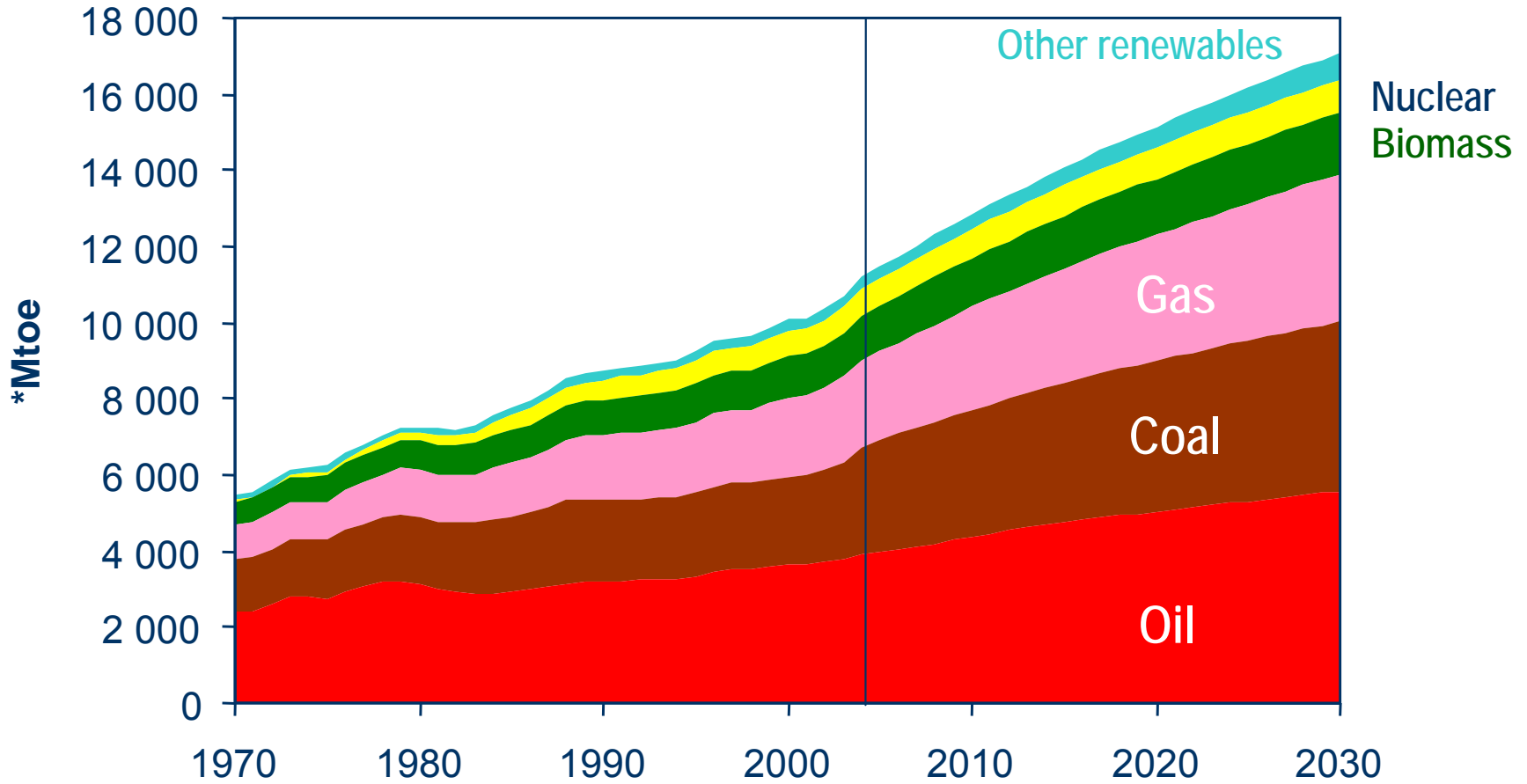

Building Critical Energy Infrastructure... A Global Challenge

Phil Wright, Williams Gas Pipeline
27th USAEE/IAEE North American Conference
September 17th, 2007



