



**Office of the Chief Economist
Office of Energy Policy and New Uses**

USDA Feedstocks and Biofuels

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AGENDA

- **Research and Development**
- **USDA Activities**
- **Q&As**



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Complexity: Diversity of Production Environment

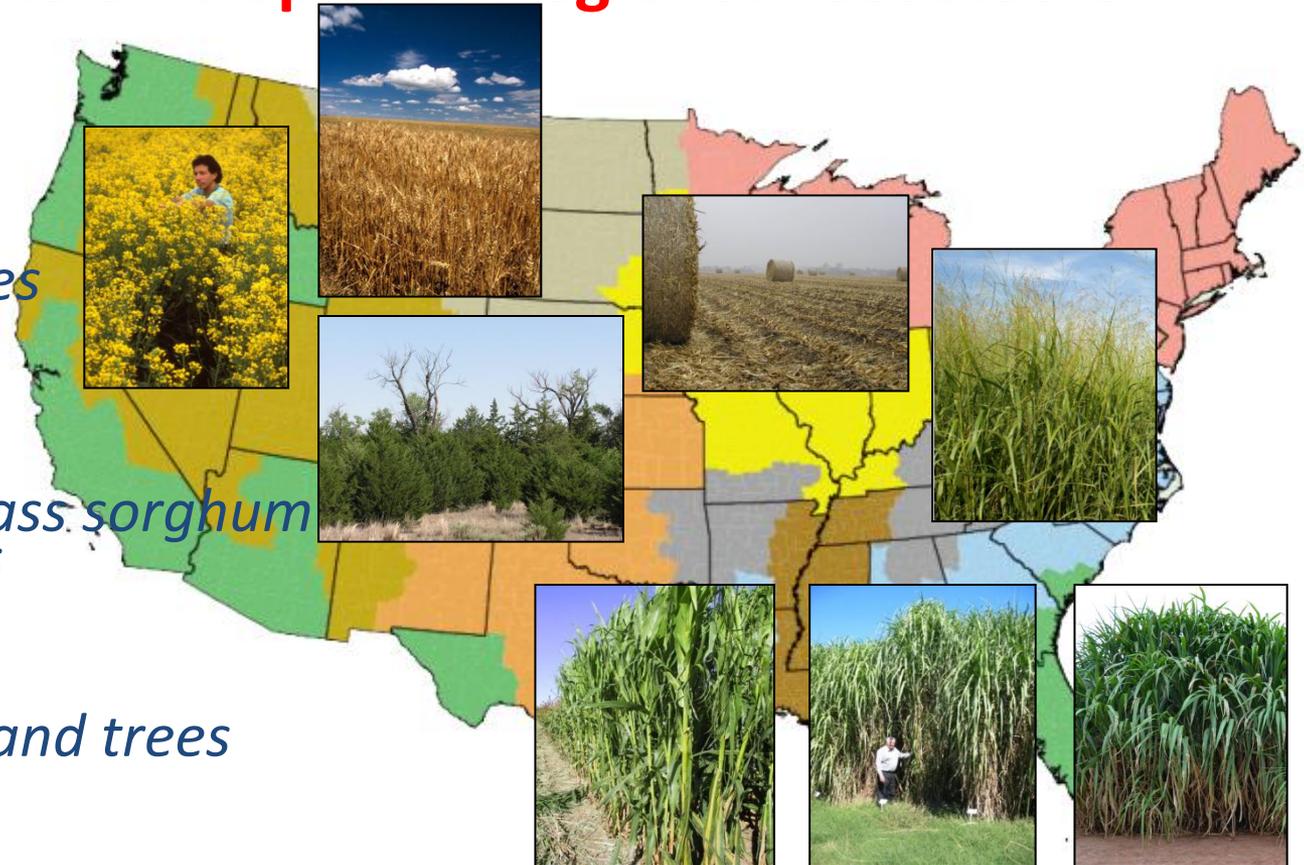




Concentrate on a Specific Regional Feedstocks

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

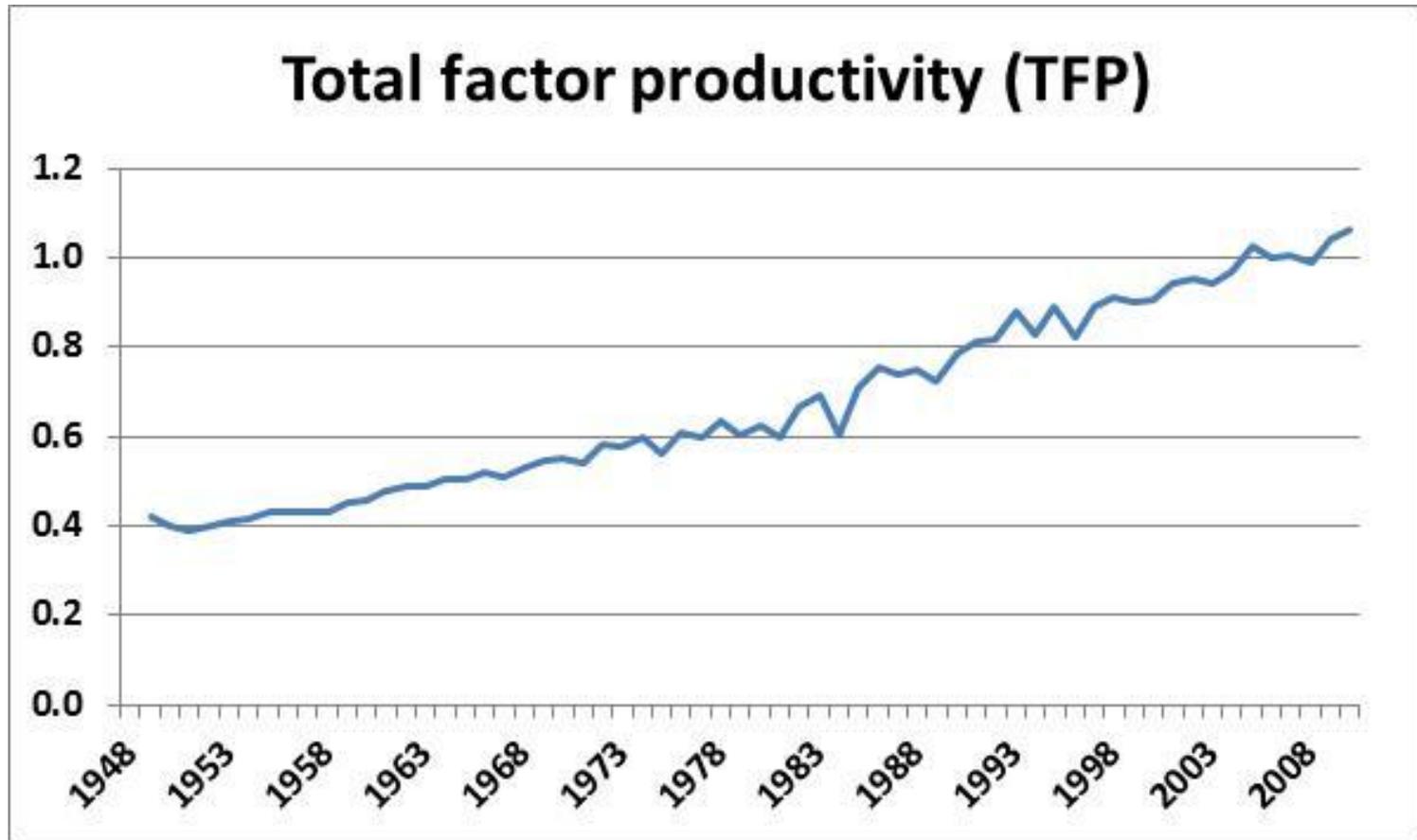
- *Invasive rangeland trees*



