Discussion Guide: *Energy Switch* Season 1

Based on the popular, national PBS Talk Show *Energy Switch*

Season 1: Table of Contents

Episode 1: How Should We Respond To Climate Change?

Dr. Steven Koonin & Dr. Michael Greenstone

Transcript

1. Some countries have introduced a price on carbon to attempt to reduce emissions: should the US follow suit? What are the arguments for and arguments against? What would be the most important positive and negative effects?

2. Globally, there are more than 2 billion people without access to clean cooking. They cook indoors with wood, biomass, and dung, which causes millions of premature deaths each year from the smoke and soot. Is this an either/or proposition: providing clean cooking to people in low-income countries **or** focusing on cutting GHG emissions in high-emitting middle and high-income countries? If both are important, how should we balance investment and priorities accordingly?

3. Do you see climate changes in the US and globally that you believe are related to the warming effects of GHG emissions?
   Optional activity for participants to complete ahead of group discussion: Pick one major climate impact such as drought, forest fires, hurricanes, sea level rise, etc., and search for a graph of the data through time for that specific climate impact. Has the trend accelerated or decelerated through time, as the result of climate change?

4. Some people, especially students and youth in developed economies, are very worried about climate change. How do you think we should best communicate about climate change risk? Compare climate change risk to other risks like global poverty, global war, global food, etc.

Episode 2: What's the Future of Natural Gas?

Dr. Naomi Boness & Rachel Fakhry

Transcript

1. Naomi Boness sees natural gas as a very economical way to enable (make reliable) the deployment of more renewables (solar and wind) and to keep energy prices affordable. Do you agree or disagree? Explain your position.

2. Rachel Fakhry cautions against the notion that natural gas is needed long term to integrate renewables: 'If we keep building pipelines [and] turbines today, we're stuck with the gas for a long time.' In terms of the energy transition, how do you define "long time"? How might Fakhry define "long time"? Can an all renewables future ever be reliable? Affordable? Why or why not?

3. Can wind power substitute for everything that natural gas does?

4. Would you be more uncomfortable living next to a shale gas field, a gas-fired power plant, or a major wind farm?

5. How should India solve its power needs for 1.4 billion people in your view?

Episodes 3 & 4: Will Solar & Wind Power Our Future? Parts 1 & 2

Leia Guccione & Robert Bryce

Transcripts: Episode 3 & Episode 4

1. Do you agree with Leia Guccione's belief that a well-planned grid system with high penetrations of renewables and modernized operations can be run reliably? Is it reliable in Germany and Australia? Why or why not?

2. Robert Bryce suggests that the federal tax incentives for solar and wind in the US are much greater than those given to nuclear and that this has distorted the wholesale market. In your opinion, what role should the government play in the energy transition?

3. Leia Guccione points out that "in some ways [redundancy] is a feature, not a bug." How can redundancy be a feature? How can it also be a bug?

4. Regarding optimal conditions for wind and solar energy battery storage, Bryce says it's like Goldilocks, "everything has to be just right" and that "the higher the energy density in the battery, the greater the volatility or the reactivity." Is battery storage a viable solution for intermittency? What are a few of the challenges?

5. Why are some communities against building wind farms, solar farms, and new grids in their community?

6. Is there really any 100% 'renewable energy'?

7. Have you lived next to renewable energy production of any kind and what was your experience?

Episode 5: Could Hydrogen Be Our Energy Future?

Dr. Steven Hamburg & Dr. Julio Friedmann

Transcript

1. What is hydrogen used for? In your opinion, is hydrogen our energy future? Explain your position.

2. Are the processes for delivering hydrogen as a fuel source today viable? If you have concerns, what do you see as the most concerning issue with using hydrogen as a fuel source? What is the challenge with storing hydrogen?

3. What is a fuel cell, and why is it considered a climate-friendly alternative?

4. Drs. Hamburg and Friedman discuss some of the ways that increasing hydrogen usage can be encouraged as we look towards 2050 - what are some of the "carrots and sticks" that are discussed among the participants? What are some of the potential roadblocks to increasing hydrogen usage?

5. Why are oil and gas companies interested in hydrogen?

6. Do you agree with Dr. Friedman's statement that "[t]he big challenge is that we have to be as ambitious and as urgent as we can possibly be"? Explain your position. How could government, industry, and academia be more ambitious *and* urgent regarding hydrogen?

Episode 6: Investing in our Energy Future

Dr. Kenneth B. Medlock & Deborah Byers

Transcript

1. Dr. Tinker states that " most energy decisions are based not just on price, but whether they can create a return for investors". How do the guests say that this will impact future investment in fossil fuels and other energy sources?

2. Dr. Ken Medlock says that you have to "go region by region and identify where the resources are and how you can capture them to deliver lower carbon assets". Why?

3. What are some of the ways that the guests suggest to de-risk investment in order to facilitate energy investment in the developing world?

