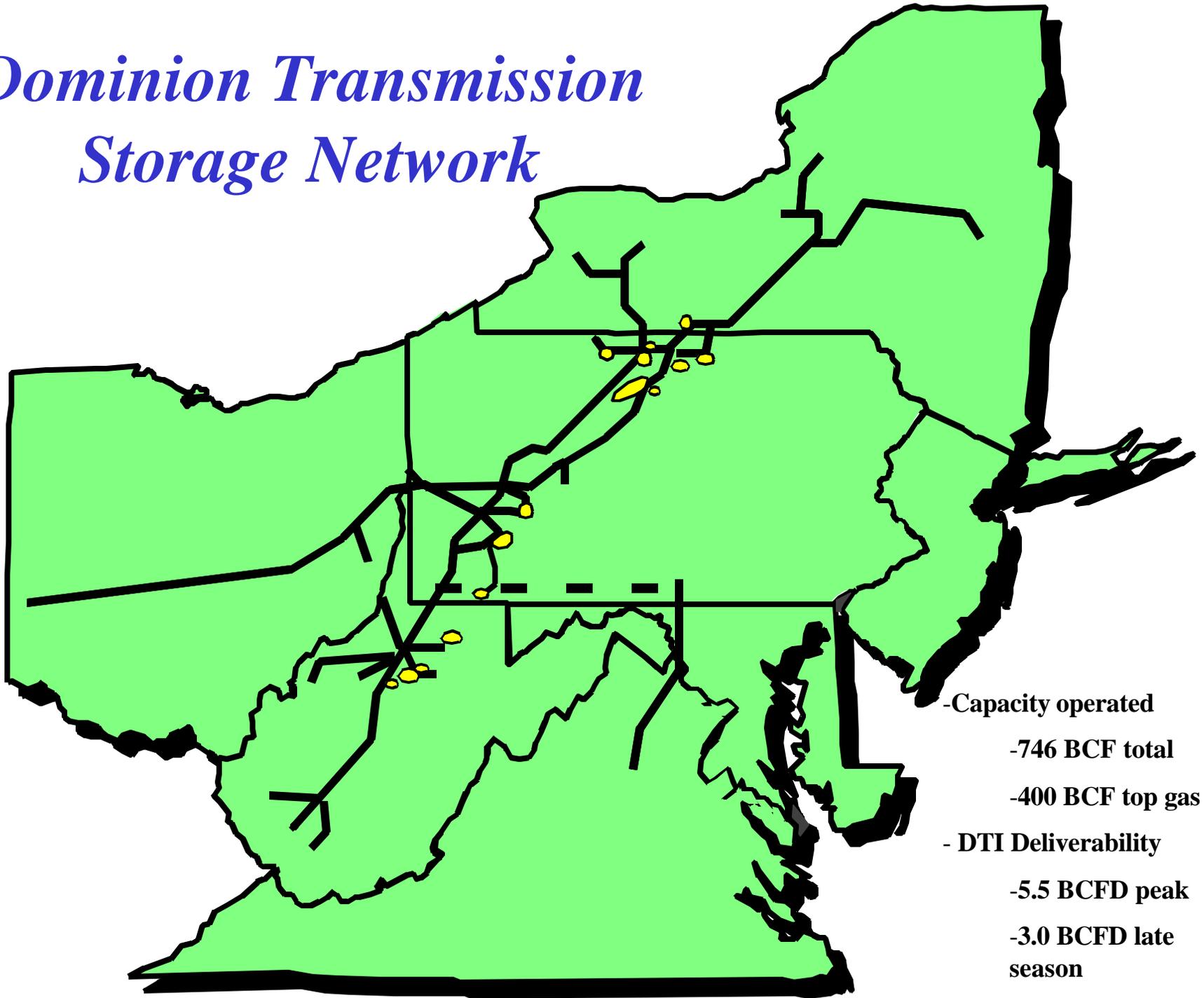


# Department of Energy Natural Gas Storage R&D Workshop

*Dominion Transmission  
Gary L. Sypolt  
Sr. Vice President  
November 29, 2001*



# *Dominion Transmission Storage Network*



# Dominion Transmission Storage Stats

- Total wells 1508
- Average depths 1400 ft-7000 ft
- Reservoir Pressures 500psi-4200psi
- Storage HP 207,265

# Perspectives of Future Gas Storage needs within the Industry

Perspectives of the future are shaped by knowledge of what's worked in the past connected to the creative possibility of the future and tempered with the realities of the competitive options in the marketplace.