No one feedstock will meet all national biofuel needs



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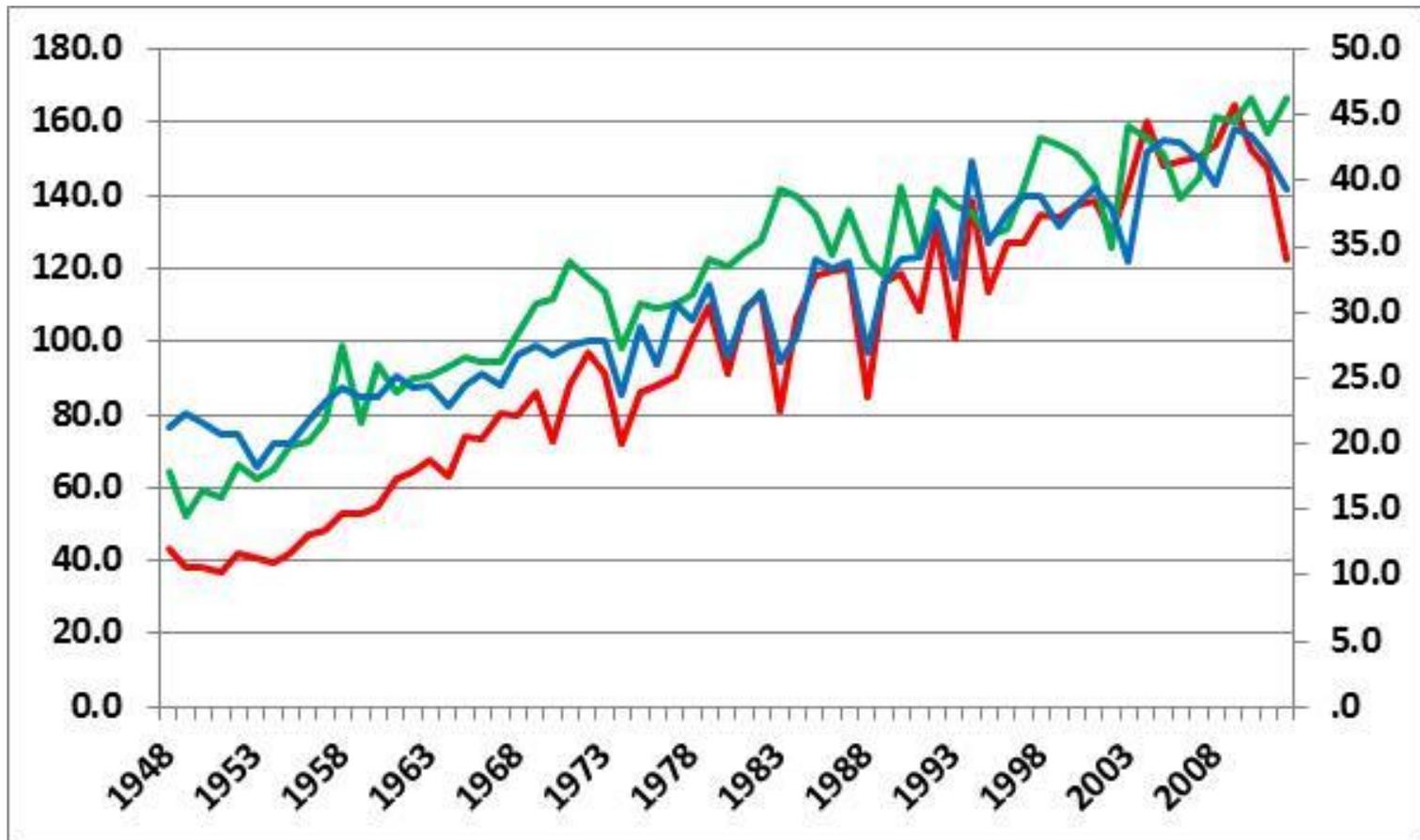


Source: USDA, Economic Research Service



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Corn, Soybeans and Wheat Yields
(Bushels Per Harvested Acre)

