



America's Energy Future

25x'25: Mission Achievable

Renewable Energy Biomass Education Field Days

Session VIII Environmental Concerns

Knoxville, Tennessee
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25x'25: a National Alliance

- Formed Spring 2004 through a grant from the Energy Future Coalition
- Organized to explore agriculture and forestry's role in energy production
- Evolved to now include a diverse collection of agricultural, forestry, conservation, environment and business organizations and leaders



America's Energy Future

Our Vision:

By the year 2025, America's farms, ranches and forests will provide 25 percent of the total energy consumed in the U.S. while continuing to produce safe, abundant and affordable food, feed and fiber.

25x'25



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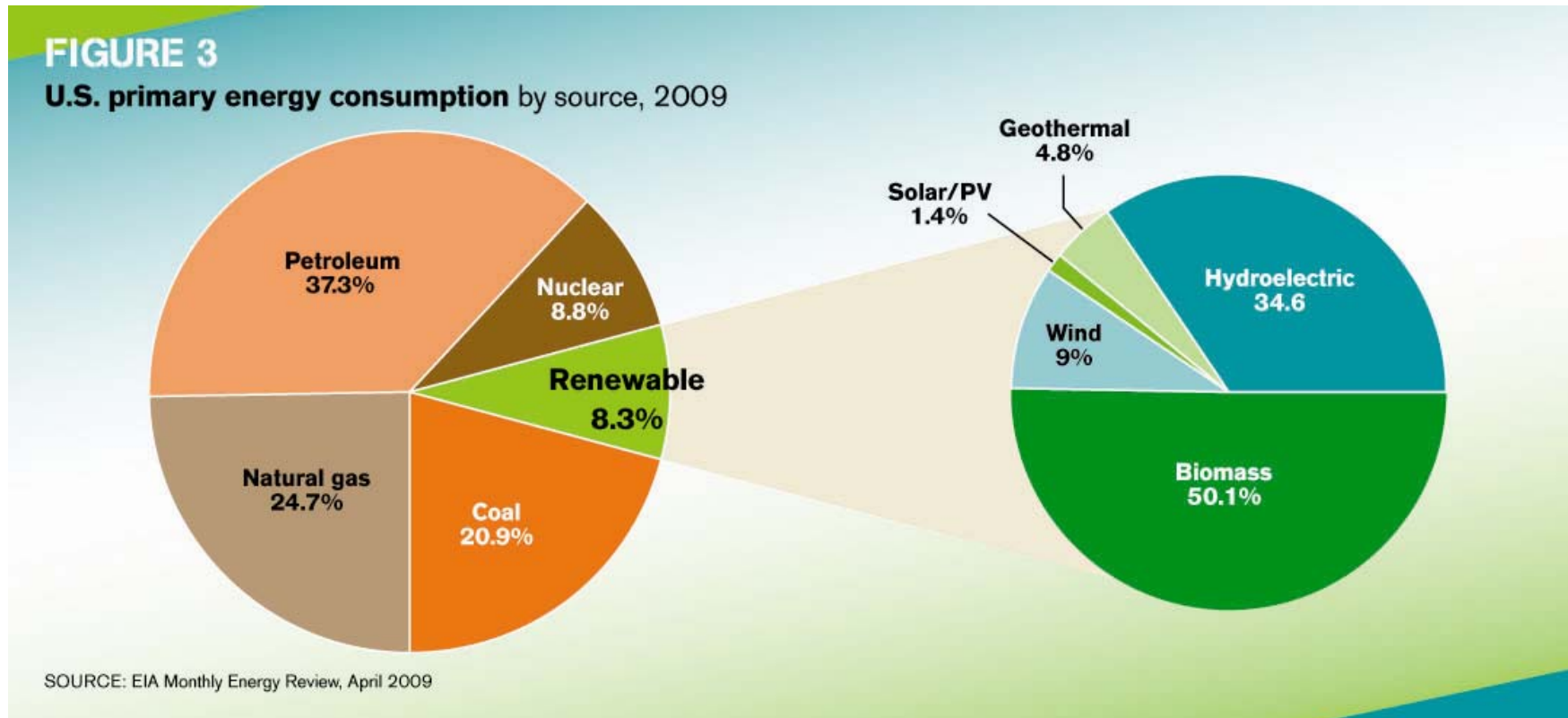
We will meet this goal by:

