Petroleum 96%     Biomass 3%     Electricity 1%
Steven Chu, told a Congressional hearing last week that the government’s mission is not to lower gas costs — but to get Americans off gas altogether.

Hey, great idea — when we invent that fantasy fuel of the future.

You can’t get off oil until you know what you’re getting on to. And right now, there is no practical replacement.

Dreamy alternatives work for unserious people like science fiction moviemakers. James Cameron’s movie Avatar talked about a resource called “Unobtainium.” Exactly — we haven’t obtained it yet.
Topics for Today

• Resource Plays
• History
• Activity
• Projections
1) Regional Extent
Tyler and Bakken
2) Bakken $T_{max}$: Maturation Index
Topics for Today

• Resource Plays
• History
• Activity
• Projections
Topics for Today

• Resource Plays
• Development History
• Activity
• Projections
What Does Every New Bakken Well Mean to North Dakota

A typical 2012 North Dakota Bakken well will produce for 29 years

If economic, enhanced oil recovery efforts can extend the life of the well

In those 29 years the average Bakken well:

- Produces approximately 580,000 barrels of oil
- Generates over $22 million net profit
- Pays approximately $4,610,000 in taxes
  - $2,200,000 gross production taxes
  - $2,000,000 extraction tax
  - $410,000 sales tax
- Pays royalties of $7,925,000 to mineral owners
- Pays salaries and wages of $1,500,000
- Pays operating expenses of $2,300,000
- Cost $8,500,000 to drill and complete
Topics for Today

• Resource Plays
• History
• Activity
• Projections
Western North Dakota

- 1,100 to 2,700 wells/year = 2,000 expected
  - 100-225 rigs = 12,000 – 27,000 jobs = 12,000 – 27,000 jobs
  - Another 10,000 jobs operating wells and building infrastructure

- 225 rigs can drill the 4,500 wells needed to secure leases in 2 years

- 225 rigs can drill the 27,500 wells needed to develop spacing units in 16 years

- 32,000 new wells = 30,000-35,000 long term jobs
Bakken Development Plan

- Original dual-zone development plan
  - 8 wells per 1,280 acres – 4 MB, 4TF
  - 603,000 Boe EUR per well (avg. 24.5 stages/completion)
  - ECO-Pad\textsuperscript{©} design: 2 wells south, 2 wells north
- Additional Three Forks potential

1st ECO-Pad well pair
- Upper Bakken Shale
- Lower Bakken Shale
- Nisku

Charlotte 2-22H: 1,140 Boepd IP

America's Oil Champion
Continental Resources
Six Wells on a Single Pad
**North Dakota Oil Production and Price**

### Key Points:

- **3,266** Bakken and Three Forks wells drilled and completed
- **32,000** more new wells possible in thermal mature area
- **Proven=7 BBO – Probable=10 BBO – Possible=14 BBO** (billion barrels of oil)

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**ND Sweet Price $/barrel**

- [Barrels per Day](#)
- [$/Barrel History & DOE-EIA Projected](#)
- [$/Barrel P50](#)
- [$/Barrel P10](#)

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**Notes:**

- Bakken - Three Forks P10
- Bakken - Three Forks P50
- Bakken - Three Forks P90
- $/Barrel History & DOE-EIA Projected
- $/Barrel P50
- $/Barrel P10
North Dakota Oil Industry Jobs (Ph2=80% Ph1)

Year

Jobs

Prod jobs
Gathering jobs
Fracing jobs
Drilling jobs
PROPPANT PROJECT

Millions of tons of sand and ceramic proppants are used every year in the Williston Basin, part of a multi-billion dollar industry. The Geological Survey has collected 125 sand samples throughout the state in our search for deposits that could be utilized for oil and gas proppants in the well fracking process. We are in the process of performing preliminary analysis on those samples to determine if any would fit the proppant criteria. We have also collected clay samples and will be testing those samples for their kaolin content to determine their suitability in the manufacturing of ceramic proppants.

Under the second phase of this project, the ten most promising sand samples will undergo full ISO analysis (including bulk density, specific gravity, crush resistance, etc), mineralogy (XRD), and stack conductivity analysis to determine which are the most suitable proppant candidates and we will continue to evaluate the clay beds.
2) Bakken $T_{\text{max}}$: Maturation Index
The Geological Survey recently completed phase I of a study of shallow natural gas in North Dakota. We investigated 9,400 ND State Water Commission monitoring well sites, tested 4,325 wells, and detected methane in 905 wells. Approximately 20% of the wells contained detectable gas.

During the second phase of the project, thirty groundwater samples, primarily from eastern North Dakota, will be analyzed for dissolved gas composition, isotopes, and general chemistry. This will enable us to determine the source of the gas and identify chemical groundwater signatures that might assist the oil and gas industry in natural gas exploration.