

GLOBAL BIOFUELS OUTLOOK 2010-2020

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**WORLD BIOFUELS MARKETS, ROTTERDAM
MARCH 23, 2011**

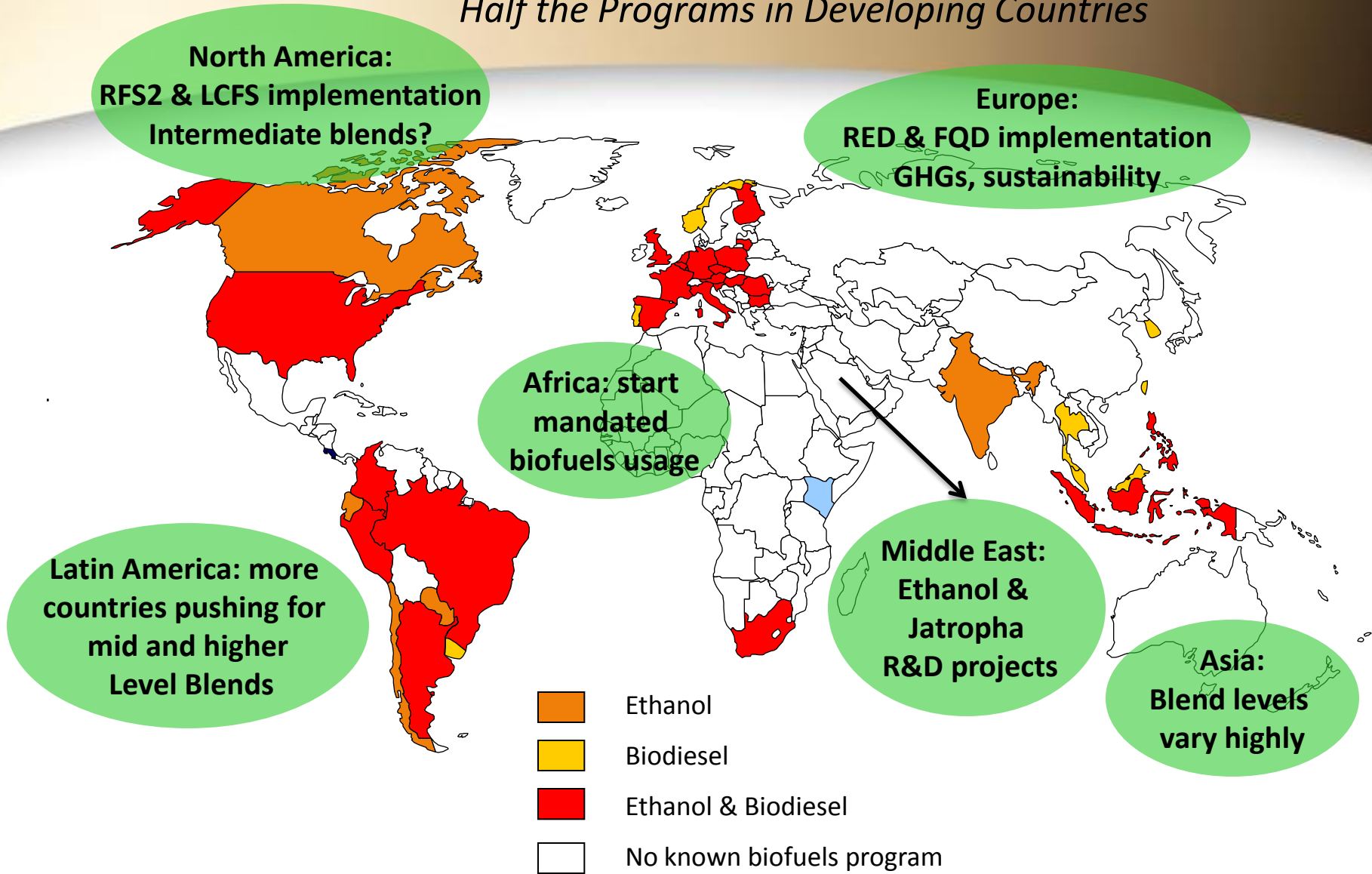
Presentation Overview

- Global Outlook
 - Biofuels Mandates in 2010
 - Total Biofuels Supply and Demand
 - Regional Supply and Demand Outlook to 2020
 - Biofuels Blending Limits
- Regional Findings for North America
- Regional Findings for Latin America
- Regional Findings for Europe
- Regional Findings for Asia Pacific
- Conclusions

