

http://en.wikipedia.org/wiki/National_Petroleum_Reserve%E2%80%93Alaska

Similar, but different than the SPR, the U.S. also has a NPR that would be good to read up on. The National Petroleum Reserve was established in 1912 as a backup source of crude oil for the federal government, originally for the Navy and it is often still referred to as the Naval Petroleum Reserve. Four sites in the country originally comprised the Naval Petroleum Reserve: Naval Petroleum Reserves 1 & 2 were in California, Number 3 was near Casper, Wyoming, and Number 4 was in Alaska, and known as NPRA. The only NPR still under government control is NPRA and it is controlled by the Dept. of the Interior and not the Dept. of Defense.

Unfortunately an assessment by the USGS in 2010 estimated that the amount of oil yet to be discovered in the NPRA is only one-tenth of what was believed to be there in the previous assessment completed in 2002. The 2010 USGS estimate says the NPRA contains approximately "896 million barrels of conventional, undiscovered oil".[3] The reason for the decrease is because of new exploratory drilling which showed that many areas that were believed to hold oil, actually hold natural gas.

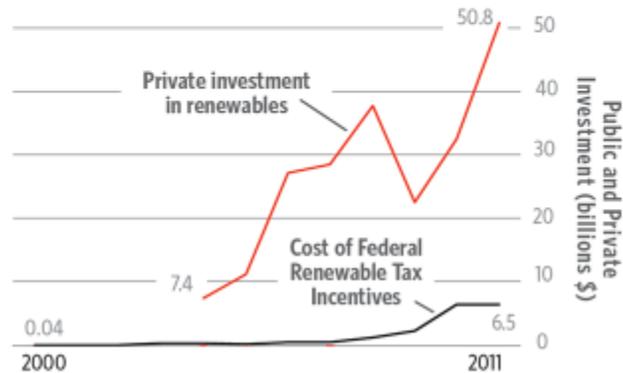
Week 9 – Energy Policy

-Learning Objectives-

- ▶ Explain the pros and cons of current energy policies for fuels and bioenergy.
- ▶ Identify an impact of current energy policy on an industrial or agricultural sector
- ▶ Suggest a fuel or emissions regulation you would make if you could and explain how it would improve things.

Current Policies Related to Biofuel in U.S.

- ▶ Mandates
- ▶ Tax Incentives for advanced biofuels
- ▶ Funding to support research and industrial development



