

**TEXAS A&M**  
UNIVERSITY®



**Water-Energy-Food**  
**Nexus Initiative**  
Launch

Information E- Booklet

October 8, 2015

**The WEF Nexus Initiative is supported by:**

- Texas A&M University System, Office of the Vice Chancellor for Research
- Texas A&M University, Office of the Vice President for Research
- College of Engineering & Engineering and Experiment Stations (TEES)
- College of Agriculture & Life Sciences, AgriLife Research
- Bush School of Government and Public Service
- College of Geosciences

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## **I. Background**

The WEF Nexus Initiative received seed support from the Texas A&M University System Office of the Vice Chancellor for Research, the Texas A&M University Office of the Vice President for Research, and the Offices of the Deans of the Colleges of Agriculture, Engineering, Geosciences and the Bush School of Government and Public Service. In this launch event, we seek to engage the water for energy, water for food, food for energy, big data, and systems and modeling communities. Each of these interface with the water-food-energy nexus and become part of the nexus community of practice within the Texas A&M System.

The WEF Nexus Initiative will leverage past efforts, existing capabilities, university knowledge, and future potential to identify and assess feasible implementation mechanisms to achieve water-energy-food (WEF) security through complex, integrated resource management. It will seek to create an improved evaluation basis that supports sound decision making, policy formation and planning through an integrated systems platform that facilitates and links the WEF complex. It is intended to raise awareness in academe, society, government, and industry of the need for simultaneous consideration of decisions on water, energy and food in a changing world. This initiative will identify and respond to local, regional, national and global WEF challenges, providing the data, analytical tools, and scientific knowledge that will lead to a better understanding of the WEF Resource interfaces. This in turn will help policy makers plan effectively to address the anticipated shortfalls in these primary resources in a non-stationary world. This effort also will contribute to a better understanding of the full life-cycle footprint of food, water and energy resources, their products and services.

This initiative will build on ongoing, successful partnerships, regionally and nationally, in an effort to develop and implement new projects whose long term goal is enhancing these primary resources' security and sustainability. These outcomes are intended to develop a plan to upscale local outcomes for enhanced national and global security.

This workshop will include breakout sessions during which we expect to expand the intellectual capacity and scope of the TAMUS WEF nexus effort. We will also advance the analytics effort by identifying capabilities, gaps in needed areas and creating a broad nexus community of practice across TAMUS. It is intended that the outcomes of the one day workshop will generate specific projects and scientific groups that will produce concepts, with seed funding potential, that will help make Texas A&M more competitive in the nexus field and better prepared for the upcoming NSF, DoE, USDA and other agencies' nexus RFPs by identifying nexus research topics and effective working groups. Each topic will include champions who will coordinate larger efforts to identify potential sources for seed funding.

## II. Program

The workshop will take place on **October 8, 2015** workshop, in the **Memorial Student Center #2406 MSC** from **8:00-1:30**. This is the first step in engaging the wide range of TAMUS expertise on which to synergize. The agenda includes:

- 8:00-8:30 Coffee & Sign in
- 8:30-8:35 Welcome
- 8:35-9:00 TAMU Leadership Panel, Moderated by Ben Zoghi
- 9:00 – 9:30 Nexus Initiative Overview and workshop outcomes
- 9:30- 11:30 Breakout sessions & Moderators
  - 1) Energy – Water: Christodoulos Floudas
  - 2) Water – Food: Arnold Vedlitz & Ron Lacewell
  - 3) Food – Energy: Elsa Murano
  - 4) Data and Analytics: Jack Baldauf
  - 5) Resource allocation / management / trade-offs: Bruce McCarl
- 11:30-12:30 Summary and conclusions
- 12:30-1:30 Lunch

## III. Breakout Sessions

### Session 1: Energy–Water

technologies and practices leading to low carbon water generation and low water footprint energy systems

### Session 2: Water–Food

technologies and practices to increase water productivity in food systems, cropping systems management. Eco-system implications of food and water management

### Session3: Food-Energy

bio-fuel systems: processing, human & eco-system impact; energy for rural agriculture

### Session 4: Data and Analytics

nexus tools, big data, multi-scale systems, systems analysis, processes and systems modeling

