

PHYS 1444 – Section 002

Lecture #21

Monday, Apr. 27, 2020

Dr. Jaehoon Yu

Special Seminar on COVID-19

CH 29:EM Induction & Faraday's Law

- Transformer
- Electric Field Due to Changing Magnetic Flux

Chapter 30: Inductance

- Inductance
- Mutual and Self Inductance
- Energy Stored in the Magnetic Field

Monday, Apr. 27, 2020



PHYS 1444-002, Spring 2020
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Announcements

- Final comprehensive exam: 1:00 – 2:20pm Wed. May 6
 - Covers CH21.1 through what we finish Monday, May 4+ math refresher
 - BYOF
- Planetarium Extra Credit: Due 1pm, May 6
 - Tape one end of the ticket stub on a sheet of paper with your name on
 - Send me the photos of the sheet with the front of the ticket stubs and of the sheet with them flipped over, showing the back of them
 - Email subject line must be: SP-Planetarium
- Course evaluation
 - Only 8 of you have done this! Please do this ASAP!
- Special seminar for extra credit today
 - Dr. Linda Lee on COVID-19 → 30min talk + ~20min Q&A



Reminder: Special Project #5 – COVID-19

- Make comparisons of COVID-19 statistics between the U.S., South Korea and Germany from <https://coronaboard.com> on spreadsheet
 - Total 27 points: 1 point for each of the top 15 cells and 2 points for each of the 6 cells for testing
- Make a timeline from Jan. 15, 2020 through Apr. 15 for The World Health Organization (WHO), U.S.A. and South Korea in their actions in response to COVID-19: One in Jan., one in Apr. and two each in Feb. and Mar.
 - 2 points each, totaling 30 points
- What are the 3 most fundamental requirements for opening back up (2 points each, total 6 points)? Identify the two of these U.S. is ready (1 point each, total 2 points; do NOT just take politician's words!) for opening.
 - **Must be quantitative!**
- Due: 1pm Monday, May 4
 - Scan all pages of your special project into the pdf format
 - Save all pages into one file with the filename SP5-YourLastName-YourFirstName.pdf
- Spreadsheet has been posted on the class web page. Download ASAP.



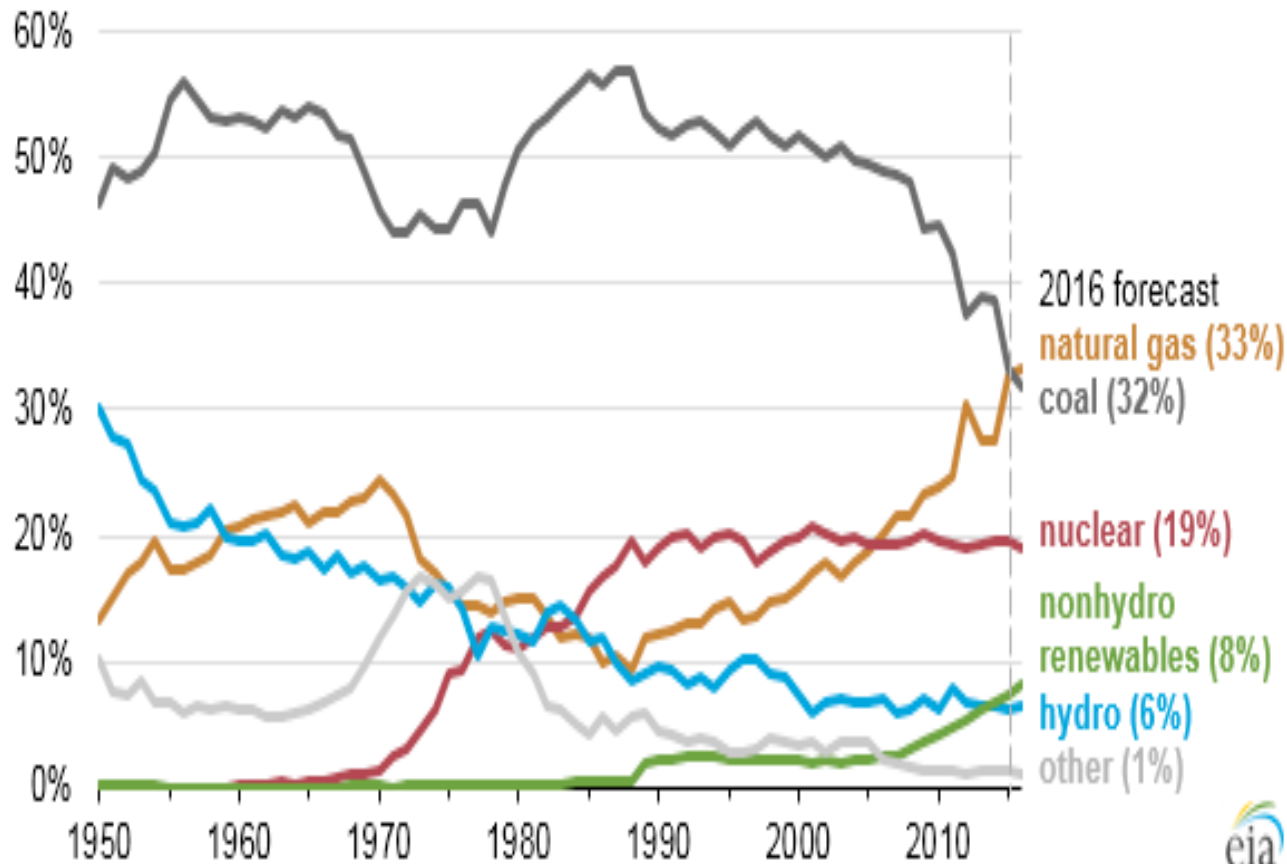
PHYS1442-002, Spring 20, Special Project #5, COVID-19

