Gas Industry Structure

Producers

Pipelines

Distributors

Customers

Upstream

Marketers/Brokers

LDC

Downstream
Natural Gas Pipelines

Legend
- Blue = Interstate Pipelines
- Red = Intrastate Pipelines

Source: Energy Information Administration, Office of Oil & Gas, Natural Gas Division, Gas Transportation Information System
U.S. NATURAL GAS CONSUMPTION (MMCF) BY MONTH
(2001-2014 AVERAGE)
Note: MMCF/d = million cubic feet per day. Areas shown are not proportional to capacity volumes indicated. Other natural gas transmission pipelines may interconnect with and supplement the supplies of the mainline transmission or local distribution company in the market area to meet peak period demands.

Source: Energy Information Administration, Office of Oil and Gas
Gas Storage

Source: Energy Information Administration, Office of Oil & Gas, Natural Gas Division Gas, Gas Transportation Information System, December 2009.
Diagrammatic cross section of an aquifer storage reservoir:

2. Impermeable cap rock.
3. Upper control aquifer.
4. Gas.
5. Water.
7. Operating well.
8. Upper aquifer observation well.
9. Peripheral observation well.
10. Water level monitoring well.
12. Neutron logging well.
13. Closure.

Burner Tip Price ($/MMBtu)

- Wellhead Price
- Pipeline Charge
- LDC Charge

= Burner Tip Price
Delivery Rates

Regulated Utility Tariff Rates

Transmission (Pipeline Charge) → FERC

Agency

Distribution (LDC Charge) → State/Local
LDC Rate Case

• Utility files proposed rates and supporting evidence
• Other parties challenge and offer alternatives
• Commission makes decision
Annual Gas Rate Case Decisions and Authorized Gas Revenue Increases ($M)
Main LDC Rate Case Issues

- **Class Cost of Service**
  - Volumetric vs. demand allocation

- **Revenue Allocation**
  - Spread of utility revenue requirement among rate classes
Purpose of a Cost-of-Service Study

To measure the responsibility of each class for the service provided by the utility
Typical Rate Classes in a Cost-of-Service Study

- Residential
- General Service
- Large Volume Service
- Interruptible
- Transportation
Cost Study Should Reflect:

- Many different types of cost
- Some customers do not use all of the services provided by an LDC
- Usage patterns affect cost incurrence
Procedure

1) Identify different types of cost
2) Determine causative basis for each type
3) Allocate each item among classes
Functionalization

COSTS
Return, Non-Gas O&M Expenses, Depreciation, Taxes

Production  Storage  Distribution
Classification

Determine the primary causative factor for each type of cost
Classification

- Production
- Storage
- Distribution

- Commodity
- Demand
- Customer
Classification Categories

- Direct assignment
- Number of customers
- Commodity (Mcf or therm usage)
- Demand requirements
  (Maximum rate of usage – Mcf per day)
- Revenue related
# Classification of Plant

<table>
<thead>
<tr>
<th></th>
<th>Customer</th>
<th>Demand</th>
<th>Commodity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Storage</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Distribution</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>General</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tbody>
</table>
### Classification of Expense

<table>
<thead>
<tr>
<th></th>
<th>Customer</th>
<th>Demand</th>
<th>Commodity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Storage</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Distribution</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Customer Acct.</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Admin. &amp; Gen.</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>
Methods of Allocation

- Cost causation
- “Benefits”
- Social / Political Policy
- End results
Demand Allocation Methods

General Criteria

• Cost causation
• Recognize utility’s load characteristics
• Choice of method can be controversial
Demand Allocation Methods

- Coincident Peak
- Non-Coincident Peak
- Average and Excess
- Average and Peak
- Average Demand
# Coincident Peak Allocation Method

