



Elbe basin - Future Energy-Corn-Belt of Europe?

- How climate change mitigation strategies induce substantial land use changes -**

Horst Gömann & Peter Kreins

Institute of Rural Studies, Federal Agricultural Research Centre, Braunschweig (FAL-LR)





1. Introduction
2. Integration of agricultural economic modeling into the GLOWA-Elbe model network
3. Results for a selected scenario:
“Amendment of the Renewable-Energy-Act”
4. Conclusions and Outlook



Objectives

1. Specification of global change scenarios for agriculture
 - future general conditions for agriculture
 - scenario hypothesis for relevant factors

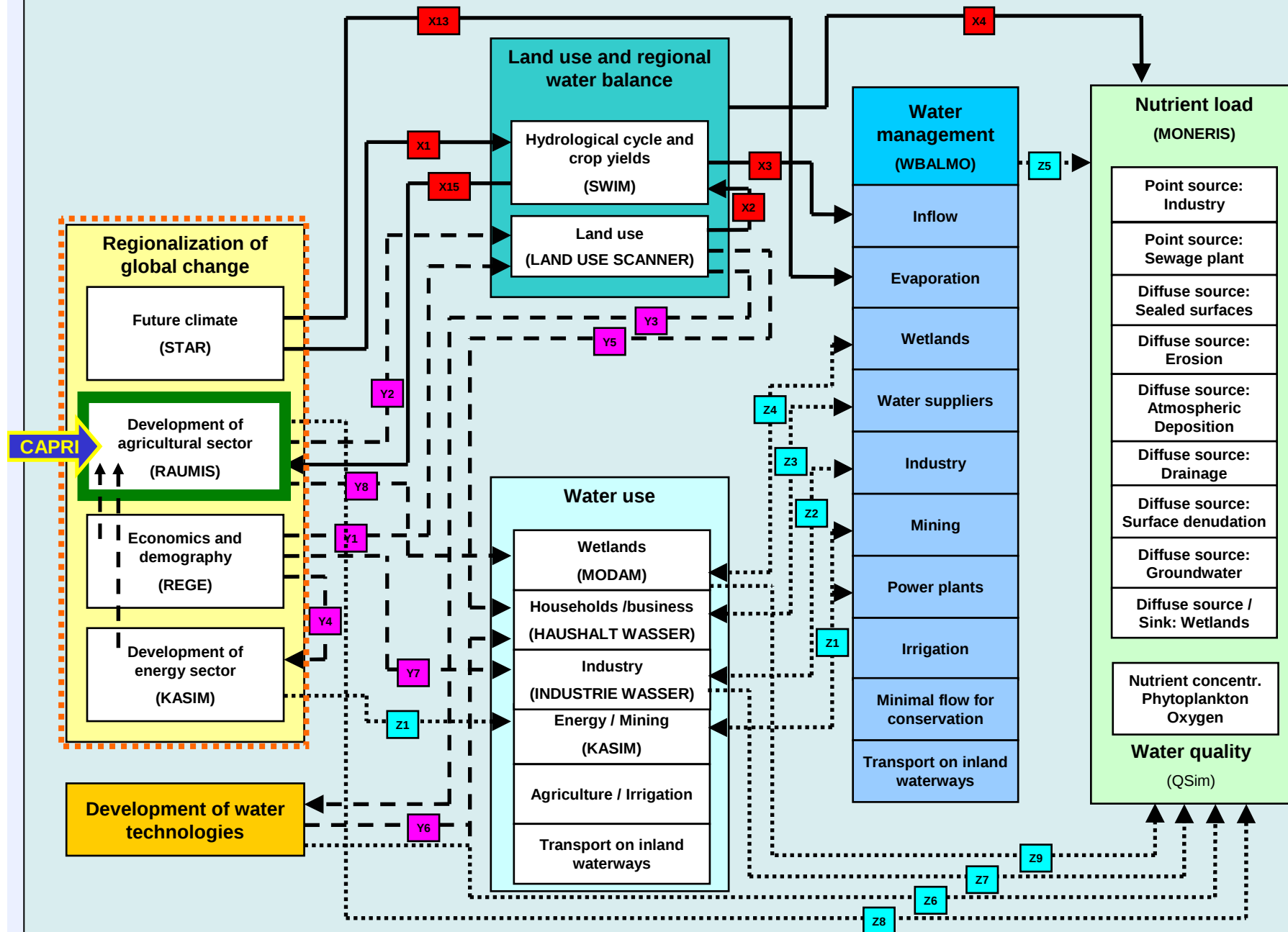
2. Model based impact analyses for agriculture
 - regionalization of global change impacts for the Elbe basin
 - calculation regional changes of land use, nutrient surpluses, and income



