



# FOOD ENERGY WATER NEXUS WORKSHOP

## *Welcome!*

## FEW: A Sustainable Rural Framework for the Upper Great Plains

*Thank you to our sponsors:*





## *FEW Planning Committee*

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## *Upper Great Plains*

- Net exporter of FEW

South Dakota: Soybeans, wheat, corn, beef **\$3.8B** ag exports

North Dakota: Wheat, soybeans, corn **\$4.1B** ag exports

- Many competing nexus challenges – Bakken oil boom, ethanol production, coal mining, uranium mining, wind farms, hydroelectric
- With these exports, achieving global system sustainability **must start at the source**: the Upper Great Plains.



## *Goals of the Workshop*

1. Exchange new ideas for FEW
2. **Cross-pollinate** → establish new and strengthen existing collaborations amongst our groups.
3. Prepare teams in advance to pursue new NSF and other (DOE, USDA, USAID, and other) FEW-related funding opportunities
4. Provide guidance (**white paper**) to NSF for future FEW funding initiatives (INFEWS, many others)



## *FEW Nexus Definitions*

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- **Water:** Water system that supplies water for human use, whether for drinking, irrigation, industry, collects and conveys wastewater and stormwater, and treats wastewater to protect public and ecological health
- **Energy:** Includes everything it takes to generate and distribute electricity and fuels
- **Food:** All activities, resources, people involved with bringing food from the farm to table



## *FEW Nexus Challenges*

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- **Nexus Framework:** only efficient when **strong linkages** between the FEW sectors exist.
- **Nexus Approach:** seeks to look at all three FEW elements as an **interrelated** system. Need inter-connected reciprocal interactions between all FEW sectors
- For this framework – what are the **tools/data, technology innovations, institutions, resilience, tradeoffs/feedbacks**



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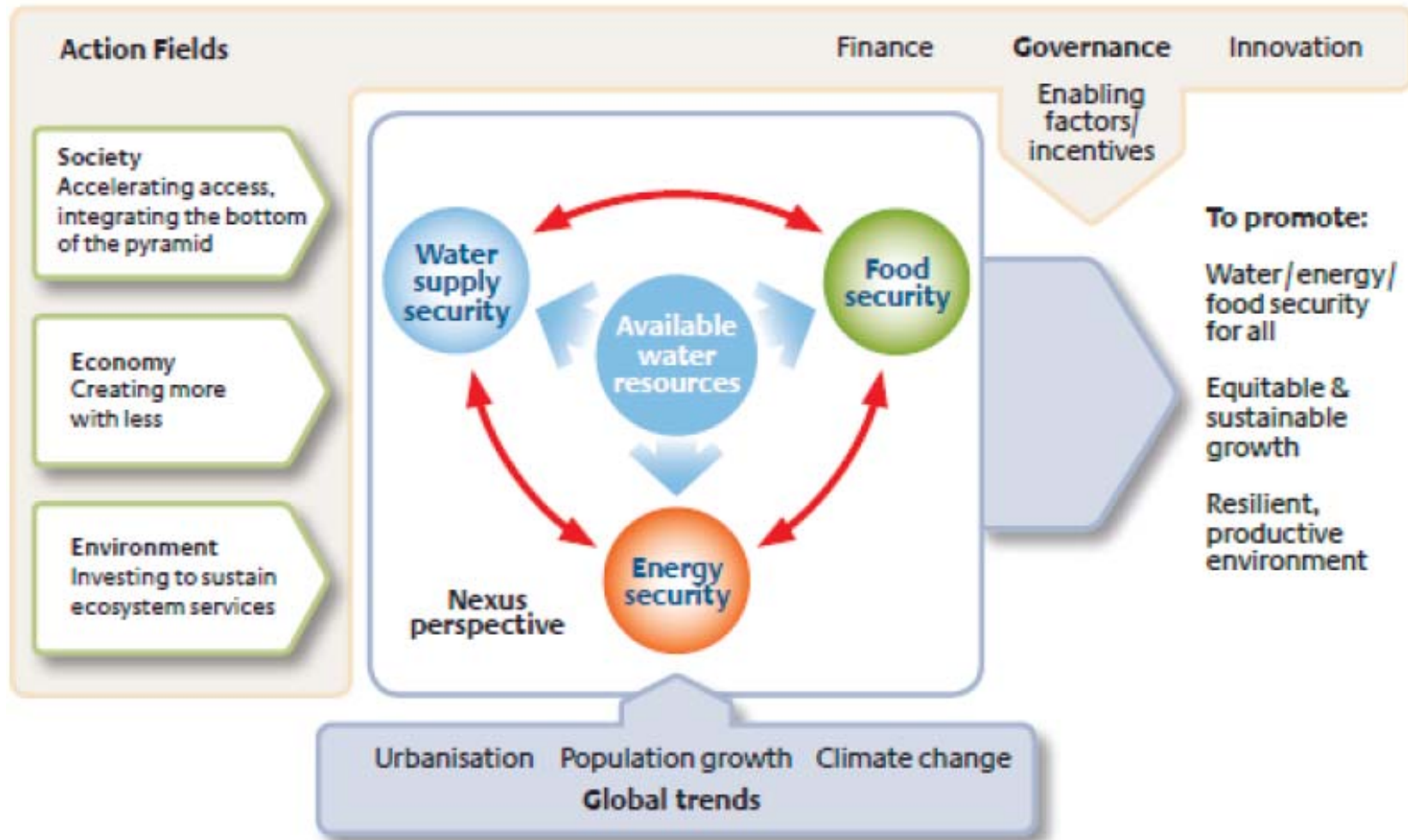
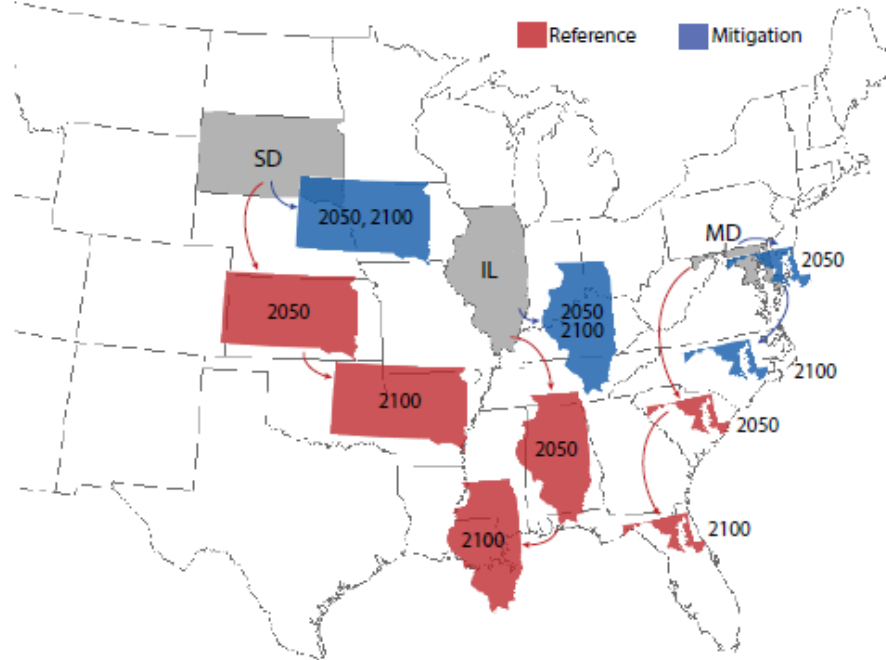