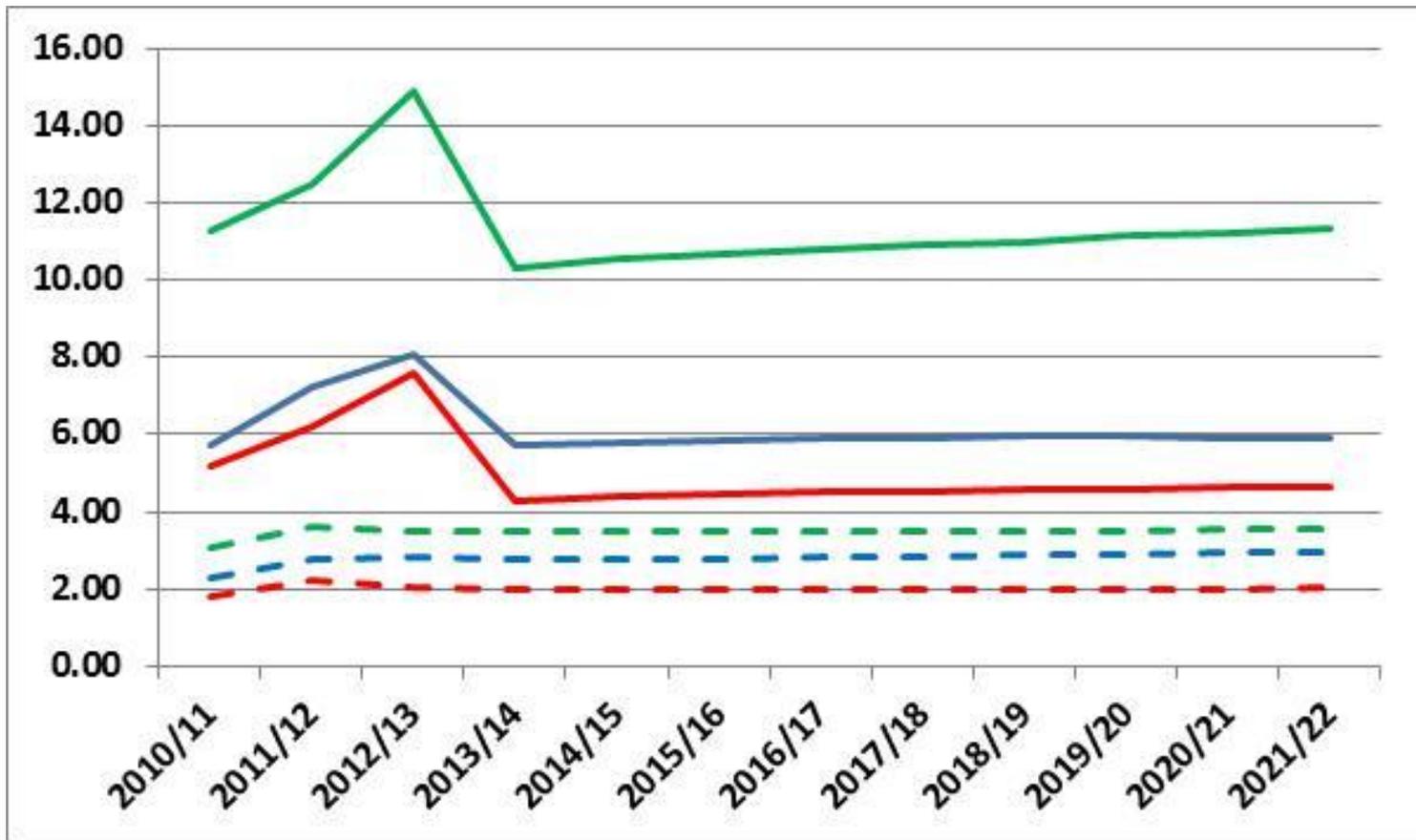


Source: USDA, Economic Research Service and National Agricultural Statistical Service



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Corn, Soybeans and Wheat Farm Price and Variable Cost of Production
(\$ Per Bushel)



Source: USDA, Baseline Tables:

<http://usda.mannlib.cornell.edu/MannUsda/viewStaticPage.do?url=http://usda01.library.cornell.edu/usda/ers/94005/.2012/index.html>

Feedstock Readiness Levels (FSRL) and Activities

Technology Readiness	Feedstock Readiness	FSRL Components with Tollgates			
		Production	Market	Policy	Package
1	Basic Principles	Preliminary Evaluation			
2	Concept Formulated				

