

Well Population Count

September 13, 2012



*This presentation contains minor corrections to slides presented at the workshop.

Background



Well population activity data are broken into

- Associated gas wells (oil wells that produce natural gas)
- Non-associated gas wells (natural gas wells)
 - Non-associated gas wells with hydraulic fracturing
 - Non-associated gas wells without hydraulic fracturing

Many emission factors are applied at the NEMS region level so activity data is also broken out by NEMS region

- Texas and New Mexico are only states with multiple NEMS regions

Well population activity data are inputs to calculations of emissions for most activities/equipment in the natural gas production stage (e.g. field separation equipment, well drilling, gas well workovers with hydraulic fracturing, liquids unloading, etc.)

Current Data Sources



National Data Sources:

- *API's Basic Petroleum Data Book* for producing oil wells from 1990 to 2004
- EIA data for producing gas wells from 1990 to 2003
- *World Oil Magazine* for producing oil and gas wells from 2004 to 2010

State Data Sources:

- New Mexico and Texas county-level data
 - Used for separating state-wide production into NEMS Regions
- Colorado, Kansas, Montana, Oklahoma, Utah, Wyoming state data
 - Used for identifying count of producing coal bed methane (CBM) wells
- Texas state data
 - Used for identifying count of Barnett shale wells

Associated gas wells

(Oil wells that produce natural gas)



Step 1. Calculate by State

of Associated Gas Wells by State = # of Oil Wells in State × % of Oil Wells with Associated Gas by State

- *# of Oil Wells in State* data from API and World Oil Magazine
- *% of Oil Wells with Associated Gas by State* accounts for proportion of oil wells that produce gas
 - 54.7% for Illinois, Indiana, and Michigan
 - 46.1% for all other states
 - From IPAA 1996 Oil & Gas Producing Industry in Your State Report

Step 2. Sum State Well Data for Each NEMS Region

*# of Associated Gas Wells in NEMS Region X = \sum Associated Gas Wells in State in NEMS Region X**

*For Texas and New Mexico, use county oil well data to break out state data into NEMS region

Non-Associated gas wells

(Gas wells)



Step 1. Calculate by State

of Non-Associated Gas Wells by State = # of Gas Wells in State

- *# of Gas Wells in State* data from EIA and World Oil Magazine

Step 2. Sum State Well Data for Each NEMS Region

*# of Non-Associated Gas Wells in NEMS Region X = \sum Non-Associated Gas Wells in State in NEMS Region X**

*For Texas and New Mexico, use county oil well data to break out state data into NEMS region

Gas Wells with Hydraulic Fracturing



Step 1. Calculate by State

of Gas Wells with Hydraulic Fracturing (HF) by State = # of CBM or Shale Gas Wells in State

- No available national-level data to directly identify gas wells with hydraulic fracturing
- Inventory assumption that all wells in unconventional formations (CBM, shale) are hydraulically fractured
 - Used available state-specific data for Colorado, Kansas, Montana, Oklahoma, Texas, Utah, and Wyoming (includes CBM and Barnett Shale only)
 - No data available for tight sands using current Inventory data sources
 - Data not available for all gas producing states

Step 2. Sum State Well Data for Each NEMS Region

*# of Gas Wells with HF in NEMS Region X = \sum Gas Wells with HF in States in NEMS Region X**

*For Texas and New Mexico, use county oil well data to break out state data into NEMS region

Updates Under Consideration: Potential Methodology with DI Desktop®



Additional nation-wide databases are available that include well data from state oil and gas commissions or other government entities

- **One example is DI Desktop® (formerly HPDI®)**
 - Contains data on producing wells , allows direct count of wells each year
 - Contains information on reservoir type to allow more accurate count of unconventional wells
 - Amount of data available for each state varies; data not available for Indiana, Illinois
- **Population Count of Associated Gas Wells in DI Desktop®**
 - Include oil or oil and gas production wells that reported oil and gas production for each year of activity data
- **Population Count of Non-Associated Gas Wells in DI Desktop®**
 - Include gas production wells that reported gas production
 - Include oil or oil and gas production wells that did not report oil production, but reported gas production
- **Population Count of Gas Wells with Hydraulic Fracturing in DI Desktop®**
 - Begin with non-associated gas wells
 - Include wells that are horizontally drilled, assuming all horizontally drilled wells are hydraulically fractured
 - Include wells that are not horizontally drilled that are in CBM, shale, or tight gas reservoirs using a crosswalk from EIA data

Updates Under Consideration: Potential Methodology with DI Desktop®



Comparison of Current and Potential Methodology for Well Populations

	1990	2000	2010
Associated Gas Wells			
2012 Inventory	272,678	246,700	245,309
DI Desktop®	183,608	149,926	189,083
Non-Associated Gas Wells (total, includes wells with and without hydraulic fracturing)			
2012 Inventory	269,782	341,678	484,795
DI Desktop®	191,381	324,992	493,281
Gas Wells with Hydraulic Fracturing			
2012 Inventory	232	6,892	50,434
DI Desktop®	43,842	78,113	168,574

Questions for Stakeholders



- Are other sources of data available for well population count?
 - Is data available for states that are not included in the nationwide databases (e.g., Indiana, Illinois)?
- Are all wells in unconventional (shale, CBM, tight sands) formations hydraulically fractured?
 - If not, what percent are hydraulically fractured?