



What do you want to be when you grow up?

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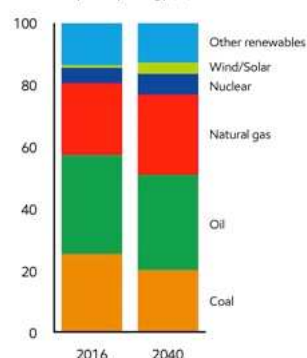
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Global energy mix shifts to lower-carbon fuels
Percent of primary energy (%)



All forecasts show strong fossil fuel emphasis for decades to come. While coals use may decline, growth in total energy demand means an absolute increase in the demand for oil and large increases for natural gas.



1.3 BILLION PEOPLE WITHOUT ELECTRICITY

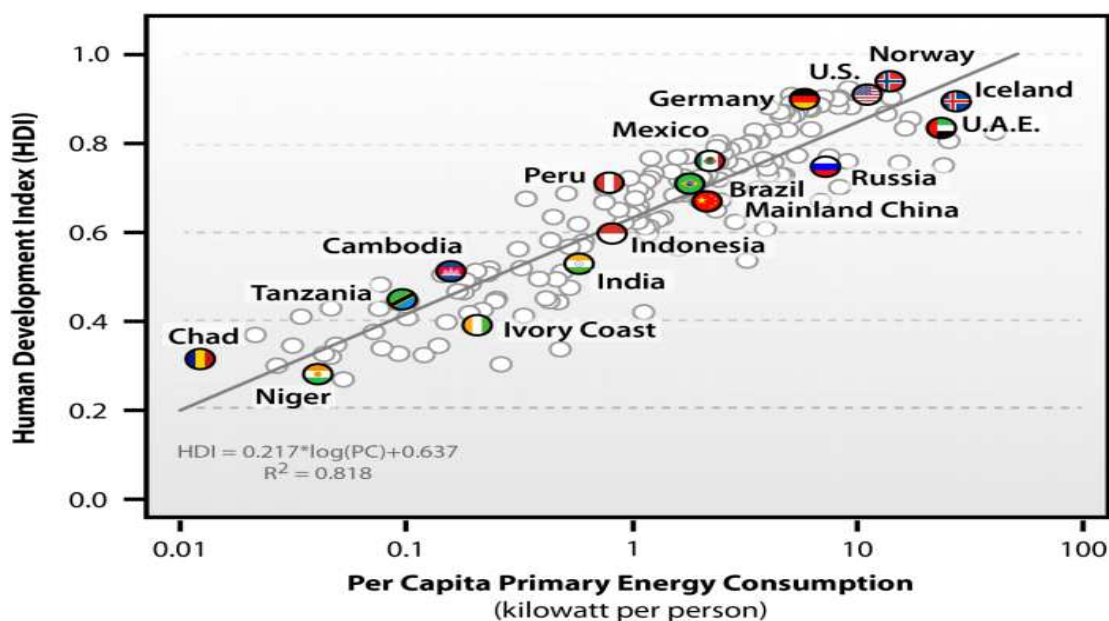


Source: Energy For All - Financing Access For The Poor, IEA World Energy Outlook 2011, Special Report

