

Understanding kW and kWh



Demand & Energy



● Demand (kW)

- ▶ Also known as power
- ▶ The rate at which electricity is consumed
- ▶ PGN measures demand in 15 minute intervals (1:00, 1:15, 1:30, 1:45, etc.)
- ▶ Demand is average kW over that interval

“The Speedometer Analogy”

kW = speed (mph)

kWh = distance (miles)

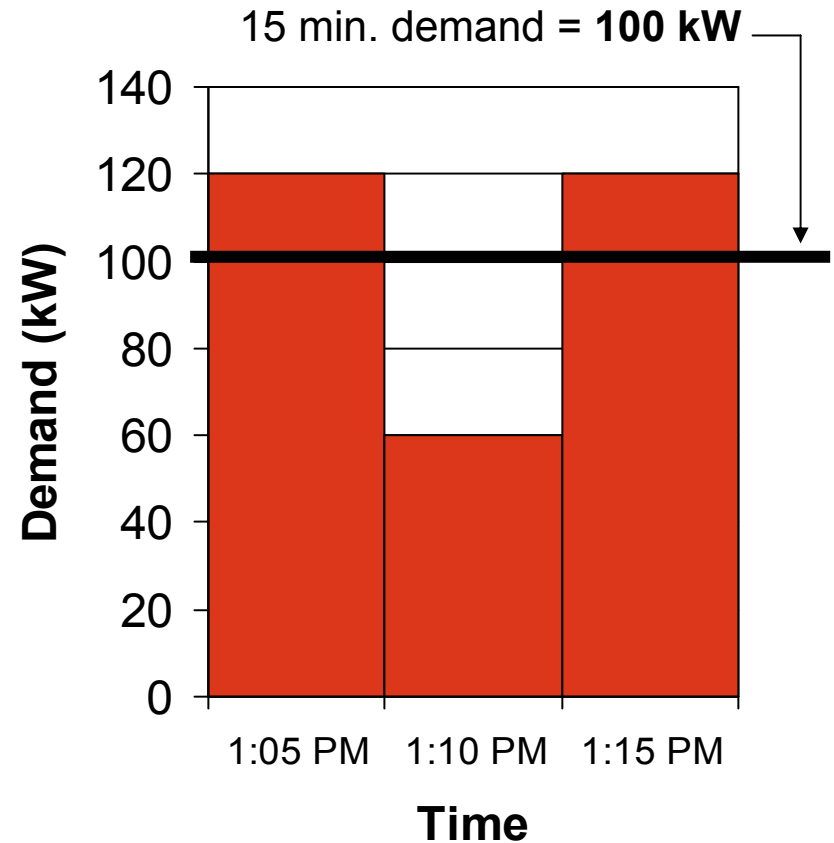


● Energy (kWh)

- ▶ Amount of electricity consumed over a period of time
- ▶ One kWh is equivalent to one kW of power used over a one hour period of time

The Demand Interval

- Integrated average over the 15 minute interval
- Not an instantaneous peak
- Not caused by motor current inrush
- Not the peak for 1 minute or 5 minutes
- This example - the 15 minute demand is 100 kW