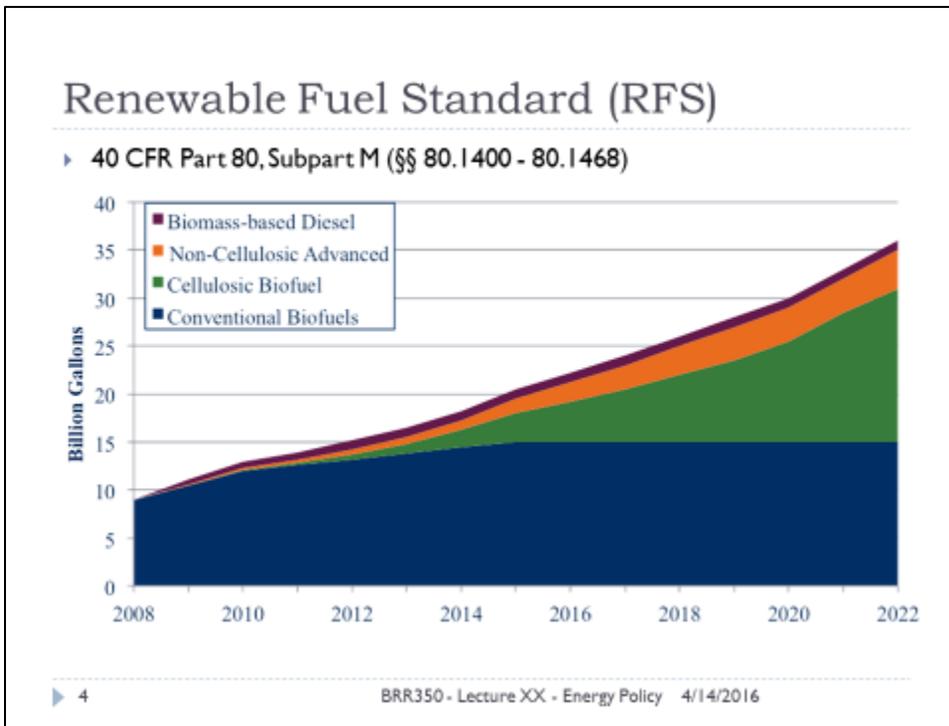
▶ 3

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BNEF 2012, Global Trends in Renewable Energy Investment 2012

Despite the challenges, blending of ethanol in gasoline continues to be practiced in the U.S. and will likely continue to become a larger part of our fuels infrastructure. There is a lot of rationale behind this approach, which is why it is a part of our biofuel policy and our strategic development in the domestic energy industry. Currently, the biofuel policy in U.S. is complicated, so we will not have time to review it in detail. However, we will review many of the policies and developments at a high level so that they make more sense when you hear them in the media.

We will cover the government's mandates on bioenergy production and use, the tax breaks to encourage the use of biofuels, and the monetary support in biofuel R&D through tax breaks and direct spending. Governmental investment in biofuels also encourages more private investment in this area.



c2es.org

The most important policy with respect to biofuel in U.S. is the renewable fuel standard, known as the RFS. It was first introduced in 2005, and first published in 2007. RFS outlines the production and consumption targets for biofuels in U.S.. Blending ethanol with gasoline is also part of the mandate in RFS.

The program was created under the Energy Policy Act, 2005 and the EPA (Environmental Protection Agency) is responsible for making annual standards for the program.

RFS2 Timeline

- ▶ Energy Independence and Security Act (December 2007) required changes to the RFS1 program
- ▶ RFS2 Published in 2010
- ▶ RFS2 peaks at 36 billion gallons of renewable fuel by 2022 and RFS1 peaked at 7.5 billion gallons by 2012



▶ 5

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The original RFS was under revision since 2007, and a new standard was published in 2010, known as RFS2. RFS2 addressed some concerns about the use of corn ethanol, specifically the CO₂ emission during the biofuel production process. Using minimum GHG emission as part of the definition for renewable fuel is very important in that we are able to make sure that the biofuels we are producing are contributing to the reduction of GHG emission, and we became more aware of the carbon footprints of the biofuel processes. Long-term goals for biofuel production and use was also outlined in RFS2, and the new standards added new definitions of biomass feedstocks as well as renewable bioenergy.

RFS2 Includes biodiesel, biomass derived renewable diesel, as well as new rules on feedstock and land use.

Additional Fuel Pathways were introduced in RFS2 in July 2014. These included compressed natural gas (CNG) and liquefied natural gas (LNG) produced from biogas, as well as electricity used to power electric vehicles produced from biogas.

Renewable Biomass Types in RFS2

1. Planted crops and crop residue
2. Planted trees and tree residue
3. Animal waste material and animal byproducts
4. Logging slash and pre-commercial thinnings
5. Urban biomass and wildfire thinnings
6. Algae
7. Separated yard waste or food waste



▶ 6

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Planted crops and crop residue harvested from existing agricultural land

Planted trees and tree residue from a tree plantation

Animal waste material and animal byproducts

Slash and pre-commercial thinning from non-federal forestland that is not ecologically sensitive forestland

Biomass (organic matter that is available on a renewable or recurring basis) obtained from the immediate vicinity of buildings and other areas in an area at risk of wildfire

Algae

Separated yard waste or food waste

Alternative Fuels (Energy Policy Act, 1992)