<table>
<thead>
<tr>
<th>Category</th>
<th>Mcf</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>54,125</td>
<td>54.00%</td>
</tr>
<tr>
<td>General Serv.</td>
<td>32,000</td>
<td>31.93%</td>
</tr>
<tr>
<td>Interruptible</td>
<td>7,100</td>
<td>7.09%</td>
</tr>
<tr>
<td>Transportation</td>
<td>7,000</td>
<td>6.98%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>100,225</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
Average & Excess Method

System Peak

Excess Demand

Average Demand

Class Peak

Excess Demand

Average Demand
## Average & Excess Method

<table>
<thead>
<tr>
<th></th>
<th>Average Demand %</th>
<th>LF</th>
<th>Excess Demand %</th>
<th>1 - LF</th>
<th>AED %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Res</td>
<td>32.5%</td>
<td>37%</td>
<td>64.9%</td>
<td>63%</td>
<td>52.9%</td>
</tr>
<tr>
<td>GS</td>
<td>29.5%</td>
<td>37%</td>
<td>33.2%</td>
<td>63%</td>
<td>31.8%</td>
</tr>
<tr>
<td>IS</td>
<td>20.9%</td>
<td>37%</td>
<td>0.1%</td>
<td>63%</td>
<td>7.8%</td>
</tr>
<tr>
<td>Transp.</td>
<td>17.1%</td>
<td>37%</td>
<td>1.8%</td>
<td>63%</td>
<td>7.5%</td>
</tr>
</tbody>
</table>
Average & Peak Method

Average Demand

Peak Demand

Double Counted
### Average & Peak Method

<table>
<thead>
<tr>
<th></th>
<th>Average Demand %</th>
<th>LF</th>
<th>Peak Demand %</th>
<th>1 - LF</th>
<th>AEP %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Res</td>
<td>32.5%</td>
<td>37%</td>
<td>58.9%</td>
<td>63%</td>
<td>49.2%</td>
</tr>
<tr>
<td>GS</td>
<td>29.5%</td>
<td>37%</td>
<td>33.7%</td>
<td>63%</td>
<td>32.1%</td>
</tr>
<tr>
<td>IS</td>
<td>20.9%</td>
<td>37%</td>
<td>0.0%</td>
<td>63%</td>
<td>7.7%</td>
</tr>
<tr>
<td>Transp.</td>
<td>17.1%</td>
<td>37%</td>
<td>7.4%</td>
<td>63%</td>
<td>11.0%</td>
</tr>
</tbody>
</table>
## Average Demand or Commodity Allocation Factors

<table>
<thead>
<tr>
<th>Category</th>
<th>Annual Mcf Throughput</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>4,015,479</td>
<td>32.5%</td>
</tr>
<tr>
<td>General Serv.</td>
<td>3,635,714</td>
<td>29.5%</td>
</tr>
<tr>
<td>Interruptible</td>
<td>2,577,034</td>
<td>20.9%</td>
</tr>
<tr>
<td>Transportation</td>
<td>2,114,666</td>
<td>17.1%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>12,342,893</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>
# Coincident Demand vs. Average and Peak

**Distribution Mains Acct. 376 Net Plant - $1,000,000,000**

## Average & Peak Allocation

<table>
<thead>
<tr>
<th>Rate Schedule</th>
<th>Amount</th>
<th>Peak Day Volume</th>
<th>Annual Load Volume</th>
<th>Load Factor</th>
<th>Net Plant $/CCF Peak Day</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>$502,789,056</td>
<td>10,000,000</td>
<td>1,100,000,000</td>
<td>30.1%</td>
<td>$50.28</td>
<td>0.96</td>
</tr>
<tr>
<td>Commercial</td>
<td>$370,697,833</td>
<td>7,000,000</td>
<td>900,000,000</td>
<td>35.2%</td>
<td>$52.96</td>
<td>1.01</td>
</tr>
<tr>
<td>Transportation</td>
<td>$126,513,110</td>
<td>2,000,000</td>
<td>400,000,000</td>
<td>54.8%</td>
<td>$63.26</td>
<td>1.20</td>
</tr>
<tr>
<td>Total</td>
<td>$1,000,000,000</td>
<td>19,000,000</td>
<td>2,400,000,000</td>
<td>34.6%</td>
<td>$52.63</td>
<td>1.00</td>
</tr>
</tbody>
</table>