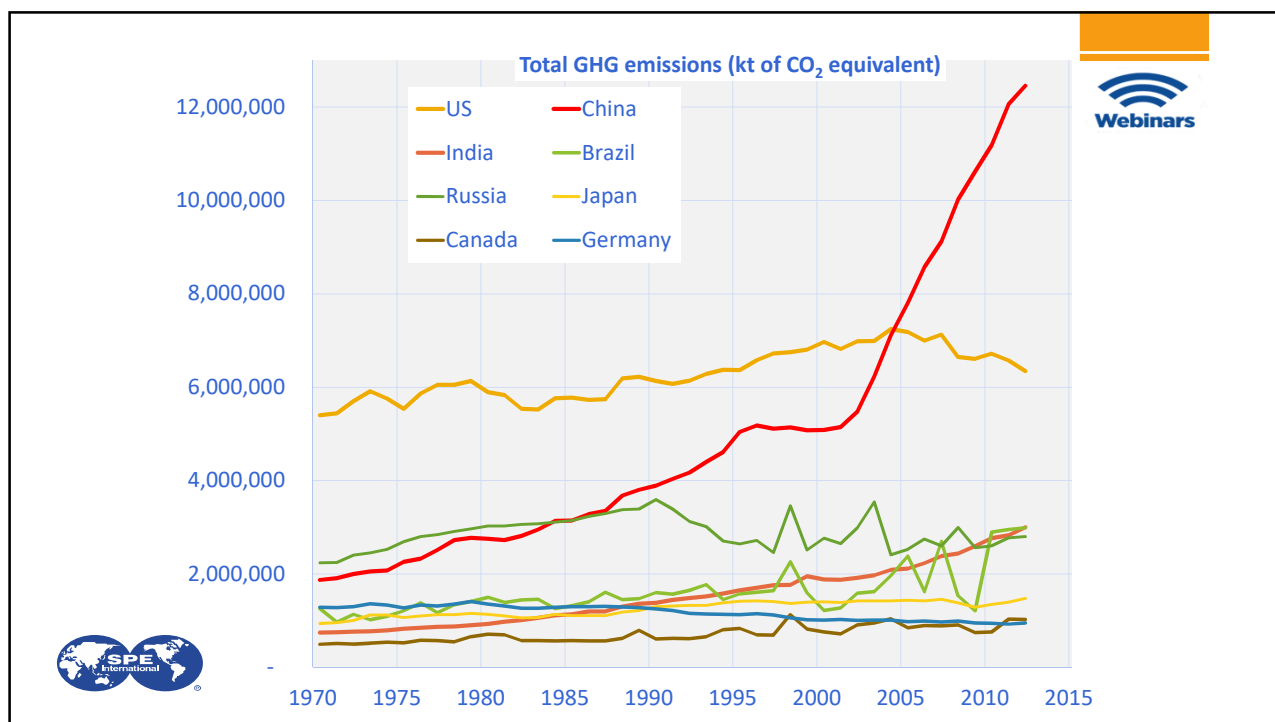
World Health Organization 2014



- Seven million premature deaths due to air pollution annually
- More than 60% (4.3 million) due to cooking with wood, animal dung and crop waste
- More than half of children's deaths (0-5 years) due to pneumonia caused by inhaling soot
- Three billion people cook in their homes using solid fuels
- Air pollution causes 1 in 8 global deaths



Source: "Energy, the Wealth of Nations, and Human Development: Why We Must Have Renewable Fuels," Bruce E. Dale, presented at Sustainable Energy for Sustainable Development.





How many of your neighbors and friends are enthusiastic about what you do?

What are we doing today?



- Let's talk about careers, life, unexpected twists and turns
- Let's talk about what is really important
- Let's talk about opportunities and decisions
- Let's enjoy this time together



A little about me: Background



- BS Physics, Georgia Tech
- MS Petroleum Engineering, University of Oklahoma
- PhD Petroleum Engineering, Stanford University
- 40+ years experience in the industry as an operator, consultant and in the service sector
- 6 children and 9 grandsons
- Lived 18 months in Hong Kong doing humanitarian work
- 500,000+ miles traveled as SPE President
- Professional career in horizontal wells, hydraulic fracturing, reservoir simulation
- Wrote the HP41 fluids pac, IOGCC member, on multiple company boards, loads of awards and stuff
- Raise bees, shoot very long range rifles and am the world's best at smoking brisket



Poll Question



Now a little about you...

HOW OLD ARE YOU?



Poll Question



Highest level of academic completion:



A true story



- Nate Colbert was born in St. Louis.
- On May 2, 1954, he watched Stan Musial hit five home runs in a single day (in a double header).
- Nate began his baseball career with the Houston Astros but was quickly traded to San Diego.
- Nate Colbert went on to hit five home runs on August 1, 1972 (in a double header).
- This is the story of a double header held three years and 11 days earlier---his first year with the Padres.
- In the first game of the double header, a young Nate Colbert goes 4-4 in the first game.



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The game



- At a little before 8 pm, Nate Colbert stepped out of the batters box and up to the plate in the nightcap.
- The crowd went wild, cheering louder than he had ever heard him.
- He stepped back and doffed his cap, but then he could see that his team had emptied out of the dugout, cheering.
- When he saw the opposing team and referees cheering he was amazed and turned to Cito Gaston in the batter's box, saying:
- "Hey City, can you believe this?"
- Cito said --- "Look at the Scoreboard" which said:



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NEIL ARMSTRONG HAS JUST SET FOOT ON THE MOON!



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Okay, what do we learn?



- The cheering isn't always for us, even if we do something pretty good.



