



BUSE 3331: From Prospects to Production to Kilowatt The Business of Energy Class 2 Lecture

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Topics for the Day

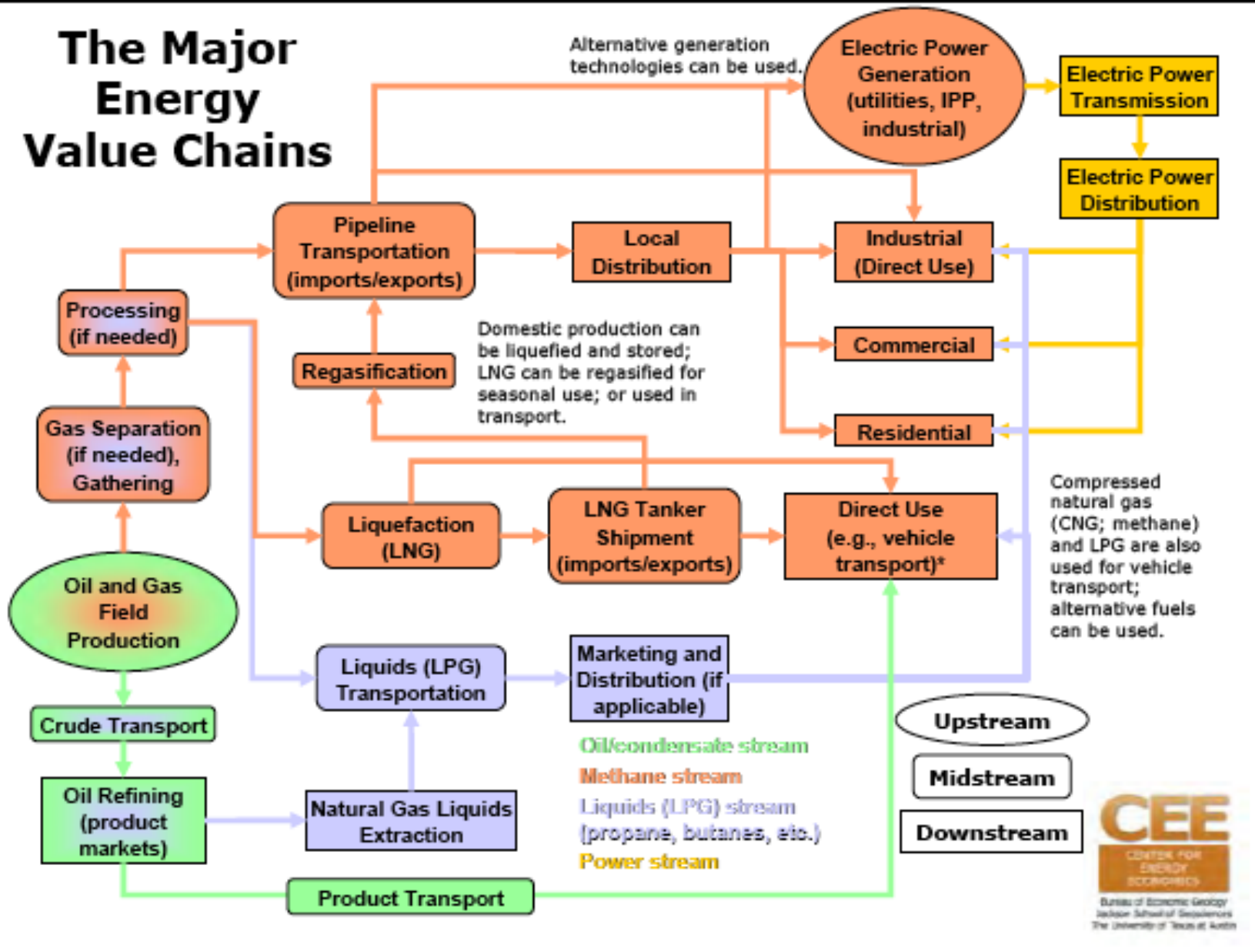
- In the news
- Energy value chain
- Drivers of change

