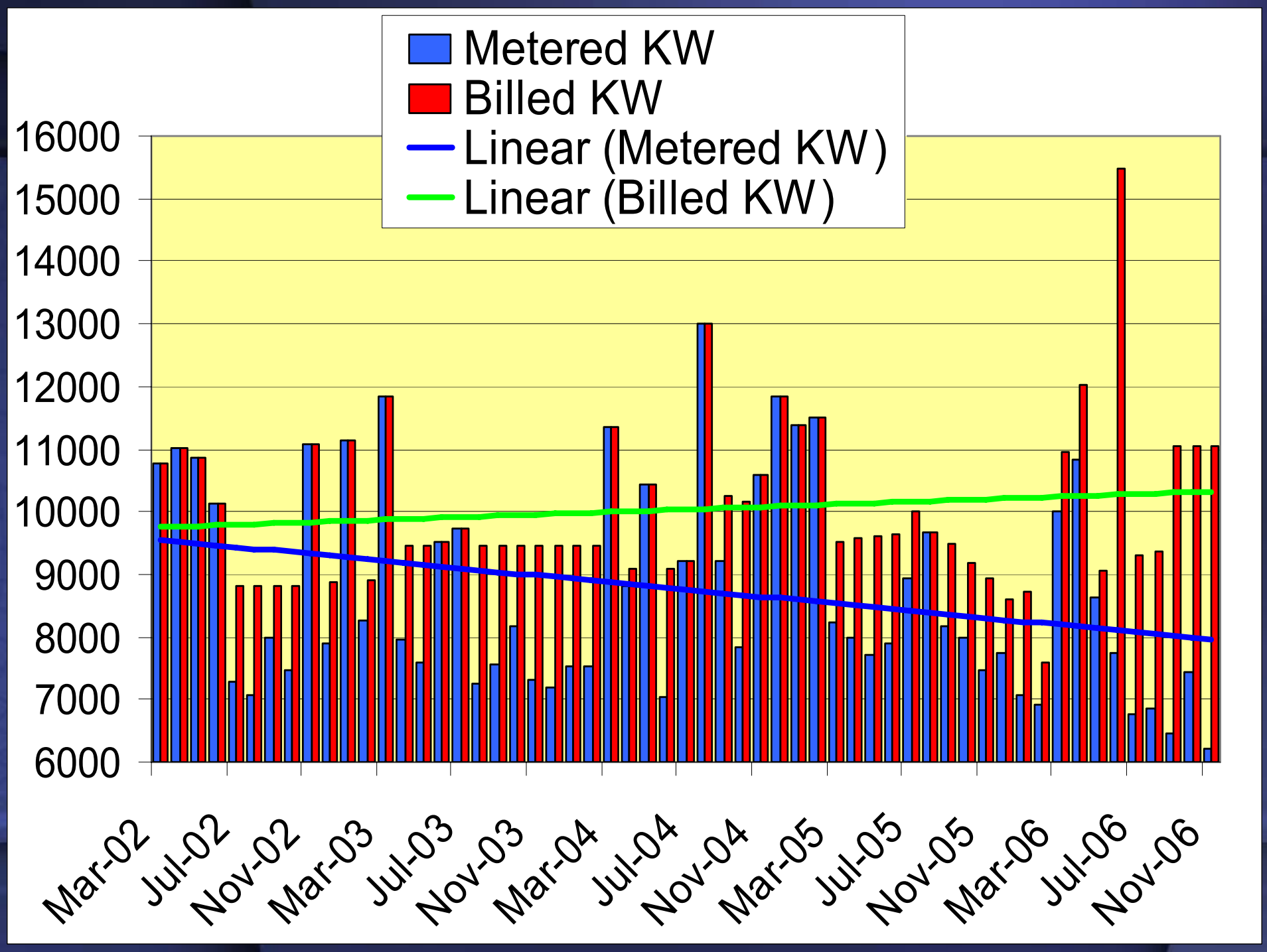


The quest for understanding our electrical bill started with two simple questions:

- **Why are we over the budget?**
- **How much should we budget for next year?**

# Cost / KWH







# Why the difference between actual and billed demand?

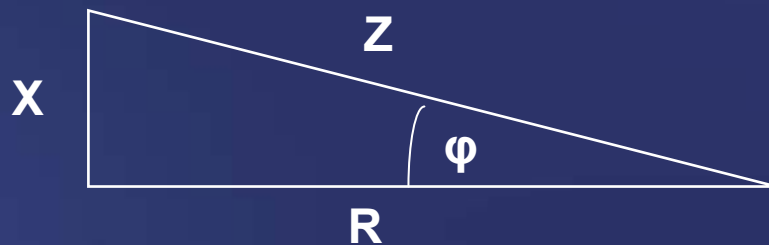
- Power Factor
- 80% Ratchet

# Power Factor (PF)

- PF value is always between 0.0 and 1.0
- Utilities supply customers with volt-amperes, but bill them for watts
  - watts = volts x amperes x **power factor**
- Since 2003 PF penalty is charged to customers with PF lower than 0.95
- The PF billed is the PF measured at 15 min interval during the peak KW demand
- PF at peak is not necessarily the lowest PF of the month

