**Power Hungry Questions**

**Chapter 1**

**1) What four things does Bryce characterize as "The Four Imperables "?**

Ans: Power Density, Energy Density, Cost, and Scale

**2) From 1990 to 2007, how has the percent CO2 emissions per capita changed for the U.S.?**

a) -29.2%  b) -1.8%  c) 37% d) 132%

Ans: b, -1.8%

**3)** *Fill in the blank.*

**Bryce Claims we must differentiate between energy and \_\_\_\_\_.**

Ans: Power

**Chapter 2**

(unavailable)

**Chapter 3**Define Energy Density and Power Density.

Energy Density refers to the amount of energy that can be contained in a given unit of volume, area, or mass.
Power Density refers to the amount of power that can be harnessed in a given unit of volume, area, or mass.

Give an example of how renewable energies compare to hydrocarbons in terms of energy or power density.

Renewables require a much larger land area than hydrocarbons to produce comparable outputs, or batteries are extremely heavy compared to hydrocarbons.

**Chapter 4**1. Since 1950, what has been the primary source of energy in the United States?

Answer – petroleum

1. In 2009, what were the three primary sources of energy in the United States?

Answer – petroleum, natural gas, and coal.

**Chapter 5
Why is the demand for electricity increasing?**

There are two main reasons for the increase in electricity demand:

-First, fully developed countries are increasing their use of personal devices such as cell phones, ipods, laptop computers, e-readers, etc. as the ability to communicate and have information readily available becomes increasingly popular.

-Secondly, research has shown that developing countries must increase their electricity use in order to raise their standards of living.

1. **Why is coal production increasing as opposed to alternative sources?**

-An increase in coal production is more economical than an increase in wind or solar production. Also, there is not a governing body for coal like there is for oil, so the increased production is unchallenged.

**Chapter 6**1. Chapter 6 was titled "If \_\_\_\_\_ didn't exist, we would have to invent it." ANSWER: OIL

2. Ch 6 quote: "Without transportation, there is no commerce." Bryce went further with it by saying, "Without \_\_\_\_\_\_\_ , there is no commerce." ANSWER: OIL

3. Name two products that are made from refined oil:

EXAMPLES: Health care products (Lotions and Cosmetics)
Medicines
Transportation fuels
Plastics (Shoelaces, Bowling Balls, Milk jugs)

4. T or F, The pivotal role of diesel engines and jet turbines in a global economy underscores the essentiality of oil. ANSWER: TRUE

**Chapter 7**

1) If the energy consumption on Earth were measured in barrels of oil equivalent per day, how many barrels of oil equivalent would be consumed on a daily basis?

1. 50 thousand
2. 226 million
3. 6.28 billion
4. 7.1 trillion

Answer: **B, 226 million**

1. Roughly 20% of electricity consumed in the United States comes from nuclear power.

Worldwide, how does the United States rank in terms of kilowatt hours of electricity generated from nuclear power?

1. 1st
2. 2nd
3. 4th
4. 6th

Answer: **A, 1st**

**Chapter 8**

1. What do we want when it comes to “Green” power?
	1. We want small pieces of real-estate packed with high amounts of power output. Wind and solar don’t have these attributes, but fossil fuels and nuclear do.
2. If “Wind and Solar” aren’t “Green” explain why both of them not “Green?”
	1. Wind energy requires additional power lines to connect them and large areas with wind. When compared to the South Texas project the wind would need approximately 869 square miles equivalent. They do not run when there is no wind.
	2. Solar power would require large areas of flat land. When compared to the South Texas project solar would require approximately 156 square miles equivalent. Solar cells do not work if there is not sunlight.

**Chapter 9**

1. In China's project to run a town on entirely wind power, the amount of coal energy production is equal to the annual power use by what country?

a. Sweden

b. USA

c. Hungary - Ans

d. Denmark

2. By 2030 how much CO2 will wind power be capable of scrubbing out of the atmosphere, and what is the world's annual production?

*731M tons scrubbed, 18,708M tons produced*

3. What percentage of the maximum energy capacity of wind power is actually obtainable?

*10-20%*

**Chapter 10**1. Why doesn't Denmark import any oil?

a. Everything is Electric Ans - Denmark does import oil.

b. Denmark doesn't use oil. Ans - The country uses natural gas, coal, and wind power.

c. Denmark gets all its oil from offshore drilling. Ans - Denmark produces so much oil that the country is an oil exporter.