### Session5: Resource allocation/Management/Trade-offs

resource allocation among multiple stakeholders with increasing demands

## IV. Suggested Reading Material

### Session 1: Energy–Water

- [Darwish, M.A, R.H. Mohtar, M. Chmeissani and Y. El-gendy \(2012\) \*\*Desalting seawater in Qatar by renewable energy\*\*, \*Desalination and Water Treatment\*. 47: 279-294.](#)
- [Darwish, M.A. & Rabi Mohtar \(2012\) \*\*Qatar water challenges\*\*, \*Desalination and Water Treatment\*, DOI:10.1080/19443994.2012.693582.](#)

### Session 2: Water–Food

- [Mohtar, Rabi H. \(2015\) \*\*Ven Te Chow Memorial Lecture: Localizing water and food security\*\*, \*Water International\*, Vol. 40, No. 4, 559–567, <http://dx.doi.org/10.1080/02508060.2015.1084209>](#)

### Session 3: Food-Energy

- [IRENA \(2015\), 'Renewable Energy in the Water, Energy & Food Nexus'](#).

### Session 4: Data and Analytics

- [Bassel T. Daher & Rabi H. Mohtar \(2015\) \*\*Water–energy–food \(WEF\) Nexus Tool 2.0: guiding integrative resource planning and decision-making\*\*, \*Water International\*, DOI:10.1080/02508060.2015.1074148](#)
- SEI (2014). **Water evaluation and planning**. Tool found on: <http://www.weap21.org/index.asp?action=200>
- **The Global Calculator** <http://uncached-site.globalcalculator.org/>
- FAO (2013). **An innovative accounting framework for the food-energy-water nexus** Retrieved from <http://www.fao.org/docrep/019/i3468e/i3468e.pdf>
- KTH (2013). **CLEWs – climate, land, energy and water strategies to navigate the nexus**. Last accessed on July 2, 2014. Retrieved from <http://www.kth.se/en/itm/inst/energiteknik/forskning/desa/researchareas/clews-climate-land-energy-and-water-strategies-to-navigate-the-nexus-1.432255>
- SEI (2013). Long range energy alternatives planning system. Tool found on: <http://sei-us.org/software/leap>
- (FAO, 2014) **Walking the Nexus Talk: Assessing the Water-Energy-Food Nexus** <http://www.fao.org/3/a-i3959e.pdf>

### Session 5: Resource allocation/Management/Trade-offs

- [Mohtar, R.H. & Daher, B. \(2014\): \*\*A Platform for Trade-off Analysis and Resource Allocation: The Water-Energy-Food Nexus Tool and its Application to Qatar's Food Security\*\* \[part of the 'Valuing Vital Resources in the Gulf' Series\], Chatham House.](#)
- [Rabi H. Mohtar, Bassel T. Daher \(2012\) \*\*Water, energy, and food: The Ultimate Nexus\*\* Encyclopedia of Agricultural, Food, and Biological Engineering, Second Edition. DOI: 10.1081/E-EAFE2-120048376](#)

## V. WEF Nexus Funding Opportunities Overview

**Table 1. Agriculture and Natural Resources Sciences in the FY 2016 Budget**  
(budget authority in millions of dollars)

	FY 2014	FY 2015	FY 2016	Change FY 15-16	
	Actual	Estimate	Budget	Amount	Percent
<b>US Dept of Agriculture Budgets</b>					
Natl Institute of Food and Agr (NIFA)	1282	1295	1508	213	16.4%
<i>Agriculture and Food Research Init (AFRI)</i>	316	325	450	125	38.5%
Agricultural Research Service (ARS)	1122	1178	1397	219	18.6%
Economic Research Service (ERS)	78	85	86	1	1.2%
Forest Service R&D	300	301	297	-4	-1.3%
<b>NSF</b>					
Innovations at the Nexus of Food, Energy, and Water Systems (INFEWS)	--	--	75	75	--
Integrative Organismal Systems (IOS)	215	214	215	1	0.5%
<b>Dept of Energy, Office of Science</b>					
Biological & Environmental Research (BER)	594	592	612	20	3.4%
Energy-Water	--	--	12	12	--
<b>U.S. Geological Survey (USGS)</b>					
Water Resources	118	122	128	7	5.7%
<b>U.S. Agency for International Development (USAID)</b>					
Feed the Future	--	1000	978	-22	2.2%

Source: Agency budget justifications and other budget documents.

All figures rounded to the nearest million. Changes calculated from unrounded figures.