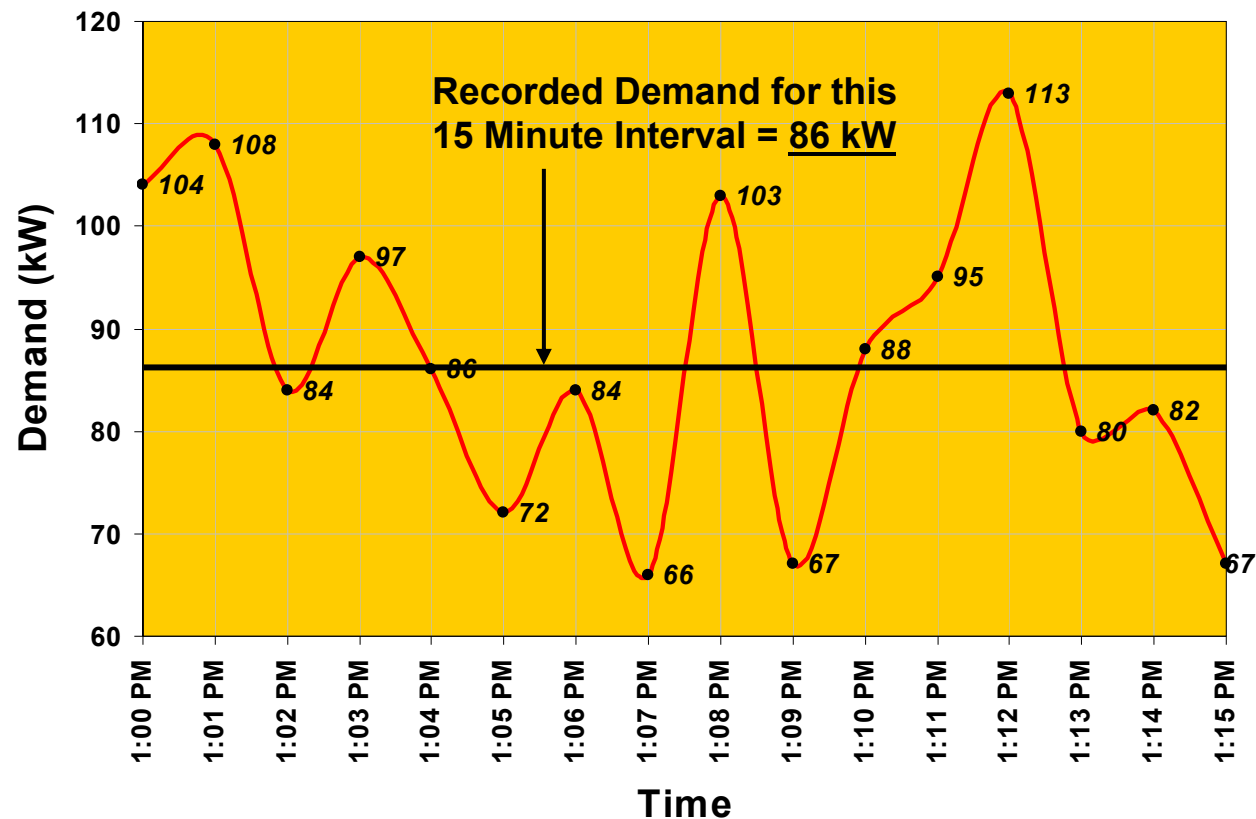




Demand in the Real World

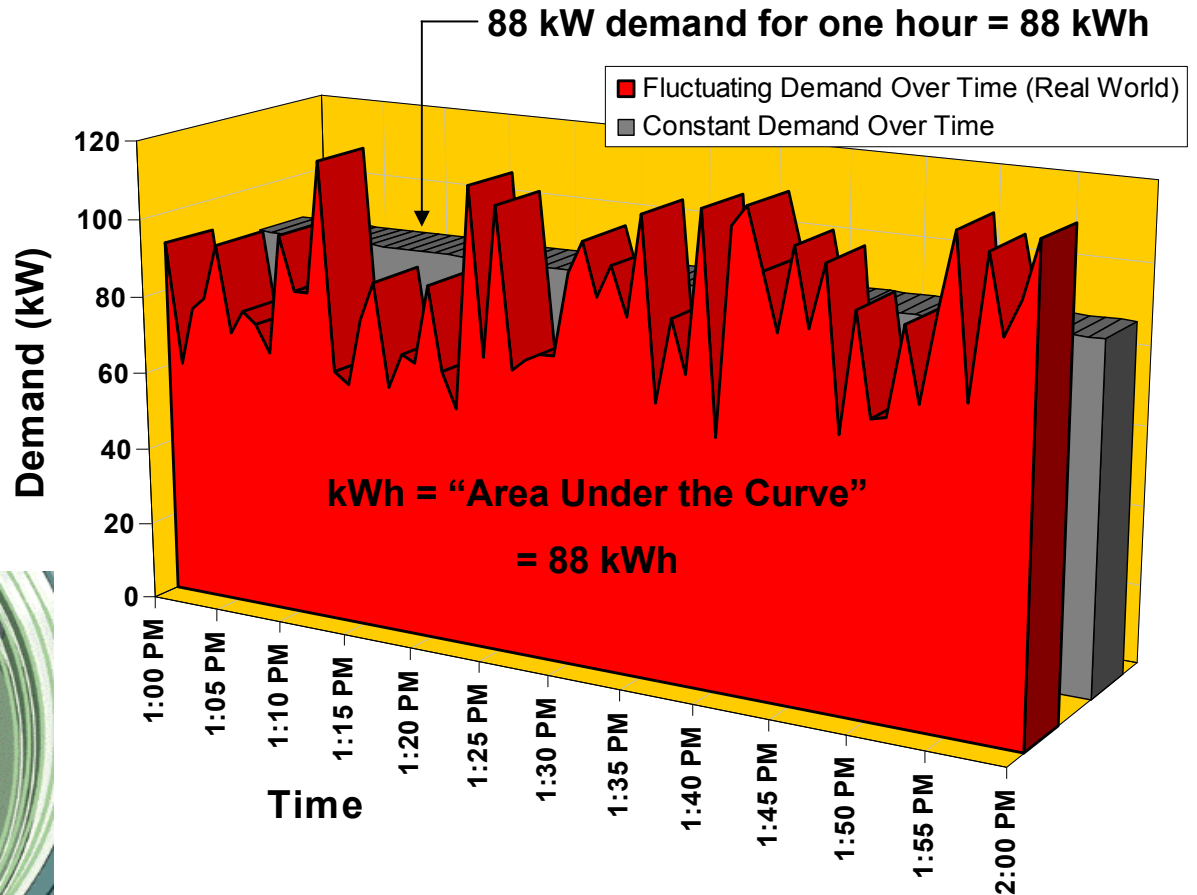
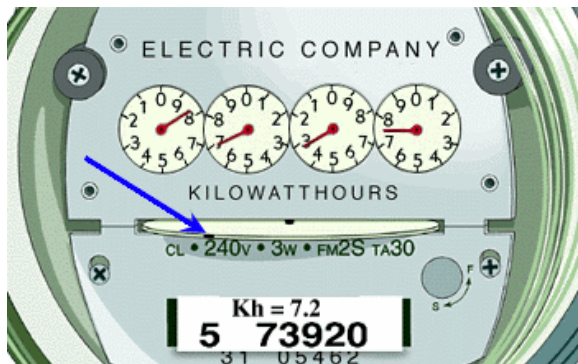
- In the real world, demand measured at the utility meter is continuously changing over time.
- High rates of power consumption in the interval impact the integrated average, but don't set the "peak".

Actual demand for this example = 86 kW (Not 113 kW).



Measuring Energy Use

- Energy use is simply power (or demand) used over time
- Electric meter integrates the power over a fixed time interval



C&I Rate Availability



- ▶ Three General Service Rates
 - ◆ **Small General Service (SGS)**
 - ◆ Medium General Service (MGS)
 - ◆ Large General Service (LGS)
- ▶ Two Time-of-Use Rates
 - ◆ **Small General Service Time-of-Use (SGS-TOU)**
 - ◆ Large General Service Time-of-Use (LGS-TOU)
- ▶ Same rates in NC & SC, but demand and energy charges vary for each state

MGS Example



- Billing Month - July
- Billing Demand - 342 kW
- Energy Consumption - 84,600 kWh

