Opportunities and constraints to a bioeconomy: international perspective

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Plenary IV

Policy for the bioeconomy

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Opinions expressed are the author's and do not represent DOE.

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http://www.ornl.gov/sci/ees/cbes/

http://climatechangescience.ornl.gov/

U.S. DEPARTMENT OF ENERGY

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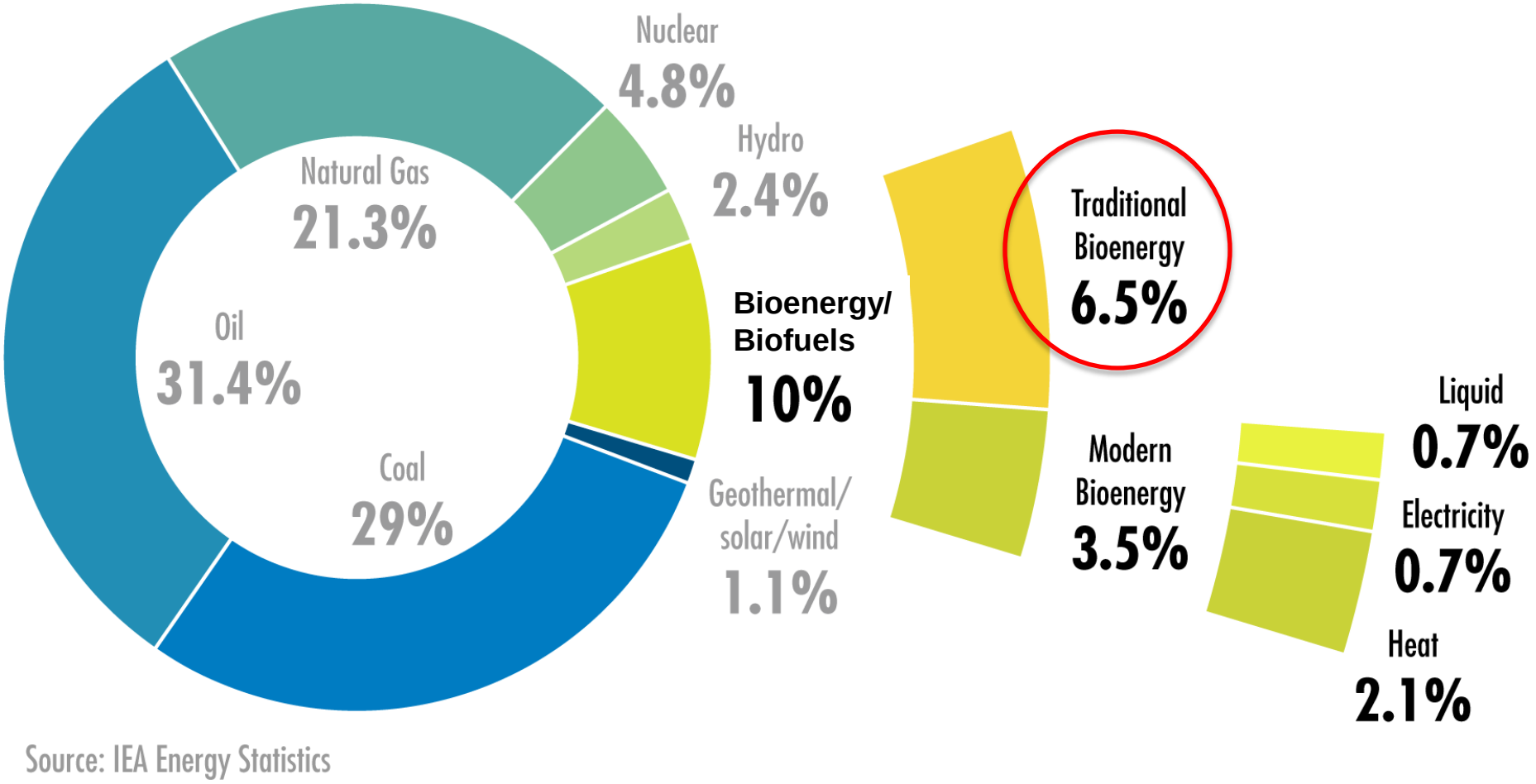
Outline: bioenergy opportunities and constraints

- Current situation
  - Modern vs Traditional
  - Policies
- Barriers
  - Relative prices
  - Uncertainty
  - Sustainability concerns
- Opportunities
  - SDGs
  - Potential to ‘boost bioenergy’
- Tools for moving forward
  - Monitoring and evaluation
  - Continual improvement
  - Communications