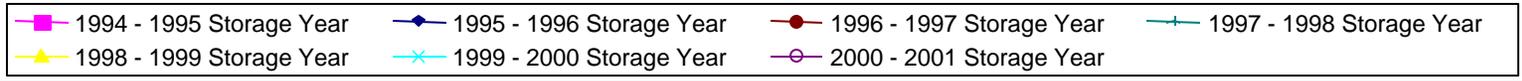
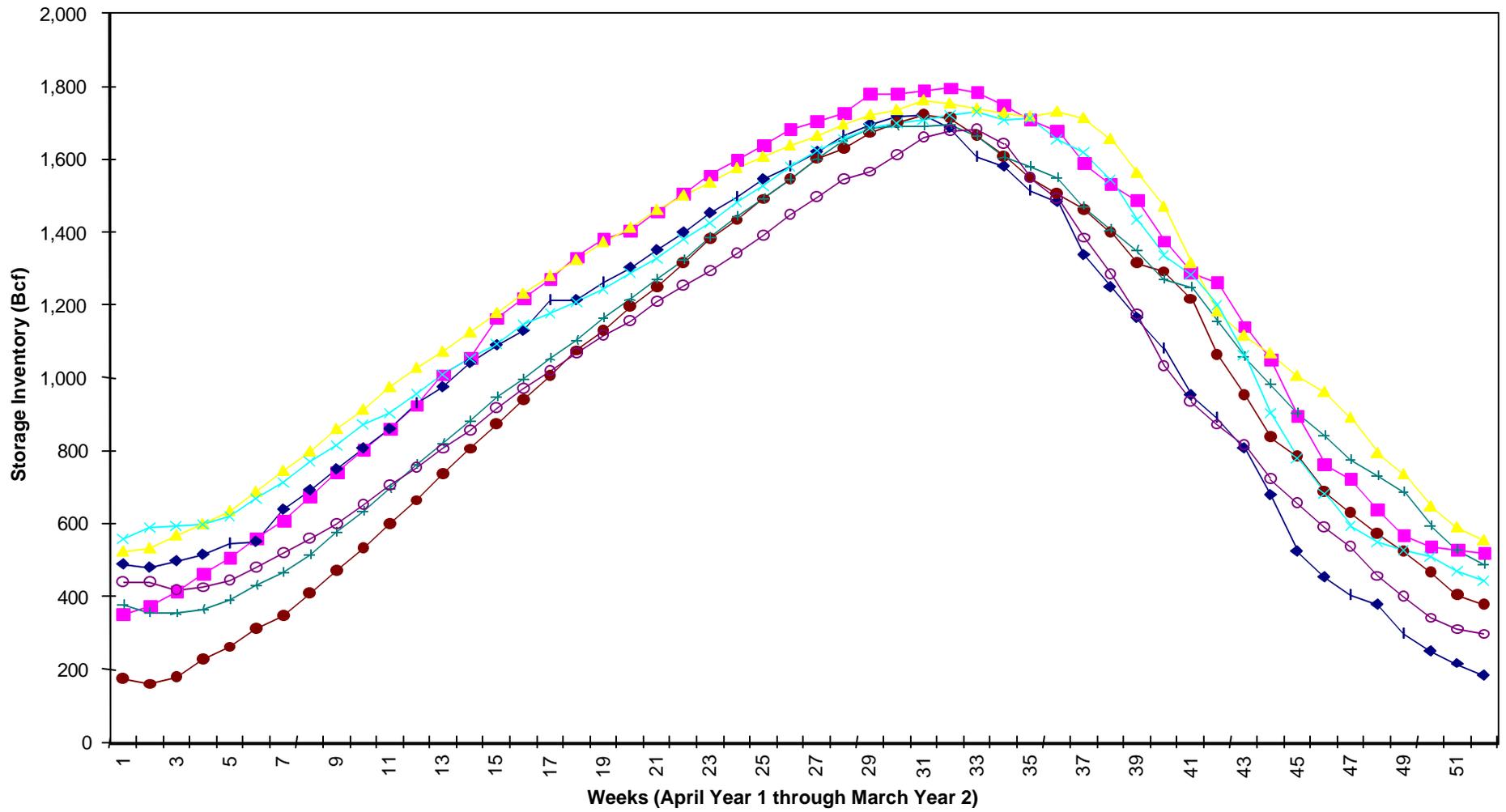
# *DOE Workshop Issue*

*Is the the existing natural gas storage infrastructure adequate to meet current needs?*