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Career



- Modern definition: an occupation undertaken for a significant period of a person's life and with opportunities for progress
- Etymology: comes from a word for wheeled vehicles and implications of going round and round a track!



What is a profession?



- A career or occupation based on :
 - specialized education and training,
 - provide disinterested counsel or service for a defined compensation independent of other business gain.
 - Examples ---accounting, surveying, medicine, dentistry, actuarial science, law, architecture and engineering.
- Full-time,
- A specialized course of study,
- Governed by local and national associations,
- Codes of professional conduct, and
- State or other governmental licensing regulations.



Profession characteristics: a very limited monopoly



- The existence of state regulatory bodies governing the practice of a profession (and deciding who can be admitted into a profession) limits access to that profession.
- This bestows a limited monopoly on the practice of that profession.
 - Doctors
 - Architects
 - Structural engineers
 - Our profession



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Licensing and registration



- Can you imagine a situation in which a company would employ medical doctors or attorneys who were not educated and licensed to governing standards?
- But in the case of petroleum engineering it is the norm! Most states do not require the licensing of engineers who are employees of a company that does not offer to perform engineering services to the public.
- Some people refer to licensed professional engineers as “registered” engineers; the term licensed more correctly conveys the concept.



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Poll Question



Regarding engineering licensure, I am:



You have all seen comparisons between
Gen X, Gen Y, Boomers, etc



- I won't reiterate these but I will point out a few things where the industry has and will continue to change
- These things will directly affect your careers



Way of working



- In the stone age...
- The rise of asset teams
- The evolution of asset teams
- Geomechanics (etc) evolves
- The social team is created and “work/life” balance is addressed
- What is still the same?



Phrases I heard



- “paying your dues”
- “fulfilling work”
- “career planning” or “career ladder”
- “retention bonus”
- “Pension plan”
- “early retirement” “5 and 5”



Changing expectations



- How long do you plan to stay with an employer?
- Have you survived a contraction?
- Role of service companies?
- Salary and compensation?
- Starting your own business?



Actual question I was asked on campus



Who wants to climb ladders dude? What do you think elevators are for?





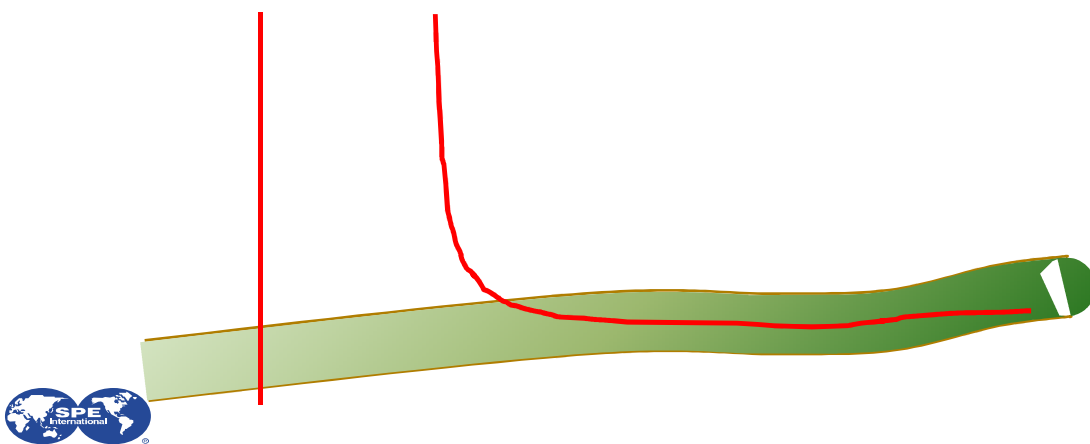
The industry is not the same



- Deepwater
- MHF
- Unconventional



Just draw a wellbore



Some examples



- BSPE, worked for a major oil company
- MSc in petroleum engineering, returned to same company to direct their CO₂ EOR
- Acquired by a primarily midstream company
- Built their EOR business enormously
- Now funded a startup EOR company





Video 1



Change of direction



- BSPE—Large independent in reservoir and drilling
- MBA— major capital firm buying and selling





Video 2



- Career senior executive
- BSPE, MBA, MSC, JD
- Global management experience in environmental and oilfield operations
- Time as a lawyer
- She gave some very good advice....