ENERGY VALUE CHAIN

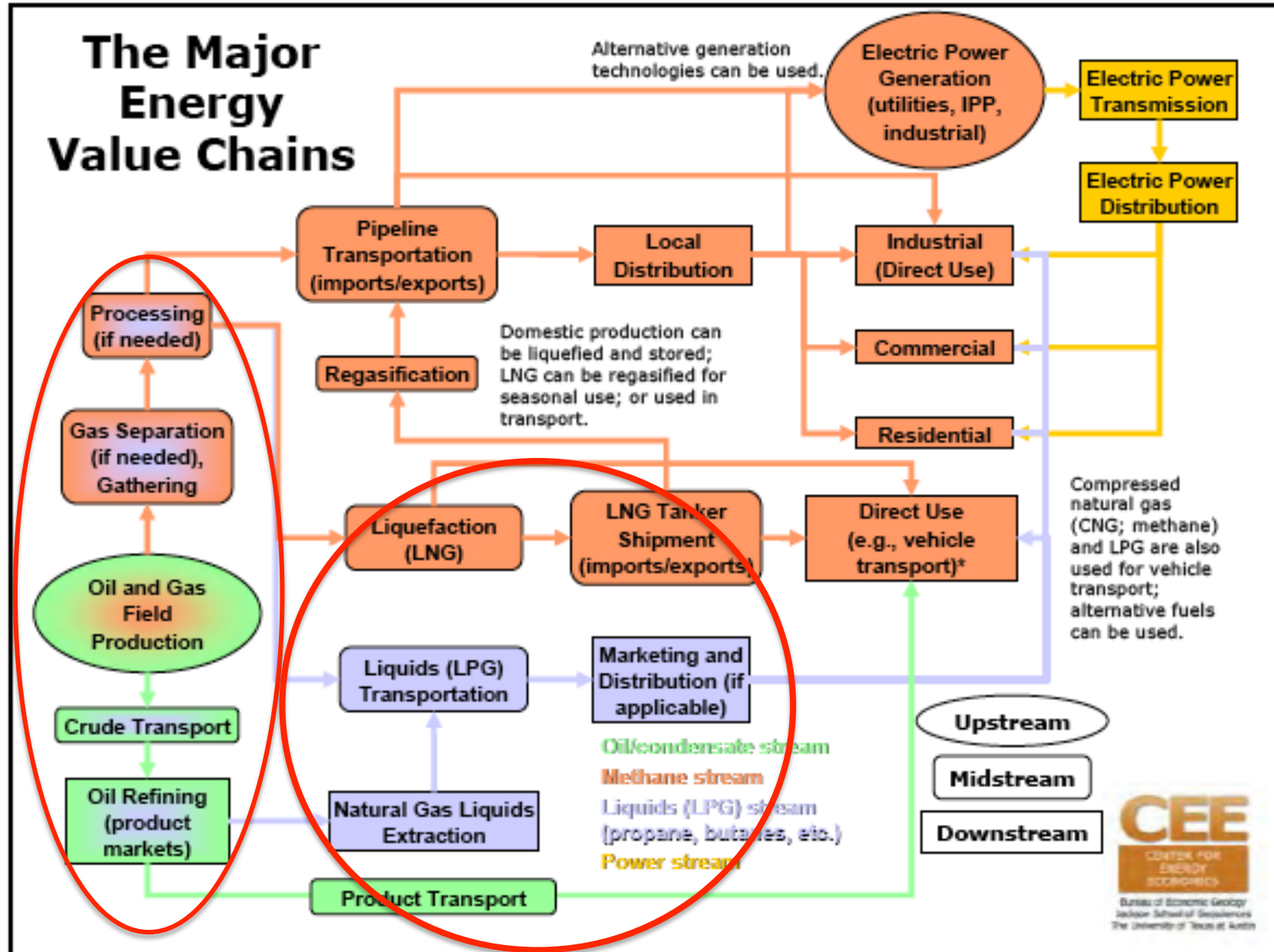
Energy Value Chain



The Major Energy Value Chains



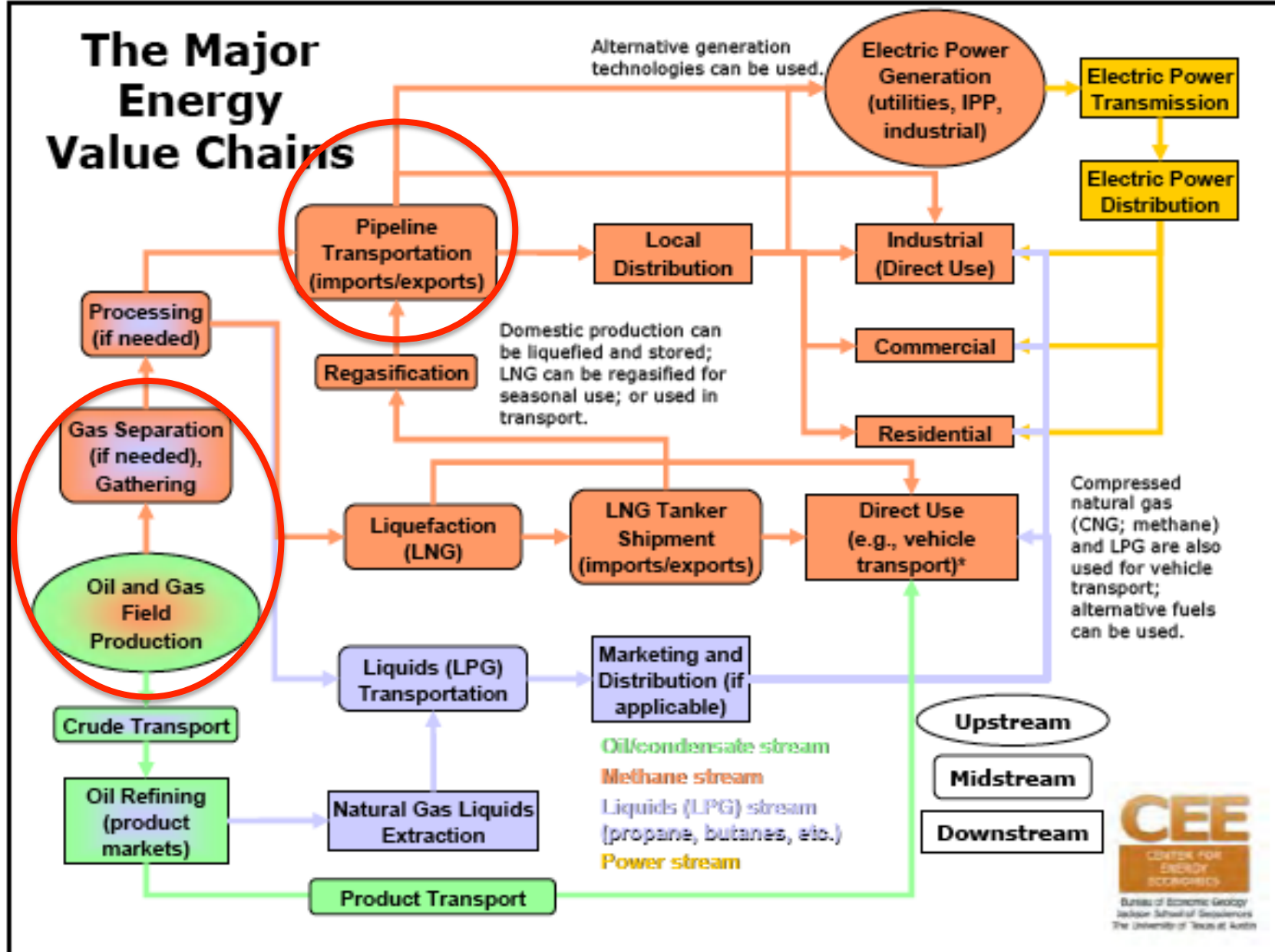
The Major Energy Value Chains



Integrated Majors and NOCS