- Producing transportation fuels
- Harnessing wind energy
- Converting biogas emissions
- Utilizing geothermal resources
- Capturing solar & hydro energy
- Providing biomass for generating heat, power, and biofuels
- Observing the benefits to the environment and increasing energy efficiency





Where We Are Now



For 2nd year in a row, U.S. installed more renewable power capacity than conventional power (fossil and nuclear) capacity.



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Sustainability

Sustainability is more and more considered key to the success of any renewable energy goals

How is “Sustainable” defined or measured?

Underpinned by the ideals of stewardship and the responsible use and development of natural resources



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Sustainability

25x'25 Definition:

Renewable energy production must conserve, enhance and protect natural resources and be economically viable, environmentally sound and socially acceptable.



Sustainability Areas of Focus

- **Biodiversity**
- **Biotechnology**
- **Air Quality/Greenhouse Gas Emissions**
- **Invasive Species**
- **Land Use**
- **Public Lands**
- **Soil Quality and Quantity**
- **Water Quality and Quantity**
- **Wildlife Habitat and Health**



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Are fossil-based energy systems truly sustainable?



- Costs of oil, natural gas and coal are increasing and volatile
- Growing evidence that emissions from burning of fossil fuels are impacting the environment



- World oil reserves are limited in supply and located in unstable parts of the world
- Dependence on foreign oil is increasing
- Susceptible to major disruptions due to natural weather and international events



The Reality

- Fossil fuel ***resources are finite and diminishing***
- Global energy ***consumption is increasing*** (nearly 36% by 2035)
- The world ***population is growing*** (9.1 billion by 2050)
- Fast-developing ***economies are demanding more energy resources***
- Greenhouse gas ***emissions are increasing*** (World carbon dioxide emissions expected to increase by 1.9% annually between 2001 and 2025)



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The Opportunity



Biomass Feedstock

- Ded. Energy Crops
- Ag and Forest Residues
- Hazardous Fuel Treatments
- Short Rotation Woody Crops
- Wood Waste

Conversion Processes

- Manufacturing
- Co-firing
- Combustion
- Gasification
- Enzymatic Fermentation
- Gas/liquid Fermentation
- Acid Hydrolysis/Fermentation

USES

Fuels:

- Bio/Renewable Diesel
- Ethanol

Electricity and Heat

Biobased Products

- Composites
- Specialty Products
- New Products
- Chemicals
- Traditional Products



Why Bioenergy?

- ❑ Energy security
 - An alternative to petroleum
- ❑ Environmental impact
 - Recycling atmospheric CO₂
- ❑ Rural economic development
 - Increased crop prices, value-added processing
- ❑ Applicable globally



Southeast Biomass Resources

- 209 million acres of forestland
- 86 million acres of traditional cropland
- 120 million acres of pasture/hayland
- 8.5 million acres of CRP land
- 7.5 billion head of poultry
- 43 million head of livestock
- 151 million tons of municipal solid waste
- Many other unique biomass resources



Biomass's Competitive Advantage

- Available year round from multiple sources
- Net energy ratios are large and positive
- Can be sustainably managed & produced
- Forest products industry has technical, financial and human resource competencies to capitalize on opportunities



Biomass's Ecological Advantage

- ❑ Generally provide perennial cover
- ❑ Require less commercial fertilizer
- ❑ Reduce soil erosion and runoff
- ❑ Possible opportunity to utilize manure and poultry litter
- ❑ Cost effective way of reducing significant nutrient and sediment loads.
- ❑ Sequester carbon



Agriculture Opportunities

- **Sequestration**
 - Conservation tillage and crop rotations
 - Cover crops
 - Grazing practices
- **Avoided emissions**
 - Biofuel production
 - Thermal bio-power and bio-heat
 - Renewable electrical power
- **Emission reductions**
 - Manure management
 - Fertilizer practices

