

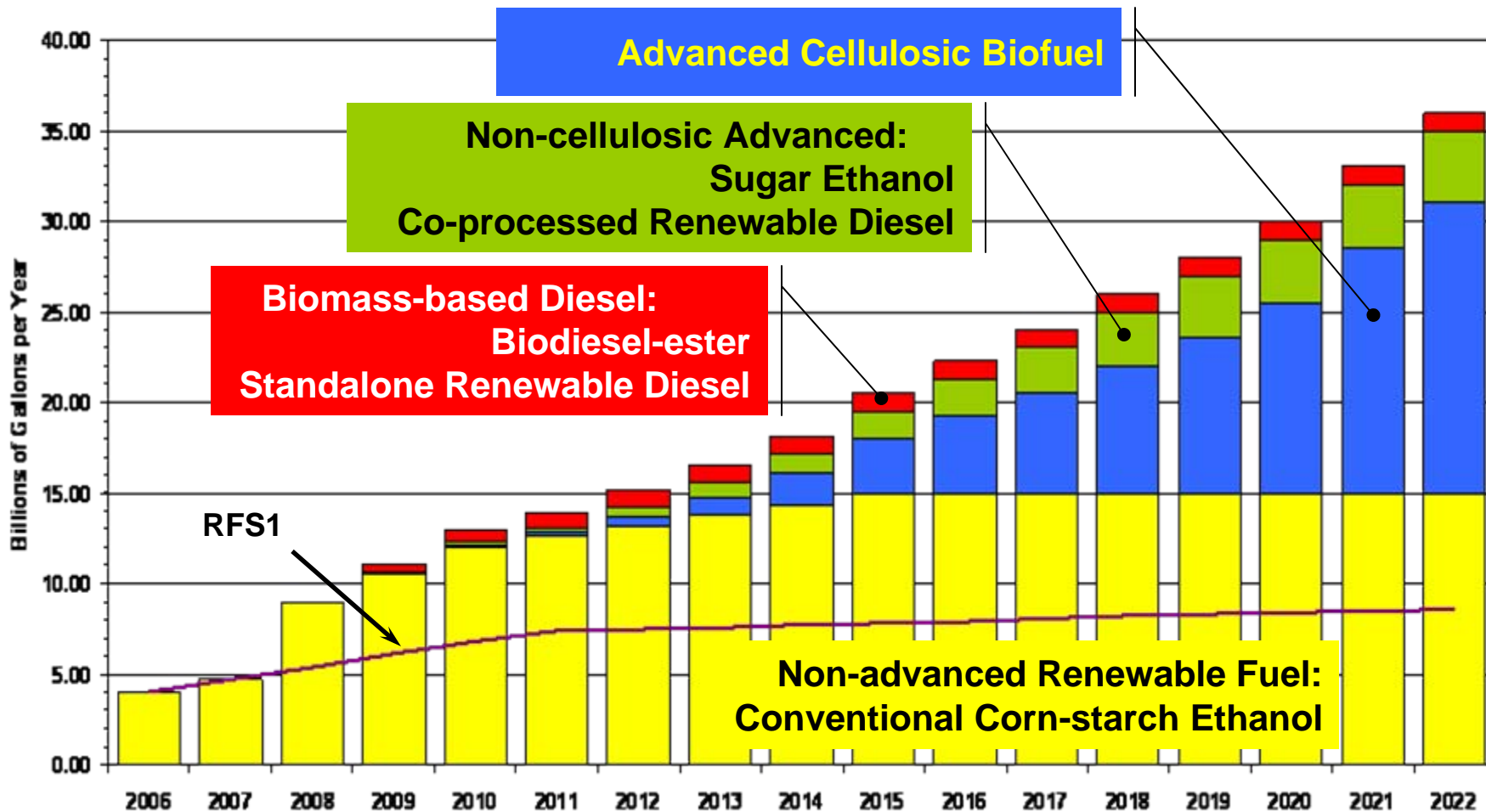


Ethanol Blends $>10\%$

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August 9, 2008

EISA Renewable Fuel Standard (2007-2022)



50% GHG

50% GHG

60% GHG

20% GHG*

*For new construction only. Existing corn-based ethanol facilities have no reduction requirement.

Background – Ethanol as a Fuel

To meet the RFS, ethanol can be used in gasoline in 3 ways:

1. Up to 10% (by volume) blend

- Can be used in all vehicles and engines
- Ethanol above 10% volume can't be used in non-flexible fuel vehicles -- E10 “blend wall”

2. E10+ blend

- Not currently a legal blend

3. E85

- An alternative fuel which must be used in a flexible-fuel vehicle



E10 Blend Wall - Explained

- EISA requires refiners and importers (*obligated parties*) to use ethanol based on their gasoline and diesel production
 - Small refiners and refineries are exempt through 2010
- Based on EIA's projected gasoline production, obligated parties will be required to use (or purchase RINs that represent) the following *volume percentages* of ethanol in their gasoline:

<u>Year</u>	<u>Percent Ethanol*</u>
2008	7.2%
2009	8.6%
2010	9.7%
2011	8.9%
2012	9.6%
2013	10.4%
2014	11.5%