- ExxonMobil
- Shell
- BP (In transition)
- Total
- ENI
- Statoil
- Petrobras

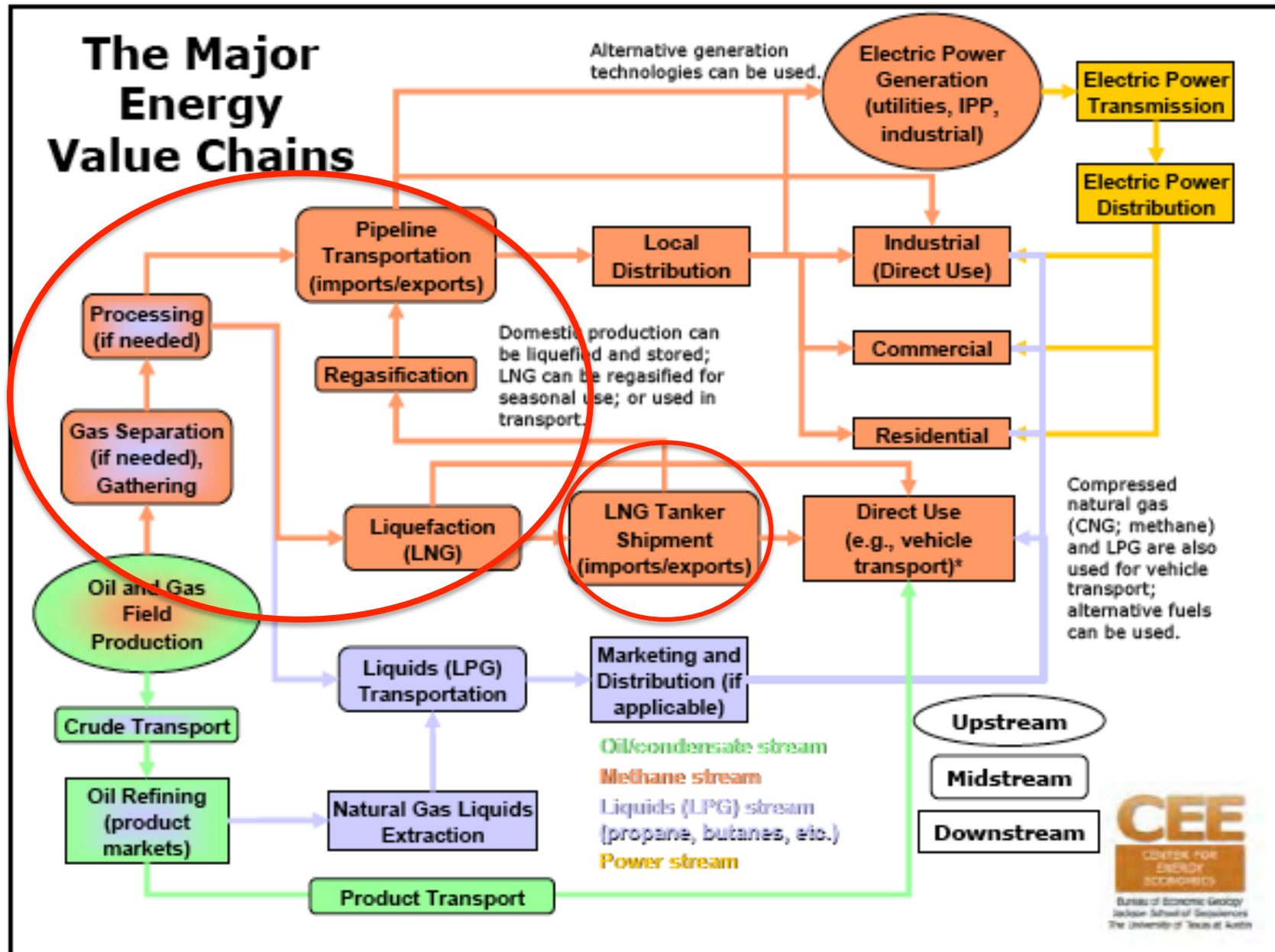
The Major Energy Value Chains



Independents

- Anadarko
- Apache
- Continental
- Pioneer