	Name:		Date of COVID-19 Data:	
Items		U.S.A	South Korea	Germany
Total Population				
COVID-19 Confirmed cases	Number			
	Cases per 1M people			
COVID-19 Deaths	Number			
	Death per 1M people			
COVID-19 Testing to date	Number			
	Per 1M people			

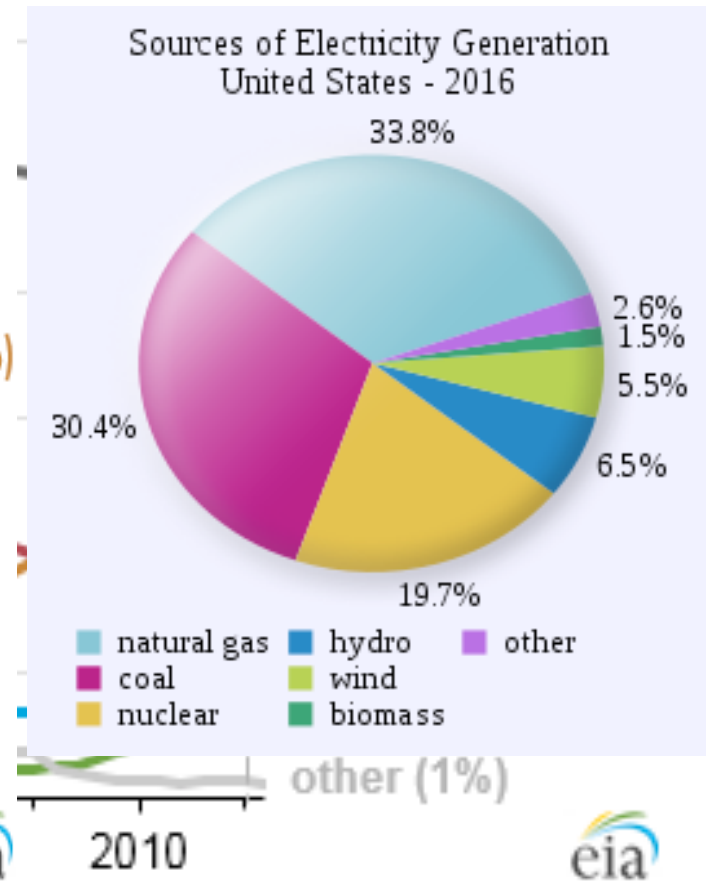


US Electricity Sources

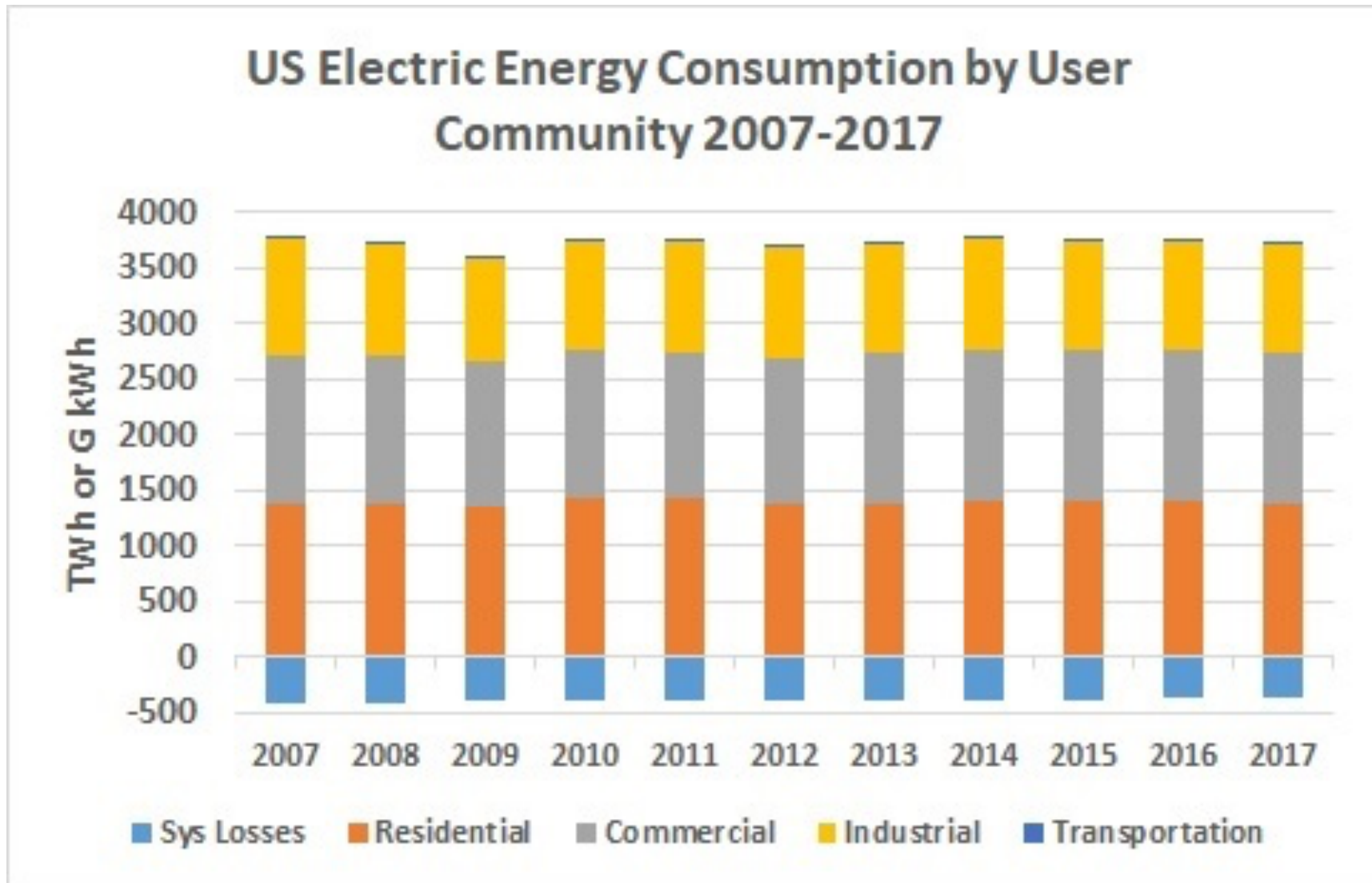
Annual share of total U.S. electricity generation by source (1950-2016)
percent of total