Commercialization

Feedstocks integrated with other supply chain components



Feedstock Development



Feedstock Production



Feedstock Logistics



Feedstock Processing



Biofuels Conversion



Fuel Testing & Approval



Large Scale Deployment

7	Feedstock Availability	Commercial Deployment			
8	Commercialization				
9	Commercially Established				

Integrates



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FEEDSTOCK READINESS LEVEL (FSRL) TOOL										
Feed Readiness Level (FRL)				Feedstock Readiness Level (FSRL)						
FRL Scale	Description	Feed Testing and Certification	Yield/Use	Activity	Scale	Description	(1) Production	(2) Market	(3) Policy - Program Support and Regulatory Compliance	(4) Linkage to Conversion Process
1	Basic Principles	Feedstock and process being produced identified	Feedstock and process being produced identified	Feedstock Readiness Evaluation	1.1	Basic Principles	Identify potential feedstocks for a specific conversion technology	Identify current feedstock producers, feedstocks and equipment used, and needs	Identify regulatory requirements to producing a new feedstock	Identify potential regulatory requirements to address feedstock
					1.2	Address likely range of production, environmental, and regulatory feed uses	Address feedstock market alternatives	Address feedstock for conversion with regulatory requirements for State production authorization		
2	Concept Feedstock	Feedstock and conversion process identified	Feedstock and conversion process identified	Feedstock Readiness Evaluation	2.1	Concept Feedstock	Identify production system components	Identify potential regulatory requirements	Address production regulatory or utility requirements	Test feedstock quality to determine
					2.2	Develop value-chain budget for potential feedstock	Identify specific demand requirements	Formulate a plan including how production to address regulatory requirements		
					2.3	Identify possible environmental or regulatory feedstock alternatives, including production, collection, and storage requirements	Identify relevant market, production, collection, and storage requirements	Develop a plan with feedstock production/regulatory requirements		
					2.4	Address available genetic resources for feedstock plant	Address feedstock production uses	Address potential for genetic resources of the feedstock feedstock	Test feedstock to determine process of the feedstock feedstock	
3	Proof of Concept	Feedstock and conversion process identified	Feedstock and conversion process identified	Feedstock Readiness Evaluation	3.1	Proof of Concept	Address available genetic resources for feedstock plant	Address current and alternative feedstock sources for establishing a feedstock source - feasibility study	Formulate a plan to address critical resources	Test feedstock to determine process of the feedstock feedstock
					3.2	Address available genetic resources for feedstock plant	Address current and alternative feedstock sources for establishing a feedstock source - feasibility study	Formulate a plan to address critical resources		
4.1	Preliminary Feedstock Evaluation	Feedstock and conversion process identified	Feedstock and conversion process identified	Feedstock Readiness Evaluation	4.1	Preliminary Feedstock Evaluation	Address environmental regulatory feedstock which is used for conversion and feedstock production to feedstock feedstock to meet supply	Address feedstock for conversion with regulatory requirements for State production authorization	Identify Federal, state, or other regulatory requirements	Performance evaluation for feedstock through a conversion process
					4.2	Compare performance of feedstock feedstock with alternative feedstock options	Identify specific alternative feedstock production and collection alternatives and feed production	Address conversion process to address regulatory requirements	Address conversion process to address regulatory requirements	
					4.3	Implement regulatory/alternative feedstock program to establish feedstock production	Address alternative feedstock program to establish feedstock production	Seek NREU (RIS or RIR) and other regulatory permitting demands	Compare production and alternative performance evaluation	
4.2	Preliminary Feedstock Evaluation	Feedstock and conversion process identified	Feedstock and conversion process identified	Feedstock Readiness Evaluation	4.4	Laboratory production development	Address range of utilization for feedstock and identify production alternatives	Develop and refine feedstock production alternatives	NREU documents, conversion plan, and other regulatory permit applications submitted	Feedstock testing
					4.5	Process feedstock	Conduct on-line, full-scale production demonstration	Address feedstock market potential for feedstock and regulatory	NREU documents, conversion plan, and other regulatory permit applications submitted	
					4.6	Availability of production infrastructure	Address permit budget and other costs	Address feedstock market and other costs	Address feedstock market and other costs	
					4.7	Other plant capacity needed	Address feedstock market and other costs	Address feedstock market and other costs	Address feedstock market and other costs	
4.3	Preliminary Feedstock Evaluation	Feedstock and conversion process identified	Feedstock and conversion process identified	Feedstock Readiness Evaluation	4.8	Full-Scale Production Evaluation	Address conversion process to establish feedstock production	Address feedstock for conversion with regulatory requirements for State production authorization	Address conversion process to establish feedstock production	Performance evaluation for feedstock through a conversion process
					4.9	Address conversion process to establish feedstock production	Address feedstock for conversion with regulatory requirements for State production authorization	Address conversion process to establish feedstock production		
					4.10	Address conversion process to establish feedstock production	Address feedstock for conversion with regulatory requirements for State production authorization	Address conversion process to establish feedstock production		
					4.11	Address conversion process to establish feedstock production	Address feedstock for conversion with regulatory requirements for State production authorization	Address conversion process to establish feedstock production		
7	Feedstock Readiness Evaluation	Feedstock and conversion process identified	Feedstock and conversion process identified	Feedstock Readiness Evaluation	7	Feedstock Readiness Evaluation	Address conversion process to establish feedstock production	Address feedstock for conversion with regulatory requirements for State production authorization	Address conversion process to establish feedstock production	Performance evaluation for feedstock through a conversion process
					8	Conversion Evaluation	Address conversion process to establish feedstock production	Address feedstock for conversion with regulatory requirements for State production authorization	Address conversion process to establish feedstock production	
8	Production Capacity Evaluation	Feedstock and conversion process identified	Feedstock and conversion process identified	Feedstock Readiness Evaluation	8	Production Capacity Evaluation	Address conversion process to establish feedstock production	Address feedstock for conversion with regulatory requirements for State production authorization	Address conversion process to establish feedstock production	Performance evaluation for feedstock through a conversion process



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THANK YOU