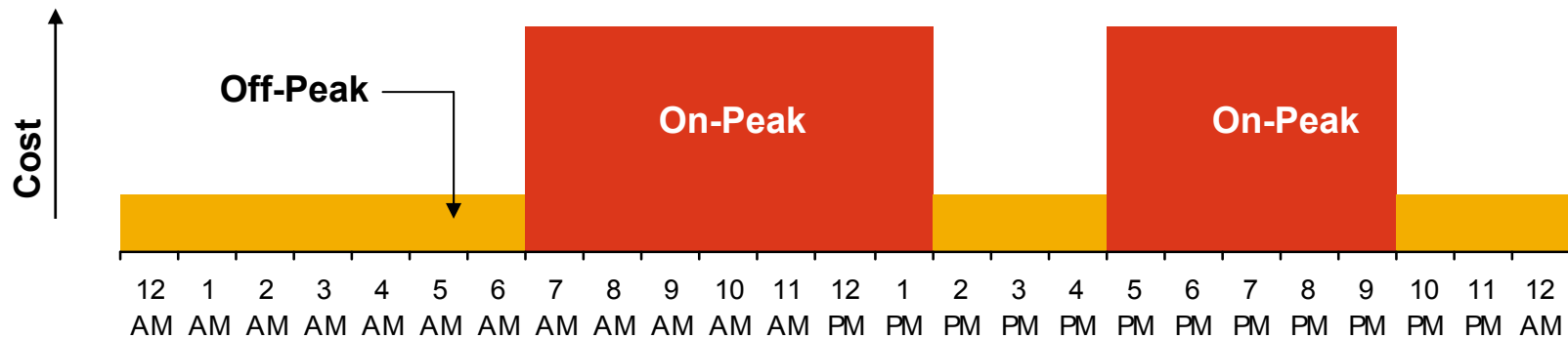
Customer Charge (3 ph service)				=	\$	21.00
Demand Charge	342 kW	x	\$ 4.89	=	\$	1,672.38
On-Peak Energy Charge	84,600 kWh	x	\$ 0.06195	=	\$	5,240.97
3% NC Sales Tax					\$	208.03
TOTAL DUE					\$	7,142.38

Time-of-Use Hrs - Non-Summer

On-Peak Hours for Commercial & Industrial TOU Customers

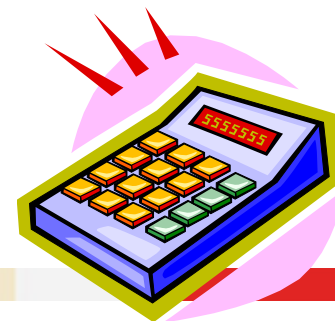
Non-summer Hours – October 1 through March 31

Monday through Friday, 6 AM – 1 PM and 4 PM – 9 PM



Weekends and holidays are off-peak

SGS-TOU Example

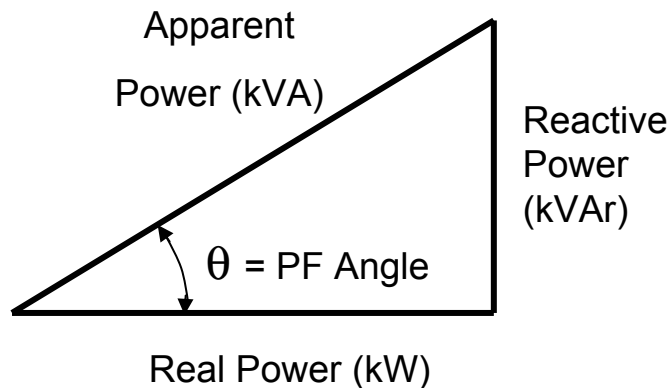


- Billing Month - August
- On-Peak Demand - 432 kW (Aug 30 at 11:15 a.m.)
- Off-Peak Demand - 320 kW (Aug 31 at 9:00 a.m.)
 - Less than On-Peak Demand - No Off-Peak Excess
- On-Peak Energy - 106,800 kWh
- Off-Peak Energy - 136,800 kWh

