

CLEAN ENERGY

Where does energy come from?



Where does energy come from?

How Magnets Produce Electricity

<http://www.youtube.com/watch?v=FehUCQKKRwo>

Energy 101: Electricity Generation

<http://www.youtube.com/watch?v=20Vb6hlLQSg>

What can you create by knowing this information?

http://www.youtube.com/watch?v=XlqYbJps_JY

Steam Turbines

- Steam Turbine: How does it work?
- <https://www.youtube.com/watch?v=SPg7hOxFItI>

Main Current Energy Source

- Fossil Fuels

- Include coal, petroleum, and natural gas
- Burned to produce energy (heat) to turn turbines



Pros of Fossil Fuels

- Well Developed Technology
- Cheap and Reliable

Cons of Fossil Fuels

- Produces Greenhouse gases
- Non-renewable (in the short term)
- Unsustainable
- Fuel Accidents

Changing Our Energy Sources

◎ Wind Power

- Wind causes the blades of wind turbines to turn, powering generators that produce electricity.



Pros of Wind Power

- Renewable energy
- Creates no waste
- In Spain, Portugal, Denmark and Germany, almost one-fifth of the energy total is wind power



Cons of Wind Power

- Wind is unpredictable, and may not be relied upon all the time
- Some people dislike the appearance of wind turbines



Changing Our Energy Sources

◎ Solar Power

- Solar panels absorb solar energy and convert it to electricity



Pros of Solar Power

- Renewable energy
- Can get energy in remote locations
- Once in place, does not cost much



Cons of Solar Power

- No energy is produced during the night
- The initial cost is expensive
- Weather can affect the amount of energy absorbed

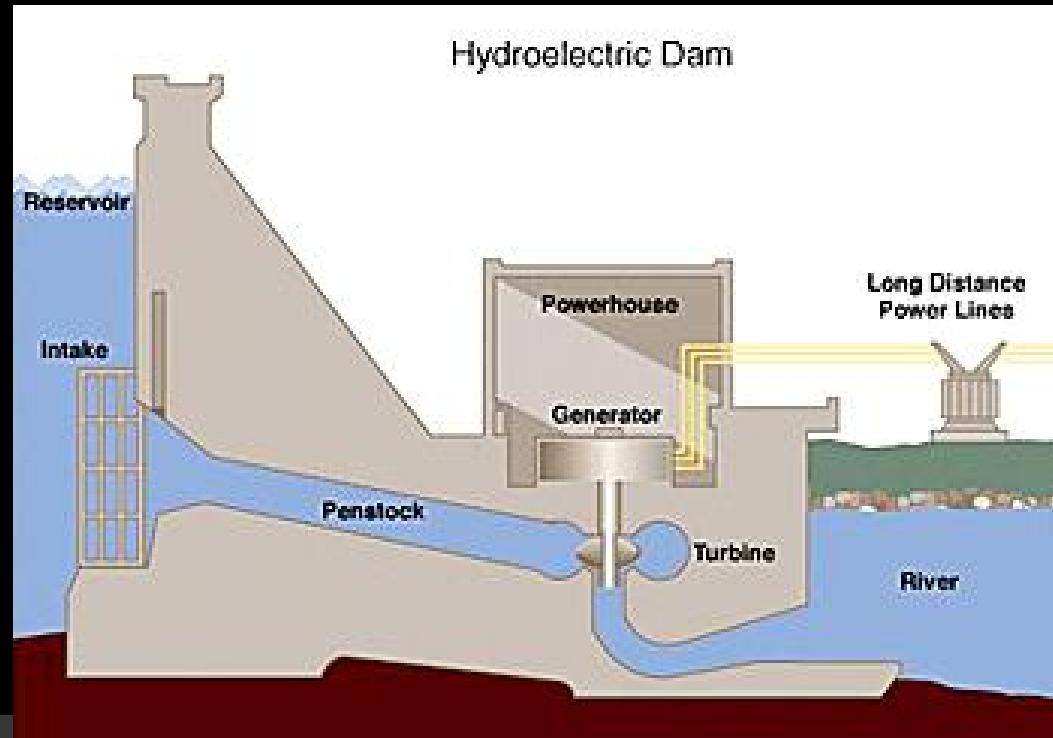


Changing Our Energy Sources



Changing Our Energy Sources

- Hydroelectricity
 - The energy of moving water turns turbines to power generators