1950-2016)



US Electric E Consumption by Users



US Energy Information Administration <http://www.eia.gov/electricity/>

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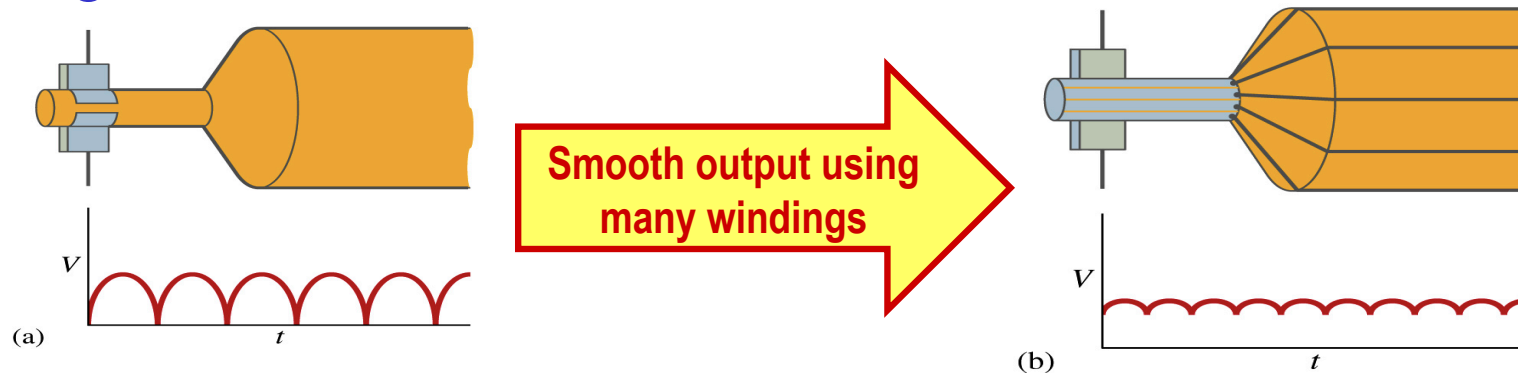
The World Energy Consumption

- In 2016, total worldwide energy consumption was 567 EJ (567×10^{18} J = 157 PWh) → expected >1000 EJ by 2050
 - Equivalent to an average energy consumption rate of 18 terawatts (1.8×10^{13} W)
 - US uses 39.1 PWh (1.38 kWh/person, as of 2014)
- The potential for renewable energy
 - solar energy 1600 EJ (444,000 TWh)
 - wind power 600 EJ (167,000 TWh)
 - geothermal energy 500 EJ (139,000 TWh),
 - biomass 250 EJ (70,000 TWh)
 - hydropower 50 EJ (14,000 TWh) and
 - ocean energy 1 EJ (280 TWh)
 - Read [this paper if you want to learn more](#)



A DC Generator

- A DC generator is almost the same as an AC generator except the slip rings are replaced by split-ring commutators



- Output can be smoothed out by placing a capacitor in parallel to the output
 - More commonly done using many armature windings

Who is Dr. Linda Lee?

- A practicing physician and an assistant professor of dermatology at the Medical College of Wisconsin in Milwaukee, WI
- Earned MD-PhD in cell biology and genetics at DUKE in 1998
- Internship in internal medicine at the University of Washington in Seattle, WA
 - This is one of the handful of institutions that provides modeling of COVID 19
- Residency on dermatology at Duke, during which she was also awarded a post-doctoral fellowship in RNA aptamer studies.
- After several years on faculty at Duke, she returned to Wisconsin to be closer to family. Through extensive professional and personal experiences, she developed a strong interest in education at all levels, especially for preserving and nurturing community and human connectivity, while taking maximal advantage of our ever-expanding digital technology.



Seminar Extra Credit Rules

- Extra credit will be given for participating in this seminar through the end
- Additional extra credit for relevant questions
 - Type your questions into the chat window
 - I will choose from the list and call your name
 - Your zoom name must be consistent with the class so that I can give you the proper credit
 - Unmute your mic and ask the question