Customer Charge				=	\$	21.00
Demand Charge	432 kW	x	\$ 10.10	=	\$	4,363.20
On-Peak Energy Charge	106,800 kWh	x	\$ 0.05199	=	\$	5,552.53
Off-Peak Energy Charge	136,800 kWh	x	\$ 0.03996	=	\$	5,466.53
3% NC Sales Tax					\$	462.10
TOTAL DUE					\$	15,865.36

Power Factor

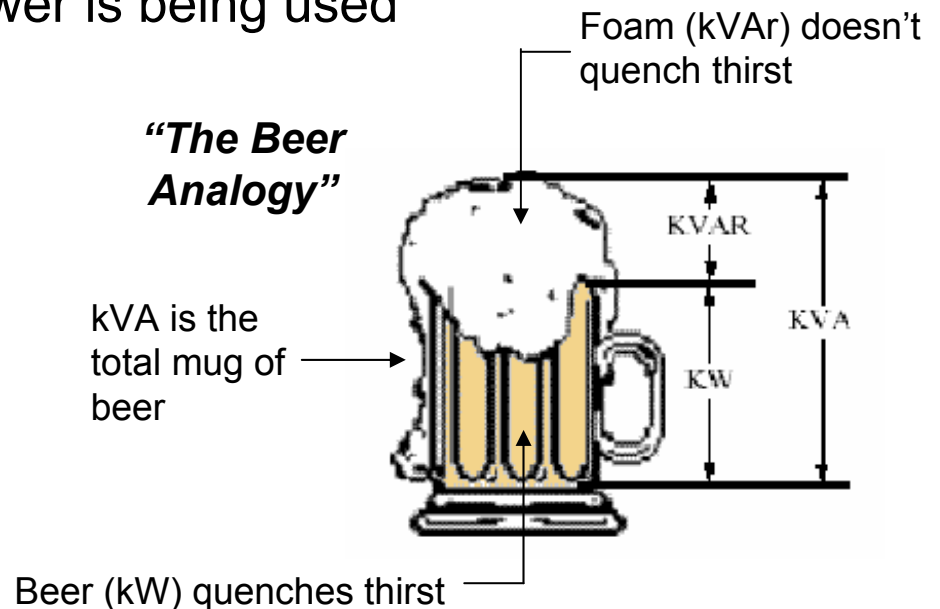
- **Apparent Power (kVA)** - Total power provided by utility or generation
- **Reactive Power (kVAr)** - Sustains electromagnetic field in inductive loads (I.e. motors, transformers, ballasts)
- **Real Power (kW)** - Performs the actual work (I.e. motors, lights, heat)
- Indicator of how effectively power is being used



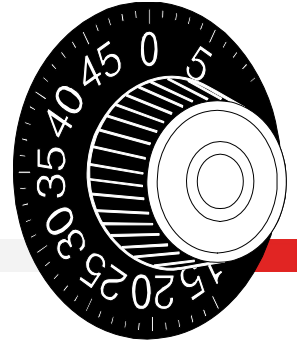
$$\text{PF} = \text{Real Power} / \text{Apparent Power}$$

$$\text{PF} = \text{kW} / \text{kVA} = \cos \theta$$

“The Beer Analogy”