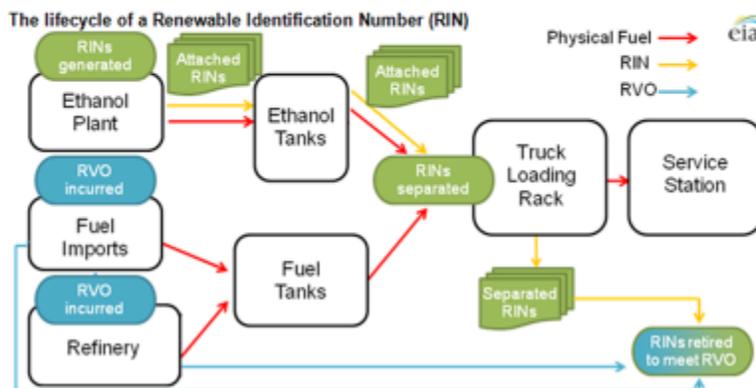
1. Pure methanol
2. Ethanol
3. Other alcohols
4. Blend of 85%+ alcohol with gasoline
5. Natural gas
6. Liquid fuels domestically produced from natural gas
7. LPG (propane)
8. Coal-derived liquid fuels
9. Hydrogen
10. Electricity
11. Pure biodiesel (B100)
12. Non-alcohol fuels from biological materials
13. P-series fuels
14. (mixture of ethanol, methyltetrahydrofuran, natural gas liquids)

Alternative fuels were defined in the

Please take a moment to review them. It is likely this list will continue to grow as our transportation technology continues to advance.

Key regulatory aspects of RFS

- ▶ EPA (Environmental Protection Agency) is responsible the program
- ▶ RIN (renewable identification number) for tracking batches of renewable transportation fuels



▶ 8

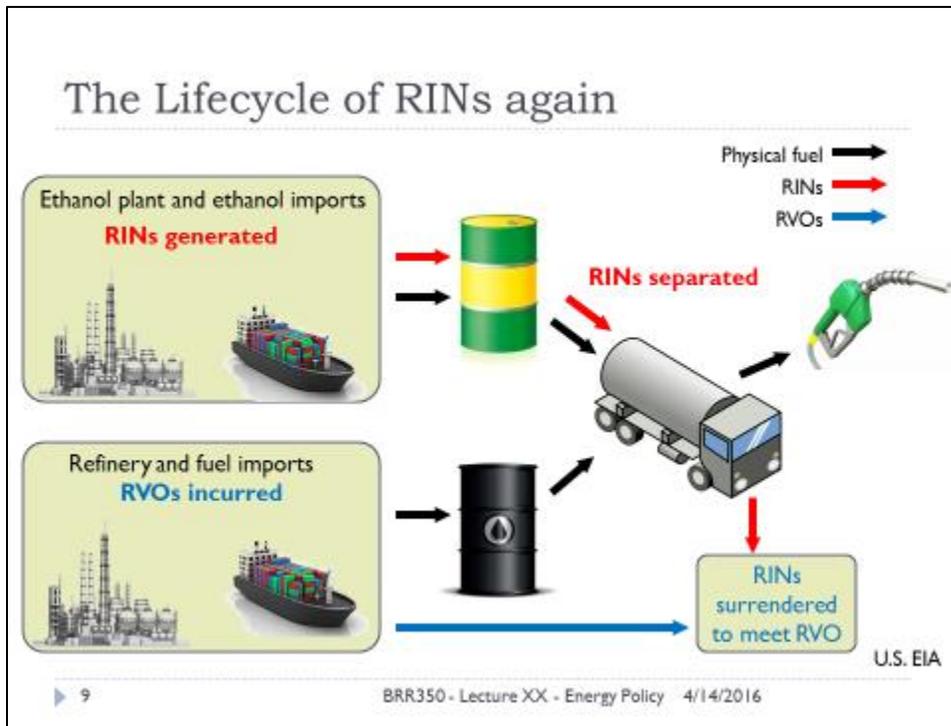
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The most important acronyms in the RFS are EPA for And RIN or RIN meaning

The blend wall is a term used to describe the limit of ethanol content in gasoline fuel. Current RFS mandates that gasoline should be sold with a 10% volume of ethanol blended in the fuel. All of the light-duty vehicles manufactured after 2007 can run on E15, therefore the transition to E10 to E15 should happen in the near future. RFS2 also includes guideline for biodiesel consumption and specific targets through the next decade.