“That men do not learn very much
from the lessons of history is the
most important of all the lessons
that history has to teach.”
— Aldous Huxley, Collected Essays



Poll Question



I am most likely to:



Poll Question



As a career, I hope to:



The biggest mistake that you can make is to believe that you are working for somebody else. Job security is gone. The driving force of a career must come from the individual. Remember: Jobs are owned by the company, you own your career!

Earl Nightingale



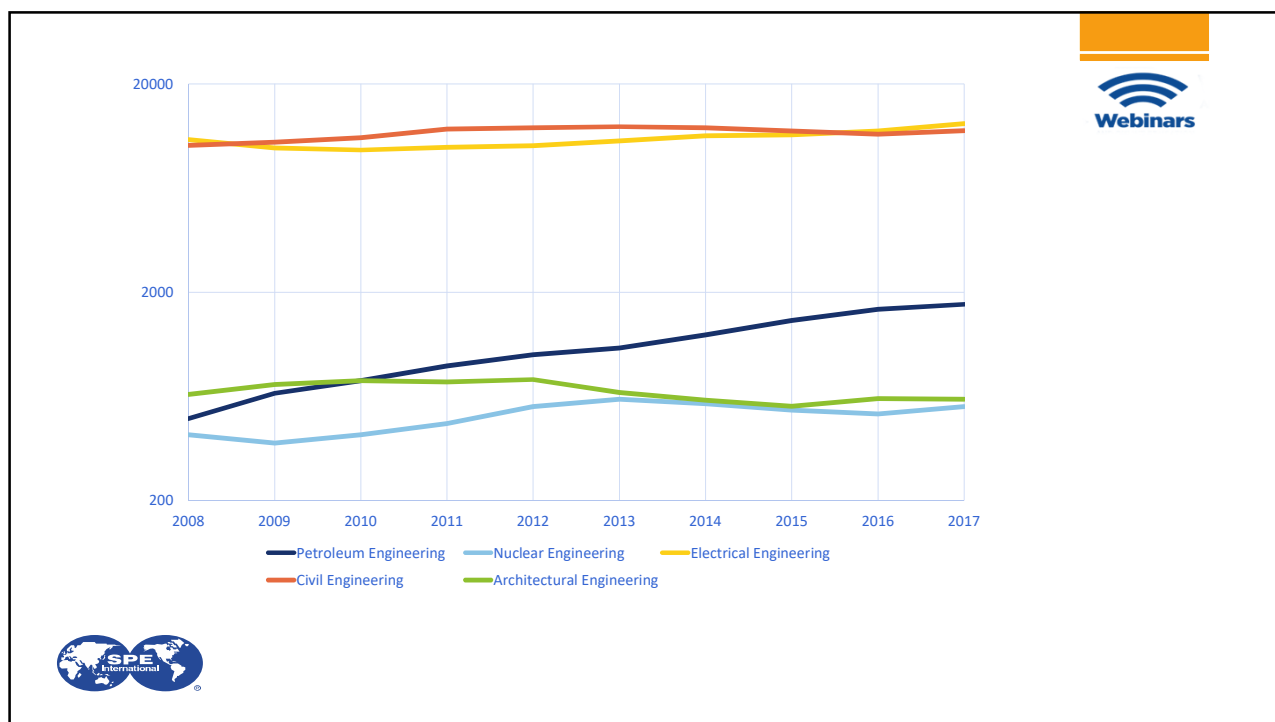
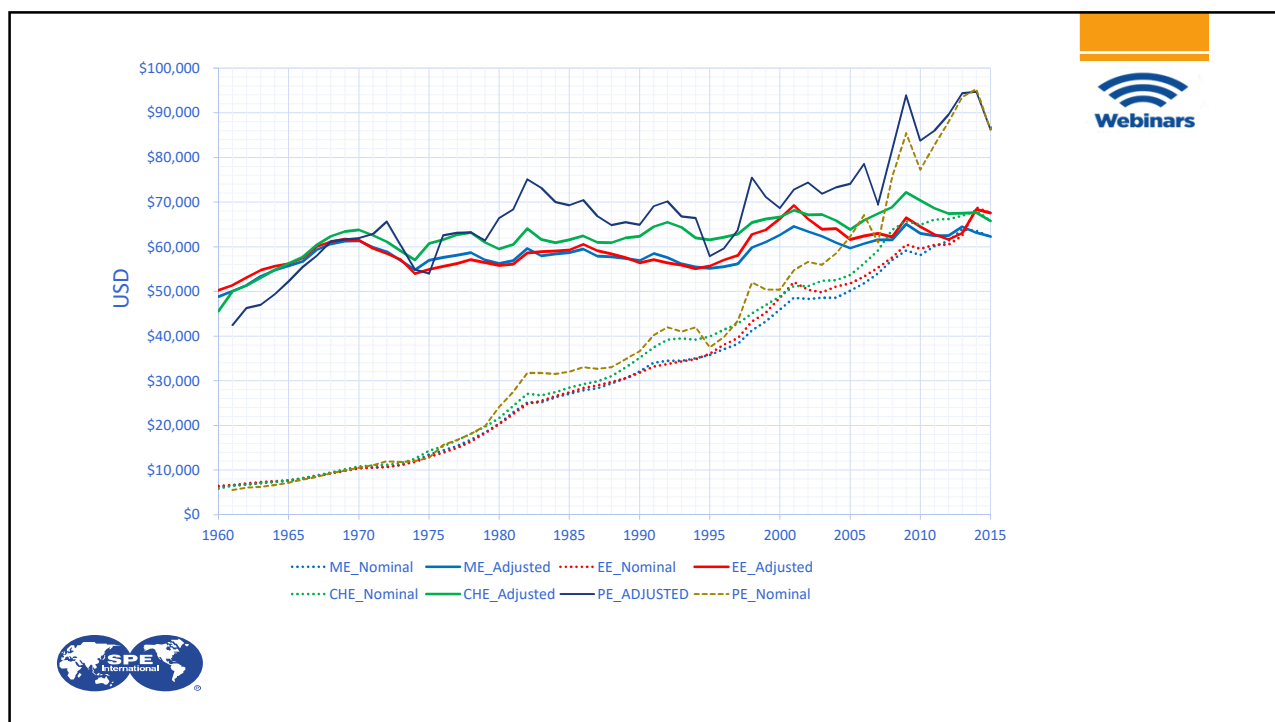