Image taken from: DOE, 2014. The water-energy nexus: Challenges and Opportunities  
Report available at: <http://energy.gov/downloads/water-energy-nexus-challenges-and-opportunities>



**Figure 3. Change in Summertime Temperatures for Select States with and without Global GHG Mitigation**

The map compares mean summertime (June, July, and August) temperature in South Dakota, Illinois, and Maryland in 2050 and 2100 under the Reference and Mitigation scenarios to states with similar present-day temperatures. For example, the projected mean summertime temperature in Illinois in 2100 under the Reference scenario (83°F) is projected to be analogous to the mean summertime temperature in Louisiana from 1980-2009 (81°F). In other words, without global GHG mitigation, Illinois summers by 2100 are projected to “feel like” present-day Louisiana summers. The maps are not perfect representations of projected climate, as other factors such as humidity are not included, but they do provide a way of visualizing the magnitude of possible changes in the summertime conditions of the future.



## Climate Change Seasonal Temperatures

- Even with GHG Mitigation, South Dakota ‘will feel like’ Iowa
- Without mitigation, South Dakota ‘will feel like’ Arkansas

Image taken from: US EPA, 2015. Climate change in the United States: Benefits of Global Action, p.13 (CIRA Report)

Model does NOT account for agricultural management changes or biofuel introduction ... these assumptions could change model results.

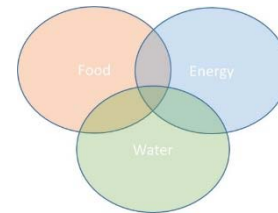




## *Plan for Monday – Day 1*

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- **NSF, universities, overview**
- **Energy Session + panel discussions**  
DOE NETL, Agrisoma, ADM
- **Water Session + panel discussions**  
US ACE, Kiksapa Consulting, USGS/EROS
- **White paper breakout groups**  
Focusing on FEW ‘intersections’
- **Poster Session**





## *Plan for Tuesday – Day 2*

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- **Identifying fundamental problems**
- **Food session + panel discussions**  
MIT, Argonne NL, NDSU
- **Nexus session + panel discussions**  
SDSU, Oak Ridge NL
- **White paper breakout groups**  
Focusing on NSF recommendations and team building



## *Suggestions*

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1. For NSF – **think big!** Look at what you can't do, and seek out people who can
2. What are the FEW game changers. No magic pill exists (that I'm aware of).
3. Think about the challenges and tools needed to create, solve, attack FEW
4. Network