<http://www.eia.gov/todayinenergy/detail.cfm?id=11511>

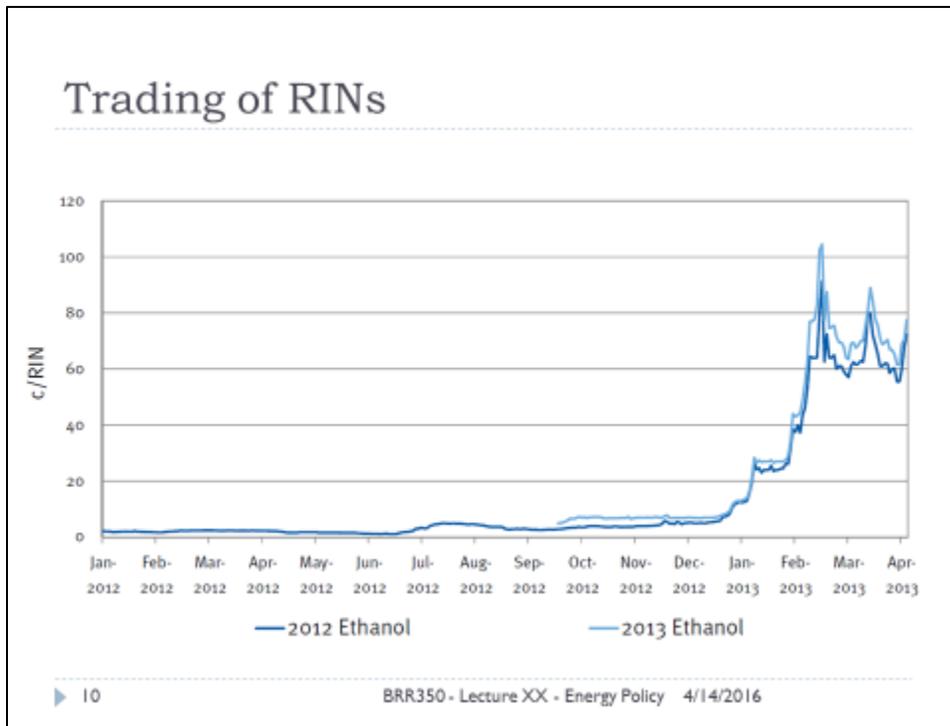
Discussions about RINS are very common in bioenergy media coverage because they are associated with subsidies that support the production of biofuels. Renewable Identification Numbers (RIN) and Renewable Volume Obligations (RVO) are the mechanisms the EPA uses to implement the RFS program. RVOs are the targets for each refiner or importer of petroleum-based gasoline or diesel fuel, while RINs allow for flexibility in how each of them may choose to comply. Basically the manufacturing and distribution of biofuel is tracked using the RIN.



<http://www.eia.gov/todayinenergy/detail.cfm?id=11511>

The lifecycle of RINs gets confusing so let's look at it closer. RINs are generated from the production of renewable fuels. The EPA distributes RVOs to obligated parties, who are required to submit RINs for RFS compliance. Businesses that produce products with RVO's must buy RINs from businesses that produce products with RINs.

Businesses obligated in meeting the volumetric mandates of renewables like oil companies, fuel blenders, gasoline retail must buy RINs from businesses like ethanol and biodiesel producers.



