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# Reducing GHG Emissions Through National Renewable Fuel Standards

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**Transportation Research Board 2010 Annual  
Meeting  
Robert Larson, USEPA**

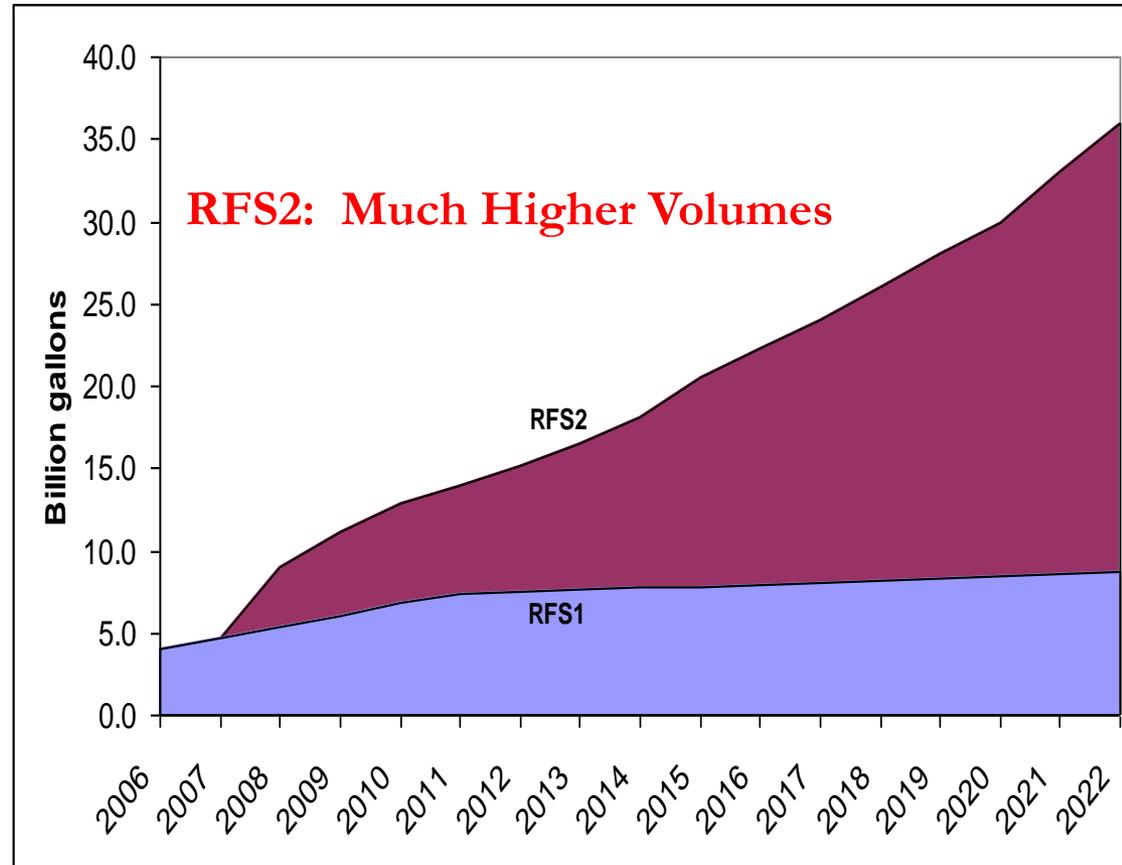
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# First Renewable Fuel Standards

- Established by Energy Policy and Conservation Act of 2005
  - Volume requirements (no GHG requirement)
    - Cellulosic credited 2.5 times corn ethanol
  - Required growing renewable use from 4 BG / yr beginning in 2006 to 7.5 BG / yr by 2012
    - Demand exceeded mandate
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# Energy Independence & Security Act

- **Passed by Congress and signed by President in December 2007**
- **Modifies Current RFS program**
  - Volumes increase to 36 Bgal/yr by 2022
    - 5-fold increase from RFS levels
  - Establishes new renewable fuel categories
  - Requires biofuels meet GHG performance thresholds



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# Energy Independence and Security Act Requires Lifecycle Assessment

- Lifecycle assessment required to determine which fuels meet mandated GHG performance thresholds compared to petroleum fuel replaced
    - 20% reduction for new facility renewable fuel
      - Existing facilities “grandfathered”
      - Generally viewed as being met by corn ethanol
    - 50% reduction for advanced biofuel including biomass-based diesel
    - 60% reduction for cellulosic biofuel
  - Lifecycle assessment must include impacts on land use
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# 4 Separate Standards

Year	Advanced Biofuel			Total Renewable Fuel
	Biomass-Based Diesel	Cellulosic Biofuel	Total Advanced Biofuel	
2006				4.0
2007				4.7
2008				9.0
2009	0.5		0.6	11.1
2010	0.65	0.1	0.95	12.95
2011	0.80	0.25	1.35	13.95
2012	1.0	0.5	2.0	15.2
2013	1.0	1.0	2.75	16.55
2014	1.0	1.75	3.75	18.15
2015	1.0	3.0	5.5	20.5
2016	1.0	4.25	7.25	22.25
2017	1.0	5.5	9.0	24.0
2018	1.0	7.0	11.0	26.0
2019	1.0	8.5	13.0	28.0
2020	1.0	10.5	15.0	30.0
2021	1.0	13.5	18.0	33.0
2022	1.0	16.0	21.0	36.0

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# Definition of Lifecycle GHG Emissions

“(H) LIFECYCLE GREENHOUSE GAS EMISSIONS.—The term ‘lifecycle greenhouse gas emissions’ means the aggregate quantity of greenhouse gas emissions (including direct emissions and significant indirect emissions such as significant emissions from land use changes), as determined by the Administrator, related to the full fuel lifecycle, including all stages of fuel and feedstock production and distribution, from feedstock generation or extraction through the distribution and delivery and use of the finished fuel to the ultimate consumer, where the mass values for all greenhouse gases are adjusted to account for their relative global warming potential.”

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# Promotes Low GHG Fuels but Challenges Remain

- Big challenge to meet the rapid increase of low GHG fuels
    - 21 b gallons of advanced biofuel including 16 b gallons of cellulosic biofuel
    - High production cost remains a hurdle for predicting sufficient investment \$ will be available
  - Infrastructure needs and similar cost impacts can limit the growth in biofuel use
    - Ethanol “blend wall” and E85 economics
      - E10 saturated by 2015
      - E15 delays saturation a couple of years
      - E85 needs fueling stations and vehicles
    - Diesel fuel demand growing in comparison to gasoline
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# EISA Promotes Sustainable Biofuels

- Requires 16 billion gallons of biofuel from cellulosic feedstock
  - Limits ethanol from corn starch to 15 billion gallons
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# EISA Promotes Sustainable Biofuels

- Biofuel feedstock must come from existing crop land or managed tree plantations
    - Intended to protect existing forests and deter unsustainable land use practices
    - Specifically excludes “forests or forestlands that are ecological communities with a global or State ranking of critically imperiled, imperiled, or rare pursuant to a State natural Heritage Program, old growth forest, or late successional forest”
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# Federal Regulation Update

- Proposed rules signed May 5, 2009
  - Public comment period closed September 25
  - Final rule undergoing inter-agency review
  - Expect to continue biofuel analysis after final rule
    - To include new, emerging pathways with higher GHG benefits
    - To enhance modeling and assessment capability
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