# Power Factor (PF) – cont.

- $PF = \cos\phi = R / Z$



- R – Actual (working) Power [KW]
- X – Reactive Power [kVAR]- circulates between generator and load to excite and sustain magnetic field. It does not perform work, yet the utilities' transmission and distribution system must be large enough to provide
- Z – Apparent Power [kVA] – working and reactive power make up apparent power.

# The Pilsner PF study



**Power lines (glass)  
have to be larger to  
carry all current**

# Power Factor – cont.

- PF can be leading or lagging (equipment with leading PF can offset equipment with lagging PF)
- PF at our plant is lagging and is corrected by capacitors
- Capacitors capture and reflect reactive power back to the motor
- Capacitors should be installed near the equipment responsible for low PF

# 80% Ratchet

- It represent 80% of the highest demand in the 11 months preceding the currently billed month
- The TDSP (transmission and /or distribution service provider) calculates regulated charges based on this number or actual demand (which ever is higher)

Highest Demand in 11 months = 10843

80% Ratchet = 8674

TX 8 TIER PRODUCT

					ACTUAL DEMAND	6860
					kWh USAGE	4,071,444
					SERVICE PERIOD	07-03-2006 to 08-01-2006
					CUSTOMER SINCE	07-05-2005

READ DATE	METER NUMBER	PREVIOUS RD	PRESENT RD	MULT	USAGE	POWER FACTOR
8/1/06	004452207WE	52,700.30	53,742.80	1080	1,125,902.16	0.8810
8/1/06	004452208WE	23,623.00	23,623.00	1080	0.00	0.8810
8/1/06	004452209WE	45,244.69	47,971.72	1080	2,945,192.40	0.8810
8/1/06	004452210WE	26,840.18	26,840.50	1080	349.92	0.8810

**ENERGY CHARGES**

Monthly Charge		\$10.00
Summer On Peak	1,893,503.52 kWh x \$0.0739	\$139,929.91
Summer Off Peak	2,177,940.96 kWh x \$0.05437	\$118,414.65
Aggregation Fee	\$258,354.56 x 0.48%	\$1,240.10
<b>ENERGY CHARGES SUBTOTAL</b>		<b>\$259,594.66</b>

**PF penalty  
=0.95/0.8810=1.078**

<b>TAXES</b>		
Reimbursement of Misc. Gross Receipts Tax / Fee	\$259,594.66 x 1.997%	\$5,184.11
<b>ENERGY TAXES SUBTOTAL</b>		<b>\$5,184.11</b>

**TOTAL ENERGY CHARGES**

**\$264,778.77**

**UTILITY CHARGES**

Metering Charge	<b>8674 x 1.078 = 9353</b>	\$41.56
Distribution Charge	9,353.00 x \$2.96	\$27,684.88
Transmission Cost Recovery Factor	7,138.00 x \$0.17627	\$1,258.22
Transmission Charge	7,138.00 x \$1.43	\$10,207.34
Aggregation Fee	\$39,192.00 x 0.48%	\$188.12
<b>UTILITY CHARGES SUBJECT TO SALES TAX SUBTOTAL</b>		<b>\$39,380.12</b>

**6830 x 2.96 = 20305.6**

**-\$7379.28**

**-\$35.42**

<b>TAXES</b>		
Reimbursement of Misc. Gross Receipts Tax / Fee	\$39,380.12 x 1.997%	\$786.42
<b>UTILITY TAXES SUBTOTAL</b>		<b>\$786.42</b>

**-\$151.11**

Transition Charge	9,353.00 x \$0.164	\$1,533.89
Nuclear Decommissioning	9,353.00 x \$0.045	\$420.89
System Benefit Fund	4,071,443.00 kWh x \$0.000637	\$2,593.51
TRANSITION CHARGE 2	9,353.00 x \$0.336	\$3,142.61