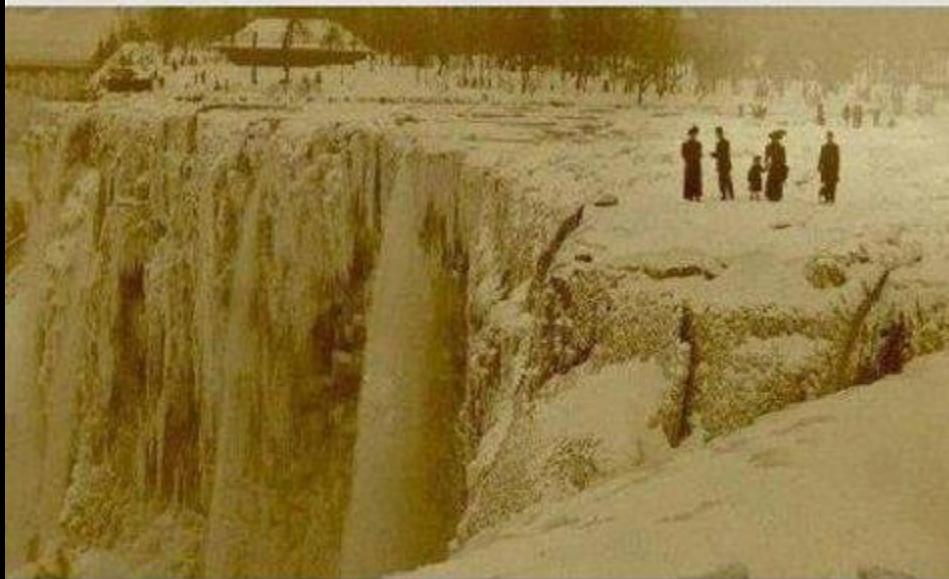
Pros of Hydroelectricity

- Generates a lot of power
- Waterfalls exist whether we use them or not (renewable)



Cons of Hydroelectricity

Niagara falls
completely froze
in the year 1911.



Cons of Hydroelectricity

- Expensive to build
- Potentially impact ecosystems
- Can be affected by droughts

Changing Our Energy Sources

⦿ Nuclear Power

- Energy is created by splitting the nuclei of atoms



A nuclear core, at the McMaster University Nuclear Reactor in Hamilton, Ontario

Pros of Nuclear Power

- ◉ Clean-burning energy, almost no carbon emission
- ◉ Produces a lot of energy through nuclear fission ($E = mc^2$)