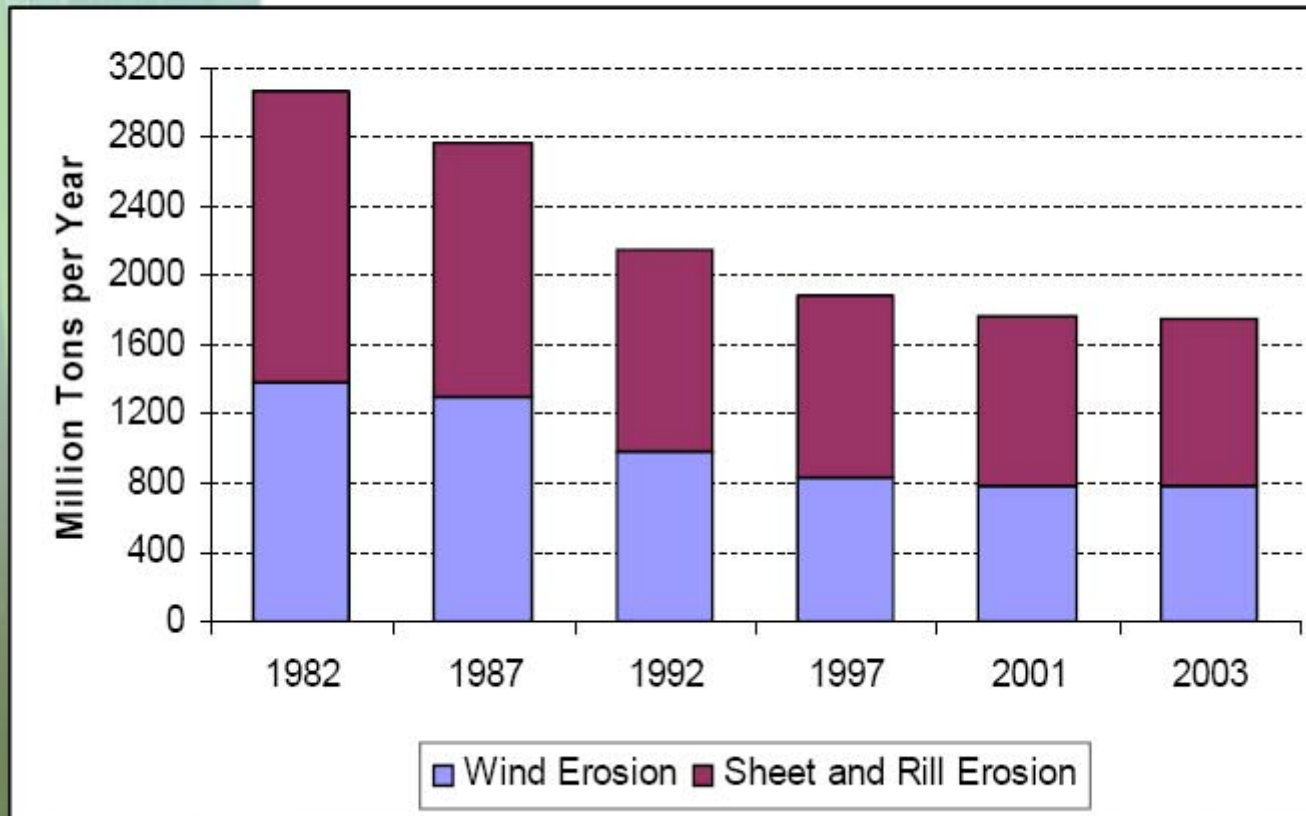


Forestry Opportunities

- **Sequestration**
 - Afforestation
 - Reforestation
 - Avoided deforestation
- **Avoided emissions**
 - Biofuel production
 - Thermal bio-power and bio-heat
 - Renewable electrical power
- **Emission reductions**
 - Forest management (fire hazard reduction)
 - Improved operational efficiency