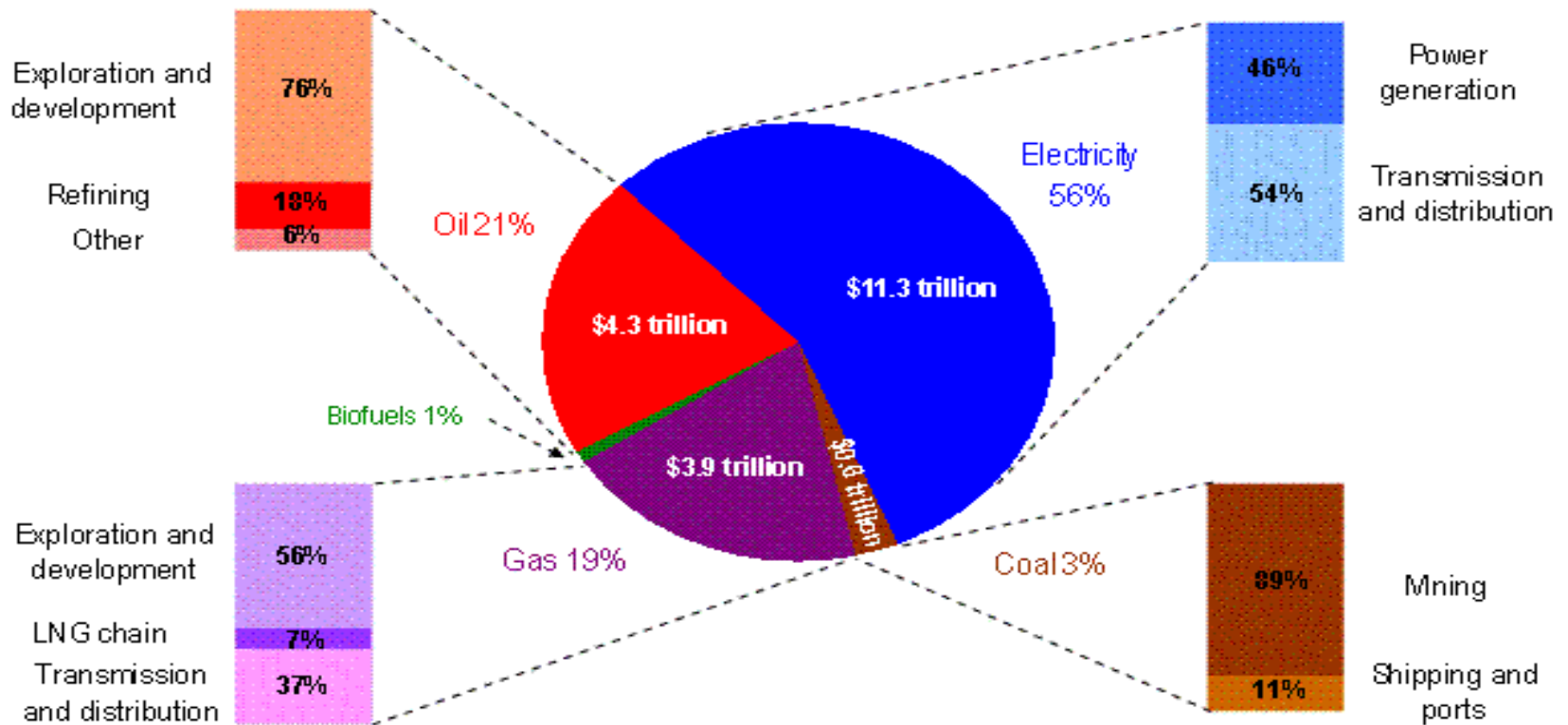
World Primary Energy Demand Forecast by IEA



*Million Tonnes of Oil Equivalent

Source: International Energy Agency (IEA) World Energy Outlook 2006

Total Energy Infrastructure Investment Needed from 2005-2030



Total investment = \$20.2 trillion (in \$2005)

