Downstream sector

- Production
- Stuff that comes out of the well head
  - Natural gas
  - Water
  - Crude oil
  - Contaminates
- Step 1 of production is separation
  - Wet Crude Handling Facility (WCHF)
    - Older fashion
      - Did not care about natural gas
      - Just burned it off
  - Gas Oil Separation Plant (GOSP)
    - Current method
    - Get crude oil after initial separation
    - Then sent to a refinery
      - Want to separate the different chains from one another
        - Use heat to do fractional distillation and separate the hydrocarbon chains
      - Naphtha
        - Basic building block of gasoline
    - How do you measure the relative weights of oil (Heavy oil)
      - API gravity
        - American Petroleum Institute
        - For oil
          - \((141.5 / \text{specific gravity of crude oil}) - 131.5\)
          - Specific gravity of crude oil is around 5.0
          - The higher the API gravity, lower the actual specific gravity of the oil
          - Industry norms
          - 15°-39° for heavy crude
            - nasty
            - toxic
            - tar-looking
            - high cost of refining
          - 40°-60° for intermediate
            - honey in color
          - 60°+ for light oil
            - looks and feels kind of like baby oil
            - refining costs are very low
          - This matters because of the cost of refining the oil
          - Light
        - For water
          - \((141.5 / 1) - 131.5 = 10°\)
- Specific gravity
  - Different calculation
- Different markets have certain benchmark crude oils
  - WTI
    - West Texas Intermediate
    - For US markets
  - Brent Intermediate
    - Came from the North Sea
- Oil contracts get written in terms of the price of a benchmark crude
  - Price + or – a quality differential depending on whether you stuff is worse or better than the benchmark
- Where does the natural gas go?
  - Gas plant
    - Same sort of refining process
    - End product is methane
    - Beginning product will have lots of other gas in it
    - Natural gas liquids or condensates
      - Propane and butane
      - If you cool down enough, you can liquefy ethane
      - CO2
      - Sulfur compounds
        - Sweet and sour gasses
          - Sweet has no sulfur compounds
          - Sour has lots of sulfur
- What can you do with natural gas once it’s purified?
  - Local production (heating and stuff)
  - Use it in oil recovery
  - Pipe it or condense it to Liquid Natural Gas (LNG) to ship it around the world
    - Having the ability to ship creates a true global market
      - Already available for oil
      - Emerging for natural gas
    - Could also use as feed stock for purification
    - Gas to liquids (GTL)
      - Turning gas into lubricants and gas
  - Regional markets for gas
    - Europe
    - Asia
    - North America / Western Hemisphere
    - Some signs of arbitraging across those markets, but nowhere near like the oil market

Politics
- US is the only place in the world where if you own land, you also own the subsurface rights, as well
- British law
  - Land was given to vassals
  - Subsurface rights still to the states
  - 6 feet under
    - term comes from this notion
    - anything below 6 feet still belongs to the sovereign
• What is a concession?
  o Define a territory, and the investor has full access to the subsurface resources in that defined territory
  o The production is the property of the investor
  o Ways sovereign is going to get a piece of the action
    ▪ Signing bonus
    ▪ Royalties
    ▪ Taxes
  o Sovereign will still not have a lot of say
  o Overtime sovereigns had lots of dissatisfaction
    ▪ Responses to dissatisfaction
      ▪ Nationalization
        • Aramco became Saudi Aramco, for example
      ▪ Expropriation
        • Compensate the investor
      ▪ 50-50
      ▪ Form a cartel
  o OPEC
    ▪ Want to re-establish control
      ▪ Have a say over investment and pricing decisions
    ▪ Want money, too
  o For deep water drilling in international waters there are all sorts of treaties and rules governing terms of use
  o If you have just nationalized, what do you do if you’re not going to give concessions?
    ▪ Do it yourself
      ▪ Saudi Arabia and Saudi Aramco
        • Since the 1970s there has been no foreign investment into upstream oil sector (Saudi Aramco)
        • Most capable national oil company in the world (Saudi Aramco)
        • Finance virtually everything on their own, too
        • Put a lot of money into the latest technology
          ▪ The most supercomputers in the world, second to the NSA
        • Service contracts
    ▪ Production Sharing Agreement (PSA)
      ▪ Like a concession
        • Agreement between the sovereign and an investor dealing with a specified territory for a specified amount of time
      ▪ Different than a concession
        • In PSA the sovereign will have more to say in what the investor will be doing with regards to investment of resources and monies
        • Government shares production with investor
          ▪ Take total volume of production and spit it up based on specified amount agreed upon in contract
            ▪ Initial compensatory product
The amount of product that the investor needs to break even

- Everything past compensatory product is what gets split up

- Why this is good for the sovereign
  - Keep ownership rights
  - Higher say in goings on

Who is the biggest oil company in the world?

- By booked reserves
  - Saudi Aramco
  - Top ten are all nationalized oil companies

- By publicly traded booked reserves
  - ExxonMobile

  "Competitive fringe" is being phased out
  - Private companies are going to have a harder and harder time fighting against the nationalized oil companies
  - Demand is only going up, especially with Asian economies on the rise, which gives the nationalized companies and OPEC a huge advantage and leverage
  - We don’t have the same sort of plays that we once did

- Peakists
  - Since it is a finite resource, there is a peak point of production at some point where, once hit everything subsequent to it will fall into decline
  - US oil production peaked in the 1970s
  - There must be a global peak for production
    - There are some people that argue that we are almost there
  - Not everyone peaks at the same time
    - UK peaked in the late 1990s
    - Norway is near peak
    - Mexico has peaked
    - Some people think Saudi Arabia is going to peak soon