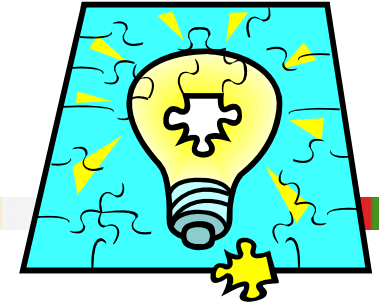


Power Factor Adjustment



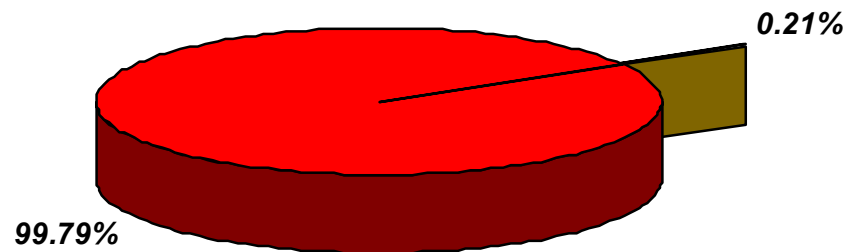
- Covers the cost of providing reactive power (kVAr) below a predetermined baseline
- Progress Energy baseline PF is 85%
- $\$.40 \times (\text{Max Monthly kVAR} - (\text{Max Monthly kW} \times 62\%))$
- Differences in cost are determined by each state's utility commission
- Can apply to all rates

Small Piece of the Puzzle



- Only **1.6%** of all large accounts are impacted by power factor adjustment
- The average power factor adjustment makes up only **0.21%** of a customer's total electric bill

■ *Customer, Demand & Energy Charges*
■ *PF Adjustment*





Sample

Customer Bill

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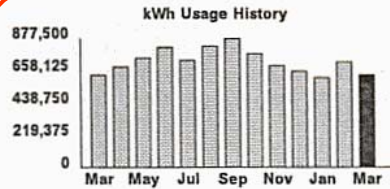
Billing Address

Customer name and address where the bill is sent.

JOHN DOE MANUFACTURING
100 MAIN STREET
ANYWHERE, NC 00000-0000

Electric Usage History

Allows you to compare your electric usage over the past 13 months.



Rate Schedule

Indicates the electric rate for the metered point-of-delivery (POD).

Power Factor Adjustment

This billing adjustment applies if the power factor for the metered service falls below 85% during the billing period.

Billing LGS rate

100 MAIN STREET - 29 Days	
Basic customer charge	
500.00	
Energy charge	639,000 kwh x \$0.03629 23,189.3100
Demand charge	1,282.00 kw x \$11.25000 14,422.5000
Peak kvar	1,537 - (1,282 x 62%) 742.18 kvar x \$0.40000 296.8640

Additional Facilities Charges

Indicates charges for additional facilities or non-metered services for this account. This sample account has two area lighting services in addition to the main POD.

ALS rate 29 Days	
High Pressure Sodium light, 86 kwh, 22000 lumens, enclosed	
Area lighting	1 Light x \$13.75 13.75
Wood pole charge	1 Pole x \$2.16 2.16
ALS rate 29 Days	
High Pressure Sodium lights, 168 kwh, 50000 lumens, flood	
Area lighting	15 Lights x \$24.31 364.65
Wood pole charge	13 Poles x \$2.16 28.08
2.83% North Carolina sales tax 1,098.53	
Total due \$39,915.84	

Please detach here.

Turn over for helpful phone numbers and customer service tips.

Return portion

If your mailing address or phone number has changed, please indicate on the back of this stub.

JOHN DOE MANUFACTURING
100 MAIN STREET
ANYWHERE, NC 00000-0000

Account number
123 456 7890

Make checks payable
and return to:

Progress Energy Carolinas, Inc.
Raleigh NC 27698-0001

Total due \$39,915.84
Current charges past due after Mar 20

Account Summary

Includes your account number, total amount due, due date, and usage period.

Usage Information

Includes the meter number for the point of delivery (POD), meter readings, days in billing period and total kWh usage.

Demand Information

Includes actual peak kW demand, on-peak and off-peak demand, and peak reactive power (kVAR).

Metered Service Charges

Includes service address and charges for all metered POD's.

