

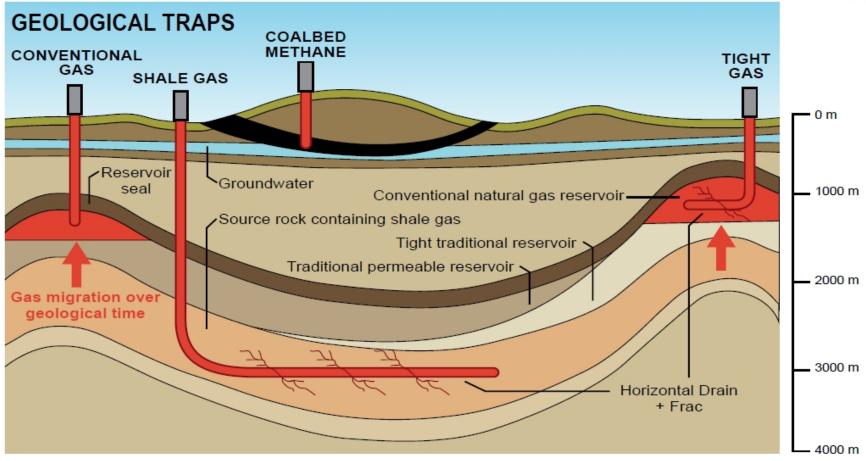


# **CSG and Shale Gas**Water Volumes



#### **Unconventional Gas Industry**





Source NT government



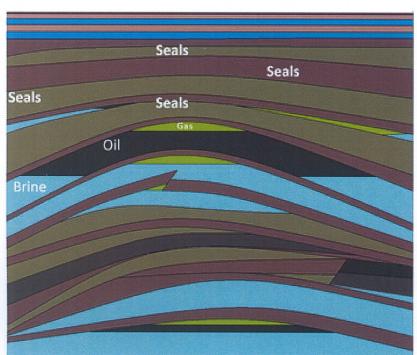


Figure 7: Seals and Structures

Gas and oil, as well as brines (salt water), have been held in place millions of years by literally hundreds of barriers and seals.

These massive seals also serve as one of the barriers that keep fractures from growing upwards towards fresh water supplies.

Source: George E King: Apache Corporation

#### **Unconventional Gas Industry**



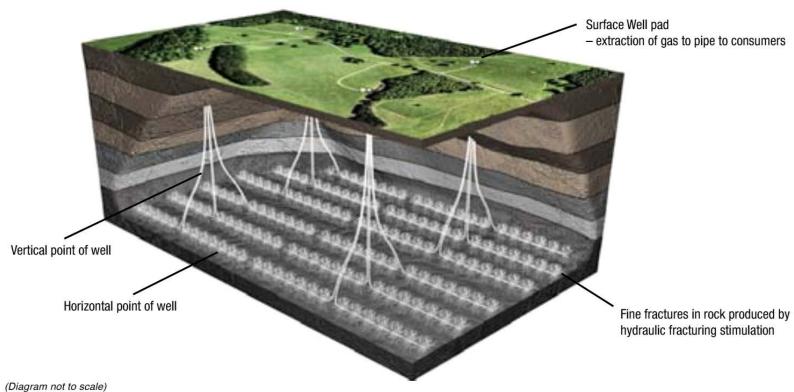
- Shale Gas
  - Commercially used since the early 1800's
  - Some shale rock allows for 'relatively' easy release of gas
  - Large world-wide increase in last 5 years
  - Coastal and inland reserves in Australia
- Tight Gas
  - Requires substantial fraccing of the rock reservoir to release gas
  - Costly in Australia
- Coal Seam Gas/Coal Bed Methane Gas
  - Mainly inland reserves in Australia