Note: recent gasoline demand decreases may accelerate blend wall

E10+ Issues

- **E10+ is gasoline containing ethanol at greater than 10% volume for use in conventional (non-flexible fuel) vehicle and engines**
- **However, there are many unanswered questions on emissions, and vehicle and engine compatibility with higher blends (E11 to E20+)**
- **Even if E10+ is approved for all or most of the existing fleet, we believe that it is unlikely to be approved for non-road applications**
- **Thus, there will likely be a need to continue to make available an E10 (or less) segregation for non-road engines which will cause significant infrastructure and transportation logistical issues**

E85 Issues

- **E85 is fuel containing 70-85% ethanol (gasoline is the balance) for use in flexible fuel vehicles (FFV's)**
 - **Lower level blends >E10 can also be used in FFV's, but specifications for such blends do not exist**
- **There will be significant costs to install pumps and tanks at retail outlets**
 - **There are 1,358 E85 public retail outlets***
 - **DOE estimates that 60,000 retail public outlets will be needed**
- **A third, high vapor pressure component may be needed in some areas to achieve adequate vapor pressure.**
- **Significant misfueling concerns**
 - **Different sized vehicle fuel inlets may be necessary with corresponding pump nozzles**

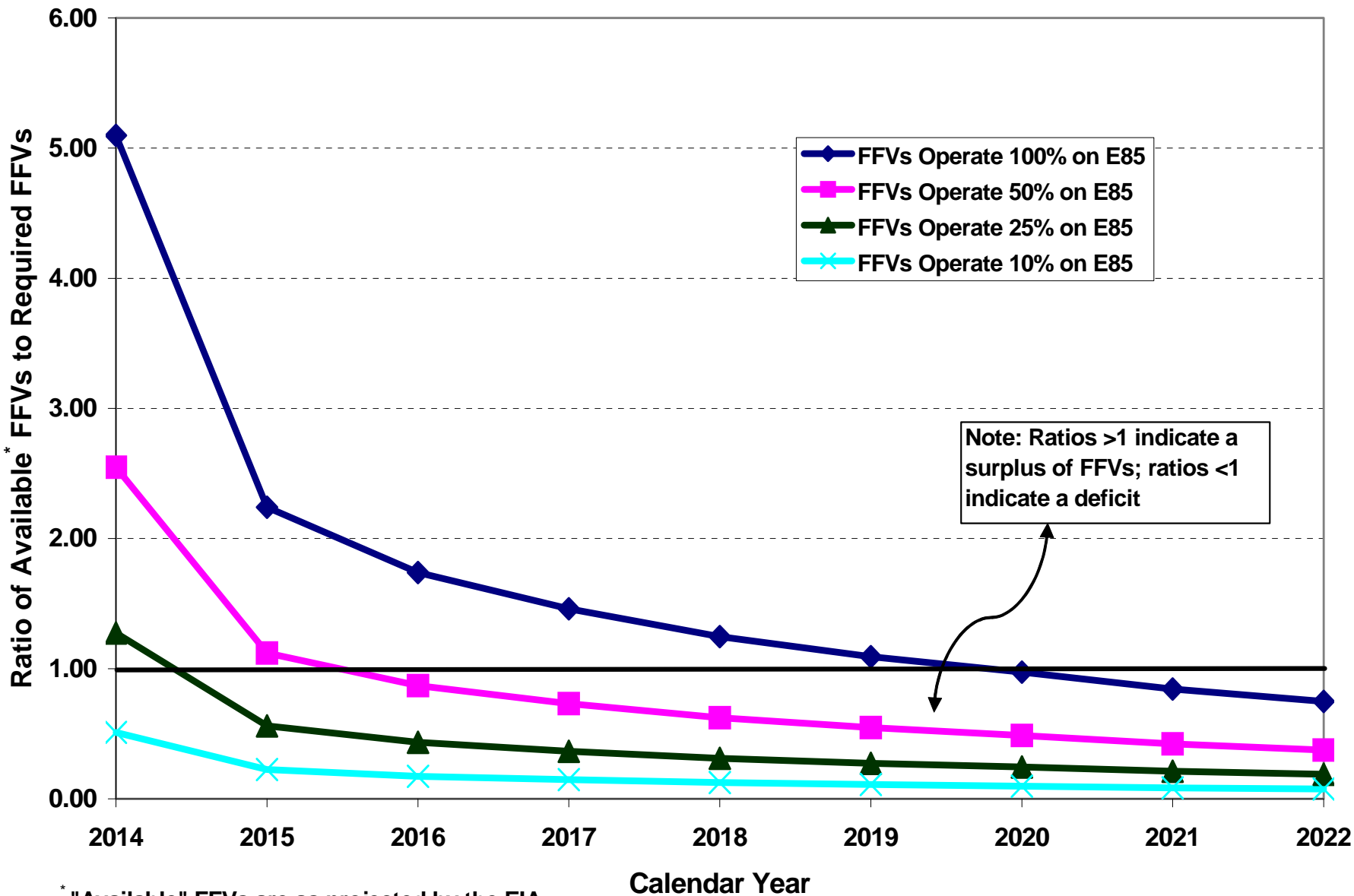


* Per DOE on June 16, 2008

E10+ Scenario Summary

- To implement the RFS, there will be several “blend walls” that will be encountered
- E10 blend wall in 2013
- E85 blend wall in 2020
 - 2020 assumes that all FFVs are fuels 100% on E85
- In concept, a combination of E10+ and E85 can work through 2022 (if FFV production is increased)
- But there is no guarantee that E10+ will ever be viable

Will there be Enough FFVs?



* "Available" FFVs are as projected by the EIA
2008 Annual Energy Outlook (revised)