NC Sales Tax

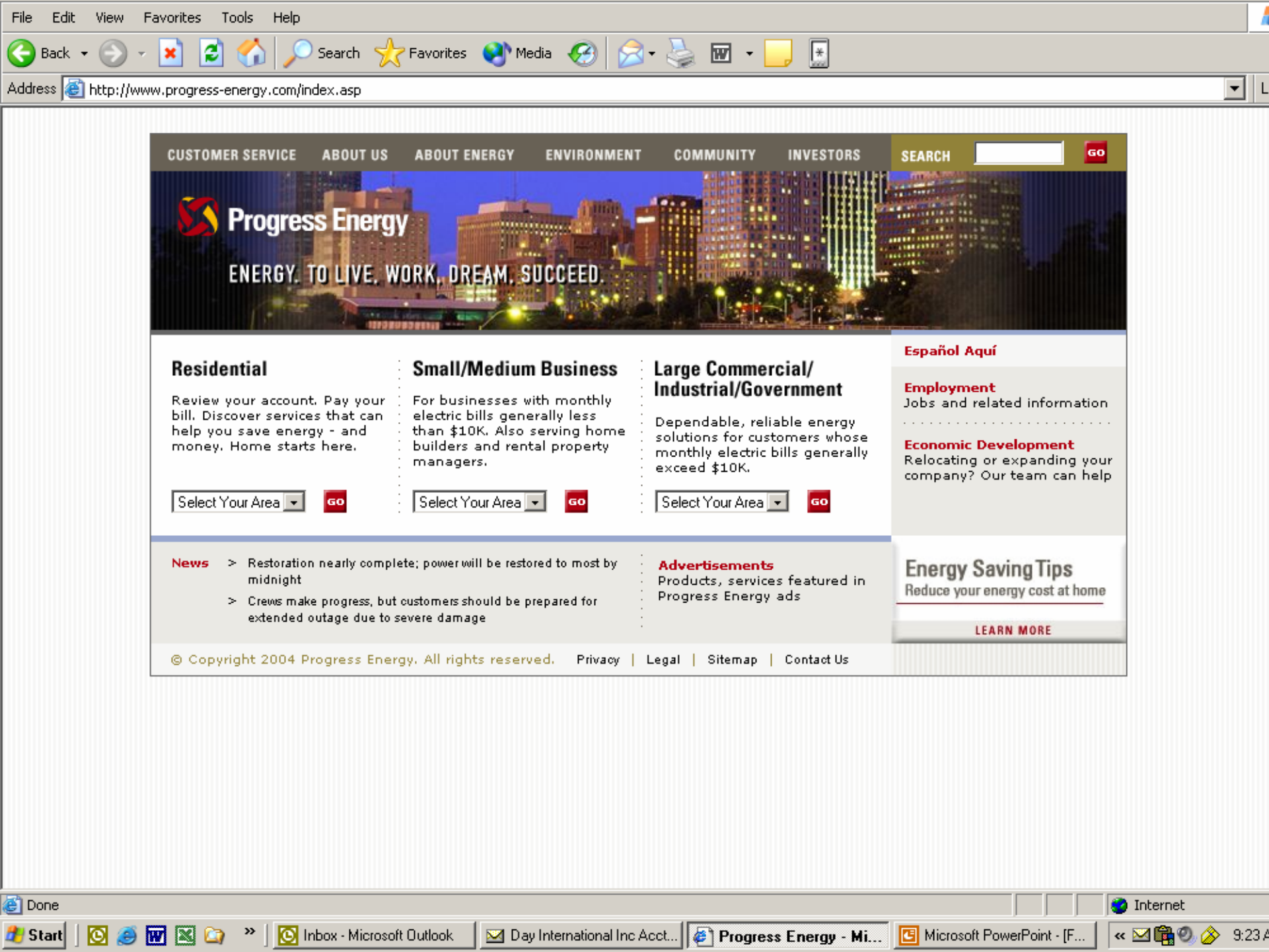
Typically 3%, but a discount of 0.17% is available to qualifying customers from the NC Dept. of Revenue under the provisions of G.S. 105-236(7). Potential qualifying customers include farmers, manufacturing industries, and commercial laundries or dry-cleaning facilities. Qualifying customers should fill out Form E-599U (available from NC Dept. of Revenue web site) and mail it to your account manager.

Total Amount Due

Indicates total amount due for the billing period.

Payment Stub

Return this portion of the bill with your payment.



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