- Marathon
- Conoco Phillips

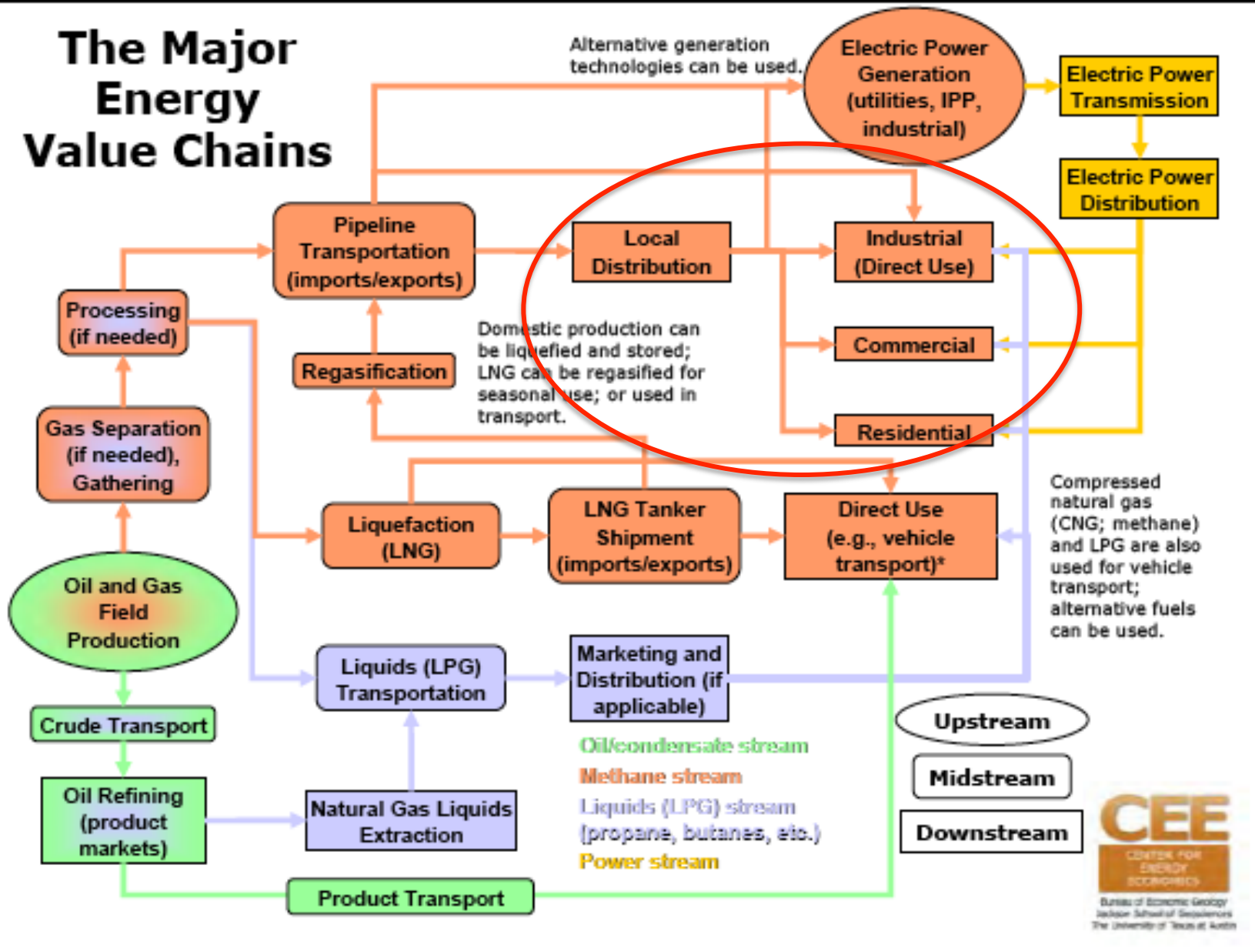
The Major Energy Value Chains



Midstream

- Enbridge
- Energy Transfer
- Kinder Morgan
- Magellan
- Plains All American
- Boardwalk
- Atlas