GLOBAL OUTLOOK

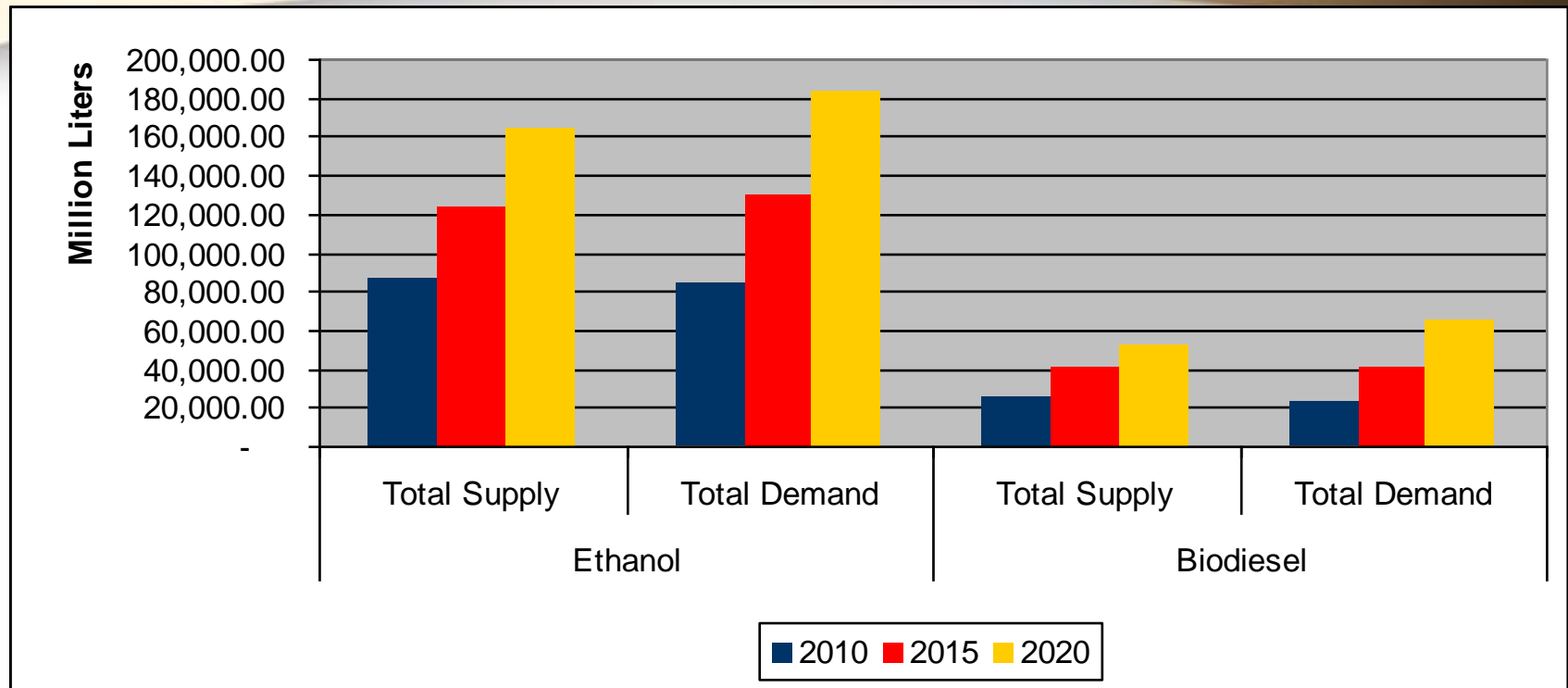
Biofuel Mandates Overview in 2011

Half the Programs in Developing Countries



Total Biofuels Supply and Demand

Substantial Growth for Ethanol and at a smaller scale for Biodiesel

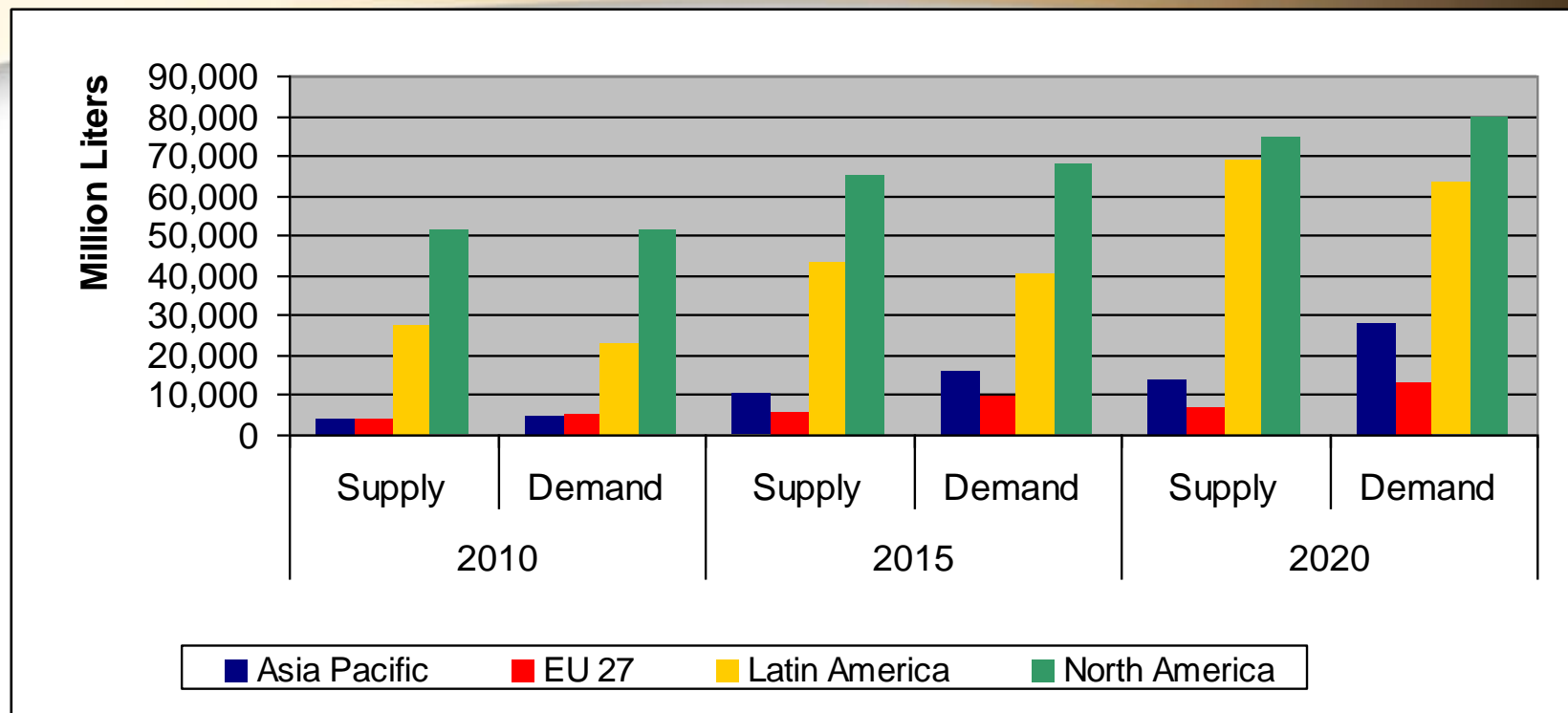


- Ethanol demand represents 73% of biofuels demand in 2020.
- Capacity will likely need to be added to keep up with demand requirements for ethanol and potential feedstock shortage for biodiesel demand by 2020.
- Biodiesel analysis generally includes only on-road diesel but for some countries we note significant demand for off-road biodiesel applications as well.

Source: Hart Energy's Global Biofuels Center, September 2010; data taken from GBC's Global Biofuels Outlook 2010-2020

Ethanol Growth by Region, 2010-2020

Global Demand to Grow Assuming No Policy Rollbacks

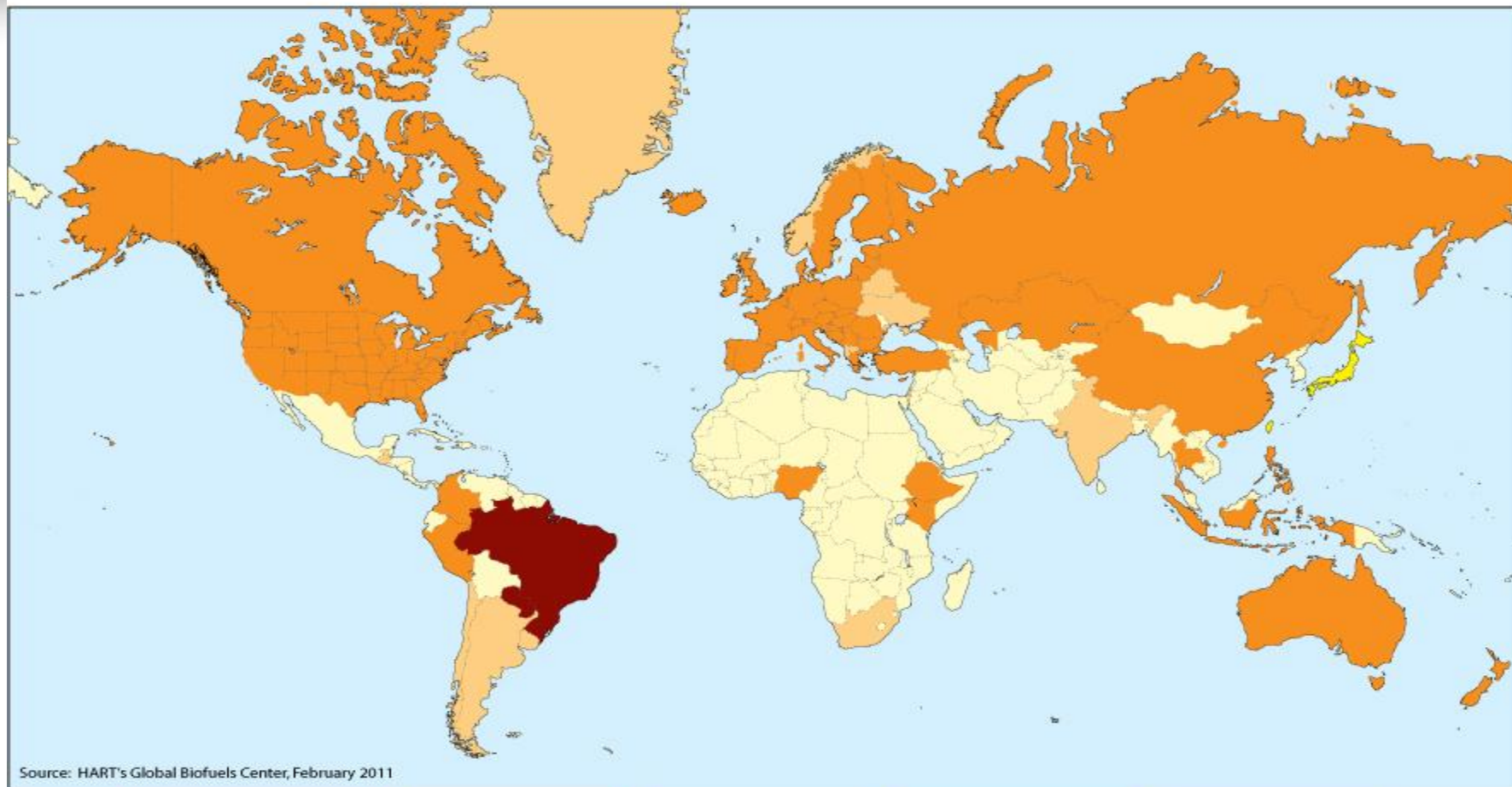


- Western hemisphere to dominate production and consumption through 2020.
- Growth in European ethanol demand based on member state National Action Plans and supply deducted from consumption and import forecasts.
- Cellulosic ethanol supplies will not be widely and commercially available by 2015 – certainly not to meet regulated targets (i.e. RFS2) – serve as a driver for sugarcane ethanol demand.
- Noticeable growth in Asia ethanol demand with supply not matching.

Current Global Ethanol Blending Limits

Blend Limits Generally 10 vol% or Less

Global Maximum Ethanol Blending Limits



24 - 25 vol % max

7-10 vol % max

5 vol % max

3 vol % max

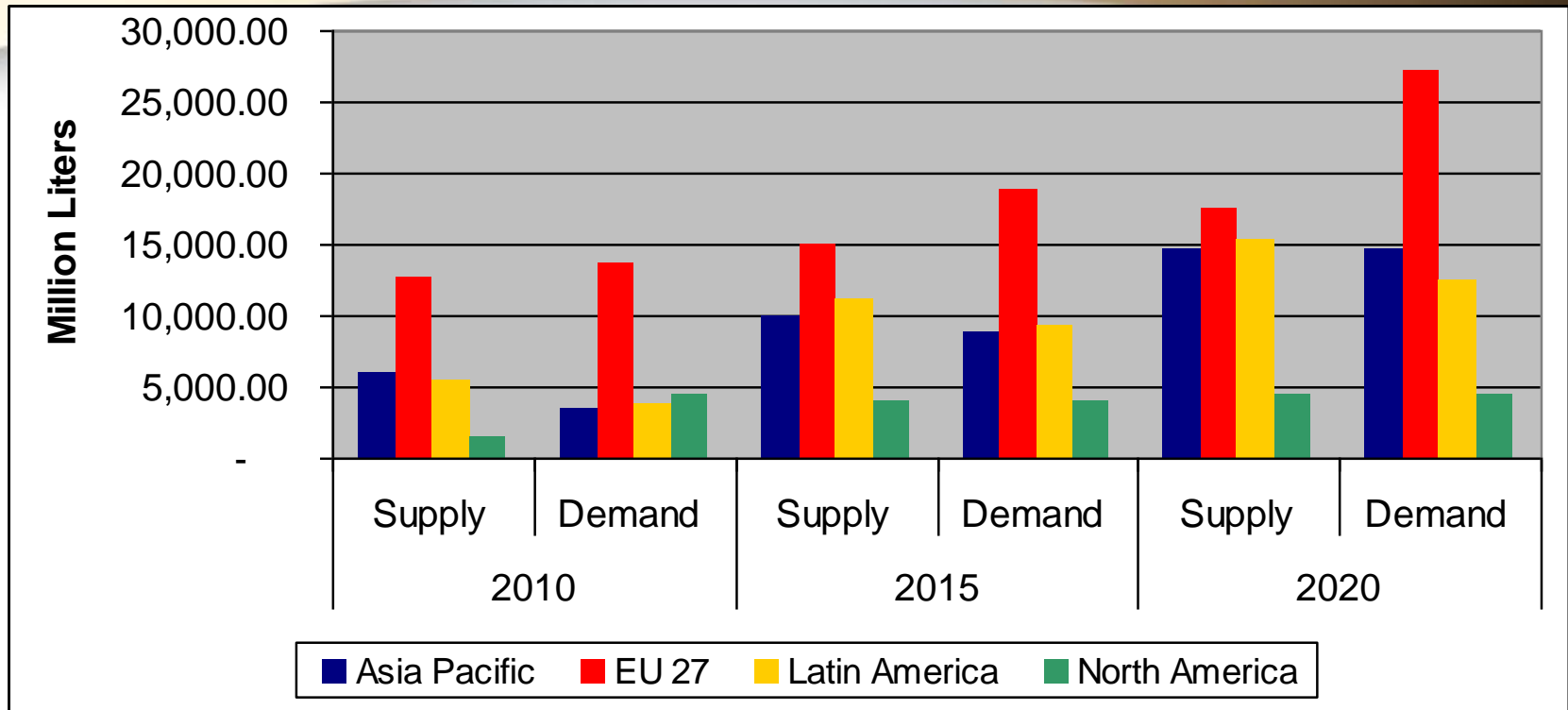
No Blends/Data

Source: Global Biofuels Center, Feb. 2011.
These are specified, legislated and regulated limits.

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Biodiesel Growth by Region, 2010-2020

Massive Overcapacity/Oversupply Remains

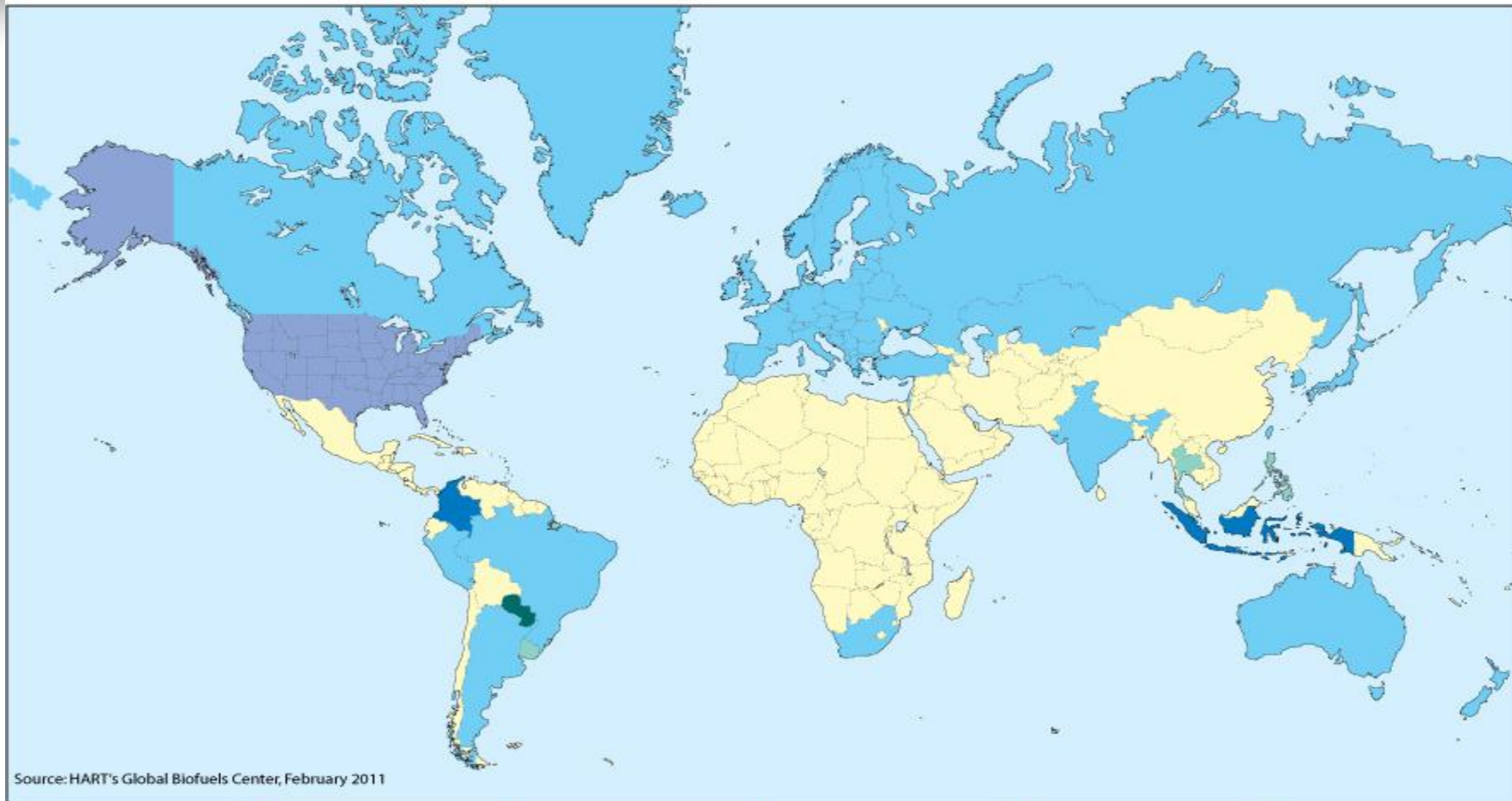


- Biodiesel supply will have to double through 2020 to meet demand requirements because of sustainability limitations.
- ILUC could effectively shut down large volumes of supply capacity in the U.S. (soy-biodiesel).
- EU will remain largest consumer with 44% share, but Asia-Pacific will come close with 39% share by 2015.
- Brazil and Colombia are two countries that will increase blending limits to absorb supply internally.

Current Global Biodiesel Blending Limits

Blend Limits Generally Less than 5 vol%

Global Maximum Biodiesel Blending Limits



20 vol % max

10 vol % max

4-7 vol % max

2 vol % max

1 vol % max

No Blends/Data

Source: Global Biofuels Center, Feb. 2011.
These are specified, legislated and regulated limits.

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REGIONAL FINDINGS

Study Findings

North America Highlights for 2010-20

- **Cellulosic biofuels requirements under RFS2 will not be met as contemplated in EISA. We expect the renewable fuel (corn ethanol) and possibly advanced biofuels (sugarcane) will be increased.**
- **We continue to expect that obligated parties will look to Brazilian sugarcane ethanol for additional volumes to meet the LCFS in the 2011-2015 timeframe. Imports may quadruple through 2020.**
- **Regional ethanol outlook (2010-20):**
 - Utilization rates increased from 2009 (85%) to 2010 (90%) and will stay at or above 90% through 2020
 - Total demand to exceed supply and reach 84 billion liters in 2020
 - Intermediate blends (E15) could see represent 30+ market penetration by 2015 in U.S.
 - Near 100% E10 penetration in U.S.
 - Canadian RFS2 to increase demand for ethanol in Canada
- **Regional biodiesel outlook (2010-20):**
 - Utilization rates around 10% of capacity
 - We project supply will meet demand by 2020 of over 4 billion liters
 - We have estimated an overall 2-3% penetration in the on-road diesel pool through the study period
 - Aside from mandates, no independent demand driver for biodiesel
 - Renewable diesel may capture some of this demand

Study Findings

EU 27 Highlights for 2010-20

- **Two directives, the amended FQD and the RED are shaping the biofuels market.**
 - They introduce a renewable energy in transport mandate for 2020, sustainability criteria (including mandatory minimum GHG reductions) and a GHG reduction mandate for fossil fuels by 2020.
- **In volumes, 2010 biodiesel demand is twice that of ethanol linked to dieselization of the car fleet but ethanol demand is projected to grow more rapidly and reach 43% of total demand volumes in 2020**
- **Regional ethanol outlook (2010-20):**
 - Current blending levels stand at 5-10 vol% (amended Fuel Quality Directive)
 - Utilization rates around 50% of capacity but rising to 69% by 2020
 - Total EU demand to exceed 13 billion liters in 2020
 - Imports to meet 47% of demand by 2020
- **Regional biodiesel outlook (2010-20):**
 - Current blending levels stand at 5-7 vol% (amended Fuel Quality Directive)
 - Utilization rates around 57% of capacity but rising to 66% by 2020
 - Total EU demand to exceed 27 billion liters in 2020
 - Imports to meet 35% of demand by 2020
- **Sustainability is a major issue in the EU 27 and with potentially huge impact on industry with Indirect Land Use Change still an unknown factor**
- **Advanced biofuels promoted under new Renewable Energy Directive but no significant volumes expected by 2015**

Study Findings

Asia Pacific Highlights for 2010-20

- **2010 saw an increase in ethanol blending under the national mandate for Indonesia, and biodiesel blending under the national mandates for Indonesia, South Korea, Taiwan and Thailand.** However, full implementation in Indonesia has yet to be successful.
- **Ethanol supply is not expected to meet demand through 2020** due to higher blending requirements at 5-10 vol% and issues with feedstock supply and pricing. If proposed plants do not proceed with construction or existing capacity is expanded to meet demand, ethanol imports from Brazil will continue to suffice.
- **Biodiesel supply is expected to meet demand up until 2020** due to lower blending requirements at 1-5 vol% and overcapacity (even with utilization rates as low as 10%). Excess supply is expected to be absorbed by increasing blending levels, or usage in off-road vehicles and sectors, or export to Europe or other countries.
- **On a regional basis, total ethanol demand is estimated to reach 1.8% of the total gasoline demand in 2010**, which is expected to grow to 5.5% in 2015 and 8.2% in 2020.
- **Total biodiesel demand is estimated to reach 1.6% of the total automotive diesel fuel demand in 2010**, which is expected to grow to 3.4% in 2015 and 4.7% in 2020. This shows that ethanol accounts for a higher share in the gasoline pool than biodiesel and is expected to grow faster than biodiesel in the region.
- **No current or future policies or mandates require use of advanced biofuels** which are produced at pilot level in Australia, China, India, Japan, New Zealand, Taiwan and Thailand.

Study Findings

Latin America Highlights for 2010-20

- **Biofuels potential in Latin America is strong considering many countries have significant land available for expansion of feedstock production, and the goals of energy security and job creation coming out of the financial crisis are a priority among many governments.**
- **Regional Ethanol Outlook for 2010-2020**
 - Brazil will continue to set the tone for the region
 - Most blend mandates range between 5 vol% - 25 vol%, 10 vol% is most common
 - LatAm supply to exceed 65 billion liters by 2020 which is higher than demand from the region
 - Exports may rise to over 15 billion liters by 2020
- **Regional Biodiesel Outlook for 2010-2020**
 - Most blend mandates range between 2 vol% - 10 vol%
 - LatAm supply to exceed 15 billion liters by 2020 which is higher than demand from the region
 - Most countries' supply expected to satisfy internal demand
 - Exports could reach nearly 3 billion liters by 2020
- **Increasing flex-fuel vehicle (FFV) sales in Brazil and the approaching FFV mandate in Colombia (2012) will be significant drivers in ethanol demand as long as prices stay competitive. Also, Jamaica and Paraguay have lowered tariffs on FFVs.**
- **Colombia and Argentina continue to raise biodiesel blend levels when supplies warrant, hoping to eventually reach B20.**

CONCLUSIONS

Concluding Observations

Ethanol Demand Expected to Grow in All Regions

- Ethanol may represent 13% of the gasoline pool by 2020; biodiesel, 6% of the on-road diesel pool.
- Hart Energy's analysis shows that most countries will be in a potential supply deficit for ethanol by 2020. On a global basis, supply could be short by at least 19 billion liters (5 billion gallons).
- The only country that will be in a position to supply the global ethanol market will be Brazil, which Hart Energy projects will be able to supply a *minimum* of 13 billion liters (3.5 billion gallons) to the global market by 2020. No other country comes anywhere close to being able to supply these kinds of volumes.
- Chief competitors for Brazilian ethanol are expected to be the U.S., EU 27, China and Japan representing a combined demand of at least 15 billion liters (4 billion gallons). China is a surprise! The demand requirement will reach 8 billion liters (2 billion gallons) by 2020, more than doubling over 2010.
- We do not expect sufficient volumes of next gen biofuels to be commercially available on the market through 2015-2020 to meet GHG-driven biofuels targets.
 - RESULT: Again, a scramble for sugarcane ethanol...will probably drive Brazil and Asia-Pacific production.

Concluding Observations (2)

Biodiesel Supply Hindered by Sustainability Concerns

- A number of countries have already moved or are considering moves to higher blends of ethanol (beyond E10) and biodiesel (beyond B5) and include: Brazil, the U.S., Colombia, Argentina, Indonesia, and several EU 27 member states.
- Global biodiesel supply will have to double over the 2010-2020 timeframe to accommodate demand requirements that governments around the world are aiming to implement. We expect fewer new facilities will be built but that utilization at existing facilities increases by 2020.
- Only 57% of existing biodiesel capacity is required in Europe in 2010 and 2015 compared to expressed demand, taking into account FAME and renewable diesel capacity and the import projections in the NAPs. The utilization could then rise to 66% of the capacity in 2020 as no new capacity is added beyond 2015. But in spite of this capacity, imports should represent 7% of demand in 2010, increasing to 20% in 2015 and then 35% in 2020 as no new capacity is added.
- Sustainability remains a very important issue with regard to biofuels, in particular, indirect land use change (ILUC) GHG emissions. The RED already mandates GHG emission reductions and may limit the use of several feedstocks. Member states remain divided over how to take ILUC into consideration. The issue of how to handle ILUC has not been decided yet by the European Commission, but nevertheless could be a hurdle for future biofuels or biofuels feedstocks imports into the EU.

THANK YOU! QUESTIONS?

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