## Coincident Demand Allocation

<table>
<thead>
<tr>
<th>Rate Schedule</th>
<th>Amount</th>
<th>Peak Day Volume</th>
<th>Annual Load Volume</th>
<th>Load Factor</th>
<th>Net Plant $/CCF Peak Day</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>$526,315,789</td>
<td>10,000,000</td>
<td>1,100,000,000</td>
<td>30.1%</td>
<td>$52.63</td>
<td>1.00</td>
</tr>
<tr>
<td>Commercial</td>
<td>$363,421,053</td>
<td>7,000,000</td>
<td>900,000,000</td>
<td>35.2%</td>
<td>$52.63</td>
<td>1.00</td>
</tr>
<tr>
<td>Transportation</td>
<td>$105,263,158</td>
<td>2,000,000</td>
<td>400,000,000</td>
<td>54.8%</td>
<td>$52.63</td>
<td>1.00</td>
</tr>
<tr>
<td>Total</td>
<td>$1,000,000,000</td>
<td>19,000,000</td>
<td>2,400,000,000</td>
<td>34.6%</td>
<td>$52.63</td>
<td>1.00</td>
</tr>
</tbody>
</table>
## Allocation of System Peak Day Capacity

### Peak Day Capacity (CCF) = 18,744,947

<table>
<thead>
<tr>
<th>Rate Schedule</th>
<th>Coincident Peak Day Demand CCF</th>
<th>Average &amp; Peak Allocated Peak Day Capacity CCF</th>
<th>Surplus/(Shortfall) in Allocated Peak Day Capacity CCF</th>
<th>Surplus/(Shortfall) in Allocated Peak Day Capacity %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Heating Residential</td>
<td>78,779</td>
<td>87,429</td>
<td>8,650</td>
<td>11.0%</td>
</tr>
<tr>
<td>Residential</td>
<td>8,823,800</td>
<td>8,664,723</td>
<td>(159,077)</td>
<td>-1.8%</td>
</tr>
<tr>
<td>Commercial</td>
<td>8,229,751</td>
<td>8,202,764</td>
<td>(26,987)</td>
<td>-0.3%</td>
</tr>
<tr>
<td>Transportation</td>
<td>1,612,617</td>
<td>1,790,031</td>
<td>177,414</td>
<td>11.0%</td>
</tr>
<tr>
<td>Total</td>
<td>18,744,947</td>
<td>18,744,947</td>
<td>-</td>
<td>0.0%</td>
</tr>
</tbody>
</table>
Customer Classification of Distribution Mains

Total Demand = 1,000 Mcf

Total Demand = 1,000 Mcf
Minimum Distribution Method for Deriving Customer Related Component of Distribution Main

1) Diameter of smallest main  
   1.5”

2) Cost/foot of 1.5” main  
   $0.61 / ft.

3) Total length of mains  
   6,385,860 ft.

4) Cost if all mains were 1.5” diameter  
   $3,988,733

5) Actual cost of mains  
   $19,326,453

6) Customer portion  
   (4) / (5)  
   20%
Cost-of-Service Study
Comparison of Allocation Factors
Bypass of an LDC

Wellhead

Pipeline 1

Pipeline 2

Pipeline 3

LDC

Bypass Line

Burner Tip

City Gate

DEK-NKU A-8 Attachment 5
Page 39 of 43
Potential Advantages of Bypass

- Lower price
- Deal directly with pipeline
- Decrease state regulation
- Choice of service
- Sometimes alternate pipeline supplier
Potential Disadvantages of Bypass

- Only one pipeline supplier
- No LDC backup or storage service
- LDC may have excess capacity
- LDC services eliminated
Bypass can often be prevented by cost-based rates