



Agenda

- I. Opening (5 minutes)
- II. Introductions (10 minutes)
- III. Overview of FEWtures Project (1 hour, 20 minutes)
 - a. **HOMEWORK:** Before the meeting, go over the one-page project description and pdf file of slides to be presented.
 - b. Project staff take 2-3 minutes to describe their part of the project, including purpose, approach, and connections to other project parts. After each topic is discussed, StaAG members are asked to speak. **Gray:** members not at meeting
 - i. Brief economic perspective: Vincent Amanor-Boadu (5 minutes)
 - ii. **Agriculture team:** Jonathan Aguilar, Vincent Amanor-Boadu (5 minutes)
 1. **StaAG** members: Dwayne Roth, Gaea Hock, Paul Hartley, Randy Hayzlett, Kirk Heger
 2. **SciAG** members: David Brauer, Candy Thomas, Meaghan Schipanski
 - iii. Ammonia Team: Peter Pfromm (10 minutes)
 - iv. **Energy team:** Hongyu Wu (10 minutes)
 1. **StaAG:** Dorothy Barnett
 2. **SciAG:** Pat Parke, Earnie Lehman, Bob Johnson
 - v. **Water Supply team:** Sam Zipper, Andrea Brookfield (5 minutes)
 1. **StaAG:** Dwayne Roth, Armando Zarco
 2. **SciAG:** Will Farmer, Dave Gochis
 - vi. **Water Treatment team:** Peter Pfromm, Ted Peltier (10 minutes)
 1. **StaAG:** Randy Hayzlett
 2. **SciAG:** Matthew Kirk
 - vii. Engagement, Business, Resilience team: Benjamin Gray, Susan Stover (15 minutes)
 1. Business Development subteam: James Bloodgood
 2. Resilience and Metrics subteam: John Symons
 3. **StaAG:** Michael Young, Marci Francisco
 4. **SciAG:** Jennifer Adam, Melanie Derby, Frank D’Agnese
 - viii. Global-scale impacts team: Robert Barron (5 minutes)
 - ix. Education team: James Bloodgood, Mary Hill (5 minutes)
 1. **StaAG:** Gaea Hock
 - x. Economic analysis – Integrated Model team: Vincent Amanor-Boadu (10 minutes)
 1. **StaAG:** Don Hineman, Patty Clark
 - IV. Open discussion, including SciAG members (20 minutes)
 - a. If economic analysis is promising, science and technologies we are investigating identify potential business opportunities for stakeholders. In what ways are they seen by stakeholders as opportunities, and how they are seen unfavorably?
 - V. Closing (5 minutes)





Selected slides from this meeting

Renewable ammonia to improve the resilience of rural communities

Peter Pfromm

For scale:
1000 tons NH₃/year for 11000 acres of corn.
World makes 170MM tons NH₃/year

Growing interest in ammonia as an energy (H₂) vector adds to existing traditional markets

C-FUTURE
Carbon Emission Free Renewable Energy

<http://solarhydrogensystem.com/>
supply 10% of energy & fertilizer for a 320 acre farm via ammonia

Siemens, UK
30kg ammonia per day
Modular ammonia plant

12-19 Dalian Shipbuilding Industry Company and MAN Energy, ammonia-fuelled ultra-large containership concept design

ThyssenKrupp modular system concept, ton per day scale

FEWtures: Business Innovations Jim Bloodgood, KSU

Appropriate business structures? Steps to implementation?

Need from producers and other stakeholders:

1. Awareness/Understanding/Involvement of what is at stake, how it will work, what is of interest, etc.
2. Buy-In (perceived as legitimate, overcome barriers to adoption)
3. Implementable

Questions:

- Who is trusted? (role of social networks)
- Who is perceived as capable? Who actually is capable?
- What organization provides positive familiarity for producers and other stakeholders?
- What degree of involvement/ownership is best?
- What resources will be available?

Local Generation (wind, solar, ...) → Electricity → Micro-grid ↔ Grid

Surface and groundwater → Water treatment → Sustainable agriculture – water reused, contamination managed, carbon reduced → Ammonia synthesis using renewable energy

From Energy presentation, Hongyu Wu

Some Possible Business Structures:

1. New business or adaptation of existing business
2. Collective/Co-op
3. 3rd Party
4. Joint enterprise (e.g., producer, suppliers, University/government)

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