Source: IEA World Energy Outlook 2006

- > Large amount of infrastructure work
- > Large capital commitments for expansion as well as maintaining current infrastructure – and stable and fair regulatory climate to attract capital
- > Increased demand for labor, materials and engineering services to put the infrastructure into place
- > Land Use, Right of Way Access (ROW), and Regulatory affects

Major North American Pipeline Projects



> Keystone	1,845	miles	30"
> Rockies Express	1,679	miles	36" & 42"
> Midcontinent Express	500	miles	36" & 42"
> Southeast Supply Header	270	miles	36" & 42"
> Gulf South East Texas Expan.	242	miles	42"
> Carthage to Perryville	172	miles	42"
> Kinder Morgan Louisiana P/L	140	miles	42"
> Gulf South Southeast Expansion	110	miles	36"

Potential Pipeline Project Requirements



<u>Pipe</u>	<u>Miles (24" – 48")</u>	<u>Current Annual Capacity</u>	
> 2007	2,795	}	ERW up to 24" 3400 miles
> 2008	3,200		DSAW 24" & up 3200 miles
> 2009	1,571		

Construction

- > For 2007
 - 40 spreads and 14,000 workers required
 - 16 – 20 spreads and 3,500 – 4,000 workers!*

*Anecdotal industry estimates (Source: Jacobs Consultancy)



Hurdles to Building Critical Infrastructure



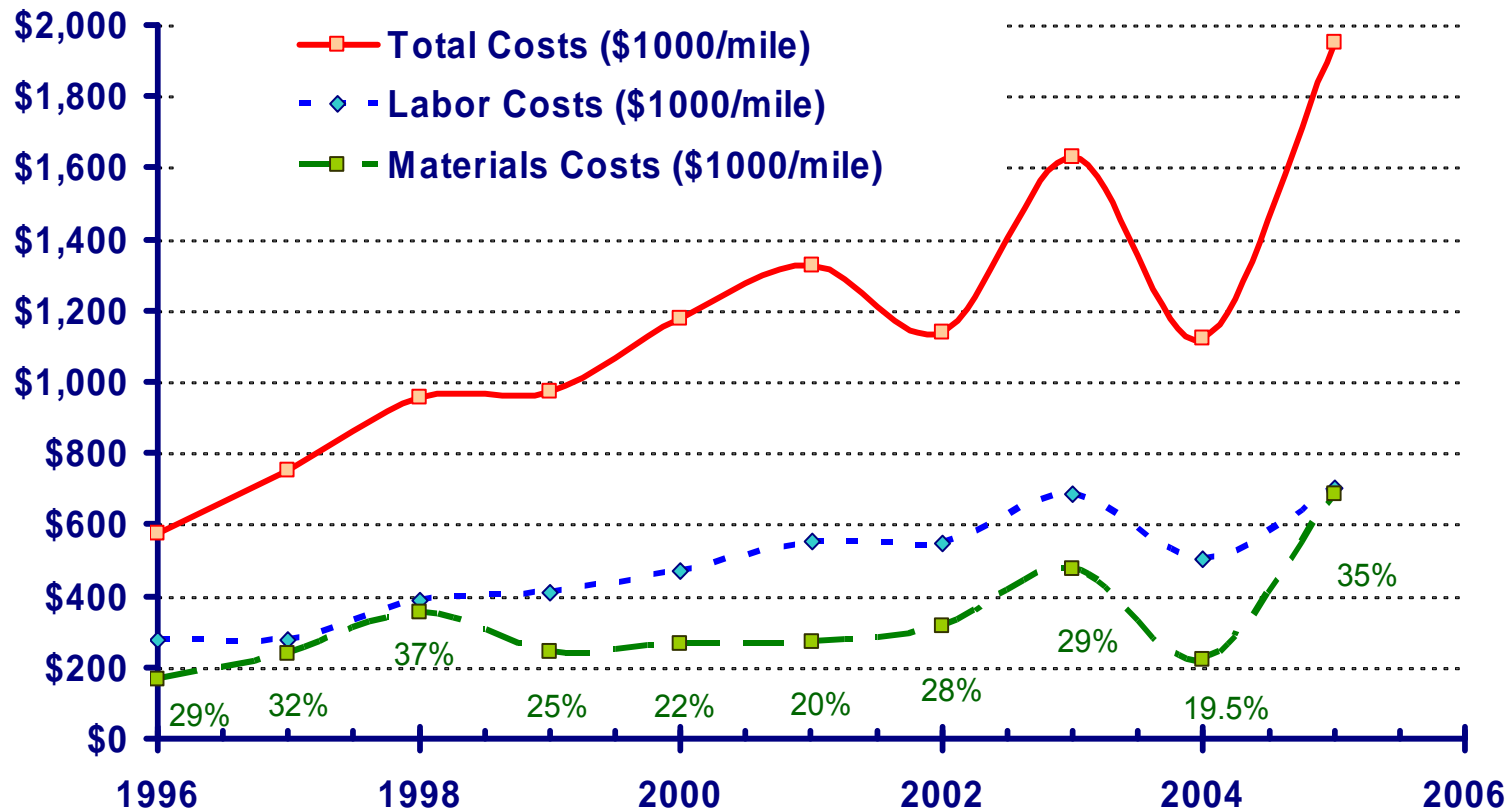
- > **Costs have risen significantly in recent years for labor, materials and services**