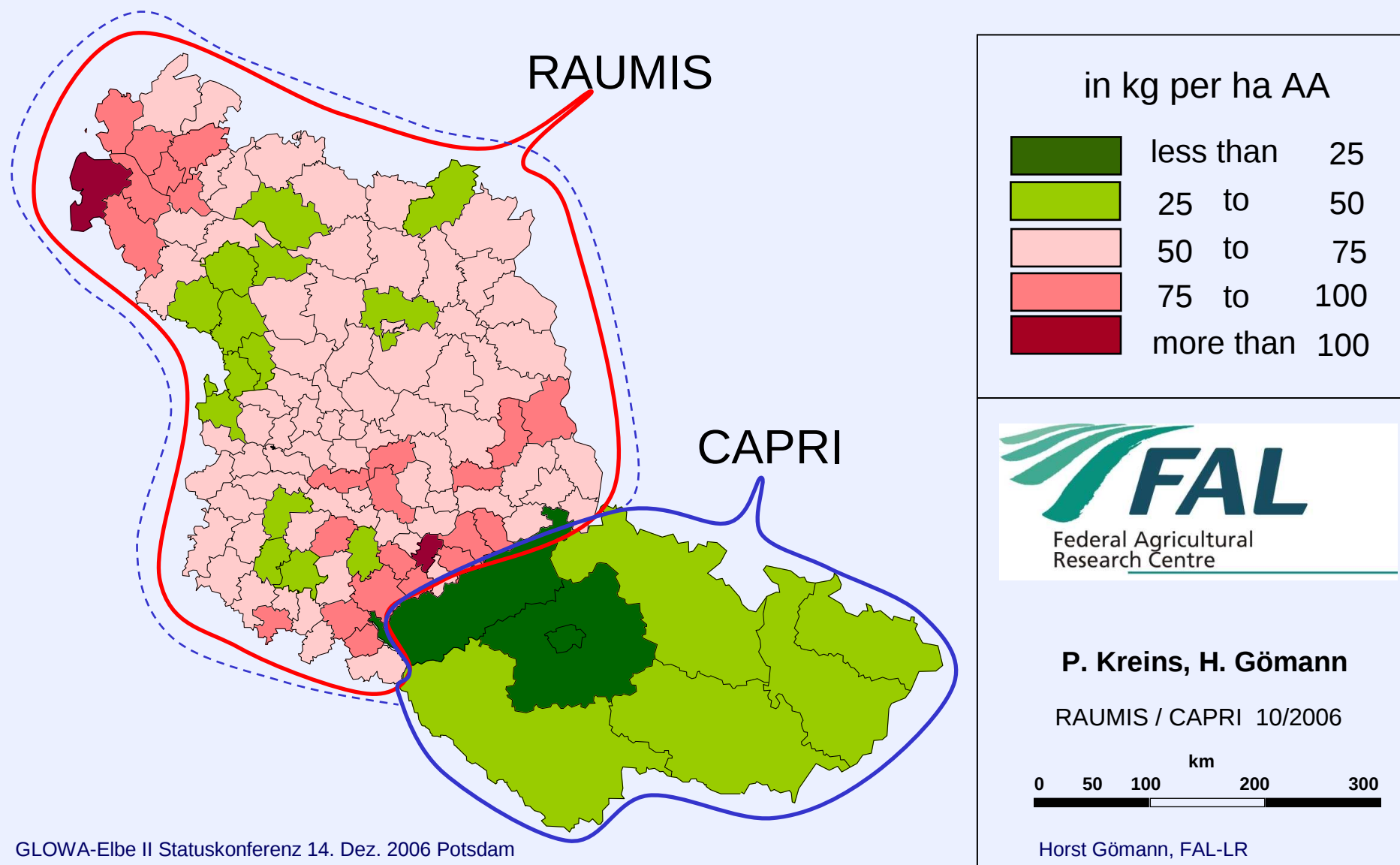
Scenarios: Overview about relevant factors for agriculture