4. Dr. Tinker mentions the film "*Switch* On", in which he showed what it looks like when you don't have much or any energy. What are some of the issues related to energy poverty that the guests mention?

5. Why is the discussion on energy not just a binary one (good vs. bad, clean vs. dirty)?

Episode 7: New Geopolitics of Energy

Secretary Ernie Moniz & Dr. Dan Yergin

Transcript

1. What are some of the challenges for the oil and gas sector that are highlighted in this episode?

2. Give an example of the disparity in the impact of energy access between “rich countries” and emerging and developing nations.

3. What are some of the roadblocks to financial investment in energy access in developing countries?

4. Both guests seem to agree that a diverse energy mix is required, now and into the future. What are some of the energy sources that they mention, and which are dependent on future (undeveloped) technologies?

Episodes 8 & 9: Is It Time For More Nuclear Power? Parts 1 & 2

Dr. Arjun Makhijani & Michael Shellenberger

Transcript: Episode 8 & Episode 9

1. Michael Shellenberger states that the real risk with nuclear accidents is that we overreact to them. What public opinions about nuclear were prevalent in your youth? Would you be more comfortable with a nuclear plant within five miles of your home, or a solar farm? Why or why not?

2. Compare nuclear and its radiation to solar and wind waste, land use, and intermittency. Which energy source or technology comes out on top in your equation and why?

3. Arjun Makhijani believes that “there's no way in which you can actually imagine a nuclear future that lives in the real world in which you can build up the supply chains, workforces and so on.” Do you agree that costs and build times today in the US make nuclear an unrealistic solution tomorrow? Explain. What can China build nuclear reactors so quickly?

Episode 10: How Can We Make Energy More Sustainable?

Dr. Bridget Scanlon & Sean O'Donnell

Transcript

1. When considering how to lower global CO_2 emissions, Sean O'Donnell questions where the price signals will come from to motivate a reduction in the 40% emissions that come from buildings. Would you support significant carbon taxes and credits, R&D incentives and other price signals that would prioritize reducing the carbon footprint of urban areas? Why or why not?

2. Bridget Scanlon discusses the trade off between carbon emissions, efficiency, and water use. Of those three priorities (carbon emissions, efficiency, water use), which one do you believe is the global priority? Which one do you believe is the federal priority in the US? Which, if any, is a priority in your home?

3. Agree or disagree and then explain your position: Energy will become more sustainable when the focus shifts to data instead of rhetoric.

4. What timeframe do you hold when considering sustainability? A year? A decade? A century?

5. As a consumer, what is more important to you, cost or sustainability? If sustainability, is there a point at which cost becomes more important?

6. The World Bank reports that globally, 733 million people are without any access to electricity and 2.4 billion people cook using fuels that are detrimental to their health. Sean O'Donnell says that for those people without reliable access to electricity, "It's not an energy transition for them. It's an energy addition for them."

   How can we balance equity, economy, and environment so that emerging nations have increased access to low-emissions electricity?

Episode 11: Policies to Reduce CO_2 Emissions

Sasha Mackler & Dr. William Pizer

Transcript

1. As an alternative to a carbon tax, two flexible policies are presented:
    a. A low-carbon portfolio standard could require certain amounts of renewable and low-carbon energy to come into the system.
    b. A carbon performance standard would give sectors the low-carbon standard and encourage flexibility, creativity, and competition without mandating a price.

    Which standard do you think would be most successful at the federal level? Why? Which would have a chance to actually reduce carbon into, or take carbon from the atmosphere?

2. Subsidies to incentivize low-carbon consumer technologies, like residential solar panels or electric vehicles, are paid for by federal tax payers. Looking at extreme ends of the spectrum, should someone who has to rely on public transportation help pay for others to own one or several $70,000 electric vehicles? Why or why not?

3. Sasha Mackler believes that bipartisan agreement is needed to get the energy transition started in meaningful ways. In an increasingly polarized political and cultural landscape, are you open to working towards bipartisan policy? If so, what is one meaningful step you could take or strategy you could enact to increase bipartisan agreement?

Episode 12: Does the US Need A Thriving Oil And Gas Industry?

Dr. David Victor & Matthew Gallagher

Transcript

1. David Victor recognizes the political pushback that comes with industries transitioning to new technologies and stresses the need to build workers and industries of the future. Looking towards industry transitions, what diversified skills and knowledge would help you better adjust to future careers?

2. In your opinion, can a workforce be retrained quickly enough to meet the market demands of booming industries?

3. David Victor describes “a vibrant industry” as one that applies existing industry skills to emerging technologies. How do you define a vibrant industry?

4. Both guests agree that we need an energy “everything bagel” that prioritizes low emissions impacts and innovation, but according to David Victor, the path forward is uncertain: “Industry leaders right now just don't know what that future looks like. And so you see a lot of experimentation and no clear direction.” Agree or disagree and then explain your position.