Photo by Kline: LUC near Atlanta, GA

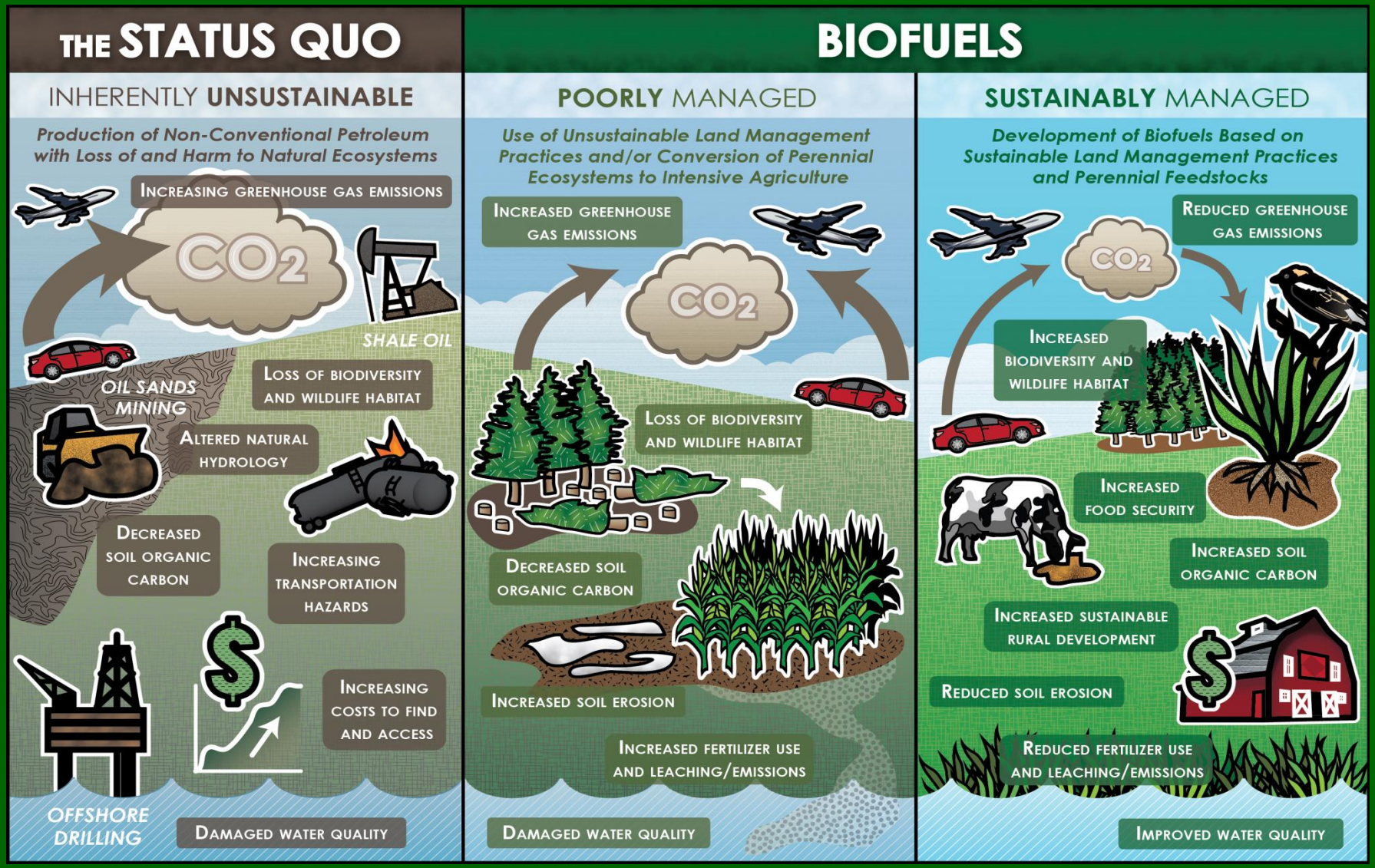
Share of total primary energy supply in 2012



Source: IEA Energy Statistics

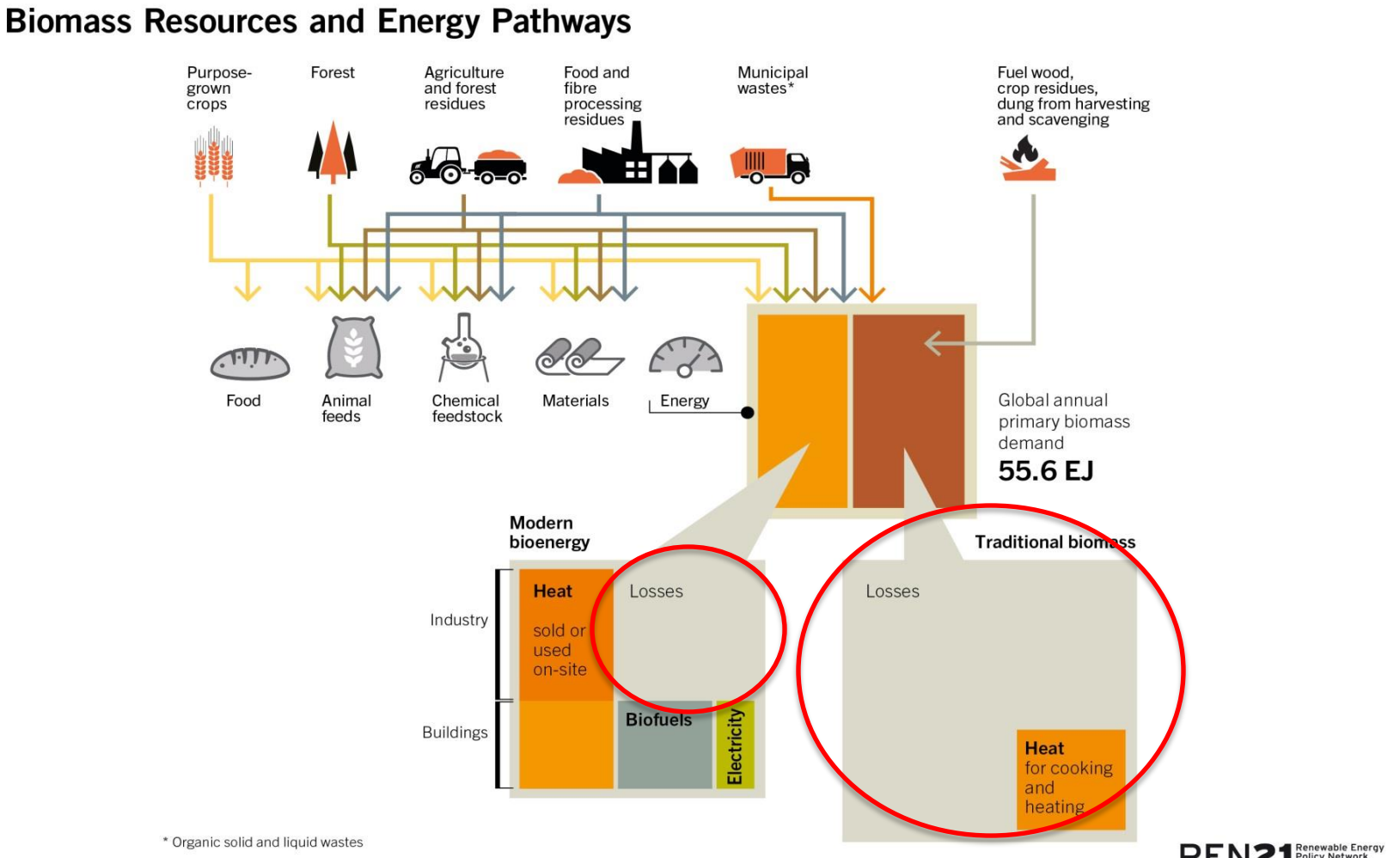
As cited in Souza et al. 2015 (summary).