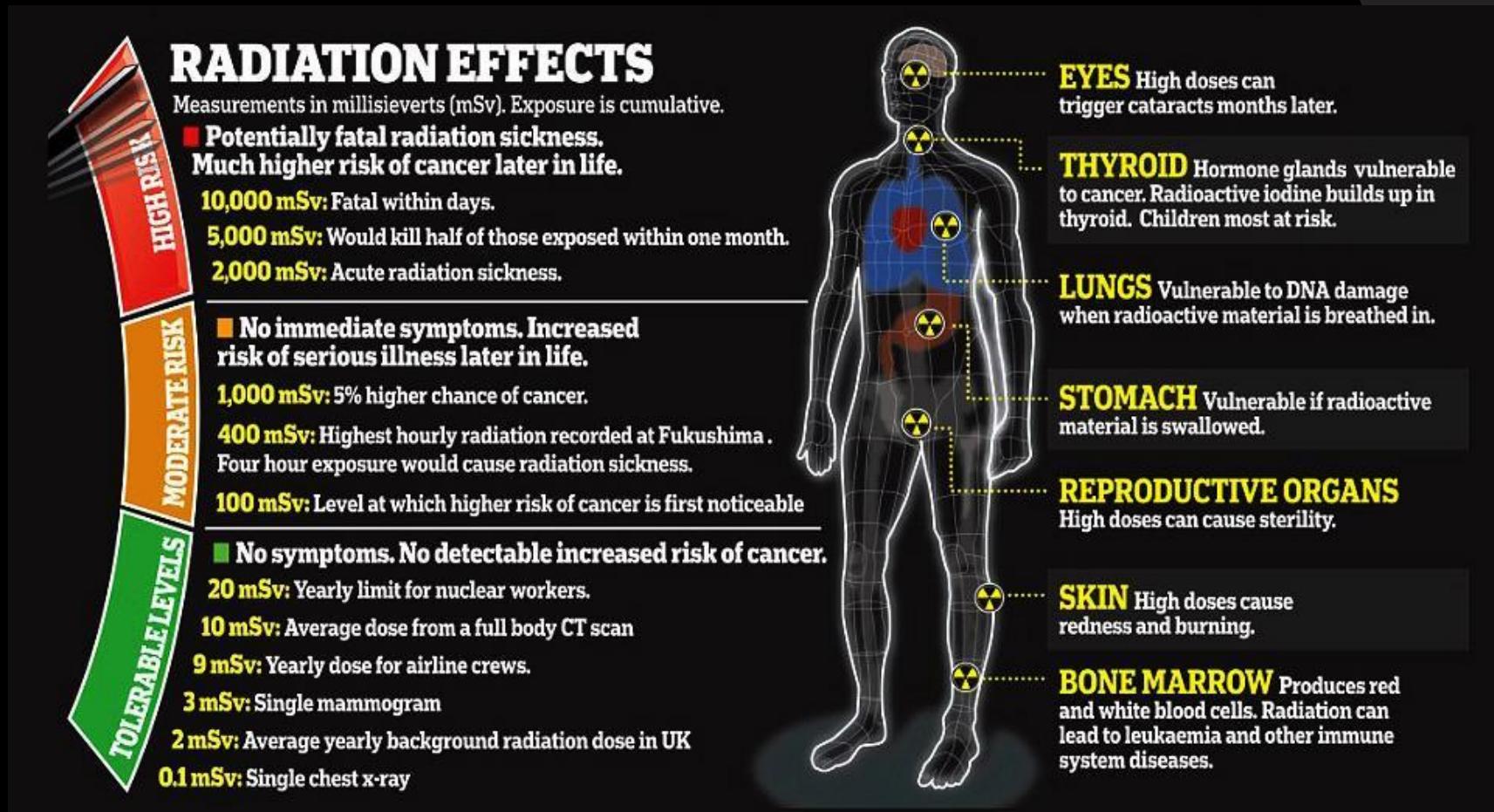
Cons of Nuclear Power

- The left over atomic pieces produce nuclear waste



- Nuclear waste gives off radiation

Cons of Nuclear Power



Cons of Nuclear Power

Birth defects were the norm for years following the Chernobyl incident



Children in Belarus, Russia and Ukraine have been suffering from the effect of the radiation released in 1986. The Rechitsa orphanage in Belarus has been caring for the huge population of sick children.

Photo Credit: Julien Behal/Chernobyl Children's Project



The reactor disaster in Chernobyl took place on April 26, 1986. The reactor was encased as a temporary solution to secure the site for only 20-30 years.