Erosion on U.S. Cropland by Year



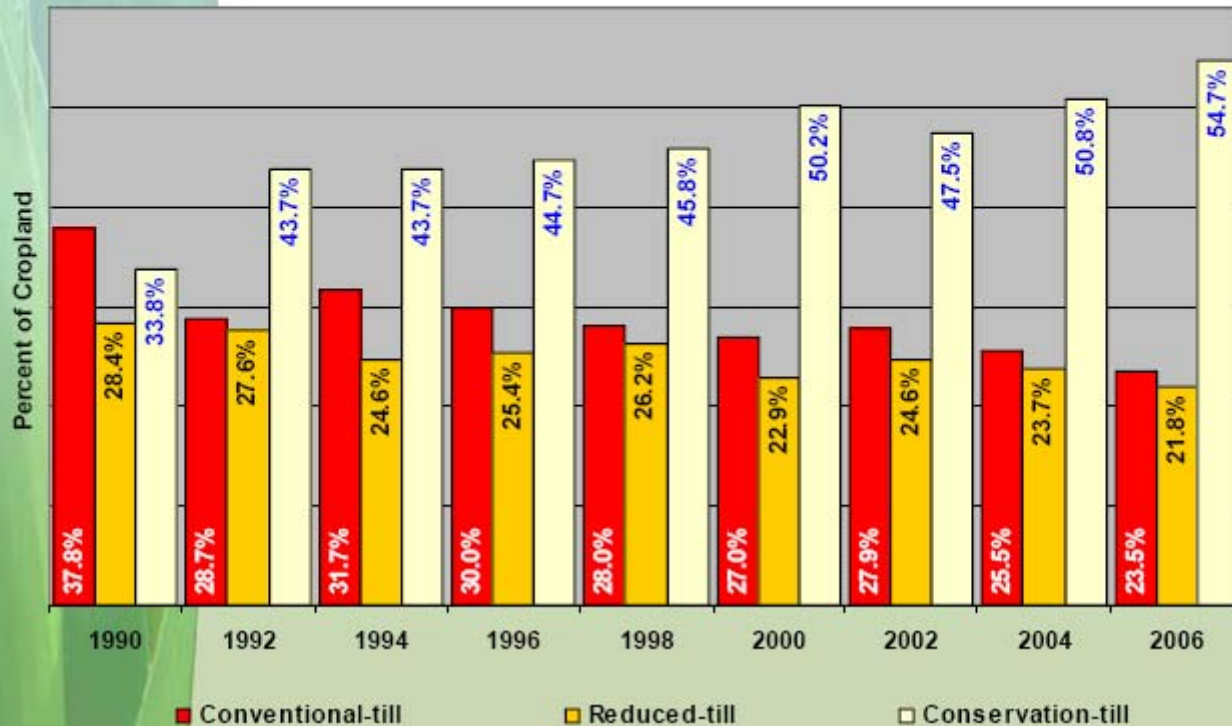
Source: NRCS, January 2007



2006 CTIC Tillage Survey – Reporting

Percent Residue Cover Management

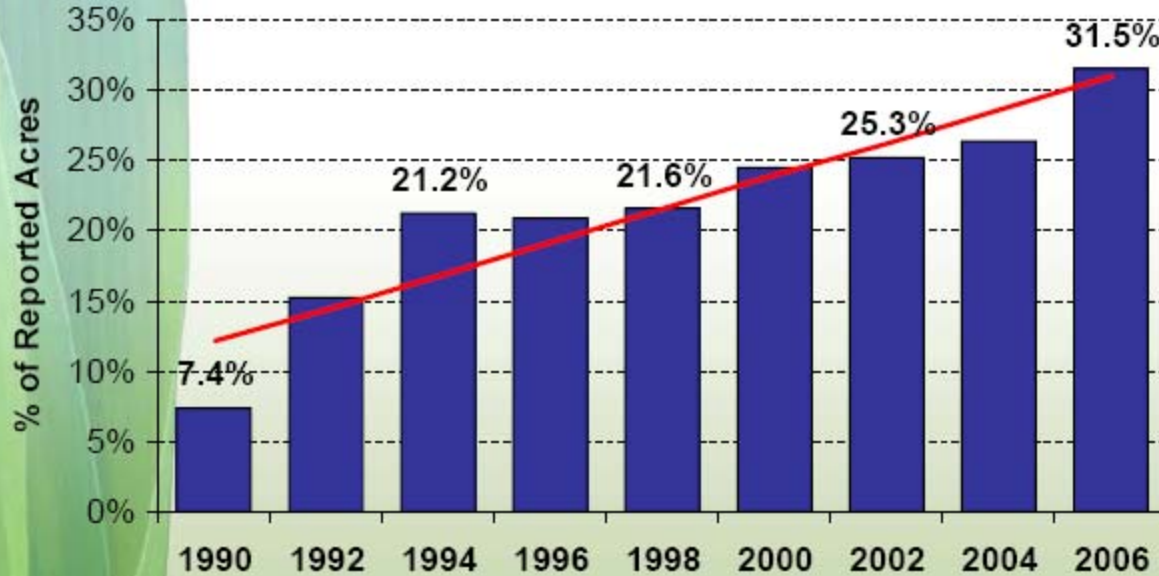
Conventional 0-15% Reduced 15-30% Conservation +30%