Seeking policies for transition toward sustainability



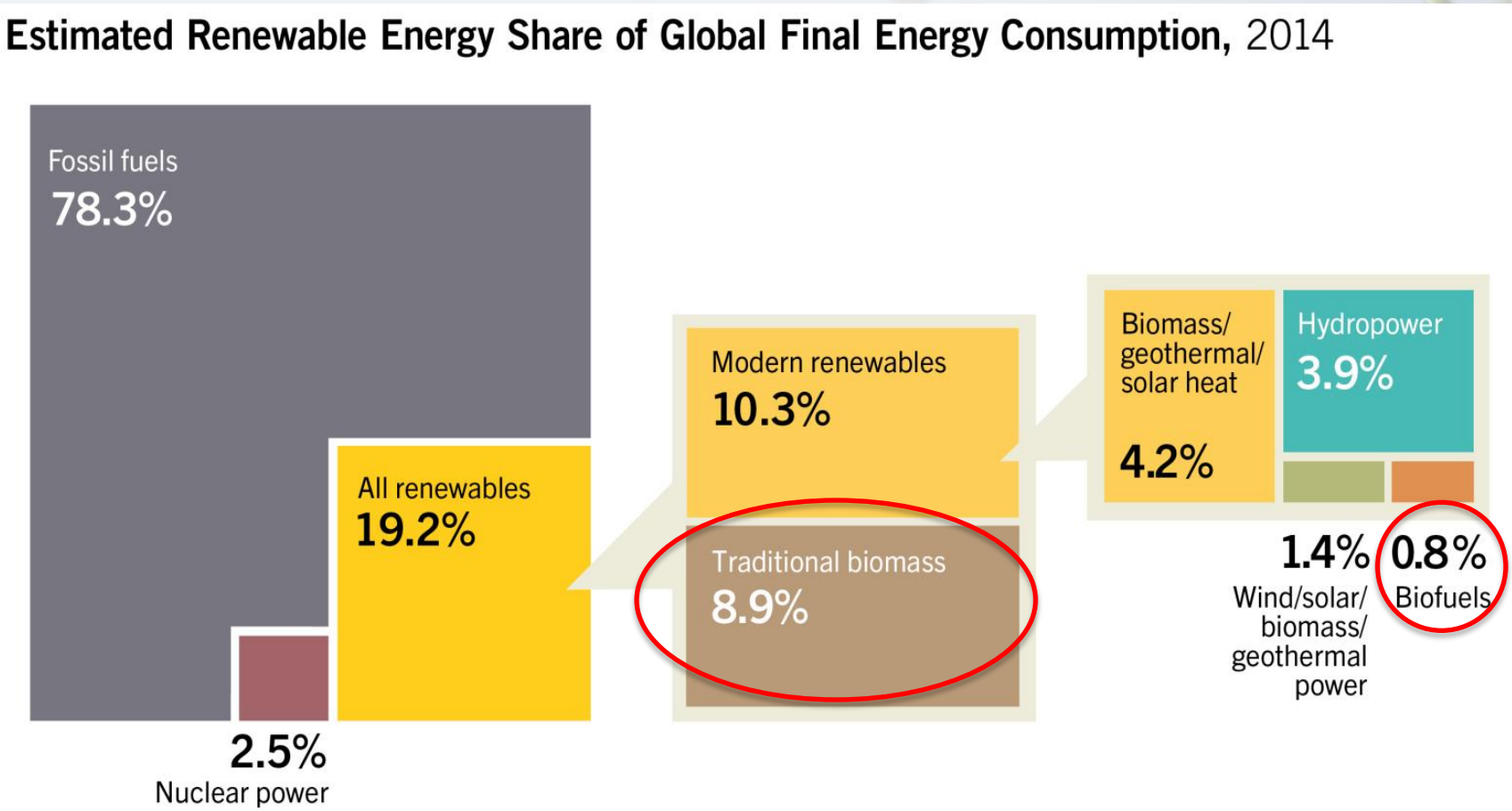
Dale et al. 2014. Take a closer look: biofuels can support environmental, economic and social goals. Environ.Science&Technology

Traditional biomass: losses >75%
= opportunities for future improvement



REN21. 2014. *Renewables 2014 Global Status Report* (Paris: REN21 Secretariat).

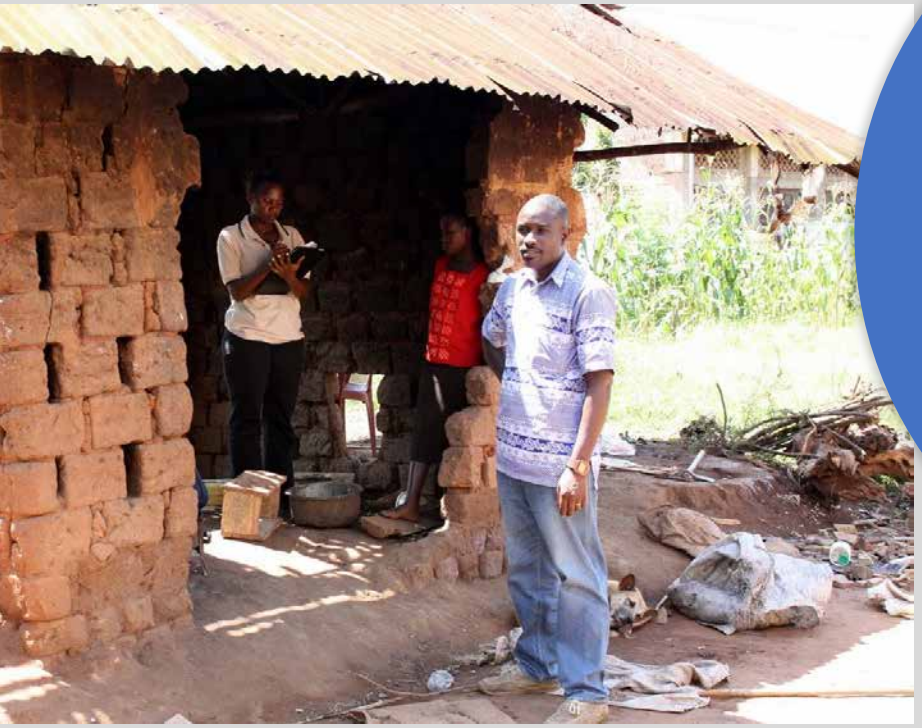
Modern renewables share growing, traditional biomass still large