Photo Credit: Julien Behal/Chernobyl Children's Project

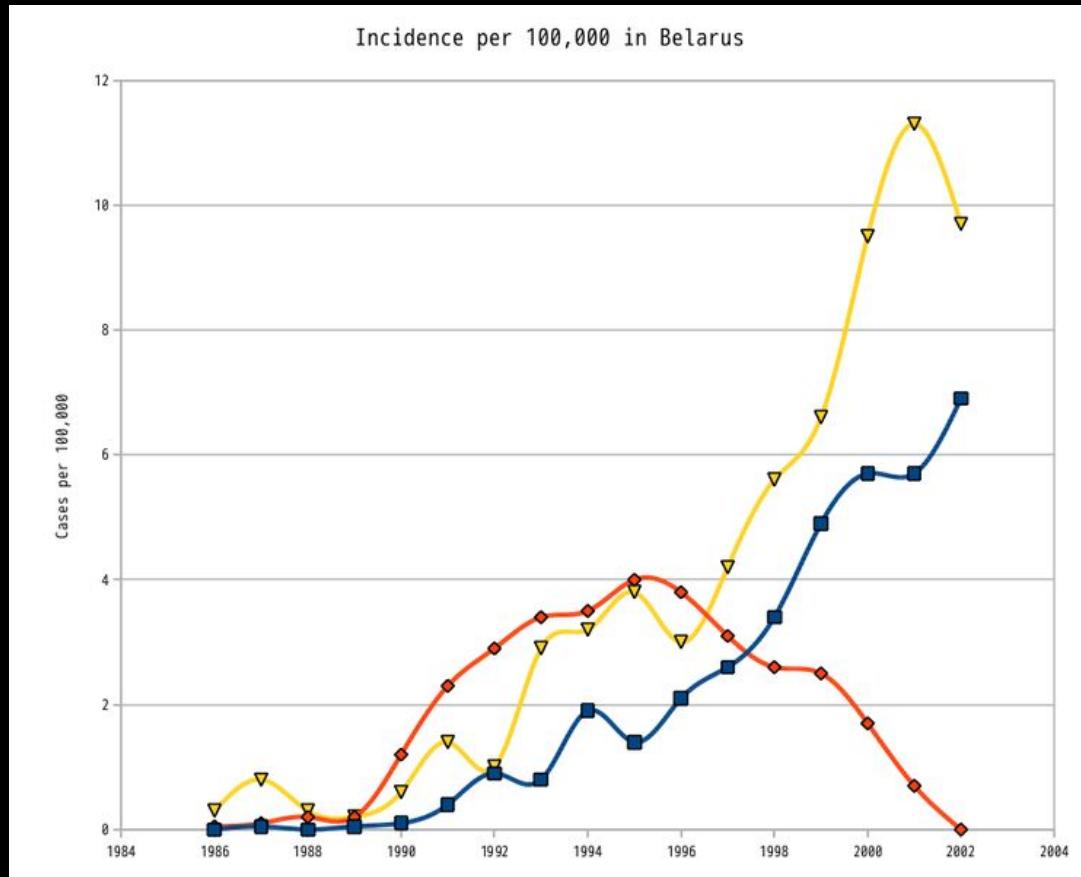


Mentally handicapped children exposed to radiation

Photo Credit:
Alex Emes/ Blacksmith Institute

The Chernobyl Nuclear
Disaster
Chernobyl Ukraine
1986

Cons of Nuclear Power



The Chernobyl Nuclear
Disaster
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Thyroid cancer incidence in children and adolescents from Belarus after the Chernobyl accident

Yellow: Adults (19-34)

Blue: Adolescents (15-18)

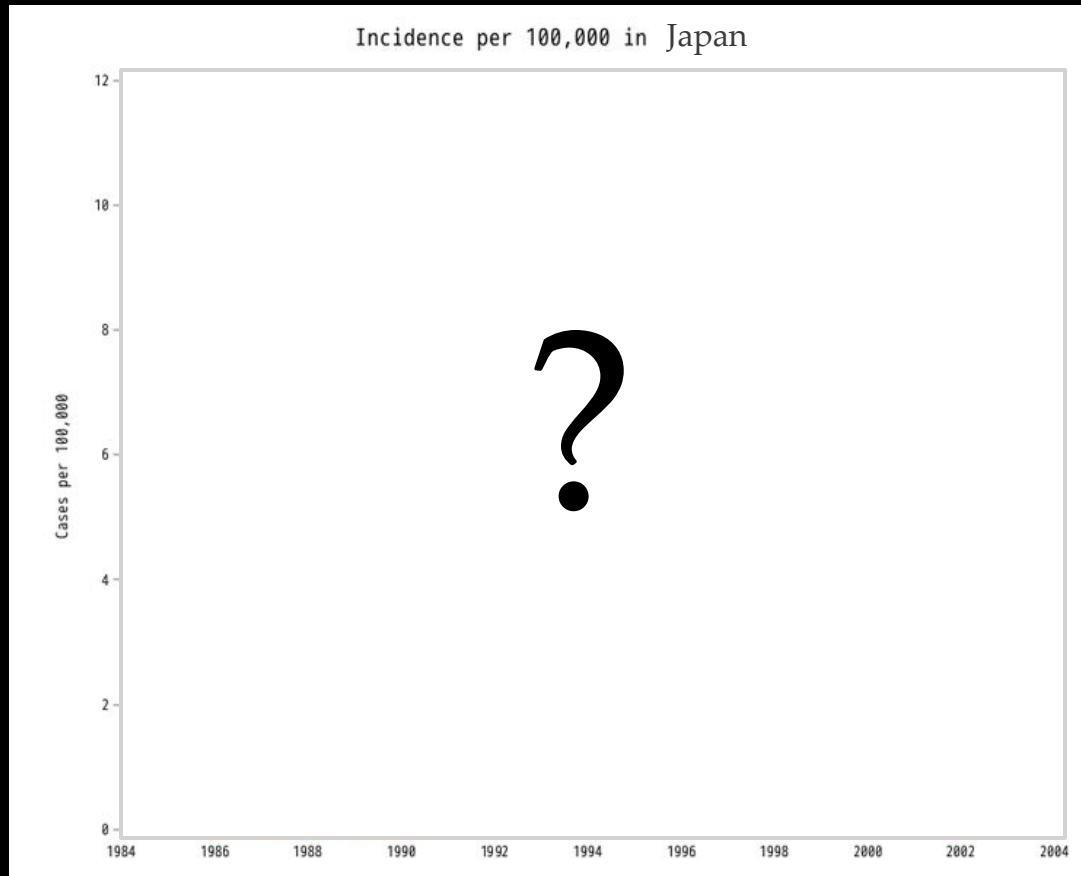
Red: Children (0-14)