Costs Have Risen Significantly in Recent Years



U.S. Nat Gas Land Pipe Construction Costs (\$1000/mile)

[%'s indicate fraction of total costs due to materials]



Source: US FERC, Oil & Gas Journal

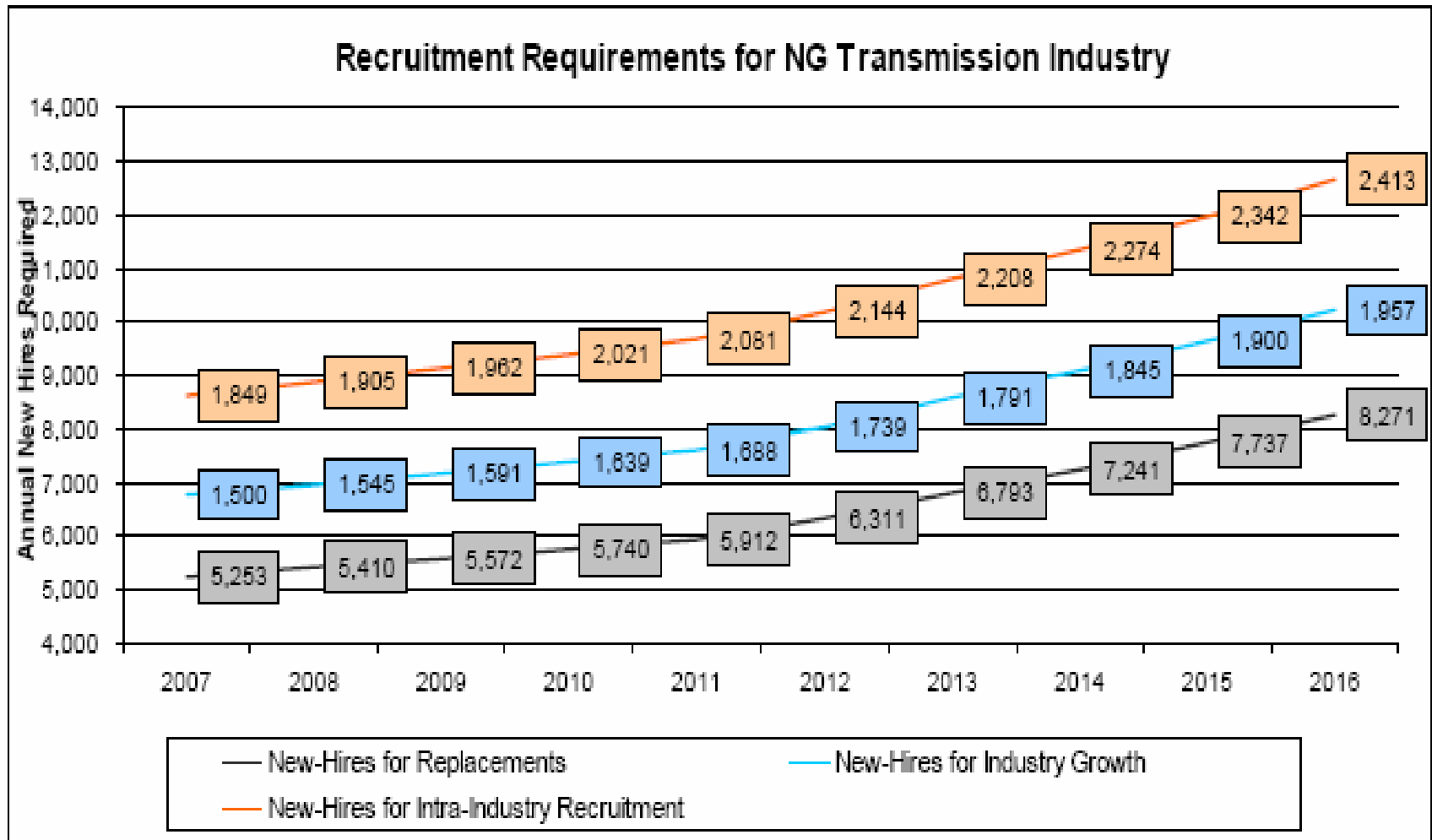


Hurdles to Building Critical Infrastructure



- > Costs have risen significantly in recent years for labor, materials and services
- > **Strain on qualified technical and construction talent**

Strain on Qualified Technical and Construction Talent



Source: 2007 INGAA Foundation Study "Securing our Future: Developing the Next Workforce"

Hurdles to Building Critical Infrastructure



- > Costs have risen significantly in recent years for labor, materials and services
- > Strain on qualified technical and construction talent
- > **Competition globally for materials and services**

> The China Syndrome

- *Auto Industry Facts*
 - Currently 14,000 new cars hit the road each day
 - China is laying an additional 52,700 miles of highway
- *Real Estate Facts*
 - Building 7.5 Billion sq. ft. per year of new commercial and residential buildings
 - Represents more sq. footage than all the malls and strip malls in the US, basically builds the entire U.S. retail system each year
- *Steel Production Facts*
 - In 1996, the U.S. and China accounted for 13% of the world's steel production and by 2005 the U.S. had declined to 8% and China had jumped to 35%
- *Energy Facts*
 - World's second largest consumer of crude oil and consumes more coal than the U.S., Japan, and the U.K. combined

> The effect is the need for more energy, more concrete, more space, etc.

> A similar trend is underway in India

Hurdles to Building Critical Infrastructure



- > Costs have risen significantly in recent years for labor, materials and services