## **CSG Wells**





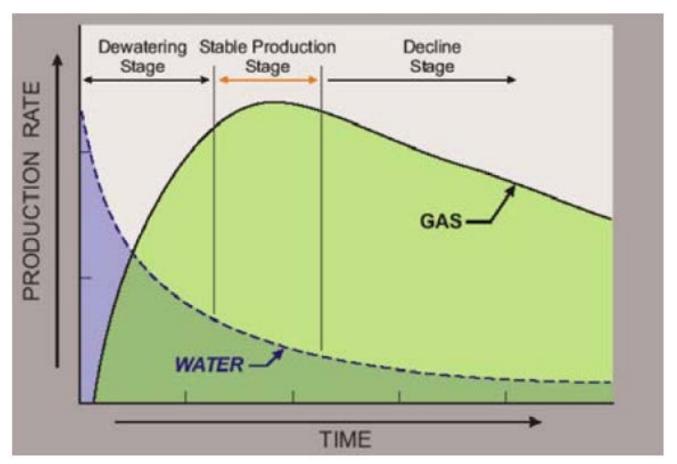




Source: Styles, Keele University, UK

## **Associated Water Volumes**

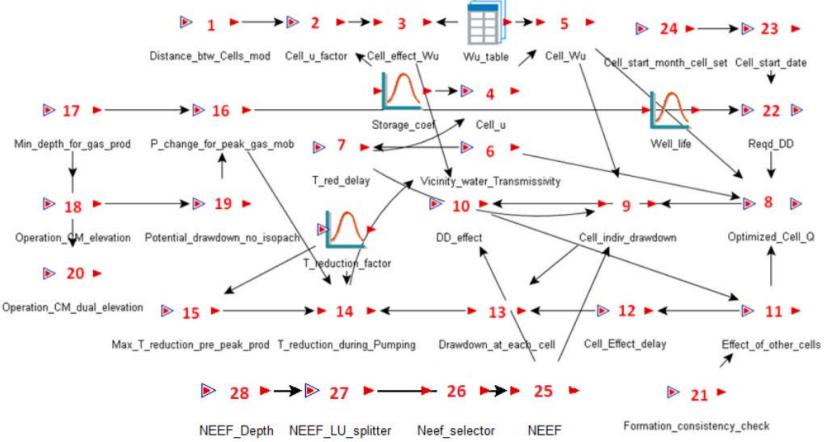




Source: DME 2008a

## **Associated Water Volumes**

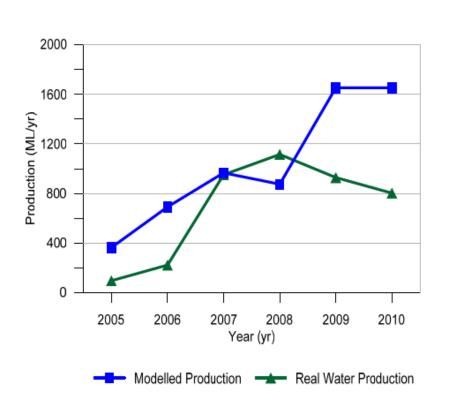


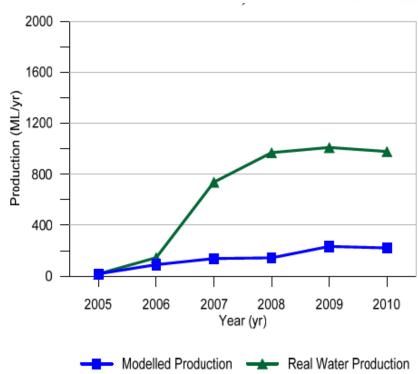


Source Qld
Government 2012:
Healthy Headwaters

#### **Water Volumes**







Source Qld Government 2012: Healthy Headwaters

### **Shale Water Cycle**



	Civil/site prep Build access roads, construct and install well pads, prepare site for drilling	<b>Drilling</b> Drill vertical and horizontal wells	Completion/ fracking Complete wells with steel and cement casings Release gas through hydro-fracking	Flowback Capture, store and treat returned fracking fluids	Production Capture, store and transport gas
					Decommission
Typical timelines	60 days	15-60 days	15-30 days	20 days	5–40 years
Water movement challenges	Diverse transportation needs to support the well pad preparation and infrastructure construction effort. Water movement requirement is minimal at this stage	Intensive and time- sensitive nature of water usage in drilling operation requires flexible and efficient logistics support	Intensive and time- sensitive nature of water usage in completion/fracking operation requires flexible and efficient logistics support	High volume of flowback water requires effective logistics management to minimize congestions, pollution and other social impacts	Transportation planning and effective cost management become increasingly important as demand for water movement stabilizes

Source: Accenture