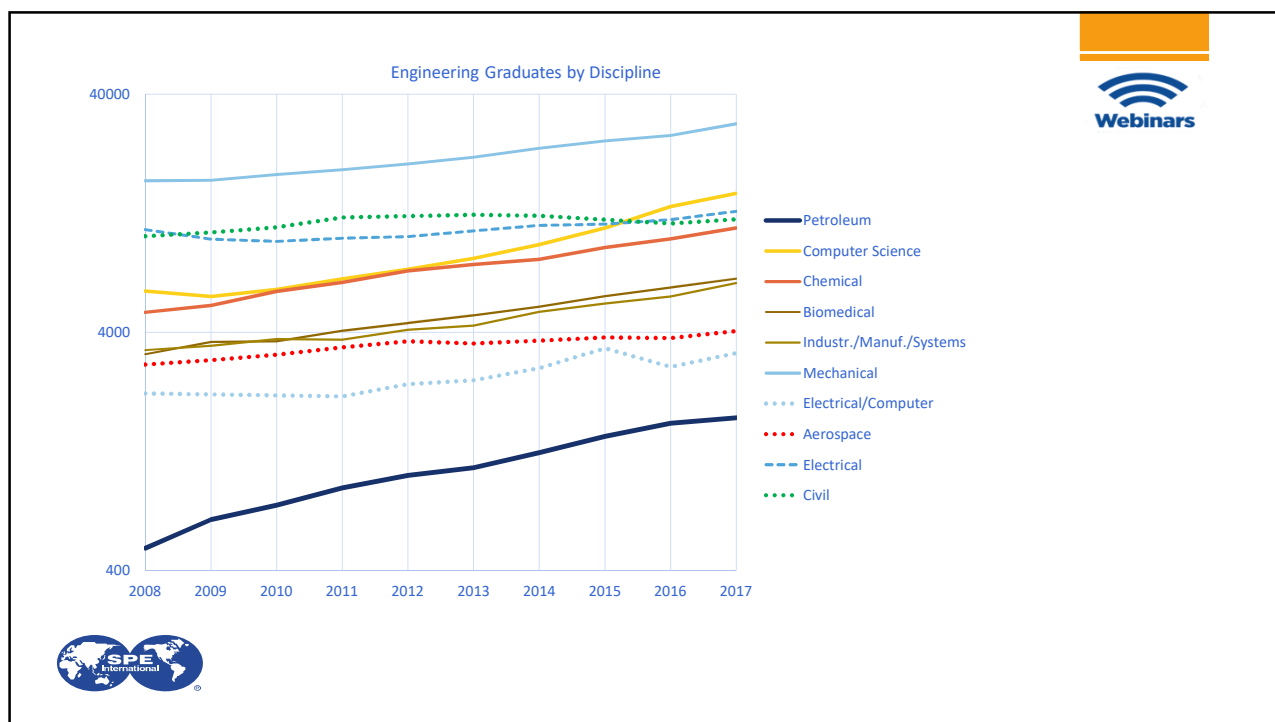
"History doesn't repeat itself,
but it does rhyme."
— Mark Twain