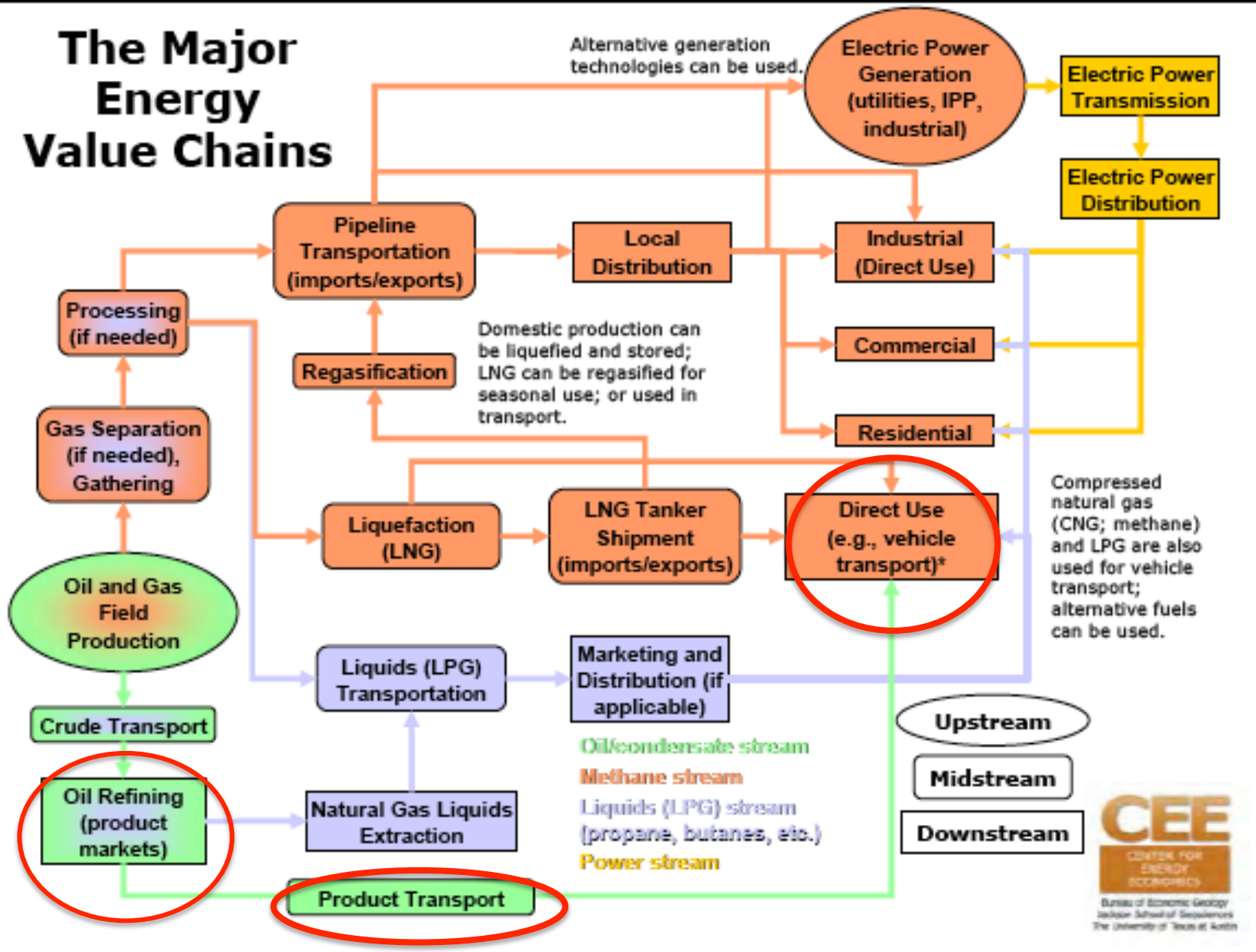
The Major Energy Value Chains



Downstream Gas

- Atmos Energy
- AGL Resources
- Centerpoint Energy

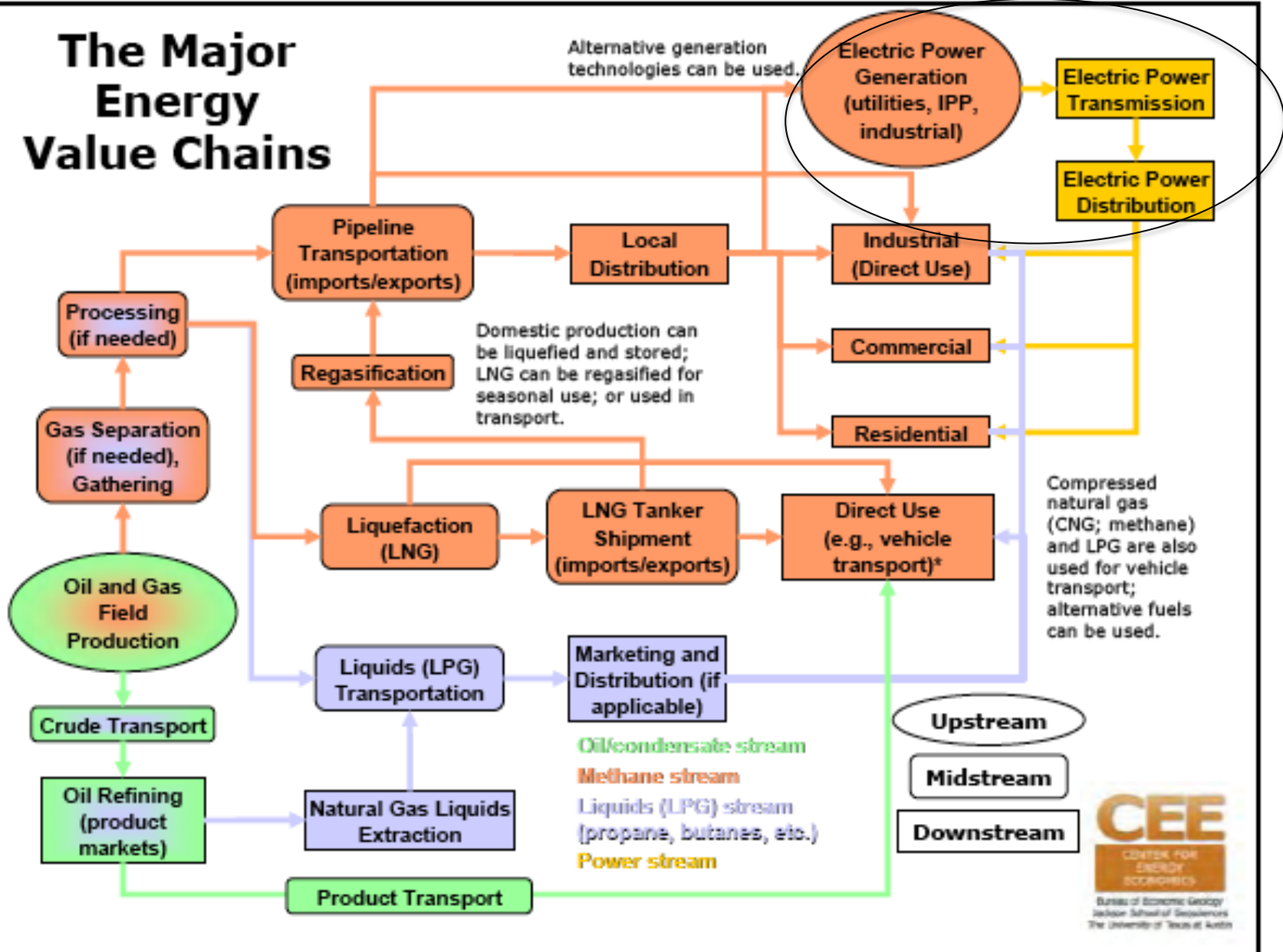
The Major Energy Value Chains



Downstream Oil

- Valero
- Tosco
- Phillips 66
- Marathon
- Quik Trip
- 7-11

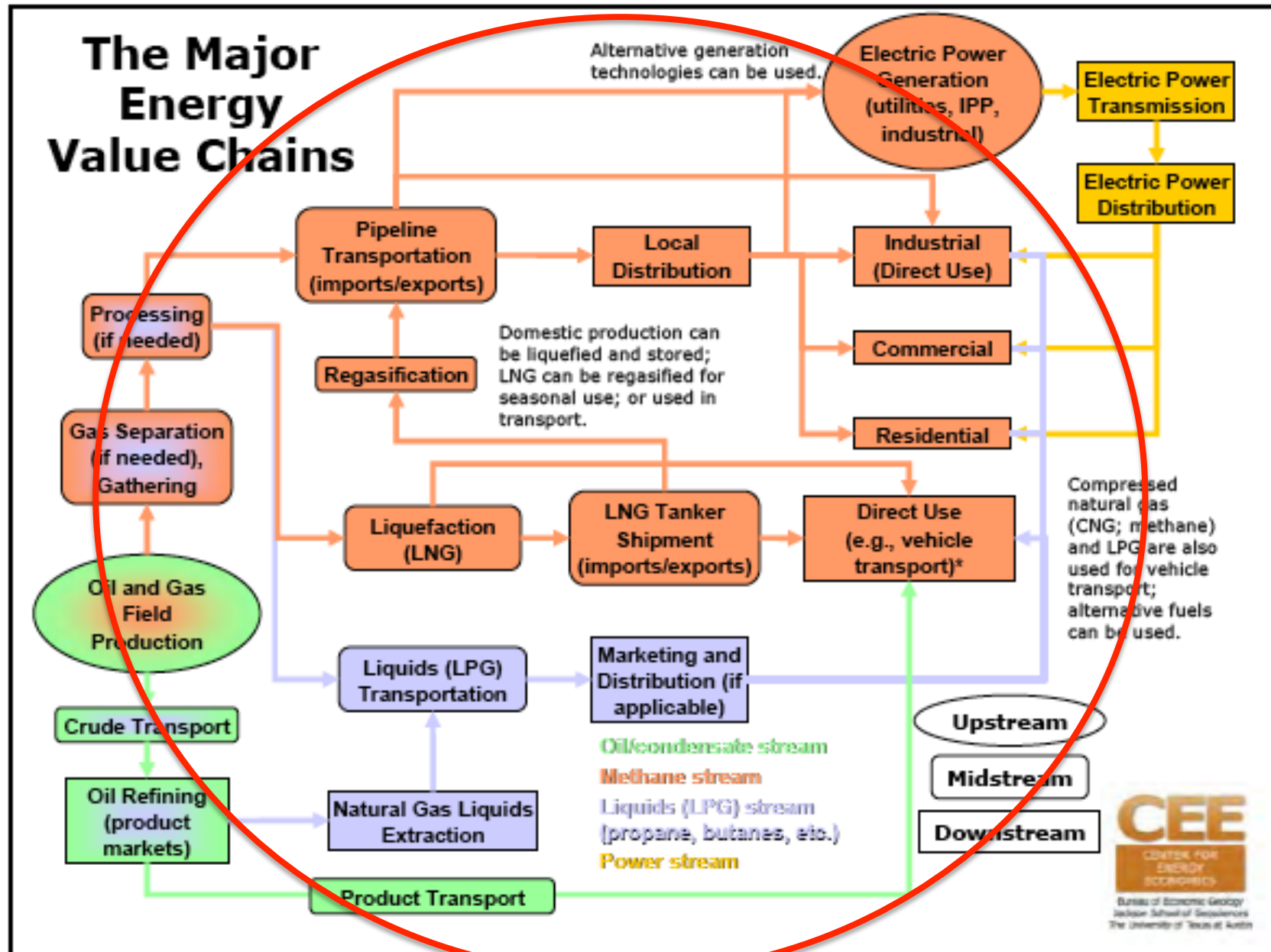
The Major Energy Value Chains



Electric Power Production and Transmission

- Energy Futures Holdings (TXU, Luminant)
- Centerpoint
- NRG
- Exelon
- PGE

The Major Energy Value Chains



Oilfield Service and Equipment

- Halliburton
- Schlumberger
- Baker Hughes
- National Oilwell Varco
- Cameron International
- FMC Technologies
- GE
- Oceaneering