2. True or False?

Since using wind power, Denmark has shown a reduction in CO2 emissions.

1. When Denmark is talked about in "happy talk" segments, emphasis is always put on how much energy and power they get from wind power. However, all of this happy talk ignores the fact that Denmark still gets most of their energy and power (around 80% in fact) from burning what fossil fuel?
2. Coal
3. Oil
4. Natural Gas

Answers:

3
False
2

**Chapter 11**

1. Is T. Boone Pickens’ energy goal possible? Why or why not?
	1. No, because (possible answers)
		1. It’s not economical to switch natural gas from electric to transportation
		2. This process would decades not years
		3. Wind farms are not efficient enough
2. Why did the public love his plan?
	1. He made the public think that this was a good idea and that it would work right away and that’s what the public wanted to hear

**Chapter 12**

1. When the wind wasn’t blowing in January of 2009 eastern Washington and Oregon used \_\_\_\_\_\_\_\_\_\_\_\_ to compensate for the lack of wind power. Ans- Hydropower
2. The best backup for wind power plants is to use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	1. Solar power facilities
	2. Hydro power facilities
	3. Natural gas facilities - Ans
	4. Coal plants
3. Natural gas facilities only need to be manned \_\_ hours a day to back up wind power plants.
	1. 8
	2. 12
	3. 16
	4. 24 - Ans

**Chapter 13**

1. What country controls nearly all of the world’s existing mines that produce lanthanides?

ANS: China

1. True or False: if the US would use more hybrid cars, wind turbines, etc., we would be free of international entanglements and the need to import oil and other strategic commodities.

ANS: False. May simply be trading reliance on one type of import (oil) for reliance on another (rare earth and lithium).

**Chapter 14**

* + - 1. Carbon Intensity- The amount of carbon \_\_\_\_\_ per unit of economic output, measured in metric \_\_\_\_\_ of carbon \_\_\_\_\_ per $1,000 of \_\_\_\_\_\_

Answer: dioxide, tons, dioxide, GDP

* + - 1. Energy Intensity-The amount of \_\_\_\_\_\_ needed to produce $\_\_\_\_ of \_\_\_\_\_\_

Answer: energy, one, GDP

**Chapter 15**

* + - 1. What is meant by Carbon Capture and Sequestration (CCS)?

CCS involves collecting the CO2 emissions produced from hydrocarbons, and underground storage.

* + - 1. Given that the world receives 88% of its energy needs from hydrocarbons and produces 30 billion tons of CO2 annually, what obstacles does CCS encounter?

Finding a place to store the enormous volume, and cost of transportation of storage.

**Chapter 16**

* + - 1. According to Bryce, how many tons of mercury in the U.S. do coal-fired power plants produce each year?
1. Mercury is not a by-product of coal-fired power plants
2. 1 ton
3. 48 tons
4. 600 tons

Ans: C, 48 tons

* + - 1. According to Bryce, China’s 2,000 coal-fired power plants release tons of mercury into the air each year.
1. Mercury is not a by-product of coal-fired power plants
2. 1 ton
3. 48 tons
4. 600 tons

Ans: D, 600 tons

**Chapter 17 - Myth: Oil is Dirty**

* + - 1. What are the downsides of biomass based fuels?

Biomass based fuels require large tracts of land to be used to produce the required biomass. The clearing of this land can cause massive releases of carbon dioxide as well as destroyin habitat. Additionally, they tend to be unclean burning, releasing noxious gasses and particulates into the atmosphere. This has the potential t melt polar icecaps as the particulates settle on ice caps, making them darker, and increases indoor air pollution from combustion gasses entering the home through improperly sealed stoves and furnaces.

* + - 1. Why are fossil fuels seen as the answer to biomass fuel sources and not other novel renewable sources?

Fossil fuels present a ready supply of fuel based on proven and inexpensive technology with relatively inexpensive infrastructure required as compared to wind and solar energy sources.

**Chapter 18**

1. In order to replace 10% of our oil use with cellulosic ethanol, the entire state of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ would need to be used to supply the biomass.

Ans: Oklahoma

1. True or False: The production of cellulosic ethanol emits about 20% less carbon dioxide per unit of energy produced by standard gasoline.