**The SINGLE most important thing to
me in my career is**







Bachelor's Degrees	2008-2009 Growth Rate
Petroleum	15%
Environmental	12%
Computer Science	11%
Chemical	9%
Civil/Environmental	9%
Biological/Agricultural	9%
Biomedical	8%
Mining	8%
Industr./Manuf./Systems	7%
Metallurgical/Materials	7%
Mechanical	6%
Computer	6%
Engineering Management	6%
Electrical/Computer	6%
Engr. Science	4%
Other Engineering	4%
Aerospace	4%
Engineering (General)	4%
Nuclear	4%
Electrical	2%
Civil	2%
Architectural	-1%

Disappearing engineering majors:

- Textile engineering
- Nuclear engineering
- Mining engineering
- Architectural engineering

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One of the big problems



- Close association with only one industry
- MOST electrical engineers go to work for industries that practically didn't exist 30 years earlier.
- Textile engineers, mining engineers, and nuclear engineers are tied to the vagaries of the industries they are associated with.
- Petroleum engineers are closely associated with only one industry and that industry routinely has massive layoffs during downturns



Big Data/AI impacts



- The Digital Industrial revolution is real
- Big Data/AI/machine learning will change all aspects of how we work
- Demand for many "old school" jobs will disappear as one engineer can do the work of many
- Any upside?



Big Data/AI upside



- The work is more difficult and more complex
- New tools offer the opportunity to create more value making us as engineers more valuable
- Augmentation vs Automation
- Future petroleum engineering duties will require a different way of thinking and different skills.



Future skills



- Decreasing carbon intensity of projects
- Design of tools for additive manufacturing
- Integration of nanotechnology
- Replacing the old way to do things (say pattern monitoring) with deep learning, integration of high frequency data, etc.



Past tense: Crew Change



- Not everyone will adapt
- Those who cannot develop the necessary digital skills will be left behind
- Engineers will be expected to “up” their games to lower-carbon intensity of oil and gas production and make fossil fuels more sustainable.



Plan B



- Victory Lap
- More degrees MSPE, MS, MBA, JD, PhD
- Fieldwork, parallel jobs
- Change completely
- How will I know?