Engineering Companies

- KBR
- Fluor
- Black and Veatch
- MWH

Trends in the Value Chain

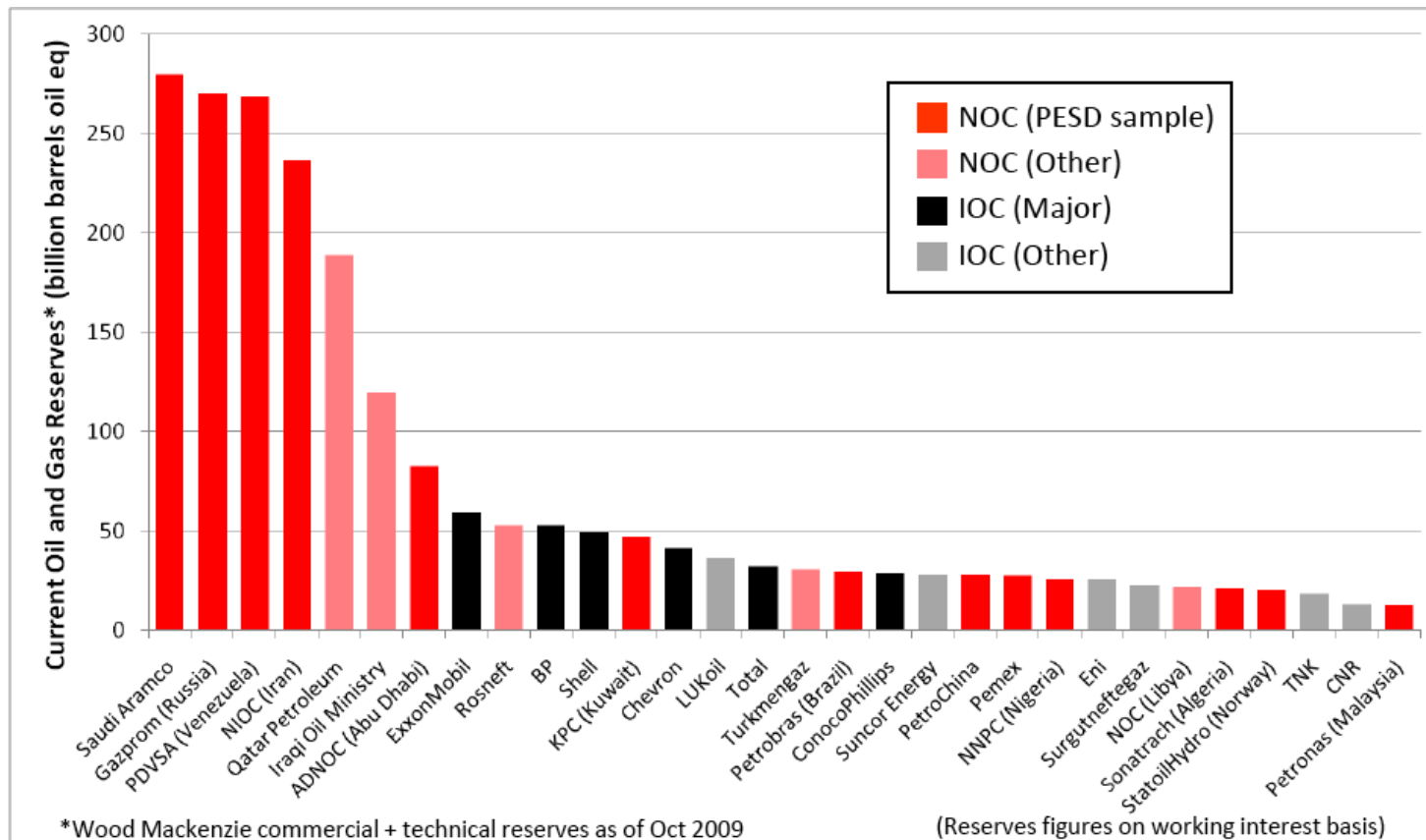
- ExxonMobil divesting retail operations
- Marathon split
- ConocoPhillips split
- Hess split
- BP divesting refining
- Rise of players like QT
- Midstream assets in MLPs
- Oilfield Service companies taking larger role from E&P companies
- Chaos in electric power markets

Big Big Oil

	Total Oil And Gas Reserves	Total Oil And Gas Production	Crude Oil Reserves	Crude Oil Production	Natural Gas Reserves	Natural Gas Production
NIOC	1	3	3	2	2	2
Saudi Aramco	2	1	1	1	4	5
OAO Gazprom	3	2	11	25	1	1
PDVSA	4	4	2	3	7	18
Qatar Petroleum	5	20	9	23	3	6
Abu Dhabi National Oil Company	6	19	6	15	5	19
Iraq National Oil Company	7	15	4	8	10	54
Kuwait Oil Company	8	10	5	6	29	34
NNPC	9	25	8	20	6	45
National Oil Corporation, Libya	10	24	7	19	13	42
Sonatrach	11	11	14	16	8	8
China National Petroleum Corporation	12	7	10	5	11	9
Petroliaam Nasional Berhad	13	21	20	27	9	10
Pemex	18	5	15	4	28	14
Petrobras	20	17	19	12	30	25

Source: Seeking Alpha, Growth
Value and Income, the Vital
Role of NOCS in Global Oil
and Gas

Big Big Oil – Another Look



Source: Woods Mackenzie, Dr. Mark Thurber – Stanford University

Facts about Oil

- Majors control about 9% of the reserves and 16% of the production
- Other IOCs about 18% of the reserves and 23% of the production
- NOCs control the remaining 73% of reserves and 61% of the production

Facts about Natural Gas

- Majors control about 12% of the reserves and 17% of the production
- Other IOCs control 20% of the reserves and 31% of the production
- NOCs control 68% of the reserves and 52% of the production

IOC Objectives

- Maximize and grow profits
- Maximize shareholder value

NOC Objectives Varied and Many

- Grow profits
- Build economy and infrastructure
- Provide government revenue
- Provide cheap domestic fuel (subsidized)
- Fund social programs and military programs
- Provide energy security
- Achieve foreign policy objectives

Objectives and Results

- Generally the more multiple and varied the goals, the less efficient the NOCs
- Efficiency measures demonstrate how.