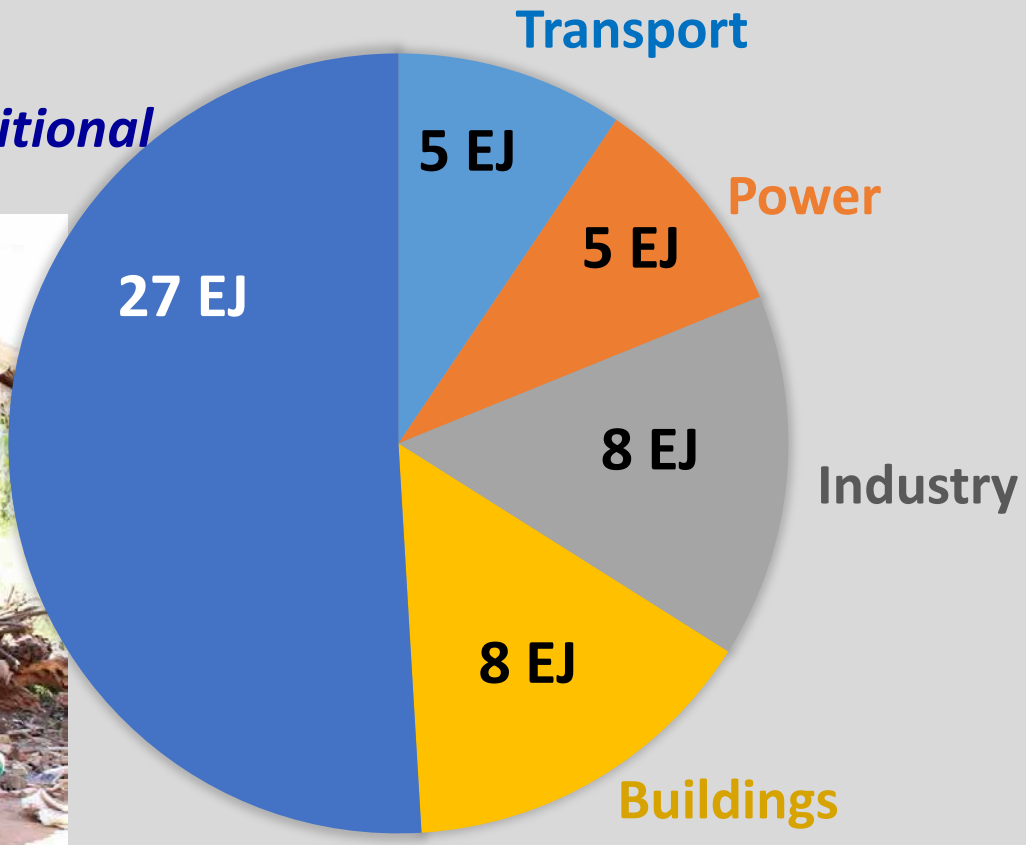


Impacts of traditional biomass for energy are large, costly

How to accelerate a transition to clean renewables?

For climate goals, modern bioenergy to quadruple by 2030, to over 100 EJ





Source: J. Skeer IRENA (2016) presentation "Boosting Biofuels" in http://www.eubce.com/parallel-events/workshops/the-world-needs-more-land-use-change.html

Barriers and opportunities

Key Barriers

- ✓ Cheap fossil fuels
- ✓ Uncertainty in bioenergy markets
- ✓ Sustainability concerns
  - Land-use change (LUC)
  - Food security

Solutions

- ✓ Clearly define problem
  - Emissions? Polluters pay (carbon tax)
  - Relative costs?
- ✓ Policies to reduce risk
- ✓ Incorporate sustainability as market enabler
  - Science-based analysis to determine cause and effect
  - Science: systematic methodology based on evidence

Challenge

As long as deforestation continues around the world, concerns about LUC will persist