Cons of Nuclear Power



The Fukushima Nuclear
Disaster
Fukushima Japan
2011

Cons of Nuclear Power



[Thyroid cancer](#) incidence in children and adolescents from Japan after the Fukushima accident
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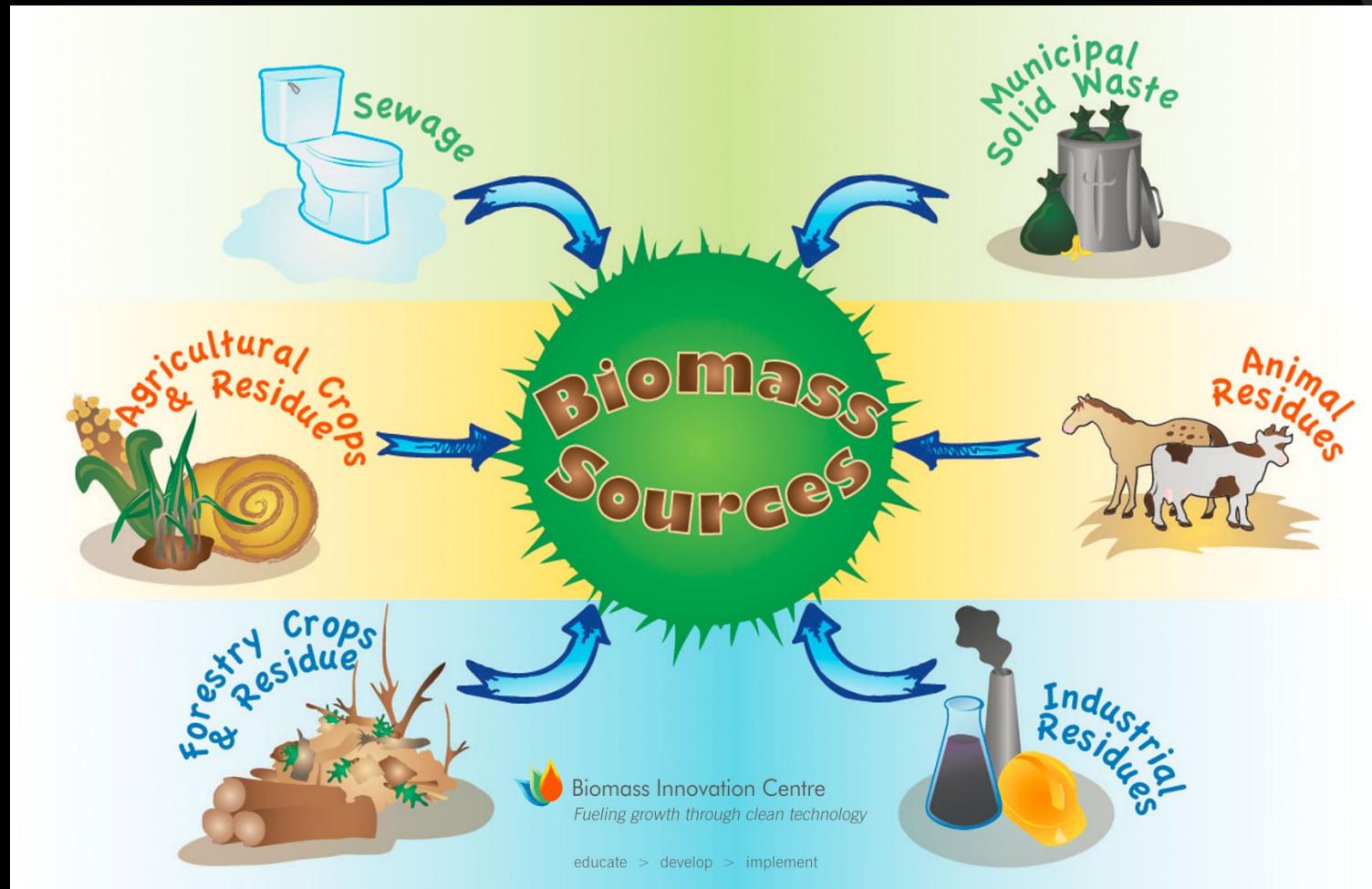
The Fukushima Nuclear
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Changing Our Energy Sources

⦿ Biomass

- Biomass from waste such as crops, manure and garbage can be used to make biofuels like methane, gas, and biodiesel
- The fuels can be burned for heat or to generate electricity with a steam turbine

Changing Our Energy Sources



Pros of Biomass Energy

- ◉ Renewable – we are always producing garbage, manure, and crops
- ◉ Carbon Neutral - part of the carbon cycle – carbon is absorbed during photosynthesis and then released when it is burned
- ◉ Not as expensive as coal and oil

Cons of Biomass Energy

- Expensive
- Requires Large Areas