Ans: False. Cellulosic ethanol produces about 50% more carbon dioxide.

**Chapter 19: The Myths of “Green” Energy and the Real Fuels of the Future**

***Short Summary:***

Energy storage techniques must improve to make electric cars a viable alternative to internal combustion propelled vehicles.

***Review Questions:***

* + - 1. Are electric cars today with modern battery technology a viable replacement to conventional propelled vehicles?

According to Bryce and the DOE, they are not. Many might dispute this claim but for most consumers internal combustion propelled vehicles are much more practical.

* + - 1. Bryce claims the energy density of gasoline is eighty times that of modern Lithium-ion batteries. Explain what “energy density” means.

Energy density is measured as the amount of energy held in a particular fuel or battery per kilogram or liter. This measure allows for the direct comparison of fuels and batteries on a per density basis.

**Chapter 20 – Myth: We Can Replace Coal with Wood.**

1. Replacing 10% of coal-fired electricity to wood-fired electricity would increase the U.S. consumption by how much?
	1. 1.5 times
	2. 2.5 times
	3. 5 times
	4. 7 times

Ans: b.

1. How many tons of wood per year would produce 1 megawatt of electricity?
	1. 1,000 tons
	2. 5,000 tons
	3. 10,000 tons
	4. 25,000 tons

Ans: c.

**Chapter 21**

1. What is the difference between Resources and Reserves?
Resources are what is probably out there; reserves are what is proven to be out there.

2. What is Peak Oil?
The worlds peak oil production.

**Chapter 22**

1. What is natural gas flaring?

The act of burning excess natural gas than is associated with oil production. (no energy production)

1. In the 1930’s the price for 1000 cubic feet of natural gas was \_\_\_\_.
	1. $1.00
	2. $0.03
	3. $0.57
	4. $4.28

Answer : $0.03

**Chapter 23**

What form of drilling was used to extract natural gas form shale?  Hydraulic Fracturing or "Frac"

What type of natural gas production is most commonly used in the US?

         A) Onshore Conventional       B) Offshore       C) Onshore Unconventional

Name one of the Natural gas shale deposits that were mentioned in the chapter.

**Chapter 24– America’s Secret Google**

1. Individual Americans made about $21.5 billion on mineral interest payments in 2007. This sum is comparable to the amount of money made by what company?
2. Google
3. Dell
4. McDonalds

Answer: Google

1. The private ownership of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is why America has become so prosperous and continues to lead the world in developing new technologies to extract hydrocarbons.

Answer: mineral rights

**Chapter 25**

1. Sketch a graph showing natural gas production (thousands of ft3/day) over the last hundred years.

1. As of 2008 natural gas production has dropped to approximately \_\_\_% of that of 1971.
	1. ~25 (25.9…etc)

**Chapter 26**

1) What is the cheapest means of producing none uninterruptible power without carbon dioxide emissions?

2) What two energy sources receive the largest amount of government subsidies?

**Chapter 27**

What idea does Robert Bryce believe should be used for the countries nuclear waste?

Ans: Energy Parks

What is goal for future nuclear power?

Ans: either reducing total radioactive fuel to prevent proliferation or long term waste depository.

**Chapter 28- Future Nukes**

1. By 2030 what will the demand of electricity be, compared to 2007?

Ans. Up 34%

2. Who came up with one of the first modular reactor?

Ans. Toshiba

3. What would be the replacement for Uranium?

Ans. Thorium

**Chapter 29**

1. Define Technological disruption

Ans: anything that cause a drastic change in the development of technology

1. Which of the following is **not** part of the N2N plan
	1. Promote Natural gas and Nuclear power through target use of tax incentives
	2. Encourage oil and gas production in the U.S.
	3. Continue promoting energy efficiency
	4. Remove tax incentive from wind energy
	5. Continue working on renewables and energy storage technologies such as batteries and compressed air energy

Ans: D

1. On average the world burns 14.5 billion cubic feet of gas without using it for energy. How many barrels of oil does the equal energy wise?

Ans: 2.6 million

**Chapter 30**

1) What does the acronym N2N stand for?

 Ans: Natural Gas to Nuclear

2) Approximately what percent of the U.S. population did Bryce report in poverty?

 Ans: ~13% (39 million American people)

3) Alongside the energy crisis, what does Bryce feel is the next "crisis"?

 Ans: Water crisis