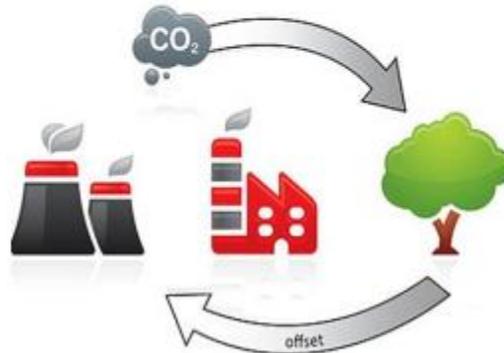
RVOs can be met by purchasing RINs that has been physically separated from the renewable fuel, and submitting the RINs to EPA. They can also be met by purchasing and blending renewable fuels into fossil fuels.

Futures of RINs are being traded in the categories of ethanol, advanced biofuel, and biodiesel.

An obligated party could purchase RINs and submit them to EPA to meet their RVOs, instead of blending any fuel. The RIN trading provides an economic incentive for blending. Because the supply and demand for RINs in light of RFS mandates make them most economical this way.

Carbon Credits are probably in the future

- ▶ Tradable certificate or permission for CO₂ emission
- ▶ Cap-and-trade system
- ▶ Provide incentives for emission reduction practices



▶ 11

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The bottom line is it doesn't matter what you burn, you are releasing CO₂.

Whether you burn coal, gas or biomass, you are still burning stuff and as a result the most fair way to regulate emissions resulting largely from burning is a carbon tax. People that grow biomass should be able to sell carbon credits and people that burn carbon should have to buy carbon credits. This avoids a mess of complicated and subjective methods of deciding whose carbon is worth what to who. As climate change begins to get more interesting and the logic of carbon credits sets in, this is probably something we will see in the future and burning biofuels will require purchasing carbon credits just like burning coal.

Expired Biofuel Incentives

- ▶ Volumetric Ethanol Excise Tax Credit (VEETC)
- ▶ Import Duty for Fuel Ethanol
- ▶ Small Ethanol Producer Tax Credit



▶ 12

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Tax breaks are also an important component of the biofuel policy in U.S., as they affect the economic competitiveness of biofuels.

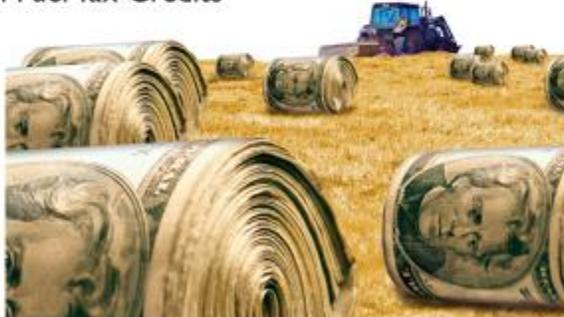
Volumetric Ethanol Excise Tax Credit (VEETC) was a \$0.45 per gallon tax credit for fuel blenders.

Import Duty for Fuel Ethanol was a \$0.54 per gallon tariff on imported ethanol.

Small Ethanol Producer Tax Credit was a \$0.10 per gallon credit to small ethanol producers (<15 MMgal/yr)

Current Biofuel Incentives

- ▶ Advanced Technology Vehicle (ATV) Manufacturing Incentives
- ▶ Airport Zero Emission Vehicle (ZEV) and Infrastructure Incentives
- ▶ Alternative Fuel Tax Exemption
- ▶ Fuel Cell Motor Vehicle Tax Credit
- ▶ Hydrogen Fuel Tax Credits



▶ 13

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These are some

Advanced Technology Vehicle (ATV) Manufacturing Incentives.

Airport Zero Emission Vehicle (ZEV) and Infrastructure Incentives is meant to Cover 50% of the costs of any installed ZEV technology.

Alternative Fuel Tax Exemption states that non-taxable use of fuel is exempt from federal fuel tax which includes Farm, school bus, non-profit educational, etc.

Fuel Cell Motor Vehicle Tax Credit is available for the purchase of qualified light-duty fuel cell vehicles.