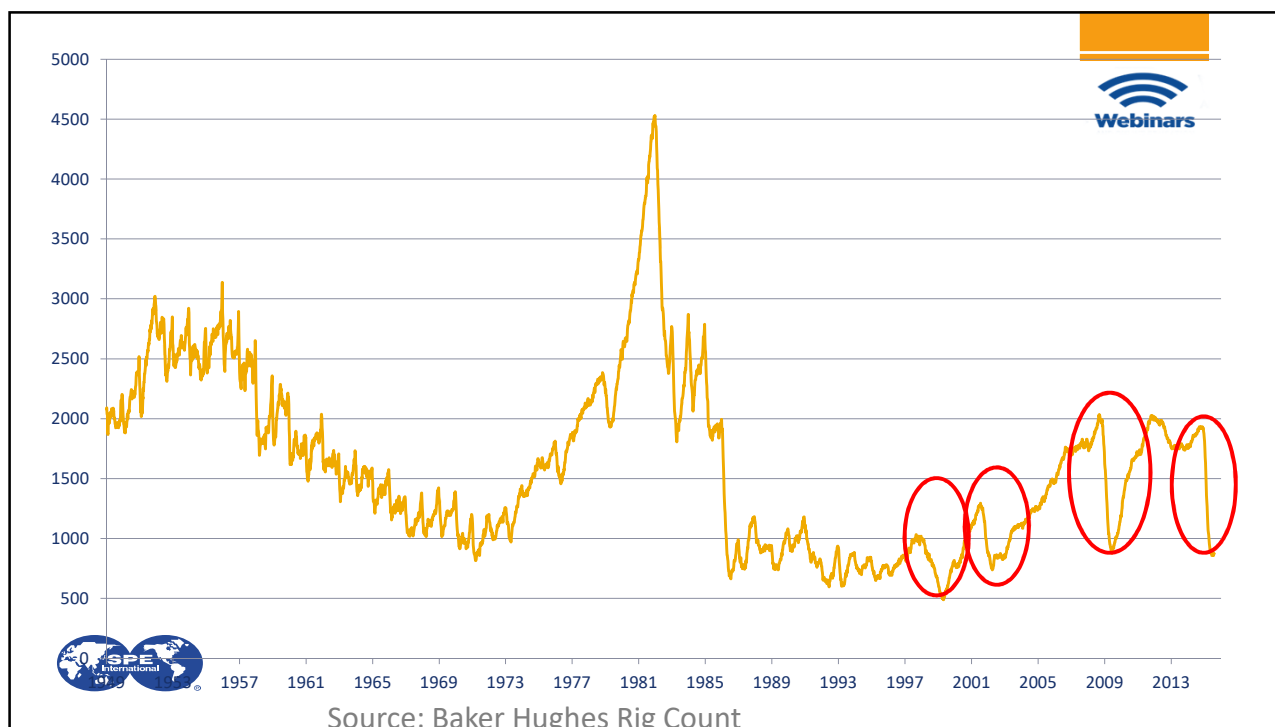


Options to up your game



- Continuous learning required
- Options to retool
- Advanced material sciences, supply chain, big data analytics, machine learning, fiber optics, etc. can hardly be touched in the undergraduate curriculum.





Riding the storm out

- Storm? Or Ice age?
- Should I stay or should I go?

MBA



- How important is it? I mean really?
- Where should I go?
- Full-time or part-time?
- How do I create the most value?
- The advice I ALWAYS give



MSc in Petroleum Engineering



- Comparison to geology or geophysics need
- In the future--- do you think it more or less likely to need an MSc to address technology
- Cash flow analysis problem– is this a matter of NPV?
- What kind of work do you want to do?
- How long does it make a difference?



MSc in Petroleum Engineering



- Personally I believe the MSc should be the entry level degree
- Full-time or remote?
- What do you want to accomplish?
- Risks and rewards
- Answer “the question”



JD



- Often viewed as a Plan B
- Patents
- Management
- Oil and Gas management



PhD



- The old way of thinking
- The new way
- Creating value in a variety of new ways
- Don't underestimate the global cachet
- Type of assignments you will get
- Answer "the question" honestly



Don't believe
everything you
think....