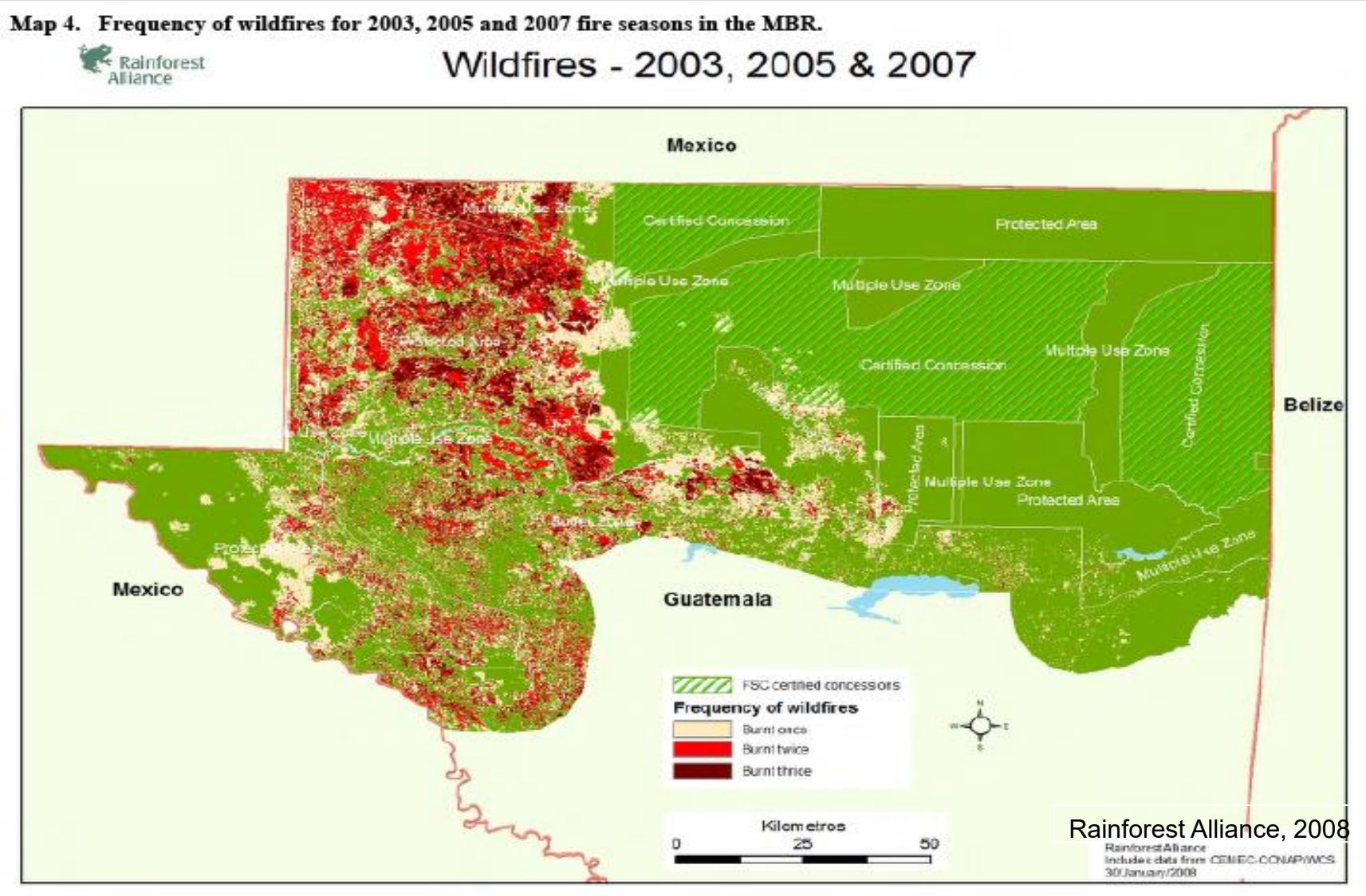
Photo VH Dale, 2016: Logging residues in East TN left to rot or burn because there is no market for biomass-bioenergy.

Many policies are important to support a successful bioeconomy

- Land tenure
- Education
- Administration of justice
- Health and social services
- Environmental protection
- Mineral and fossil fuel exploration and use…

USAID assisted women in Tajikistan to get certificates for land-use rights. *USAID photo.* https://www.usaid.gov/news-information/frontlines/feed-future/laws-land-raise-tajik-women-farmers

Fires and deforestation in Maya Biosphere Reserve, Guatemala. Habitat loss, contamination of water and soil, and new settlements are legacies of oil, not agriculture.