- **Climate Changes**
- **Agricultural Sector**
 - Developments on world markets
 - Luxembourg Compromise incl. policy reforms on sugar and milk markets
 - Decrease of support prices for agricultural products
 - Decoupling of premiums
 - Cross Compliance
 - European Agricultural Fund for Rural Development (EAFRD)
 - Development of acceptance of “Genetically Modified Organisms”
- **Water Sector**
 - Water Framework Directive
 - Regulation on Fertilization
- **Energy Sector**
 - **“Amendment of the Renewable-Energy-Act 2004” (EEG) in Germany**

2. Integration of Agricultural Economic Modeling



Regional Nitrogen Surpluses under Luxembourg Compromise



3. Impacts of the „Renewable-Energy-Act- Amendment in 2004”



Background

The “Amendment of the Renewable Energy Act” (EEG) aims at supporting:

- sustainable energy supply
- protection of nature and environment
- prevention of fossil resources conflicts
- further development of technologies to generate power from renewable resource
- increase the share of power generation from renewable resources to 20% of total power generation in 2020

Specific support for power generation from biomass production:

- guaranteed power purchase price
- bonus for use of renewable primary products (6 EuroCents per kWh)
- bonus for combined heat and power
- bonus for use of new technologies

3. Impacts of the „Renewable-Energy-Act- Amendment in 2004”



Further development of RAUMIS and scenario definition (EEG):

Specification of “**Energy Maize**”