# Gas Storage Utilization within the Industry

## Gulf Coast vs. Eastern Markets

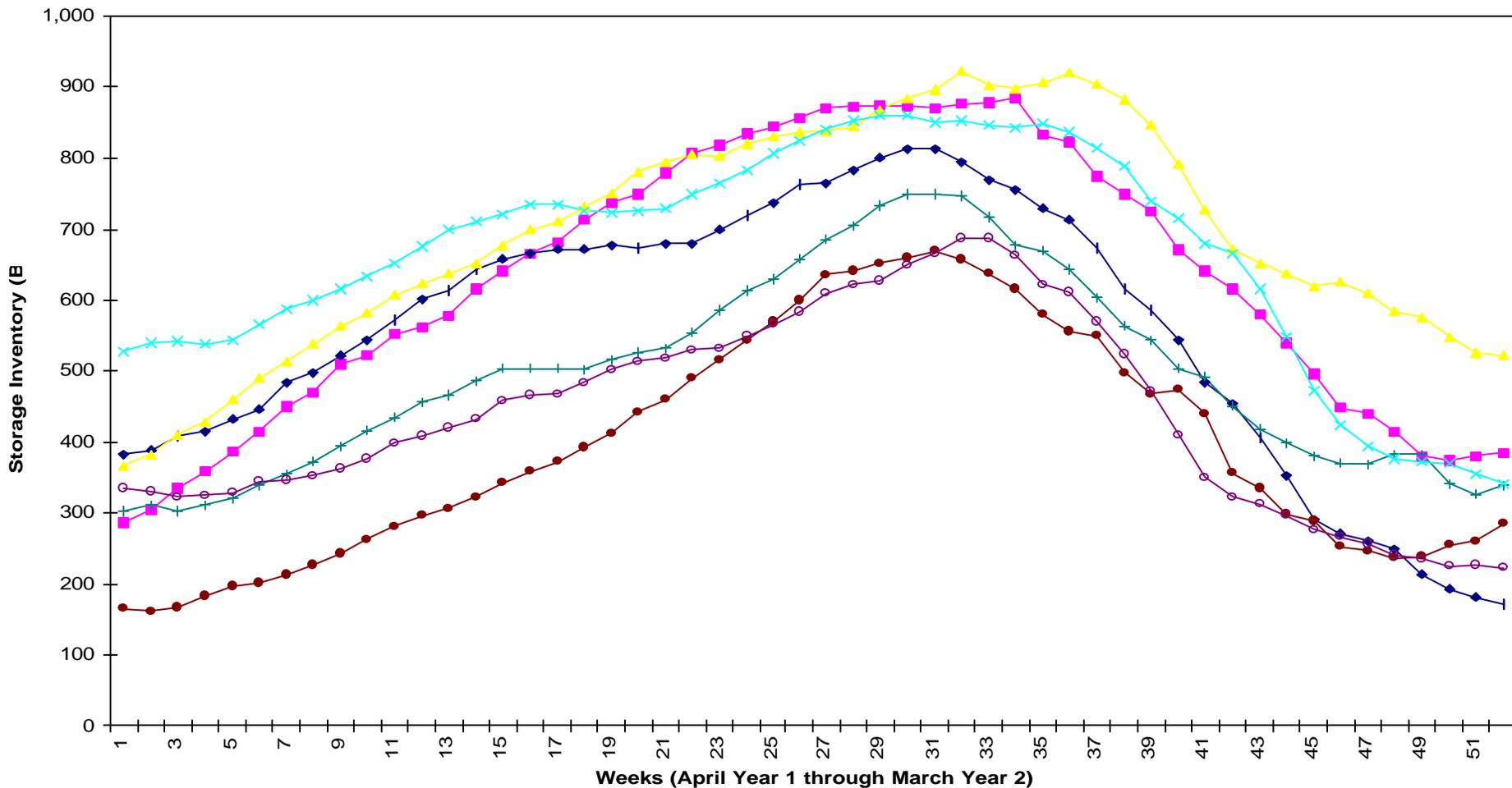
1994 to 2001 Natural Gas Storage  
U.S. Working Gas Level Comparison: East Region



