

Sustainability Thrust 10-minutes Report

**Armen R. Kemanian
NEWBio Annual Meeting 2013**



Interdisciplinary collaboration for bridging scales

Address system's emerging properties

(4.4) Multi-Criteria System Assessment

Regional scenarios

LCA, market and non-market ecosystem services, landscape scale biodiversity, assess tradeoff among ecosystem services and profit

(4.3) Regional feedstock supply and Environmental Assessment

Regional scenarios

County level, use models to determine bioenergy crops effect on soil (erosion, carbon), air quality, and water quality, and landscape biodiversity

(4.2) Modular scenario definition

Components of regional scenarios

Soil (mineland, marginal soils), weather, bioenergy crop (willow, switchgrass, miscanthus), cover crop, fertilizer, other practices

(4.1) Knowledge gaps

Disciplinary questions

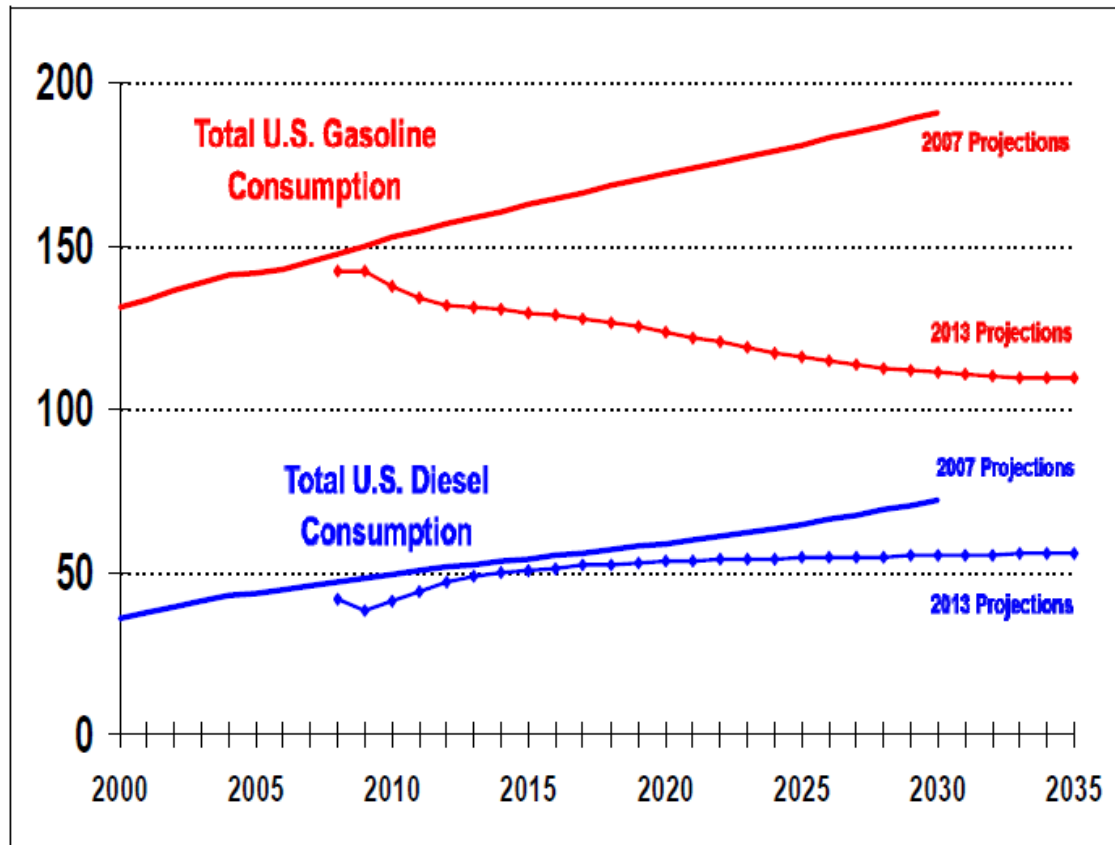
Carbon balance, nitrogen cycling in willow, switchgrass and miscanthus, adaptation to soils with limitations (many), polycultures

What's new?

Renewable Fuel Standard (RFS): Overview and Issues

Figure 6. EIA Long-Term Projections of U.S. National Transportation Fuel Use

Billion gallons



Source: DOE, EIA, *Annual Energy Review 2007* and *Annual Energy Review 2013*,

How are we doing?

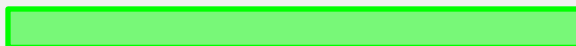


- ❑ Knowledge “Gaps”
- ❑ Scenario development
- ❑ Regional scenarios
- ❑ Integrated assessment



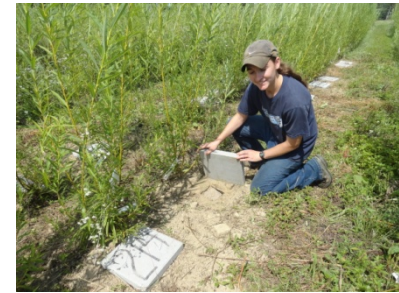
Model	_nInfo_levYear	Grain_yi	Above-	Above-	Max_LAI	AnthesisMaturity	Cumulati	Cumulati	Total_ab	Total_abGr		
CropS	low	2005	9.175	na	17.386	4.790	178	220	0.000	0.0	117.8	256.6
CropS	low	2006	8.609	na	16.304	4.603	181	218	0.000	0.0	102.0	238.0
CropS	low	2007	10.372	na	19.517	4.616	181	231	0.000	14.8	91.3	278.9
CropS	low	2008	11.301	na	21.393	5.231	184	232	0.000	17.3	106.2	299.3
CropS	low	2009	10.791	na	20.411	5.162	184	229	0.000	20.3	111.7	289.5
CropS	low	2010	9.331	na	17.606	4.597	184	226	0.000	0.0	100.4	257.2

- Knowledge “Gaps”
- Scenario development
- Regional scenarios
- Integrated assessment
- Data management
- Sustainability Matrix
- Interaction with Thrusts



Knowledge gaps

- ❑ Carbon: soil sampling (WV, PSU, NY) and eddy covariance system ongoing, more to go.
- ❑ Nitrogen: ^{15}N fertilizer trial installed; one more next year
- ❑ Nitrogen modeling: theory and sampling ongoing for grasses
- ❑ Nitrous oxide – Cornell and PSU (what a year)



- ❑ Simulation model
 - ❑ Model operational
 - ❑ Runs slightly delayed and so are deliverables
 - ❑ Climate: Daymet / NASA Power

- ❑ Management for each crop known, but not explicit in a file

- ❑ Marginal land: Cornell (Brian), PSU (Wei, Mike)

Regional Scenarios

- ❑ On task, most important issue:
- ❑ Need to report on air quality (Woodbury, Yanosky)
- ❑ One VOC monitoring attempt at PSU
- ❑ How important are VOCs is uncertain; issue not going away



- ❑ Work on deliverable matrix and teams associated to each deliverable
- ❑ Identify obstacles within and outside NEWBio that may delay reaching goals
- ❑ Need to define strategy to handle failures

- ❑ Re-focus energy on integration with other thrust to have a cohesive Integrated Assessment in the future
- ❑ Inclusion of EPA role through RINs and other regulation should be highlighted.