- > Strain on qualified technical and construction talent
- > Competition globally for materials and services
- > **Land use and ROW restrictions**

- > Restriction on leasing of land for exploration
 - 100+ TCF already restricted from exploration and development in the U.S. alone

- > A recent experience :
 - We followed procedure to received FERC approval for a project
 - Numerous Open Houses with the public
 - After we received approval a landowner objected to the project and threatened legal action
 - As a result, FERC reopened the process and cost \$ millions more!

We can lower these hurdles by...



> In the interim

- Leverage global markets to supplement domestic resources (e.g. sunset of protective tariffs on pipe)
- Encourage students not interested in four year colleges to pursue technical school degrees / career path – joint industry / academic effort initiative
 - IPAA and Houston Area High School Technology Program
- Open dialog between state and local governments and special interest groups regarding land and ROW access
- Engender sense of urgency

We can lower these hurdles by...



> Long Term

- Supporting efforts to encourage enrollment in engineering and science at the university level and promoting our industry to future workforce
- Educating government that all out effort is essential for maintaining affordable energy
 - Efficiency
 - Renewables
 - Clean coal technology
 - And a lot of gas and oil

- > Projected demand growth for energy calls for \$20 trillion cumulative global infrastructure investment through 2030
- > Significant incremental talent required to execute the largest build out since post- WWII era expansion
- > Excessive hurdles complicate building necessary infrastructure
- > Overcoming these hurdles will require creativity and efficient resource management