No-Till Trends

NO-TILL ACRES AS % OF REPORTING ACRES



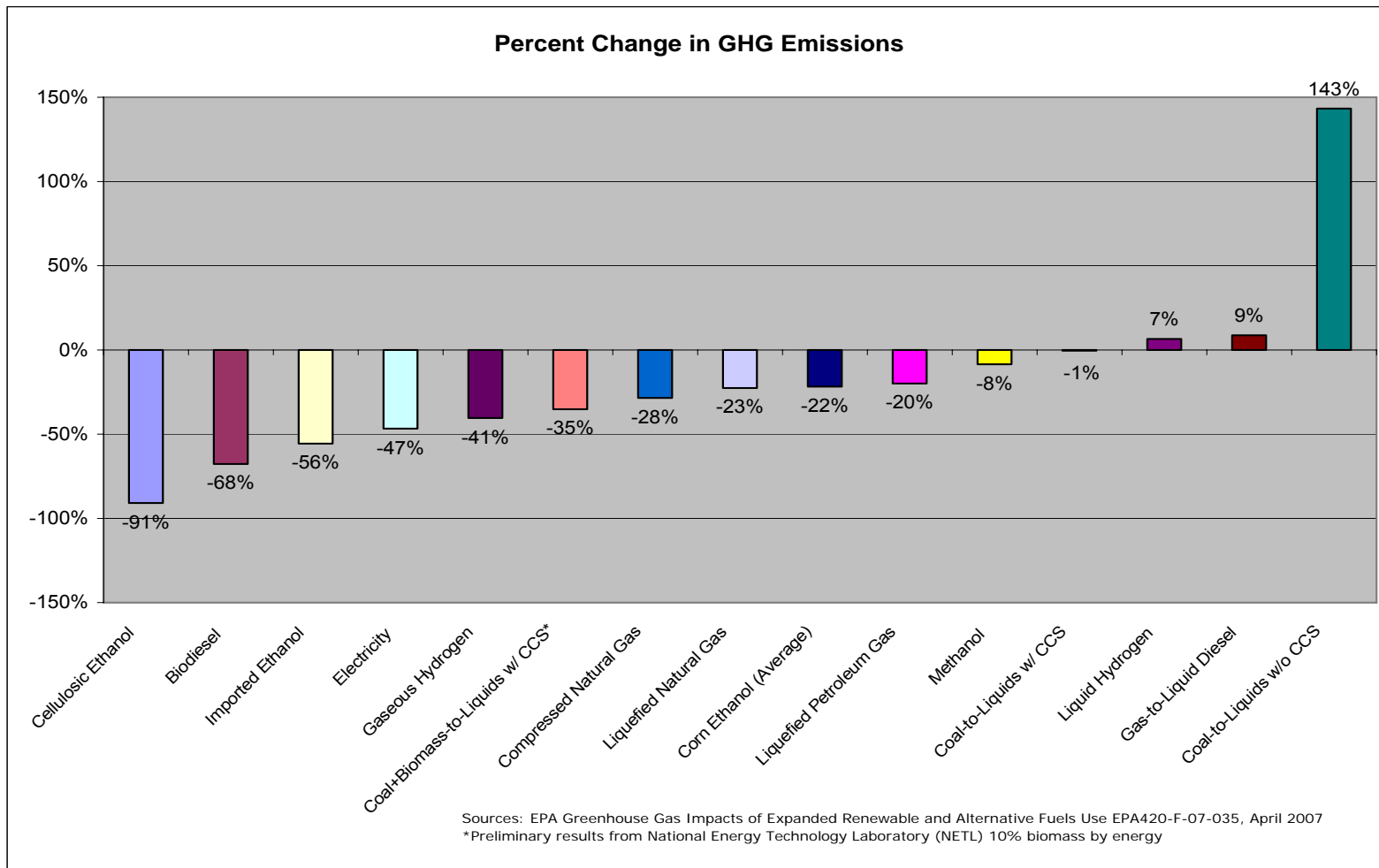
NOTE: DOES NOT INCLUDE OTHER CONSERVATION TILLAGE PRACTICES SUCH AS LOW-TILL, RIDGE-TILL, ETC.



