# NAYGN Essay Contest 2015

35-40 minute presentation

Then 5-20 minutes for questions

**1. Slide 1: Introduction**

* My name is…
* North American Young Generation in Nuclear is an organization of young professionals in the nuclear industry.
* Today we are here to discuss electricity generation and an essay contest about energy policy!

**2. Slide 2: Electricity**

* Name five things you did this morning that required electricity.
* Modern society depends on electricity!

**3. Slide 3: Where does electricity come from?**

* Outlets, wires, transmission lines.....all leading back to Power Plants

**4. Slide 4: Power Plants!**

* \*\*Replace this power plant with a picture of a power plant closest to you!
* Power plants are electricity generation stations.
* What is the power plant closes to where you live?
* Does this power plant provide all of your electricity? (No! Electricity needs to be produced/consumed 24/7. Electricity is provided to the grid via various sources.)

**5. Slide 5: Electricity Generation**

* Electricity is made in a power plant
* Electricity is transported via transmission lines
* Electricity is used by consumers!

**6. Slide 6: Can you name types of electricity generation?**

* Have students guess
* The majority (coal, natural gas, petroleum) comes from fossil fuels

**7. Slide 7: Types of Electricity Generation**

* Ask students to identify the pictures

**8. Slide 8: Fossil Fuels**

* Coal burns and the heat is used to generate steam which turns a turbine. (Rankine Cycle)
* Natural gas burns and the heat forces gases to turn a turbine. (Brayton Cycle)
* Petroleum (or oil) is burned to generate heat to either turn a turbine or heat water.
* Big Picture: heat source is used to convert thermal energy to mechanical energy (turning a turbine) which then generates electrical energy (via a generator)

**9. Slide 9: Hydroelectric**

* Potential energy (PE=mgh) is converted to mechanical energy (turbine) that then is converted to electrical energy (generator)

**10. Slide 10: Other Renewables**

* Solar – can use the photoelectric effect to move electrons (moving electrons=electricity)

Note: there is also thermal solar power

* Wind – wind currents spin a turbine
* Geothermal – using the heat at the earth’s center to generate steam to turn a turbine

**11. Slide 11: Nuclear**

* Nuclear works much the same way! A heat source is used to boil water, steam turns a turbine.

**12. Slide 12: Nuclear Power Plant**

* Describe the steps of making electricity with nuclear power
* Nuclear “heat” comes from fission which is splitting atoms (E=mc2)

**13. Slide 13: What are some challenges to electricity generation?**

(1) Electricity is generated and consumed almost instantaneously

It is possible to store energy, but there are losses during the conversion and it can be very expensive

(2) Electricity use varies throughout the day

A set amount (“baseload”) of electricity is required at all times

**14. Slide 14: Climate Change**

**15. Slide 15: What is climate change?**

* Gauge your audience’s understanding of what global warming is
* What is the difference between climate and weather?

**16. Slide 16: What are some effects of climate change?**

* Rising sea levels
* Heat waves and extreme weather
* Effect on plants and animals who can’t adapt

**17. Slide 17: What causes climate change?**

* Climate change is caused by the Greenhouse Effect
* Increased levels of carbon dioxide trap heat near the earth’s surface

**18. Slide 18: Where does carbon come from?**

* Two major sources are cars (transportation) and electricity generation

**19. Slide 19: Which types of electricity generation produce carbon?**

* Compare these life cycle emissions for various sources of electricity generation
* In general, fossil fuels emit considerable carbon. But, natural gas is about half that of coal.
* Surprisingly, photovoltaic solar generates carbon because making solar panels is an intensive industrial process.
* Nuclear, hydroelectric, and wind are fairly low. Although nuclear does require industrial processes to build a plant, the energy density of nuclear power is enormous compared to that of solar.
* Why don’t we use more hydroelectric? In the US, hydroelectric stations have effectively been maximized. Dams can only be placed in certain areas and even then they can cause changes to the landscape (creating lakes, flooding land) and affect marine life.

**20. Slide 20: Why is nuclear cool?**

* No carbon emissions! (amongst other things )
* Why did you go into the nuclear field?
* Why do you believe in nuclear technology?

**21. Slide 21: Remember there are CLEAN ways to make electricity!**

* Solar, nuclear, and wind are all carbon free (during operation)

**22. Slide 22: We Need a Mix**

* Video about clean electricity generation and energy policy

**23. Slide 23: The Importance of Electricity**

* Is electricity really that important?
* Can’t we just achieve our carbon goals with conservation?

**24. Slide 24: Energy Poverty**

* 1.2 billion people worldwide do not have access to electricity
* 17% of the global population lacks access to electricity
* Electricity is a huge part of modern life, high standard of living, developed health care facilities, life expectancy, etc.

**25. Slide 25: World Population**

* Population growth is exponential
* 7 billion people in 2011
* prediction of 9.6 billion by 2050
* the need for electricity is not going away

**26. Slide 26: Your turn!**

* How would you solve this problem?

**27. Slide 27: 2016-2017 Essay Contest**

* Consider participating in the NAYGN essay contest for high school students
* Write 1000-1500 words proposing an informed energy solution using some of what you have learned today
* Three reliable sources must be utilized
* The grand prize will be a laptop.

**28. Slide 28: Quiz**

**29. Slide 29: What is the path of electricity generation?**

* Power Plant
* Transmission Lines
* Houses!

**30. Slide 30: What component in a power plant spins wires through a magnetic field?**

* Generator

**31. Slide 31: Name a type of electricity generation**

* Coal, natural gas, petroleum, nuclear, solar, wind, geothermal, hydroelectric

**32. Slide 32: What process is used to generate heat in a nuclear power plant?**

* fission

**33. Slide 33: Nuclear power plants produce zero carbon emissions during operation: True/False**

* True

**34. Slide 34: What percent of the global population lives without electricity?**

* 17%

**35. Slide 35: Questions?**