**-\$408.85**

**-\$112.19**

**-\$837.65**

**-\$8924.5**

**UTILITY CHARGES NOT SUBJECT TO SALES TAX SUBTOTAL \$7,690.90**

**TOTAL UTILITY CHARGES**

**\$47,857.44**

**TOTAL CURRENT CHARGES**

**\$312,636.21**

LATE PAYMENT CHARGE		\$0.66
FINANCE CHARGE		\$0.09
<b>LATE PAYMENT/FINANCE CHARGES SUBTOTAL</b>		<b>\$0.75</b>

**TAXES**

Reimbursement of Misc. Gross Receipts Tax / Fee	\$0.75 x 1.997%	\$0.01
<b>LATE PAYMENT/FINANCE TAXES SUBTOTAL</b>		<b>\$0.01</b>

**TOTAL LATE PAYMENT/FINANCE CHARGES**

**\$0.76**

**TOTAL AMOUNT DUE TO Constellation NewEnergy, Inc.**

**\$312,636.97**

# Why undertake PF correction?

- It will save you \$\$\$ (it will not conserve energy)
- PF correction does result in a reduction of resistance within the plant distribution system
- Low PF is an effective indicator of a problem within the electrical system

Date	PQM	PQM	KWH/day	price/KWH	price/day	# of blowers
	line A	line B				
	Power F	Power F	Total		\$	in use
7/28/2004	0.97	0.97	56971	0.06379	3634.18	2(2&3)
7/29/2004	0.98	N/A	45625	0.06379	2910.419	2(1&2)
7/30/2004	0.98	N/A	57258	0.06379	3652.488	2(1&2)
8/2/2004	0.98	N/A	56297	0.06379	3591.186	2(1&2)
8/4/2004	0.98	N/A	54702	0.06379	3489.441	2(1&2)
8/6/2004	0.98	N/A	55302	0.06379	3527.715	2(1&2)
8/9/2004	0.98	N/A	52282	0.06379	3335.069	2(1&2)
8/10/2004	0.98	0.85	50952	0.06379	3250.228	2(1&5)
8/11/2004	0.98	0.85	50005	0.06379	3189.819	2(1&5)
8/12/2004	0.98	0.87	52577	0.06379	3353.887	2(1&5)
8/13/2004	0.98	0.87	53595	0.06379	3418.825	2(1&5)
8/16/2004	0.98	0.85	50980	0.06379	3252.014	2(1+5)
8/18/2004	0.98	0.84	48334	0.06379	3083.226	2(1+5)
8/23/2004	0.98	0.97	54639	0.06379	3485.422	2(1+3)
8/24/2004	0.98	0.97	54086	0.06379	3450.146	2(1+3)
8/25/2004	0.98	0.97	54626	0.06379	3484.593	2(1+3)
8/26/2004	0.97	0.97	55630	0.06379	3548.638	2(2+3)
8/27/2004	0.97	0.97	56160	0.06379	3582.446	2(2+3)
8/30/2004	0.97	0.97	56621	0.06379	3611.854	2(2+3)

# WHITE ROCK RAW SEWAGE PUMP STATION

Date	PQM North	PQM South	KW H/day Total	price/KW H	price/day \$
	Power F	Power F			
6/30/2004	0.39	0.81	15750	0.06379	1004.693
7/1/2004	0.39	0.81	16212	0.06379	1034.163
7/2/2004	0.39	0.81	13865	0.06379	884.4484
7/6/2004	0.4	0.77	11431	0.06379	729.1835
7/7/2004	0.39	0.8	12663	0.06379	807.7728
7/8/2004	0.4	0.8	10896	0.06379	695.0558
7/9/2004	0.38	0.79	9331	0.06379	595.2245
7/12/2004	0.39	0.8	7346	0.06379	468.6013
7/13/2004	0.38	0.78	8481	0.06379	541.003
7/13/2004	0.39	N/A	14847	0.06379	947.0901
7/19/2004	0.4	0.75	7593	0.06379	484.3575
7/20/2004	0.39	0.75	7593	0.06379	484.3575
1/3/2007	0.97	0.98	8125	0.06379	518.2938
1/5/2007	0.94	0.98	10317	0.06379	658.1214
1/9/2007	0.96	0.98	7883	0.06379	502.8566



# Electrical Consumption Distribution at CWWTP

- Aeration Blowers.....35.3%
- ASIPS.....13.2%
- WRRSPS.....7.6%

# PQM Units



# High Mast Lighting



# Stop living in the dark!

- **Evaluate your electrical bill**
- **Install Power Quality Monitoring Units (PQM)**
- **Identify the biggest electrical users at your facility**
- **Determine how you compare against industry standards (typical AS Plant 1250 – 1800 KWH/MG)**
- **Educate your employees**

Thank you for your time!

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[http://www.txuelectricdelivery.com/electricity/metering/power\\_factor/default.asp](http://www.txuelectricdelivery.com/electricity/metering/power_factor/default.asp)

<http://www.puc.state.tx.us/electric/rates/TDR.cfm>