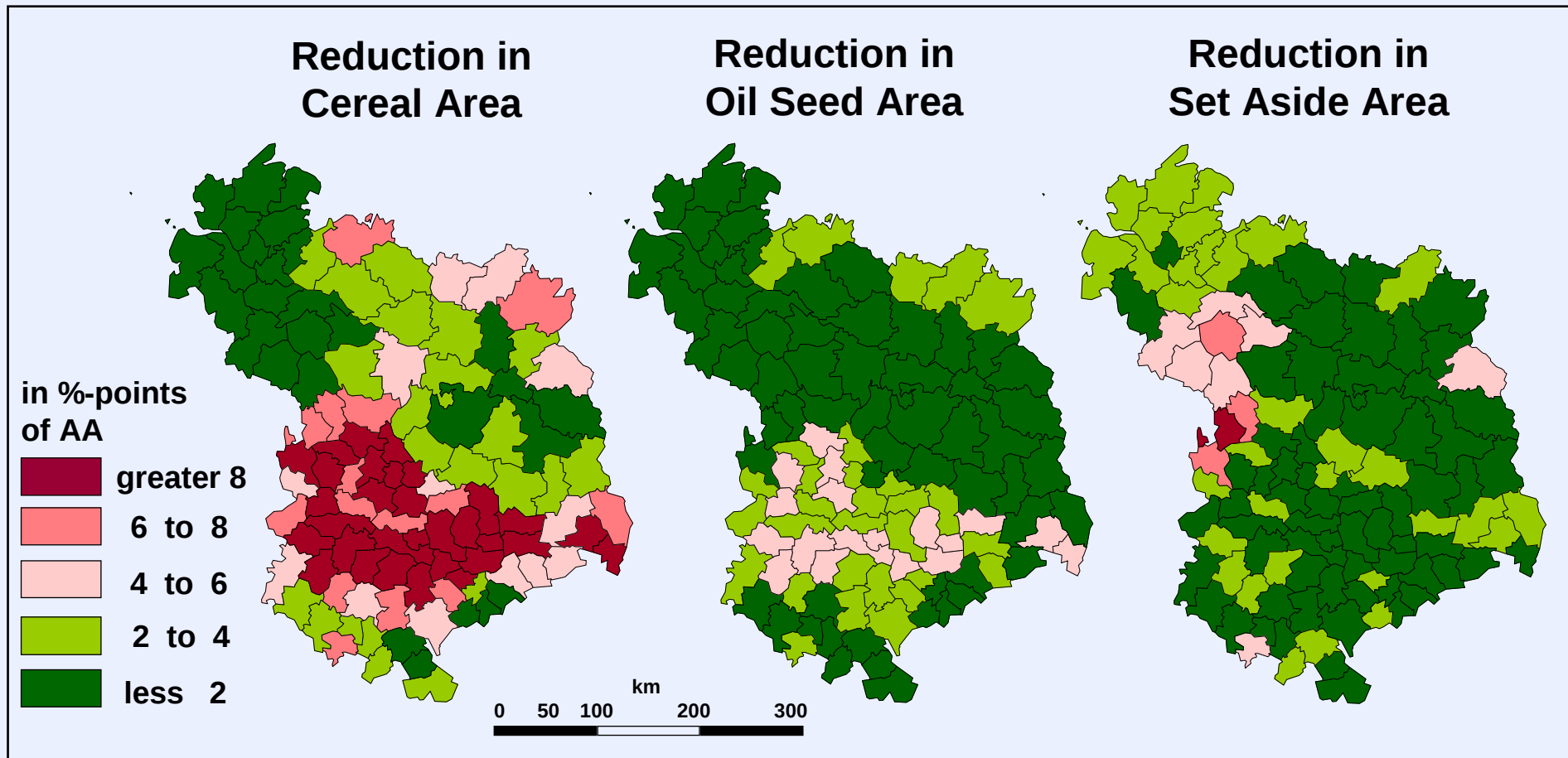
as the major renewable primary product activity in RAUMIS

- Characteristics based on activity: “Fodder Maize”
 - approx. 20% higher yield on average
 - regional yields levels
 - input use
- Adjustment behavior of major cash crops: wheat or barley
- Producer price
 - 22-24 Euro per t (free at biogas plant; 30% dry matter)