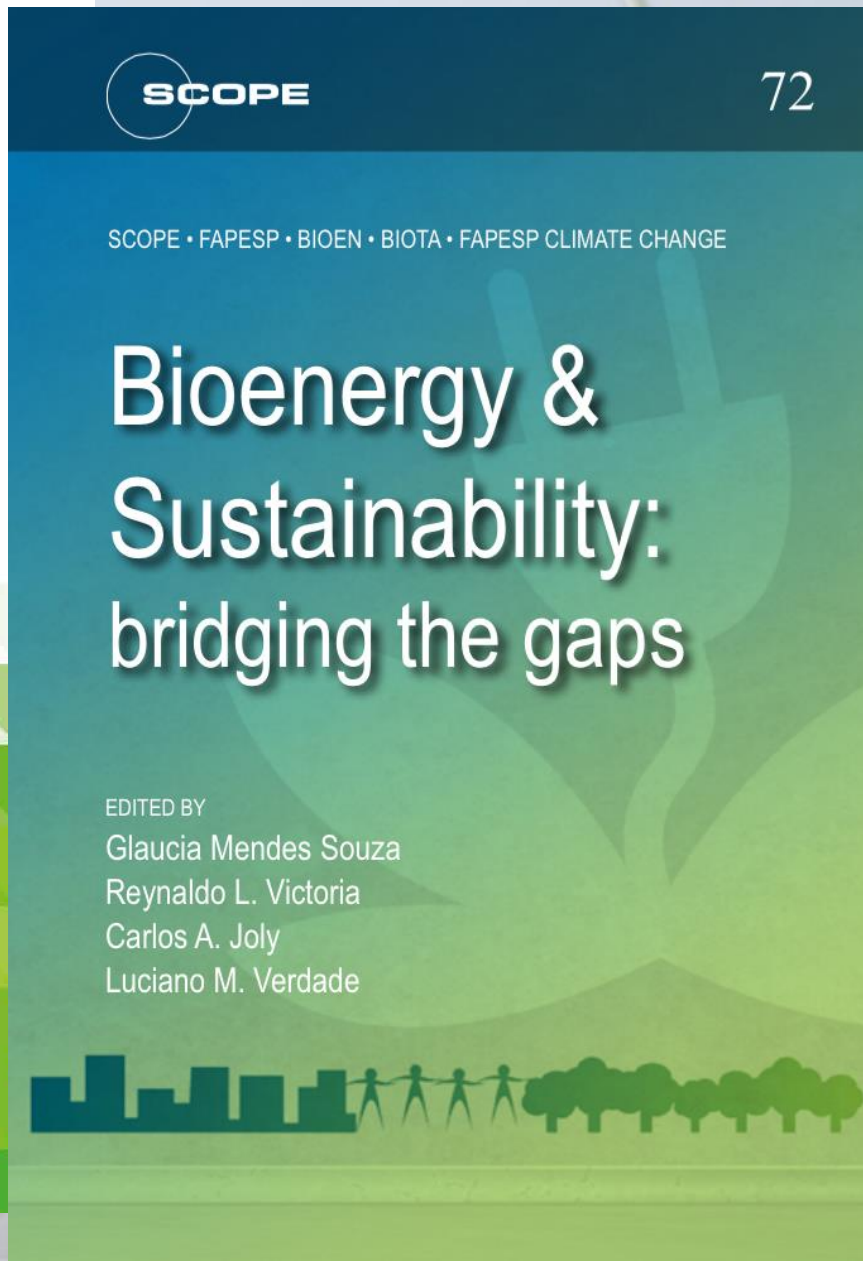


IRENA
International Renewable Energy Agency

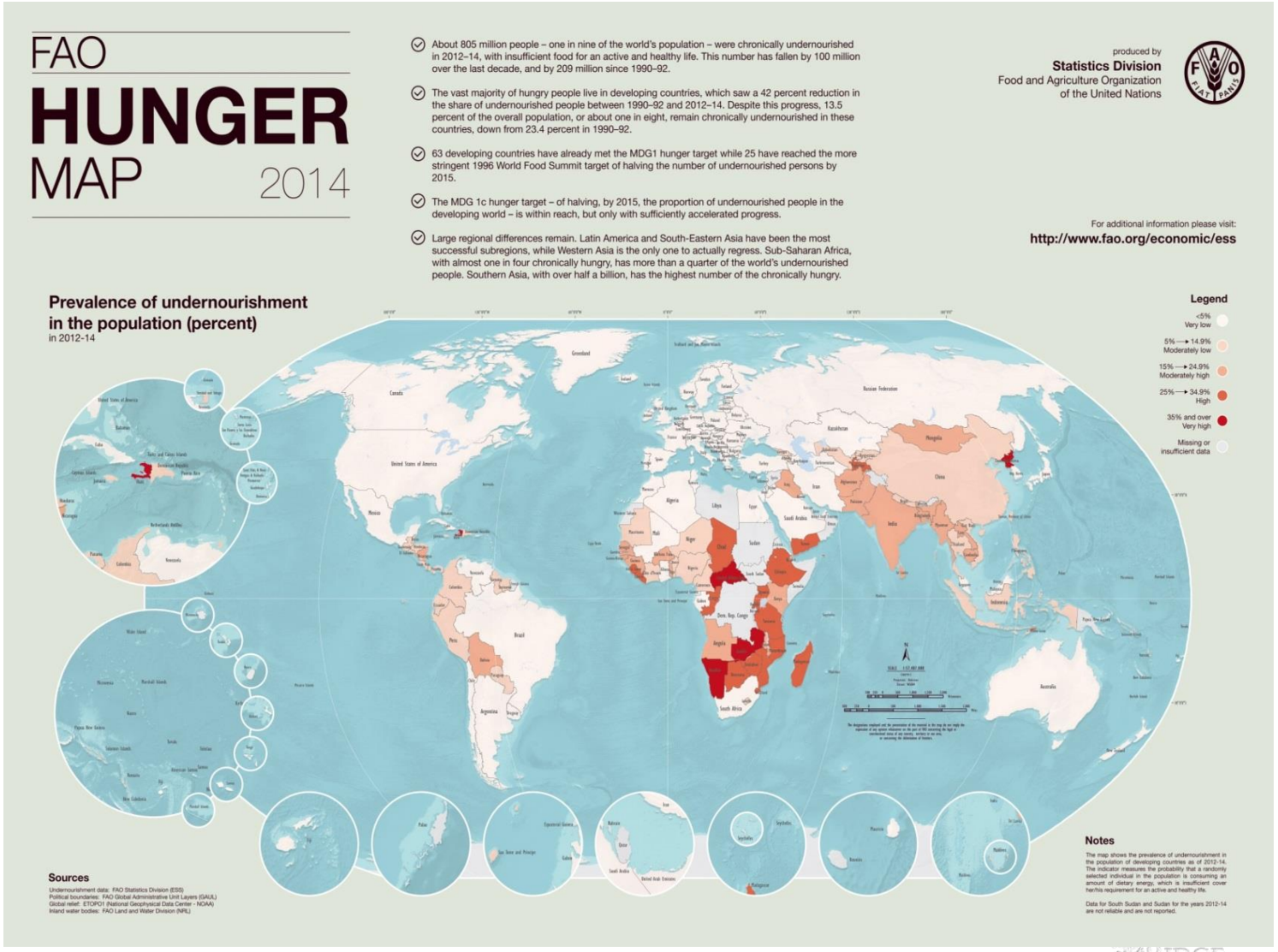
BOOSTING BIOFUELS

Sustainable Paths to Greater Energy Security

- **Close yield gaps**
- **Better use of pasture, marginal land**
- **Reduce food chain losses**
- **Forestry**



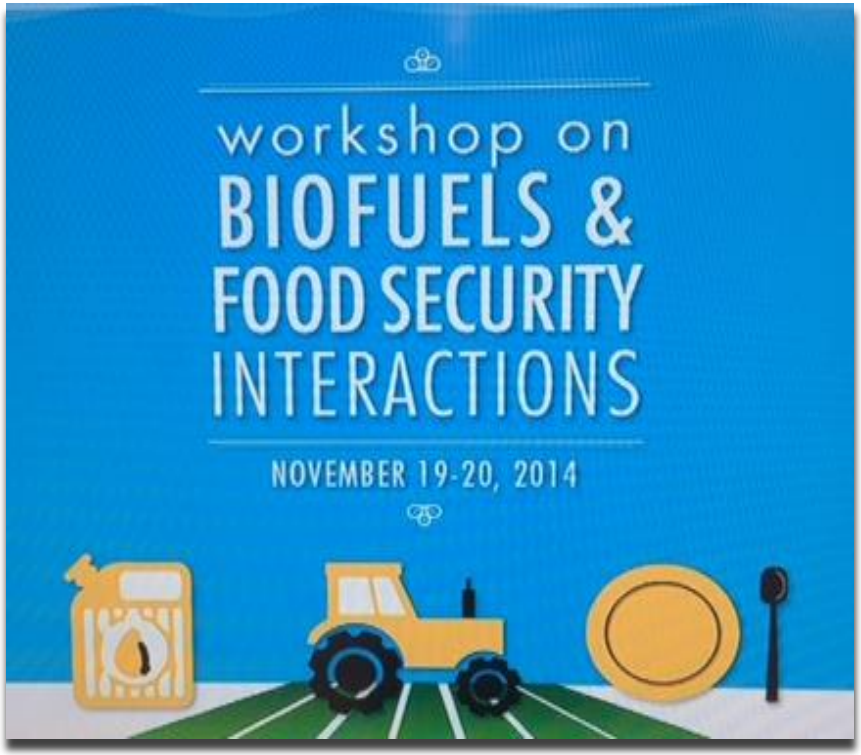
Challenge: As long as hunger continues around the world, concerns about food security will persist