# Gas Storage Utilization within the Industry

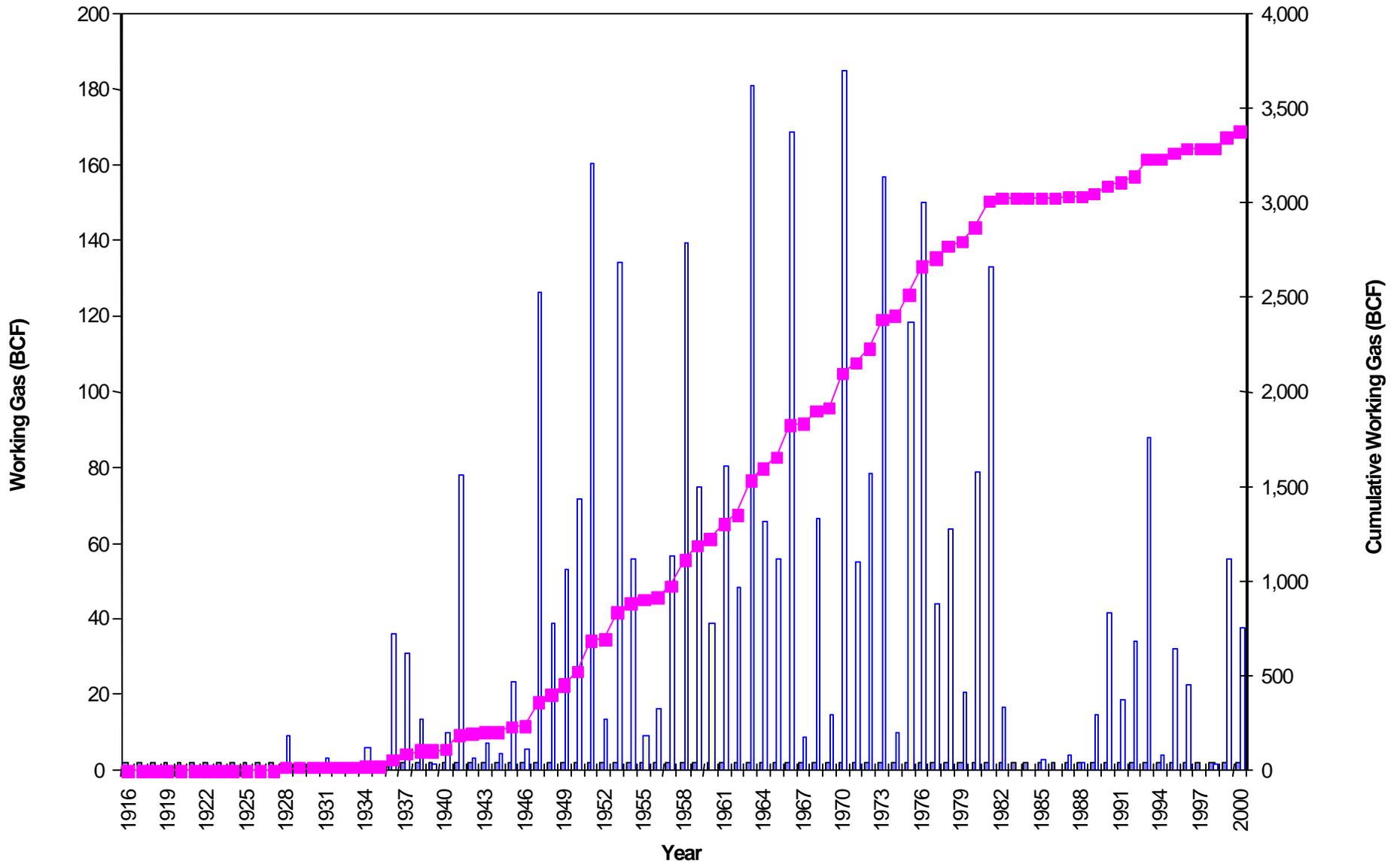
## Gulf Coast vs. Eastern Markets

1994 to 2001 Natural Gas Storage  
U.S. Working Gas Level Comparison: Producing Region



■ 1994 - 1995 Storage Year   
 ◆ 1995 - 1996 Storage Year   
 ● 1996 - 1997 Storage Year   
 + 1997 - 1998 Storage Year  
▲ 1998 - 1999 Storage Year   
 × 1999 - 2000 Storage Year   
 ○ 2000 - 2001 Storage Year

# U.S. Natural Gas Underground Storage Working Gas Capacity Additions



# Gas Storage Infrastructure

- **In total**
  - 444 storage projects
  - 3.4 TCF capacity
  - 82 BCF / day
- **Since 1990**
  - 55 storage projects
  - 440 BCF capacity (13%)
  - 16.6 BCF / day (20%)

# *DOE Workshop Issue*

*What market and technology trends are likely to change storage needs over the next ten years?*

# Market Trends

## Dominion's View

- Market demands more flexibility in storage service
  - Asset managers
  - Marketing companies
  - LDC unbundling (shifting)
- Power Generation market will grow and will require gas storage for load balancing
- Clean air regulations will force fuel conversion creating more storage opportunities



# Market Trends

## Dominion's View

- Storage development activity will be driven by cost
- Customers continue to look at locational value of storage
  - alternative to holding firm transportation on long line pipelines from Supply area
  - Total delivered price is what matters
- Gas Storage further promotes the liquidity
  - Gulf Coast
  - Eastern Market
- Storage will help all customers capture value created by volatility in gas prices



# Technology Trends

## Dominion's View

- Storage developers will look to technology to help improve deliverability
  - Reengineering of reservoir storage
    - Existing
    - New
  - Salt storage
  - Mined storage
  - LNG
- Storage operators and developers will look to technology
  - Reduce operating costs
  - Maintain integrity of the infrastructure
  - Reduce storage gas loss



# *Potential Barrier*

*Cost to develop and operate*

# *Potential Barrier*

*Regulation (uncertainty of  
Local, State and Federal)*

# *Potential Barrier*

*Cost effective transportation  
capacity to market*

# *Potential Barrier*

*Did I mention cost to  
develop and operate*



**Dominion**  
It all starts here: