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Overview of USDA Biofuels Programs and Activities

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4th International Conference on Biofuels Standards
Current Issues, Future Trends
National Institute of Standards and Technology
Gaithersburg, Maryland
November 13-15, 20012

AGENDA

- What is driving programs & activities
- USDA Activities
- Q&As

BIOFRENZY

POLICY

- Energy Independence and Security Act of 2007
  - RFS 2
- Food, Conservation and Energy Act of 2008
  - Energy Title IX

USDA Programs and Activities

- Research
- Programs
- Collaboration
- Outreach and Education

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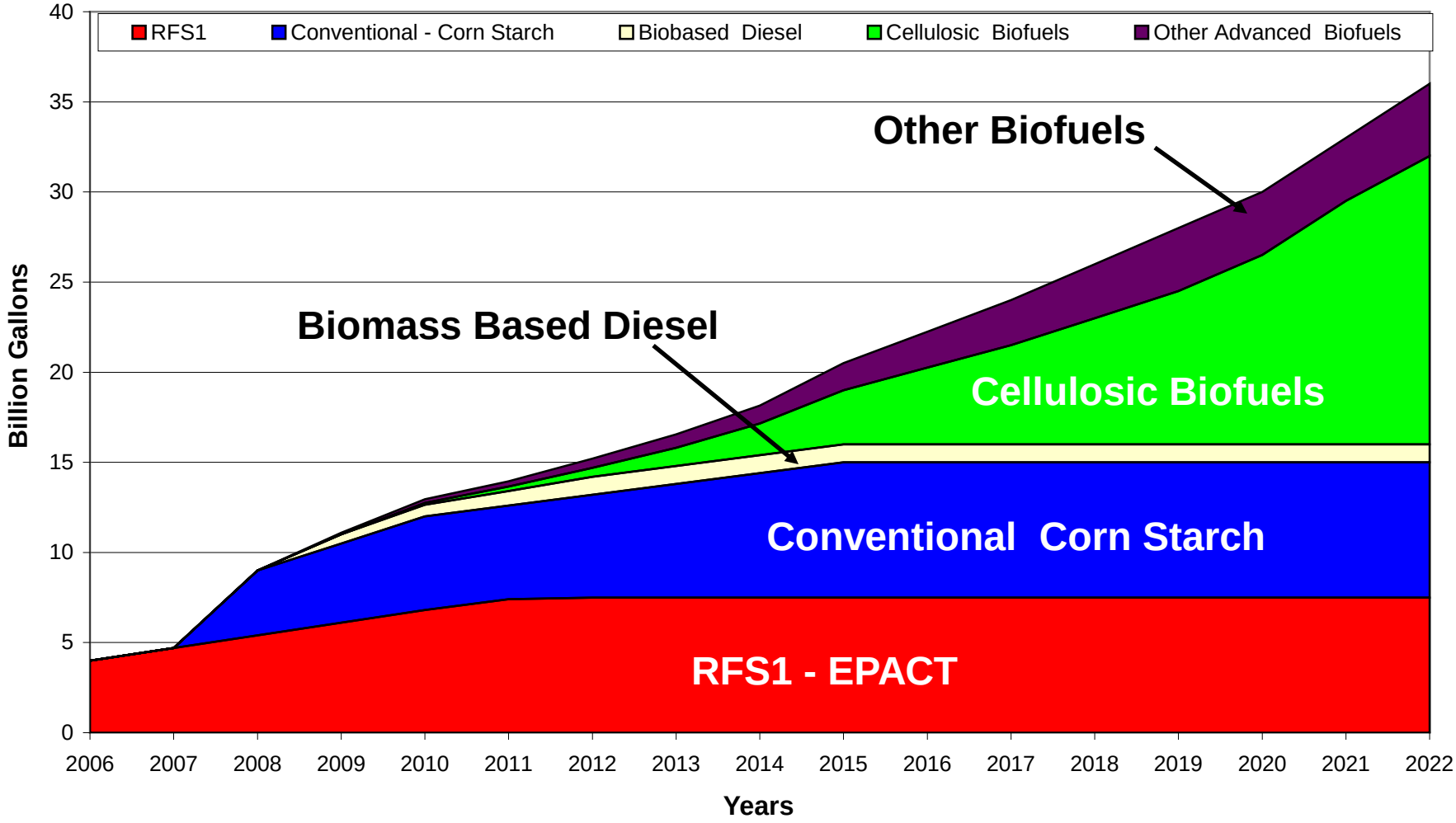
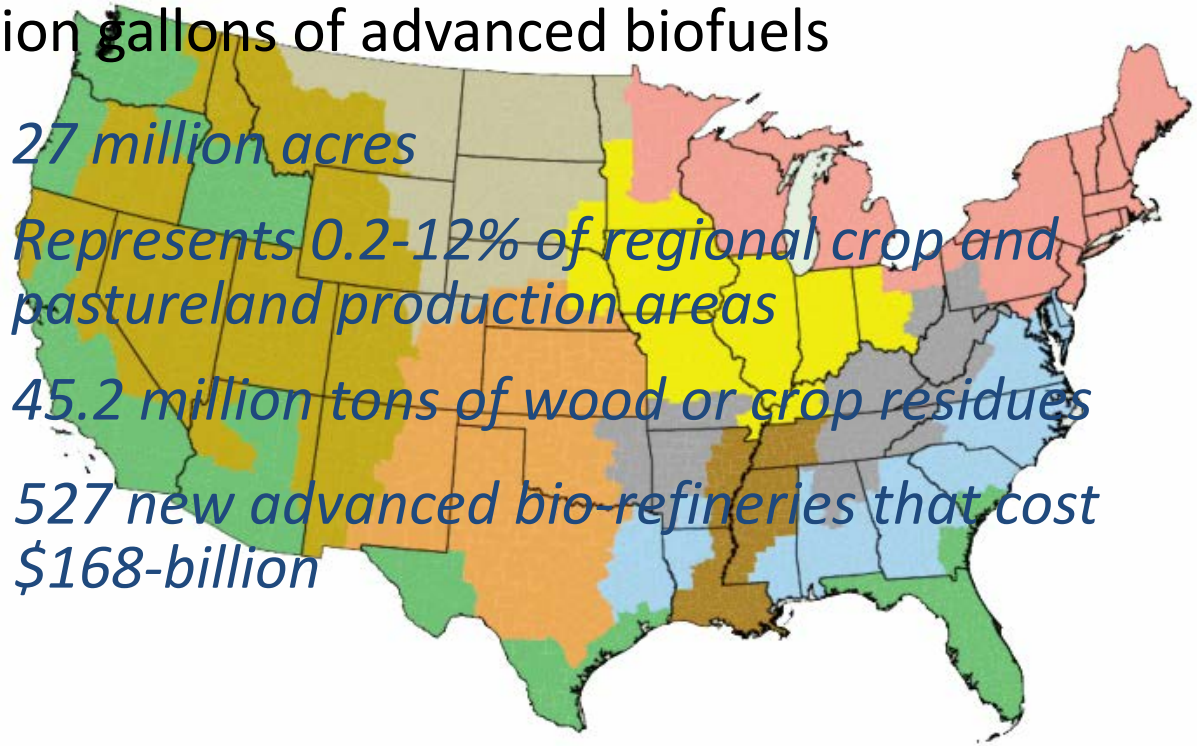
EISA – EPACT Renewable Fuels Standard



Clear Targets – Scope Out Significant Challenges

Required investments needed to produce 21-billion gallons of advanced biofuels

- *27 million acres*
- *Represents 0.2-12% of regional crop and pastureland production areas*
- *45.2 million tons of wood or crop residues*
- *527 new advanced bio-refineries that cost $168-billion*



Biofuels Strategic Production Report – A USDA Roadmap to Meeting the Biofuels Goals of the Renewable Fuels Standard by 2022, June 23, 2010

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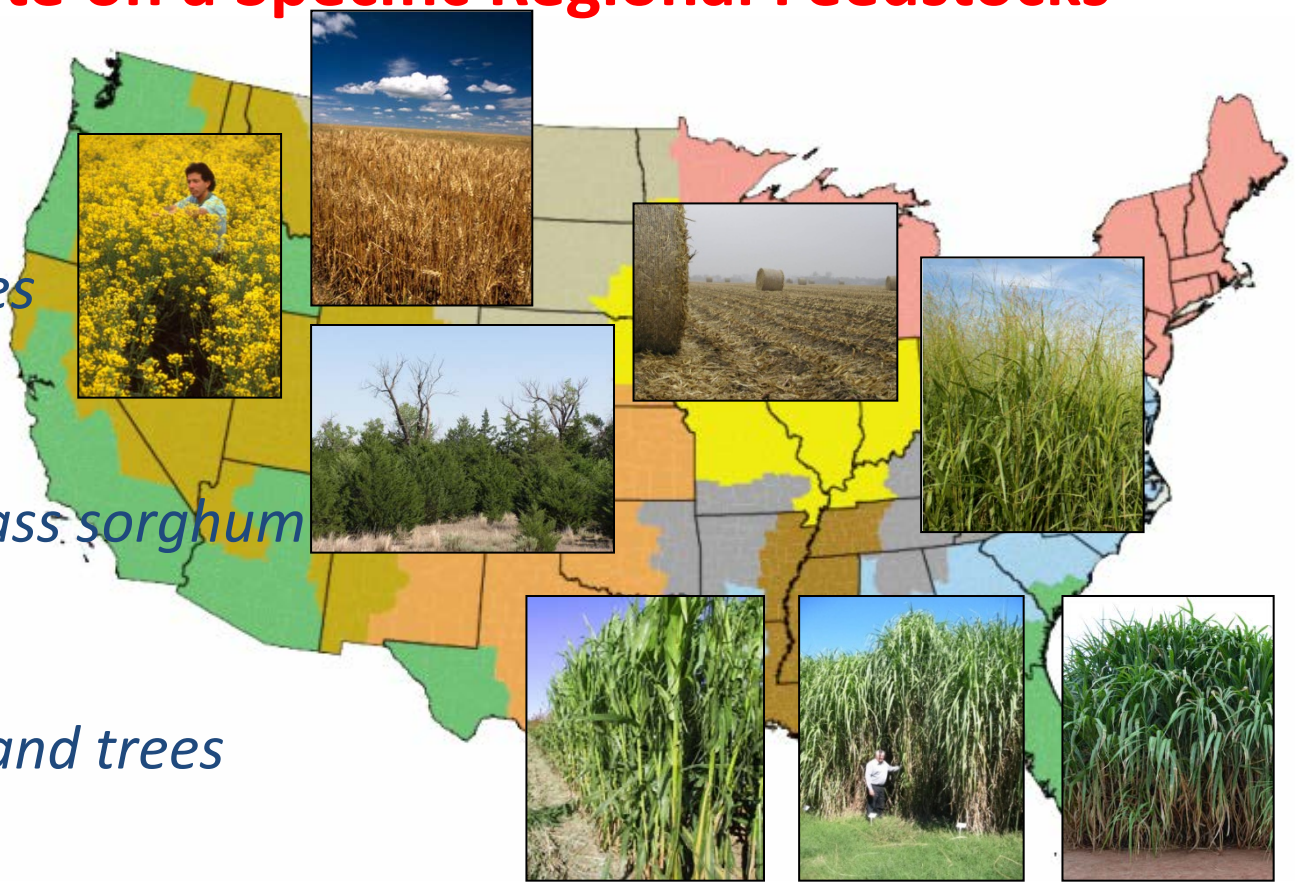
Use Region-based Strategies to Develop Sustained Feedstock Supplies

Every region will make its own unique contribution, no one region will provide all the needed biomass to achieve targets

Concentrate on a Specific Regional Feedstocks

- *Crop residues*
- *Perennial grasses*
- *Energy cane*
- *Non-food biomass sorghum*
- *Lipid seed crops*
- *Invasive rangeland trees*



No one feedstock will meet all national biofuel needs

New Directions for Bioenergy R&D

- **What is a systems-based approach?**
  - Expand project boundaries to include Social, Environmental, and Economic feasibility of innovation, AND…
  - link feedstock development, production, logistics, conversion, product development and markets
  - Transdisciplinary - no research “silos”
  - Compatible with existing agricultural systems
  - Integrate research, education, Extension
- **Focus on Outcomes and Impacts**
  - Rural Development and Sustainability

NIFA Bioenergy/Products Portfolio

- Joint DOE/USDA Plant Feedstock Genomics Program $2M
- Agriculture and Food Research Initiative (AFRI)
  - Sustainable Bioenergy Challenge $46M
- Joint USDA/DOE Biomass Research and Development Initiative (BRDI) $40M
- Critical Agricultural Materials $1M
- Small Business Innovation Research Program (SBIR) $4M
- Other and non-competitive ~ $15M
- >$100M NIFA annual investment in FY 2012

Biomass Research and Development Initiative FY2009-2012

- $118M support 25 projects
- Focus on advanced biofuels/biobased industrial products/chemicals
- Interest in small scale processing/rural manufacturing
- Funding range $3M - $7M
- Required integration of:
  - feedstock development/production, feedstock logistics,
  - feedstock conversion, product development
  - system analysis, e.g. life cycle analysis, impacts on food/feed supply

Biomass Research and Development Initiative

FY 2009 awards focused on conversion technologies:

- Cellulosic Isobutanol Fermentation Biocatalyst (Gevo, Inc.)
- Kinetic Models of Biomass Gasification (GE Global Research)
- Production of Polyitaconic Acid from Northeast Hardwood Biomass (Itaconix, LLC)
- Improving Biorefinery Economics through Microchannel Hydroprocessing (Velocys, Inc.)

Regional Approaches to Bioenergy Systems

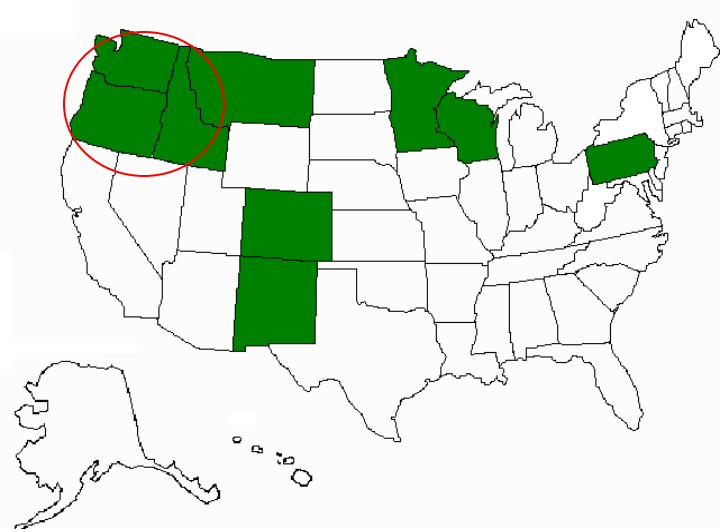
- **Coordinated Agricultural Projects (CAP)**
  - *Regional partnerships*
    - Academic, government, non-government, industry
  - *Work back from targets to develop entire supply chains*
  - *Build on existing infrastructure and previous investments*
  - *Integrate Research, Education, and Extension/Tech Transfer*
  - *Robust sustainability analysis: Impacts on …*
    - *Economics, rural communities, and the environment*
  - *Targeted Feedstocks (perennial grasses, energy cane, sorghum, woody biomass, oil crops)*
  - *2010-12: 6 awards totaling ~$146 M over 5 years*

Northwest Advanced Renewables Alliance (NARA): New Vista for Green Fuels, Chemicals, and Products

WA St U, $40,000,000 (5 years)

- **41 Key Personnel representing 9 Universities, 3 Federal Partners, and 4 Industrial Partners from 9 States:**
  - *Renewable aviation fuel, value-added industrial chemicals*
  - *Woody biomass residues,*

    purpose-grown trees
    - *Weyerhaeuser, Greenwood Res.*
  - *Bioconversion and fuel production*
    - *Gevo, Catchlight, Chevron*



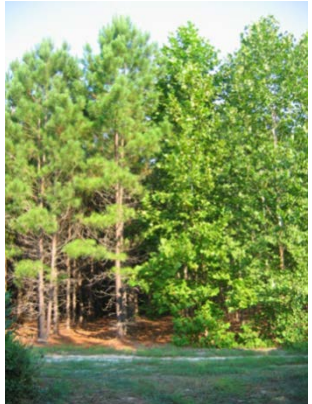
Forest Service R&D Critical Research

- Sustainable and economical forest biomass management and production systems for public & private ownerships
- Competitive biofuels and conversion technologies and innovative bioproducts
- Information and tools for decision-making and policy analysis

… Reduce investor risk and significantly contribute to U.S. energy security, environmental quality, and economic opportunity

Sustainable Production and Management Research

- Sustainable Soil Productivity
- Integrating Feedstock Production into Forest Management Systems
- Short Rotation Woody Crops
- Forest Operations Research
- Best Management Practices



Food, Conservation, and Energy Act of 2008 - Title IX – Energy

- Federal Procurement of Biobased Products (9002)
- Biorefinery Assistance Program (9003)
- Repowering Assistance Program (9004)
- Bioenergy Program for Advanced Biofuels (9005)
- Rural Energy for America Program (REAP - 9007)
- Biomass Research and Development (9008)
- Biomass Crop Assistance Program (9011)
- Community Wood Energy Program (9013)

Renewable Energy/Energy Efficiency Investments by Technology, 2003 - 11

Technology	Number of Projects	Grant and Loan Guarantee Investments	Leveraged Amount
Anaerobic Digester	166	$ 95,592,536	$ 295,039,652
Ethanol Production	63	$ 56,148,961	$ 123,467,698
Solid Fuel Production	147	$ 35,858,243	$ 87,792,770
Biodiesel Production	10	$ 22,319,086	$ 69,739,987
Thermal Conversion	43	$ 18,958,758	$ 39,148,094
BIOMASS	429	$ 228,877,585	$ 615,188,200
ENERGY EFFICIENCY	5,399	$ 177,880,630	$ 356,326,946
GEOTHERMAL	198	$ 6,109,847	$ 22,474,229
HYBRID	40	$ 3,607,001	$ 188,288,374
SOLAR	1,054	$ 56,952,256	$ 135,307,251
WIND	562	$ 109,595,668	$ 604,957,982
FLEXIBLE FUEL PUMP	66	$ 4,284,342	$ 22,193,369
HYDROELECTRIC	7	$ 8,497,001	$ 13,298,709
HYDROPOWER	10	$ 1,780,798	$ 13,455,103
Planning grants			
Feasibility Studies	174	$ 5,878,094	
Energy Audits	50	$ 4,603,016	
Renewable Energy Development Assistance	33	$ 3,149,991	
Total	8,022	$ 611,216,230	$ 1,971,490,163

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Rural Development, Title IX Energy Investments Fiscal Years 2003-11, with Performance Measures

Fiscal Year	Projects	Total Investments	Jobs Saved-Created	Businesses Assisted	Energy Saved - Generated	GHG Reduced**	Advanced Biofuel Produced
	Number	*Millions of dollars*	*Number*	*Number*	*Millions of kWh*	*1,000 metric tons of CO2*	*Millions of gallons*
2003	114	22	736	108	974	979	
2004	163	23	411	186	504	643	
2005	158	32	289	103	590	611	
2006	412	45	1,357	285	997	1,304	
2007	436	76	2,122	331	1,956	1,969	
2008	764	50	1,797	537	2,438	2,643	
2009	1,559	217	5,981	2,924	3,006	3,085	
2010	2,609	236	2,371	5,250	4,676	7,794	882
2011	2,459	477	1,775	2,358	9,326	8,965	1,829
TOTAL	8,674	1,178	16,839	12,082	24,468	27,993	2,711

INEOS New Planet Energy, Vero Beach, Florida

First Commercial Scale Cellulosic Ethanol Producer

- $75 million loan guarantee; $50 million DOE grant; $2.5 million State of Florida grant
- MSW and citrus pulp to 8 million gallons per year of cellulosic ethanol and 6 MW of electricity
- Mechanical completion 4/12; Commissioning complete 9/12
- On schedule to produce 2 MG in 2012!

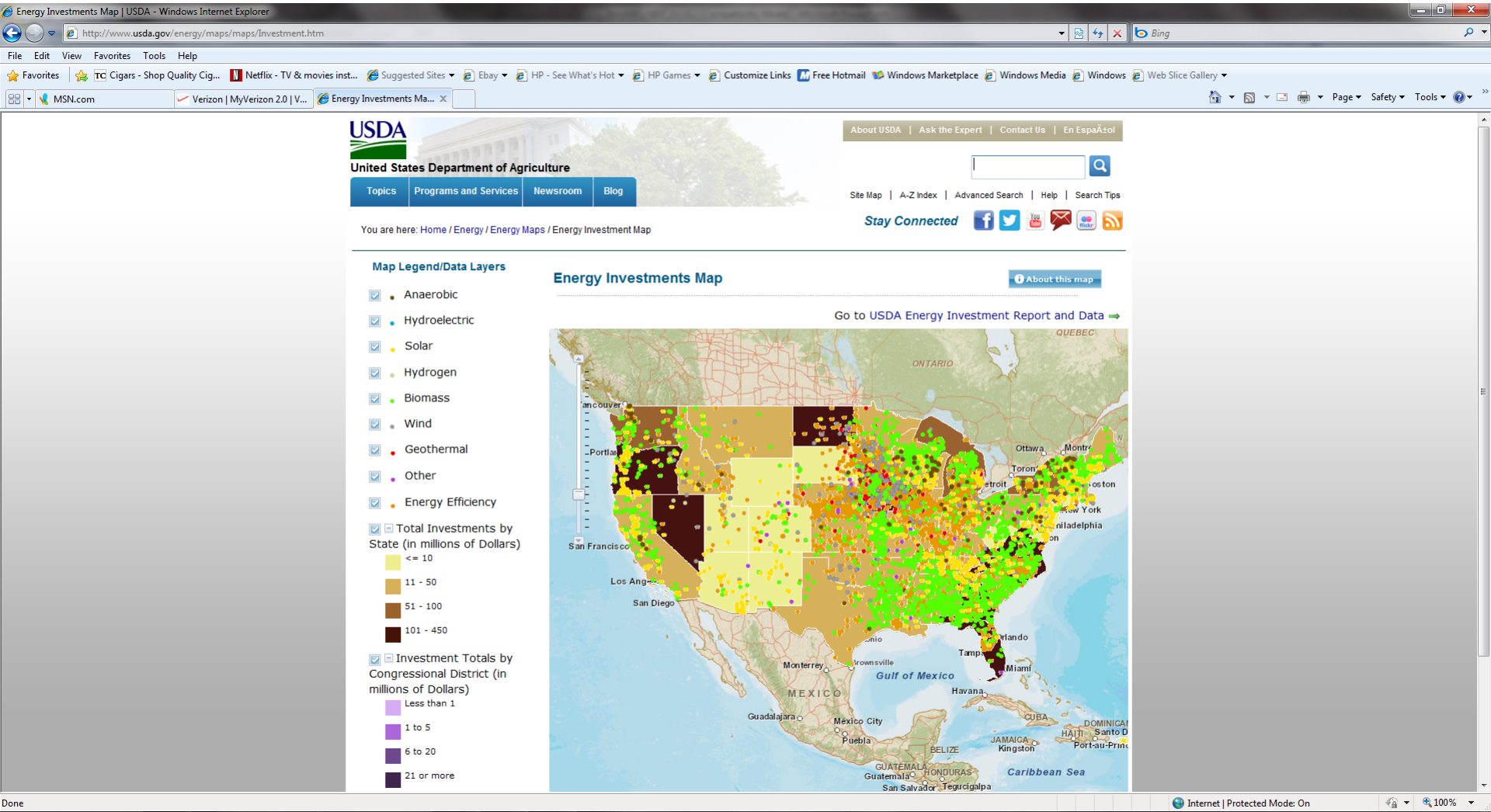
Collaboration Initiatives & MOUs

- Flexible Fuel Pumps
- Wood to Energy
- Digester Initiative
- Farm to Fly - (Defense, CAAFI, MASBI)

- MOU – Dairy Indiustry
- MOU – Department of Navy
- MOU DPA – DOE/DON
- MOU - FAA

Outreach & Education

Outreach & Education



THANK YOU

Other Key Drivers in Renewable Energy Development

- **May 5, 2009, President Obama signed the directive establishing a new working group to be chaired by the Secretaries of Energy and Agriculture, and the Administrator of the EPA.**

- **February 2010, Biofuels Working Group Report (Growing America's Fuels)**

- **June 2010, USDA Roadmap for achieving 36 billion gallons renewable biofuels by 2022; 21 billion gallons of advanced biofuels**

Other Key Drivers in Biofuels Development

- **November 2010, Secretary Vilsack announces establishment of Biomass Research centers leveraging resources to support 1st, 2nd and 3rd generation renewable fuels**

- **March 2011, President Obama releases *BLUEPRINT FOR A SECURE ENERGY FUTURE***

- **PARTNERING with other agencies and other countries like China (2007)**

America's Energy Security- Blueprint for a Secure Energy Future

- Reduction of Imported Oil by 1/3 by 2025
- Expanding Biofuels Markets and Commercializing New Technologies
  - 4 Commercial-scale cellulosic or advanced biorefineries in the next 2 years
  - Expedite development of "drop-in" biodiesel and bio-jet fuel
- Clean Energy Standard
  - 80% of Nation's electricity from clean energy sources by 2035

Key Points Moving Forward with Renewable Energy Development

- **Focus on 2nd and 3rd Generation Biofuels - i.e., cellulosic, biomass based diesel, …**
- **Leverage regional resources, in the United States we have diversity in the types of biomass resources available and where they are located.**
- **A market oriented approach – we are not selecting feedstocks or technologies but rely on markets**
- **Continue develop strategic partnerships to accelerate progress - domestic and international / private and public**
  - **Defense Production Act where Department of Navy, Department of Energy, and USDA working together and funding jointly facilities for the production of drop-in aviation biofuel**
  - **Partnering**

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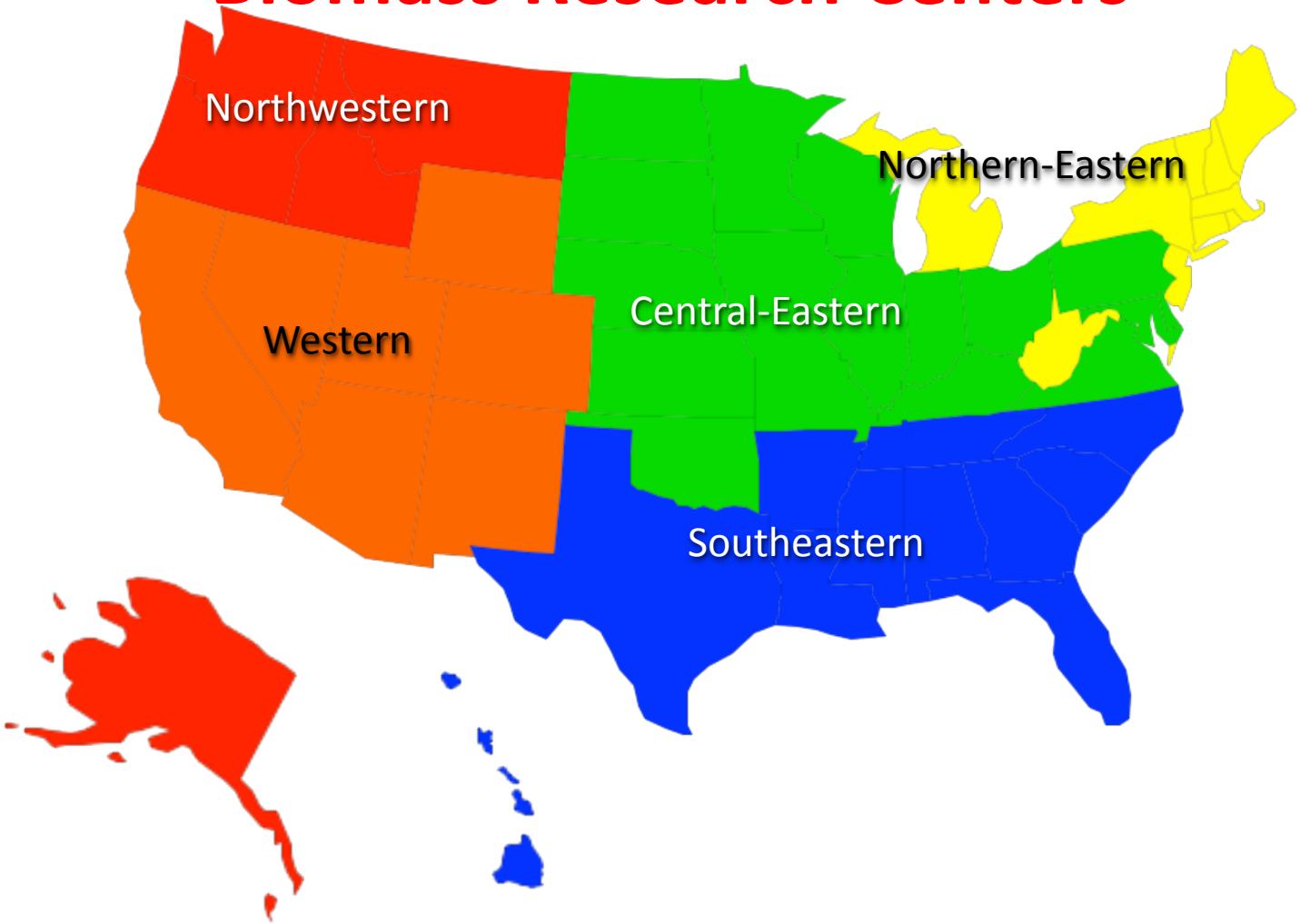
Biomass Research Centers



USDA Regional Biomass Research & Demonstration Centers

- Multifunctional landscape approach.
- Regional dedicated energy crops and purpose-grown woody species.
- Incorporates sustainable biomass production into existing agricultural and forest systems.
- Systems designed to meet biorefinery requirements – always considers a supply chain approach.

2012 & Future Political Realities

- Super Committee - Deficit reduction
- 2012 Presidential Election Year
- 2012 New Farm Bill
- Renewable Energy Issues
  - Tax credits and subsidies
  - Infrastructure
  - E-15 & FFVs
  - Heat & Power

Looking Ahead – 2012 & Future

- Difficult to move forward – there is a need for STABLE public policy especially in the short-term
- "Commercial Cellulosic Facility" needed
  - RFS2 Mandates – Cellulosic
- Use of biomass for energy production instead of traditional uses
  - Food emotional issue
  - Wood chips for fuel & heat power - resistance

2012 & Future

- No silver bullet
- It will be difficult and challenging
- Require interdisciplinary cooperation, coordination, and leveraging resources
- USDA is positioned to meet the challenge ahead

Meeting the United States' Future Energy Needs

- Diversified Sources
- Need to increase efficiency (conservation)
- Sound – Strong Research Base
- Partnering (across stakeholders)
- IT WILL BE CHALLENGING

Use Region-based Strategies to Develop Sustained Feedstock Supplies

- Optimally incorporate energy crops into existing agriculture and forestry-based systems.
- Address uncertainties up-front to reduce negative impacts on existing markets and ecosystem services.
- Increase production efficiency to increase grower profits and reduce biorefinery transaction costs.