NOC and Majors

Measures of Efficiency

Company	Revenue per Employee \$/employee	Revenue per Reserves \$/boe	Government Ownership %	Country
<i>NOCs</i>				
Adnoc	205	0.20	100%	UAE
CNOOC	2,656	2.97	71%	China
EcoPetro	824	2.26	100%	Colombia
Eni	1,056	10.50	30%	Italy
Gazprom	103	0.16	51%	Russia
INA	187	11.70	75%	Croatia
KMG	n/a	n/a	100%	Kazakhstan
KPC	1,650	0.34	100%	Kuwait
MOL	635	42.37	25%	Hungary
NIOC	283	0.11	100%	Iran
NNPC	1,460	0.56	100%	Nigeria
NorskHydro	673	11.37	44%	Norway
OMV	2,214	8.90	32%	Austria
ONGC	298	2.11	84%	India
PDO	1,591	0.98	60%	Oman
PDVSA	1,985	0.66	100%	Venezuela
Pemex	506	4.01	100%	Mexico
Pertamina	453	0.73	100%	Indonesia
Petrobras	773	3.39	32%	Brazil
PetroChina	111	2.52	90%	China
Petroecuador	1,026	1.25	100%	Ecuador
Petronas	1,202	1.45	100%	Malaysia
PTT	2,896	16.68	100%	Thailand
QP	1,800	0.10	100%	Qatar
Rosneft	86	0.19	100%	Russia
SaudiAramco	2,261	0.40	100%	Saudi Arabia
Sinopec	192	19.76	57%	China
Socar	n/a	n/a	100%	Azerbaijan
Sonangol	755	1.37	100%	Angola
Sonatrach	688	0.93	100%	Algeria
SPC	375	1.71	100%	Syriac
Statoil	1,910	10.85	71%	Norway
TPAO	154	1.53	100%	Turkey
<i>Average</i>	<i>1,000.27</i>	<i>5.23</i>		

<i>Major IOCs</i>				
BP	2,788	15.68	0%	UK
Chevron	2,606	12.78	0%	US
ConocoPhillips	3,368	14.03	0%	US
ExxonMobil	3,148	12.26	0%	US
Shell	2,418	21.67	0%	Netherlands
<i>Average</i>	<i>2,865.48</i>	<i>15.28</i>		

Source: Stacy L. Eller, Peter Hartley and
Kenneth Medlock
*Empirical Evidence on the Operational
Efficiency of National Oil Companies*
Rice University, Baker Institute

Company	Revenue per Employee \$/employee	Revenue per Reserves \$/boe	Government Ownership %	Country
<i>Others</i>				
Amerada Hess	1,532	16.07	0%	US
Anadarko	1,838	2.52	0%	US
Apache	2,019	2.71	0%	US
BG	1,547	3.64	0%	UK
Burlington	2,537	2.74	0%	US
Chesapeake Energy	1,577	3.22	0%	US
CNR	4,606	3.85	0%	Canada
Devon	2,356	4.33	0%	US
Dominion	847	13.81	0%	US
EnCana	2,915	4.48	0%	Canada
EOG	1,844	2.38	0%	US
ForestOil	1,841	4.02	0%	US
HuskyEnergy	2,149	9.53	0%	Canada
Imperial	2,838	35.72	0%	Canada
Kerr-McGee	1,263	4.15	0%	US
Lukoil	233	1.68	0%	Russia
Maersk	60	2.90	0%	Denmark
Marathon	1,757	39.14	0%	US
Murphy	1,436	21.60	0%	US
Newfield	2,114	4.45	0%	US
Nexen	1,048	4.25	0%	Canada
NipponOil	2,690	131.74	0%	Japan
Noble	2,433	2.54	0%	US
Novatek	220	0.21	0%	Russia
Occidental	1,577	4.46	0%	US
PennWest	1,577	2.53	0%	Canada
Petro-Canada	2,370	9.24	0%	Canada
PetroKazakhstan	546	4.12	0%	Kazakhstan
Pioneer	1,183	1.76	0%	US
Pogo	5,088	4.38	0%	US
RepsolYPF	1,561	10.79	0%	Spain
Santos	789	1.92	0%	Australia
Sibneft	189	1.81	0%	Russia
Suncor	1,447	78.50	0%	Canada
Surgutneftegas	121	1.01	0%	Russia
Talisman	2,207	3.26	0%	Canada
TNK	63	1.66	0%	Russia
Total	1,406	14.33	0%	France
Unocal	1,259	4.63	0%	US
Vintage	1,136	1.76	0%	US
Woodside	758	2.11	0%	Australia
XTO	1,437	1.94	0%	US
<i>Average</i>	<i>1,628.94</i>	<i>11.24</i>		

All IOCs Measures of Efficiency

Source: Stacy L. Eller, Peter Hartley and
Kenneth Medlock
*Empirical Evidence on the Operational
Efficiency of National Oil Companies*
Rice University, Baker Institute

Economic Impacts

- Inefficiency can cause a poor supply response to price increases
- Social goals and revenue needs can cause a poor supply response to price decreases
- Poor regulation of OPEC cartel creates volatility in the market

Resource Nationalism

- Refers to some notion of that the benefits of the resources belong solely to the nation or should revert back to a nation
- Expropriation
 - Venezuela
 - Argentina
- Export levies
- Ban on exports of unprocessed materials

Resource Mercantilism

- China has aggressively pursued bilateral contracts in Africa and the Middle East
- China's 3 NOCS have locked up contracts in 31 countries
- China is importing 60% of its oil
 - 50% from the Middle East
 - 25% from Africa
- CNPC owns 40% of the Sudanese national oil company

Questions?