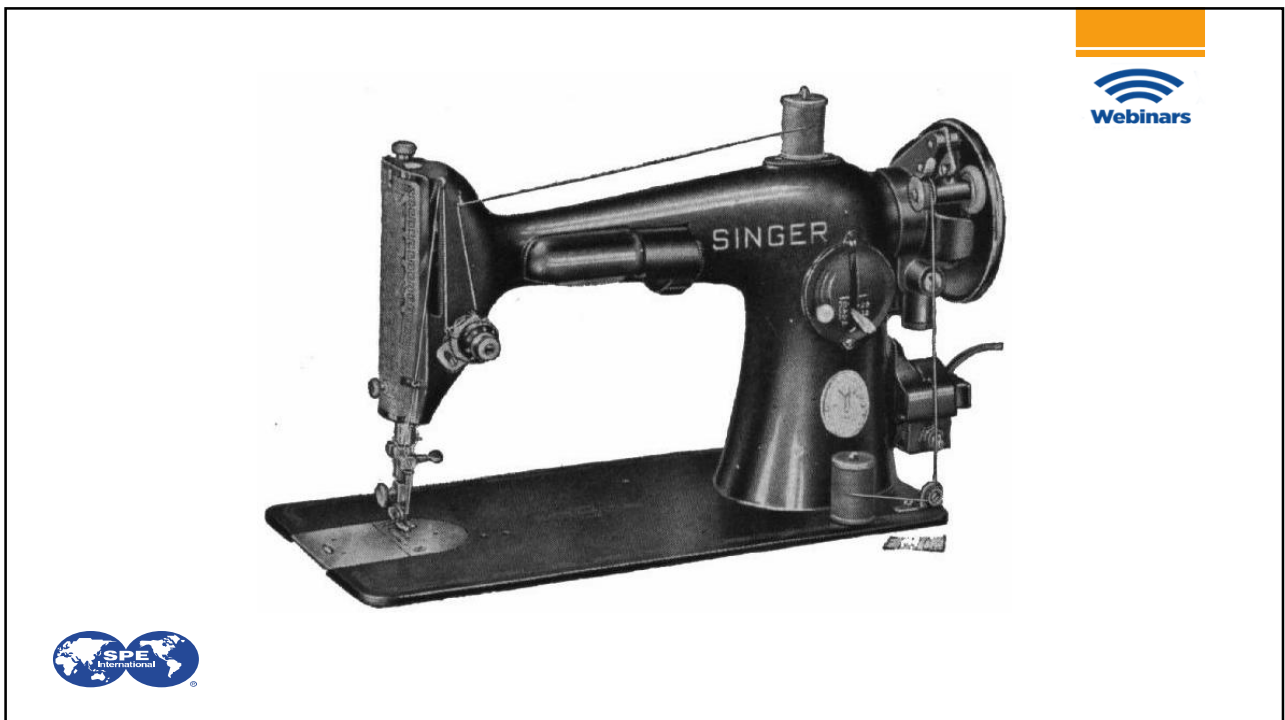


It is the mark of an educated mind to be able to entertain a thought without accepting it.

Aristotle







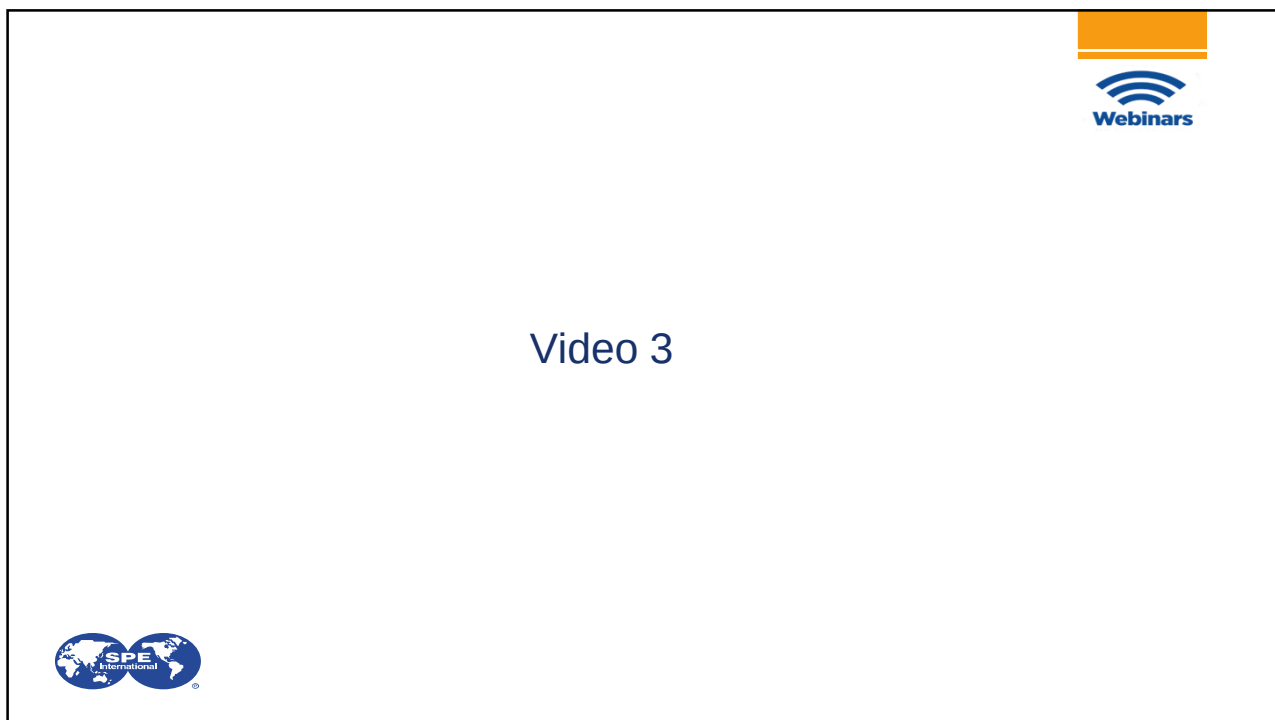




“If anyone tells you that a certain person speaks ill of you, do not make excuses about what is said of you but answer, "He was ignorant of my other faults, else he would not have mentioned these alone.”
— Epictetus









Thank you!

Questions?