Hydrogen Fuel Tax Credits are tax credits for hydrogen fueled vehicles.

Some Sources for Bioenergy Grants

- ▶ Surface Transportation Research, Development, and Deployment (STRDD) Program
- ▶ Biomass Research and Development Initiative (USDA & DOE)
- ▶ Loan Guarantee Program (DOE)
- ▶ Value-Added Producer Grants (VAPG)



▶ 14

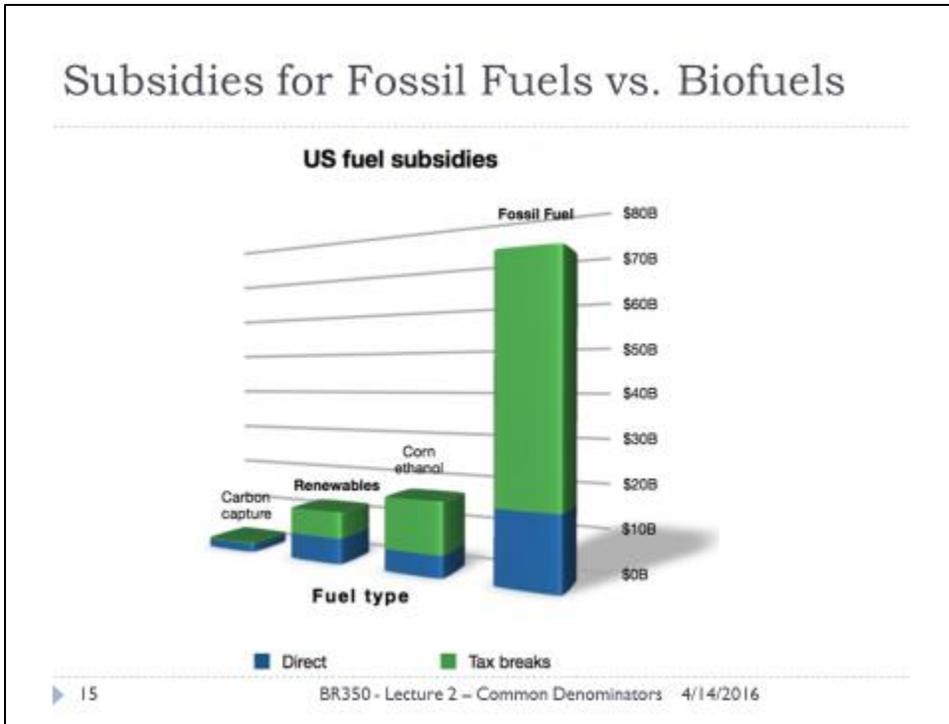
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<http://mosshartjoshua.blogspot.com/2014/02/bioenergy-funding-brief.html>

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Federal funding encourages investments in the private sector.

Subsidies for Fossil Fuels vs. Biofuels



<http://cleantechnica.com/2012/06/26/fossil-fuel-subsidies-are-5-times-larger-wind-energy-subsidies-12-times-larger-renewable-energy-subsidies/>

http://www.greeningsteps.com/2012_08_01_archive.html

Bioenergy gets a disproportionate level of attention in the media and in politics. Some believe this is because it is finally starting to achieve some legitimacy and some believe this is because it is a mistake. The available data would suggest that bioenergy gets more attention than it deserves. Bioenergy is growing and it is accepting help to grow, but fossil fuels needed that as well and have continued to enjoy it for the better part of 100 years. Oil pipeline and oil refining technology would not be as advanced as it is today if not for considerable government investment in the research and infrastructure that was necessary. Considering the U.S. fuel paradigm that we learned about it is surprising that increasing the supply of domestic fuel comes under such attack at times.

Next Lecture – Basic Energy Economics



▶ 16

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We get excited about fuel. These are traders at work in the crude oil futures pit at the New York Mercantile Exchange (NYMEX).