Differentiating Between Fuels on a GHG Basis

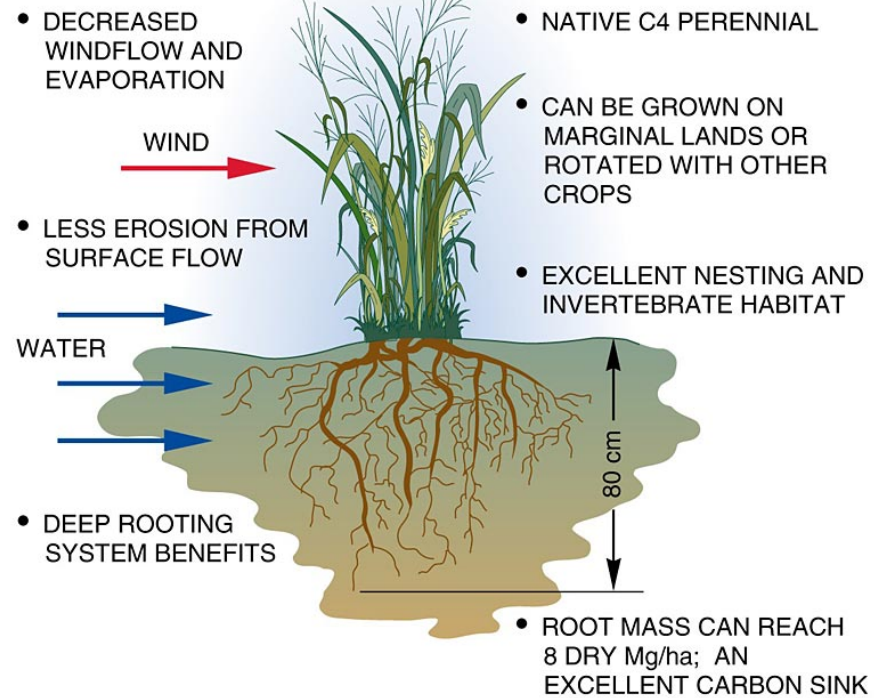
For Demonstration Purposes Only

Most values derived from RFS rule. Does not account for all inputs in LC Modeling