3. Impacts of the „Renewable-Energy-Act- Amendment in 2004”



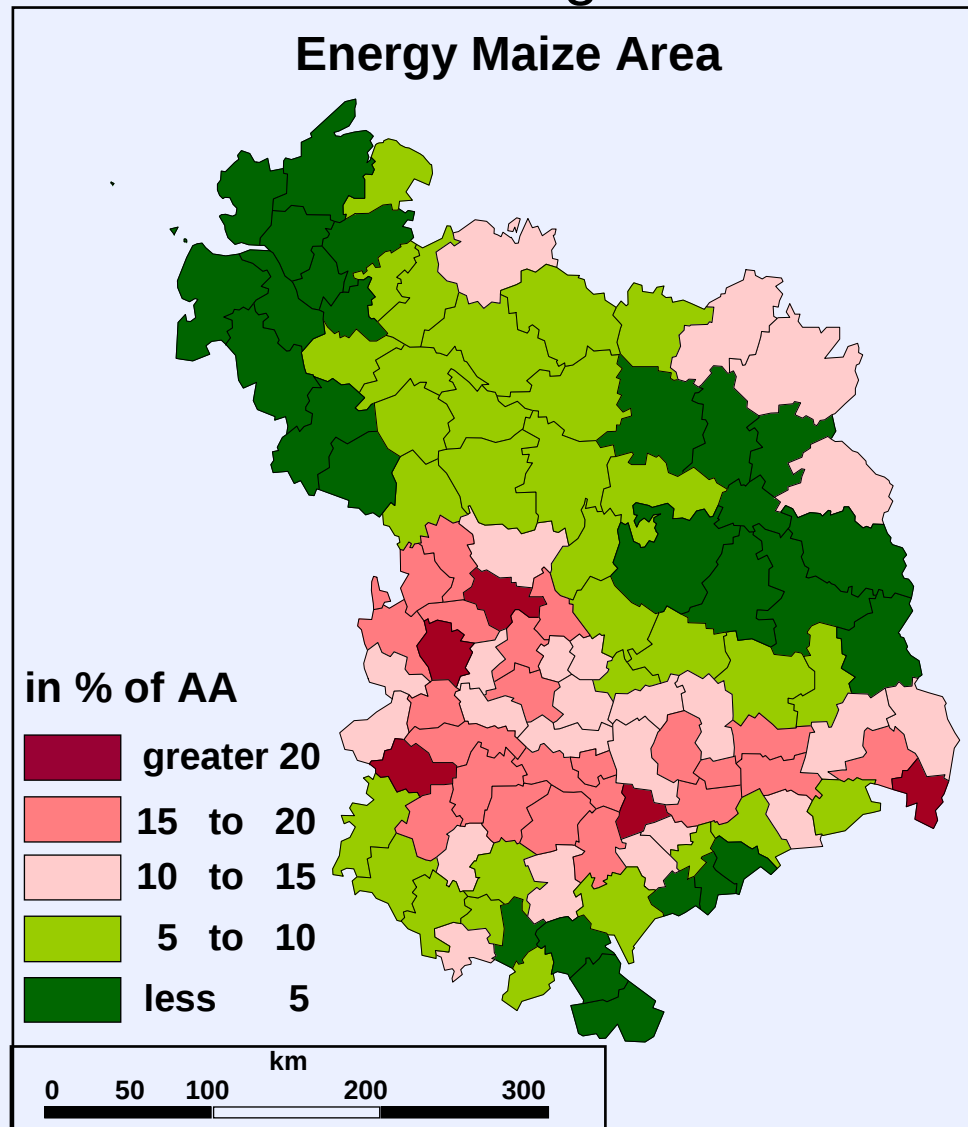
Regional Land Use Changes in the German Elbe basin 2010 vs. Reference Scenario



3. Impacts of the „Renewable-Energy-Act- Amendment in 2004”



Regional Land Use Changes in the German Elbe basin in 2010



3. Impacts of the „Renewable-Energy-Act- Amendment in 2004”



Impacts on agriculture in the German Elbe basin in 2010

	Luxem. Compromise			Energy maize 23 EUR/t		
	Area / Head	Production	Production value	Area / Head	Production	Production value
	1000 ha	1000 t	Mio. EUR	1000 ha	1000 t	Mio. EUR
Cereal	2.687	19.609	1.949	2.369 (-12)	17.228 (-12)	1.714 (-12)
Oilseeds	527	2.039	435	437 (-17)	1.683 (-17)	359 (-17)
Oilseeds (Renew. Cr.)	261	1.115	228	237 (-9)	1.008 (-10)	206 (-10)
Silage/Fodder maize	273	11.938		259 (-5)	11.313 (-5)	
other fodder	316	8.803		299 (-5)	8.218 (-7)	
Energy maize				634	36.568	860
Values in brackets () are percentage changes versus reference scenario.						



Conclusions

- Comprehensive GLOWA-Elbe model network is able to model complex scenarios
- Model network can be adapted to new developments
- Modeling of the Czech Elbe pursues a promising path
- Amendment of the EEG induces a substantial increase in biomass production with impacts on water quantity and quality

Outlook

- Further downscaling to Hydrologic Response Units
- Integration of Czech Republic into the scenario analyses
- Feed back from hydrological models in regard to water availability for “energy maize” production: Is irrigation an option?
- Nutrient surpluses from renewable resources needs to be modeled



Thank You
for your attention!