Food security

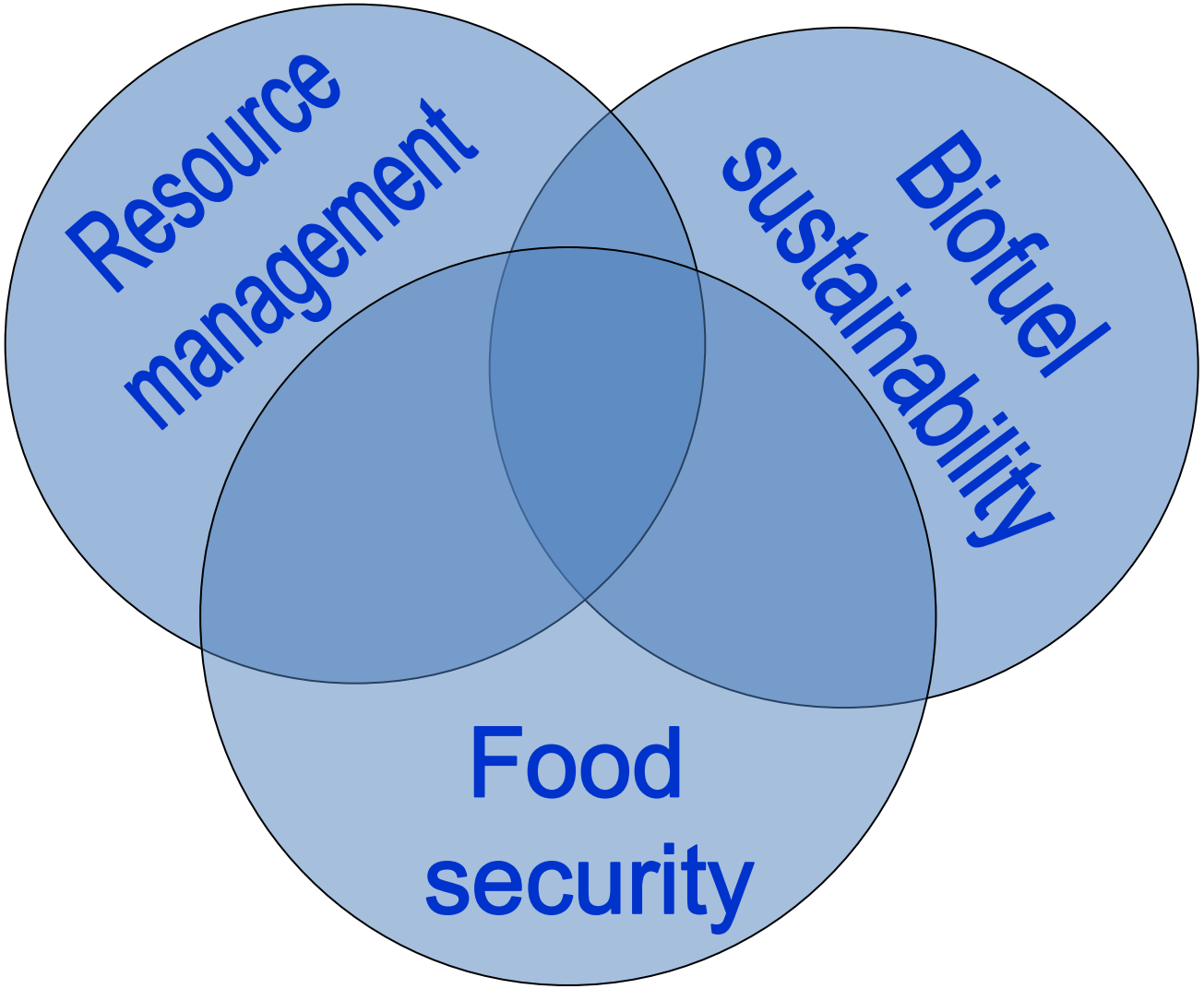
*International workshop**

- **Identify synergies – for example**
  - **Flex crops**
  - **Rural infrastructure supports food & fuel**
  - **Sustainable resource management**
- **Frame the problem: Ask the questions that matter**
- **Use clear terminology**
  - See workshop report (link below) and forthcoming publication in GCB-Bioenergy