More on: <http://www.aaas.org/fy16budget/agriculture-and-natural-resources-fy-2016-budget>



## National Science Foundation

- [Dear Colleague Letter: SEES: Interactions of Food Systems with Water and Energy Systems](#)
- [Dear Colleague Letter: FY 2016 Innovations at the Nexus of Food, Energy and Water Systems \(INFEWS\) Funding Opportunity on Nitrogen, Phosphorus, and Water](#)
- [Innovations at the nexus of food, energy, and water systems \(INFEWS\) \(\\$74,960,000\)](#)
- Science & Technology Centers (STC)
- Engineering Research Centers (ERC)
  
- Funded 17 WEF Nexus Workshops in 2015
  1. [Food, Energy and Water Nexus in Sustainable Cities](#)
  2. [Technology and Information Fusion Needs to Address the Food, Energy, Water Systems \(FEWS\) Nexus Challenges](#)
  3. [Toward Food, Energy and Water Security in California under Changing Conditions: the Nexus Perspective](#)
  4. [Workshop to explore the nexus between food, energy and water in a large international river system](#)
  5. [Workshop on Migration, Climate Change and the Resilience of Regional Food, Water, and Energy Systems](#)
  6. [Coupling Economic Models with Agronomic, Hydrologic, and Bioenergy Models for Sustainable Food, Energy, and Water Systems](#)
  7. [Workshop to Identify Opportunities and Challenges for Nanotechnology to Optimize and Unify Food, Energy and Water Systems](#)
  8. [Planned Migration as a Strategy to Sustain Agricultural Production](#)
  9. [Development and Application of Analytical Tools in Support of Food-Energy-Water Nexus Planning](#)
  10. ["Scaling Up" Urban Agriculture to Mitigate Food-Energy-Water Impacts](#)
  11. [Closing the Human Phosphorus Cycle](#)
  12. [Developing Intelligent Food, Energy, and Water Systems \(DIFEWS\)](#)
  13. [Water- and Energy-efficient Food Production: Solutions for America's Bread Basket](#)
  14. [Food-Energy-Water infrastructure systems, engineering solutions and institutions](#)
  15. [Food-Energy-Water Nexus Workshop to Develop System Approaches and Sustainability Metrics for Evaluation](#)
  16. [A Workshop to identify interdisciplinary Data Science approaches and challenges to enhance understanding of Interactions of Food Systems and Water Systems](#)
  17. [A sustainable rural framework workshop for the upper Great Plains](#)



## Department of Energy

- Meetings with Sec Moniz
- [New \\$38 million Energy-Water crosscutting initiative](#)
- **Energy-Water Track:**  
[RECENTLY FUNDED PROJECTS RELATED TO WATER-ENERGY](#)
- **Current opportunities related to Energy-Water**
  - [RENEWABLE ENERGY AND EFFICIENT ENERGY PROJECTS LOAN GUARANTEE SOLICITATION](#) - DECEMBER 30, 2015 DEADLINE
  - [ADVANCED FOSSIL ENERGY PROJECTS LOAN GUARANTEE SOLICITATION](#) - DECEMBER 30, 2015 DEADLINE
- [WATER POWER PROGRAM](#) \$67M FOR 2016
- [U.S.-China Clean Energy Research Center Issues Solicitation to Address the Energy-Water Nexus \(2015\)](#) \$12.5 million



## USDA

- **Centers of excellence**
- [AFRI](#)  
Requests **\$450 million for competitive grants through AFRI**, which supports all strategic goals. A portion of this funding will **support research focused on developing solutions for water management** that could potentially **affect health, food, climate, energy, and the environment.**
- [NIFA](#)  
The President's FY 2016 budget request for NIFA includes \$57 million to support research on **food security**, a **\$17 million increase** over FY 2015.
- [ARS](#)  
The President has proposed an **increase of \$5 million**, to \$206 million total, for USDA ARS environmental stewardship research. USDA Regional Climate Hubs will support study of the **impact of global climate change on critical natural resources including water availability, soil health, soil conservation, and water quality.**
- [ERS](#)  
Economic Research Service (ERS) will use **\$1 million to analyze linkages between shifting water supplies, farming practices, and food production.** This will improve our understanding of the range of risk management and adaptive decisions in drought-prone areas, and analyze how farmers might respond to extreme weather events.

More info on: <http://www.usda.gov/wps/portal/usda/usdahome?navid=BUDGET>