Shale Gas – a quick look at the US

Shale gas plays, Lower 48 States

Source: Energy Information Administration based on data from various published studies.
Updated: May 9, 2011
Production from Shale Gas Plays: 1 Tcf ~ 3 Bcf/d

annual shale gas production
trillion cubic feet

Sources: EIA and Lippman Consulting
Barnett shale – 5 Bcf/d within 6 years

- In 2008 ~ 180 rigs drilling in Barnett resulting in ~2,500 wells/yr
- Drill rate > 1 well/month/rig
- In 2009/10 ~ 90 rigs
- Currently ~40 rigs
- DMITRE scenario ~ 1 Bcf/d or 10 BCM/yr

Source: EIA
Rig Count for shale plays

Source: Smith International
The Fayetteville – Southwestern Energy

- From Southwestern Energy March 2012 Update
The Fayetteville – Southwestern Energy

• From Southwestern Energy March 2012 Update

We collapsed the “learning curve” dramatically; Paradigm shift in gas prices
Fayetteville – 100 wells/quarter in 2011

- Moved to 12 stimulations along lateral
- Lateral length increased from 2,600 feet (~800m) to 4,800 feet (~1,500m)
Haynesville

- ~2200 wells on production
- Currently drilling 10-20 wells per month
- Perhaps 20 rigs (difficult to source numbers)
- Production in late 2012 6.5 Bcf/d
- Compare with Barnett producing the same from >10,000 horizontal wells
Cost Drivers

EnCana - 2006

- Reduced drilling time by > 60%.
- Increased initial production by 200%.
- Increased gross reserves by 60%.

Southwestern - 2012

EOG - 2006

Source: Southwestern Energy Corporation, 2007

Days to Drill | Lateral Length (in feet) | Well Cost ($ in millions)
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2.657 | 3.619 | 4.100 | 4.528 | 4.836 | $2.9 | $3.0 | $2.9 | $2.8 | $2.8
The DMITRE Scenario

- DMITRE estimates up to 15 rigs drilling 100-170 wells per year for 15 years
- One well finishes drilling every two or three days
- Assuming 15 stimulation stages per well
- 1500-2500 stages per year or 4-8 stages per day
- Minimum 2-4 spreads dependent on techniques employed and efficiencies
- Sand/proppant requirements of 100-200,000 tonnes per year or 300-500 tonnes/day (15-30 trucks per day)
- Water requirements 15-20 megalitres per well for stimulation
- Well connection every two to three days
DMITRE Success Scenario – Gearing For Potential

Drilling Related

- Marked improvements in drill rates occurs in all plays – 30-50% reduction
- Technical knowledge transfer/acquisition from US players, training or regulatory bodies knowledge share
- Assistance to bring skilled professionals and labour in from OS (Visa, support, short term incentives)
- Logging – reduce evaluation of all strings to minimum required to meet objectives and minimise time on well – regulatory requirements?
- Rig availability – new build or retrofit sleeper from US (dimensions/weights/wiring/brakes)
- Trucking services (rig mob/demob) – with 15 rigs a rig will always be moving somewhere
- Mud chemicals – local or import – price will define
- Cementing services – competitive spot or long term agreement with guarantees?
- Casing materials/delivery – standardise
- Wellhead - standardise
- Earthworks
Stimulation Related

- Access to stimulation service providers with shale and tight gas experience globally (incentives, enticement to base locally, assistance to set up yards, assistance with equipment mods?)
- Assistance to bring skilled professionals and labour in from OS (Visa, support, short term incentives)
- Laydown or staging areas for proppant and other equipment
- Transport efficiencies for proppant and additives from ports to inland destinations
- Local providers/manufacturers of suitable materials – import cheaper?
- Water access/management/recycle/reuse/disposal – key to successful and responsible operation