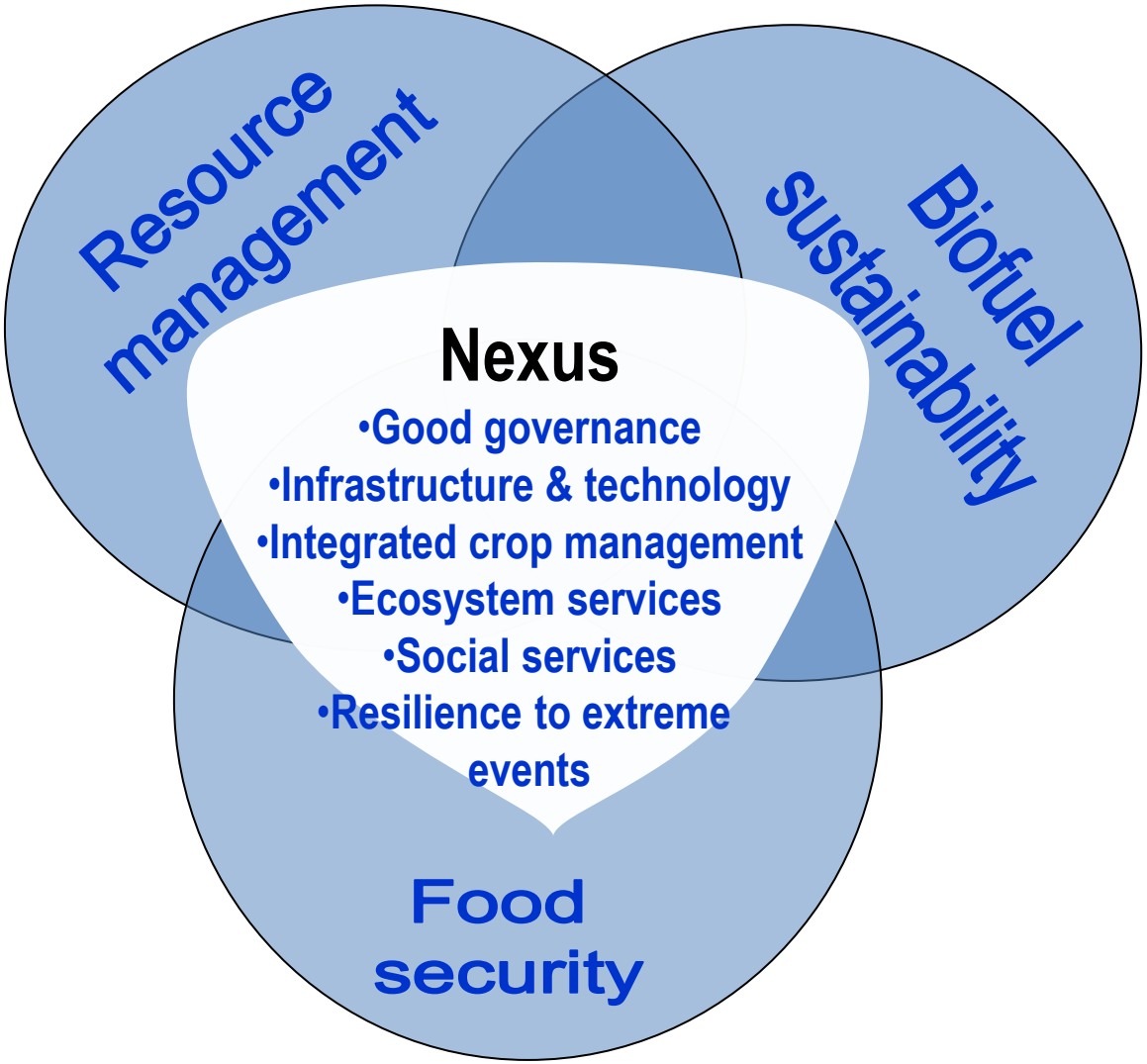
* http://www.ifpri.org/event/workshop-biofuels-and-food-security-interactions

The nexus between biofuel sustainability and food security invokes a focus on resource management



(Kline et al. 2016)

Attributes of the nexus



(Kline et al. 2016)

At the nexus of food security and sustainable bioenergy:

Address rural poverty

Diversify crops and sources of income

USAID photo - Feed the Future annual report 2015

SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD >160 indicators

http://sd.iisd.org/news/iaeg-sdgs-sets-workplan-for-finalizing-indicators/

Sustainable bioeconomy contributes to SDGs addressing #1 poverty, #2 food security and nutrition, #3 health, #5 gender, #6 water and sanitation, #7 **affordable and clean energy**, #8 **jobs**, #12 sustainable consumption/production, #13 **climate change**, #14 oceans, seas and marine resources, #15 terrestrial eco-systems, forests, land degradation and biodiversity, and #16 strengthened institutions.

Souza et al. 2015

Plenty of biomass.
Policies need to reward better management, use







Source: Kline training seminar for Advanced School on Present and Future of BioEnergy; ESPCA – FAPESP – University of Campinas, 10-17 October, 2014. Campinas, SP Brazil. Photos: Ron Savage; ORNL; Kline.

Can policies applying standards and certification ***facilitate*** the transition toward sustainability?"

"Yes, *if" it*

1. Is ***developed with users*** as a cost-effective tool that meets their needs
2. Provides feedback to guide production toward ***continual improvement*** from users' perspectives
3. Is designed to ***adapt*** to changing contexts and priorities
4. Is ***inclusive***
5. Is ***supported*** by government, civil society, and financial incentives

Engage stakeholders to develop collective understanding and resolution of issues

What the world needs now…
Steps to encourage beneficial LUC

- Motivation to adopt better management practices
- Encourage “natural climate mitigation”
- Give biomass value! Reduce losses from fire and other disturbances
- Create value-added jobs and services that reduce pressure on isolated forest frontiers
- Accelerate shift to ever-higher performing, integrated systems
- Increase scrutiny, awareness and enforcement to end illicit land-management activities
- Apply same performance criteria to all sources of energy and all land management (food, feed, fiber, energy…)

Summary:

- Current situation
  - Plenty of biomass
  - Most used inefficiently
- Tools for transition
  - Develop consensus-based standards
  - Science to support, monitoring, evaluation, continual improvement
  - Clarify terms, use consistently
- Opportunities
  - Outreach and communications
  - Think about future generations
  - For global barriers, involve international stakeholders
  - Build consensus on the problem first, then approaches to transition to solutions
- Improve communications

Thank you

Center for Bioenergy Sustainability

http://www.ornl.gov/sci/ees/cbes/

See CBES website for

- Reports
- Forums on current topics
- Recent publications

Most recent: Reconciling food security and biofuels now available: http://onlinelibrary.wiley.com/doi/10.1111/gcbb.12366/full

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BETO Bioenergy research at ORNL

- Advance common definitions of environmental & socioeconomic costs & benefits of bioenergy systems
- Quantify opportunities, risks, & tradeoffs associated with bioenergy production in specific contexts
- Support efforts to improve stainability assessment via agreements on definitions, criteria, baseline & targets & a manageable set of relevant indicators
- Support improved standards, recognizing that c*ertification ≠ sustainability*

CBES
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Enable long-term supply of renewable biomass for clean, domestic bioenergy

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