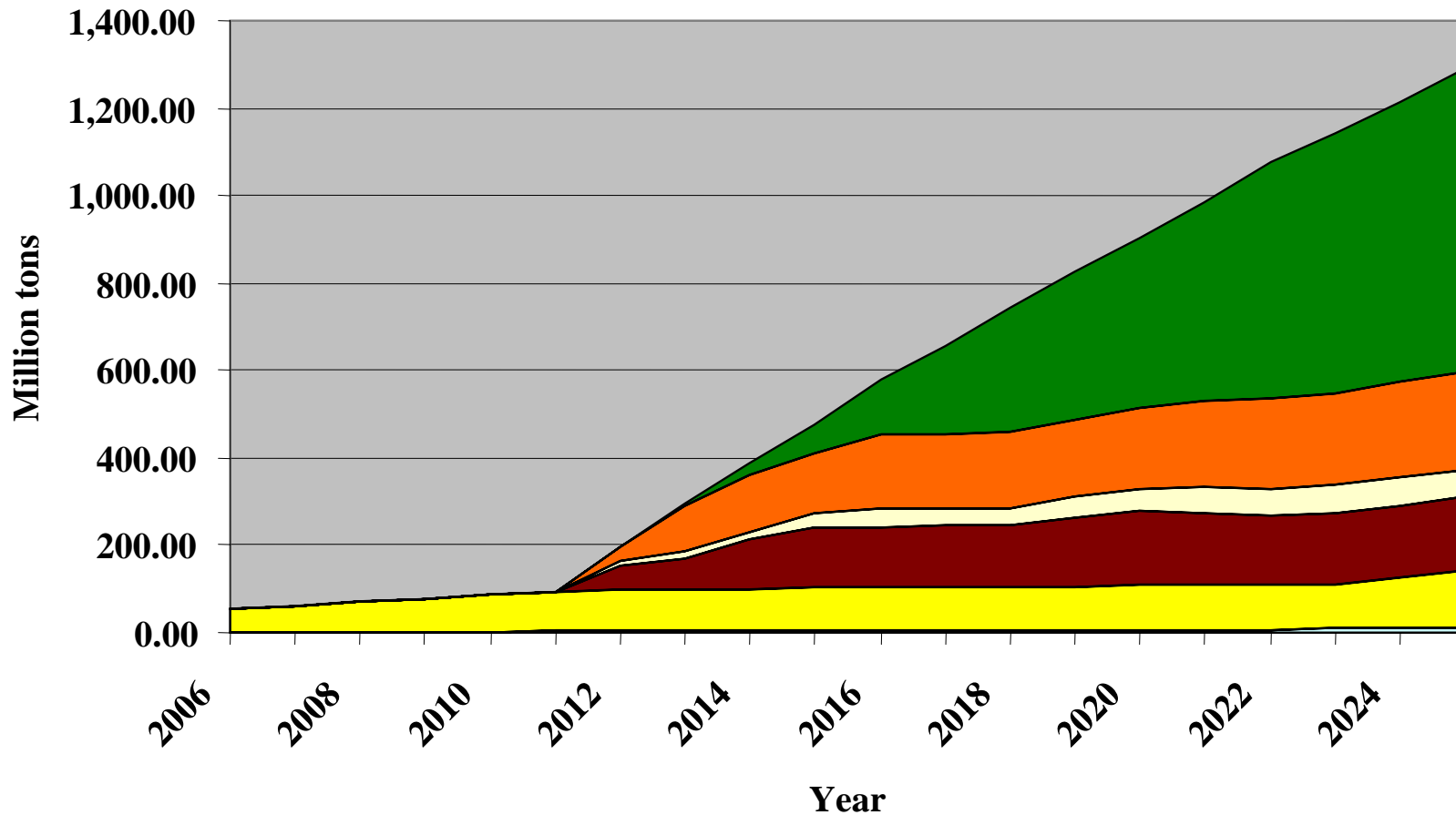
SWITCHGRASS





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Feedstocks Used to Reach 25x'25



Legend: Soybeans (light blue), Corn Grain (yellow), Wood Residue (dark red), Straw (light yellow), Stover (orange), Dedicated Energy Crops (green)



America needs a comprehensive, long-term energy plan that will:

- accelerate the production of all forms of renewable energy
- create new renewable energy markets
- deepen our commitment to conservation of natural resources, sustainability and protection of the environment



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The 25x'25 Vision:

- Is achievable
- Provides a positive impact on the national and rural economies
- Reduces our reliance on foreign oil and improves national security
- Creates important environmental benefits



Points to Remember

- We are on a path to a lower carbon energy future
- Recognize concerns of increasing production of traditional crops and energy crops
- Multiple natural resources can be managed with proper market incentives
- All sectors are well positioned to deliver energy and environmental solutions
- Let's do this right the first time; control our own destiny



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**Please join us in bringing the
vision of 25x'25 to life.**



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www.25x25.org