AgBalance™

A life cycle tool to assess progress in sustainable agriculture

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SCI: Sustainable Intensification

Jealott's Hill, 30 October 2012

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Sustainable Agriculture
Balancing all three dimensions

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Economy
Ensure the profitability of farming

Ecology
Care for the environment

Society
Meet the expectations of society

AgBalance™

Production Costs
Farm Profit
Commodity Prices
Subsidies
Eco-Toxicity
Energy
Waste
Acidification
Resource Depletion
Biodiversity
Soil degradation
Rural Development

Development of AgBalance™
Motivation and Purpose for BASF

- Increase knowledge on sustainable agriculture and use as guidance for own R&D
- Design innovative, more sustainable solutions for our customers
- Foster more rational debate on sustainability in agriculture

AgBalance Method Development
Measure sustainability in agriculture

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- Holistic method for life cycle assessment in agricultural and food value chain production processes
- Helps to make informed decisions on how to manage improvement
- 16 categories, 69 indicators, more than 200 evaluation factors
- Independent assurance of functionality and coherence received by

DNV BUSINESS ASSURANCE TÜV SÜD NSF

AgBalance™

What does AgBalance assess?

Key focus

- What are the key **sustainability drivers** for any given agricultural production system?
- Which conditions **impact sustainability** in agriculture?
- How is it possible to make production systems **more sustainable**?

Beneficial for business and advocacy

Farmers

- Identifying options for improvements
- Helping to be better prepared for upcoming challenges

Retailer

- Addresses consumers needs and provides them with facts
- Improvement for more sustainable business practices

Provider

- Fact-oriented dialogue with suppliers & retailers
- Identifying options for improvements

Society

- Progress in sustainable food production
- Sustainability topics and farming practices get more transparent and tangible

Looking closer at AgBalance
Dimensions, categories and indicators

Social aspects
include indicators like
working conditions, educational skills, salaries

and also

rural employment, access to land and social security.

Economic aspects
include indicators like
variable costs, fixed costs,

and macro-economic indicators such as

subsidies, share of agriculture in GDP and farm profits.

Ecological aspects
includes categories like
water use, land use

as well as indicators related to

soil health and to biodiversity.

Social Indicators
Overview

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SOCIAL INDICATORS	Farmer	Consumer	Local & national community	International community	Future generation
	Wages	Residues in feed & food	Access to land	Developing countries import	Trainees
	Professional Training	Unauthorized / unlabeled GMO	Employment	Fair trade	Social Security
	Association Membership	Toxicity Potential	Gender Equality	Child labour	R&D Expenditures
	Wages and Salaries, prechain	Functional Product Characteristics	Integration	Foreign direct investment	Capital Investments
	Toxicity Potential	Other risks	Qualified Employees		
	Risk Potential		Employees		
	Strikes and Lockouts		Part time workers		
			Family Support		

Economic Indicators
Overview

ECONOMIC INDICATORS

Variable costs	Fixed costs	Macro economy
Soil Preparation	Deprecations	Subsidies
Seed	Maintenance	Gross Value of Production (GVP)
Crop protection	Insurances	Farm Profits
Fertilization	Labour	Wider economic effects
Machinery	Investment	
	Other fixed costs	

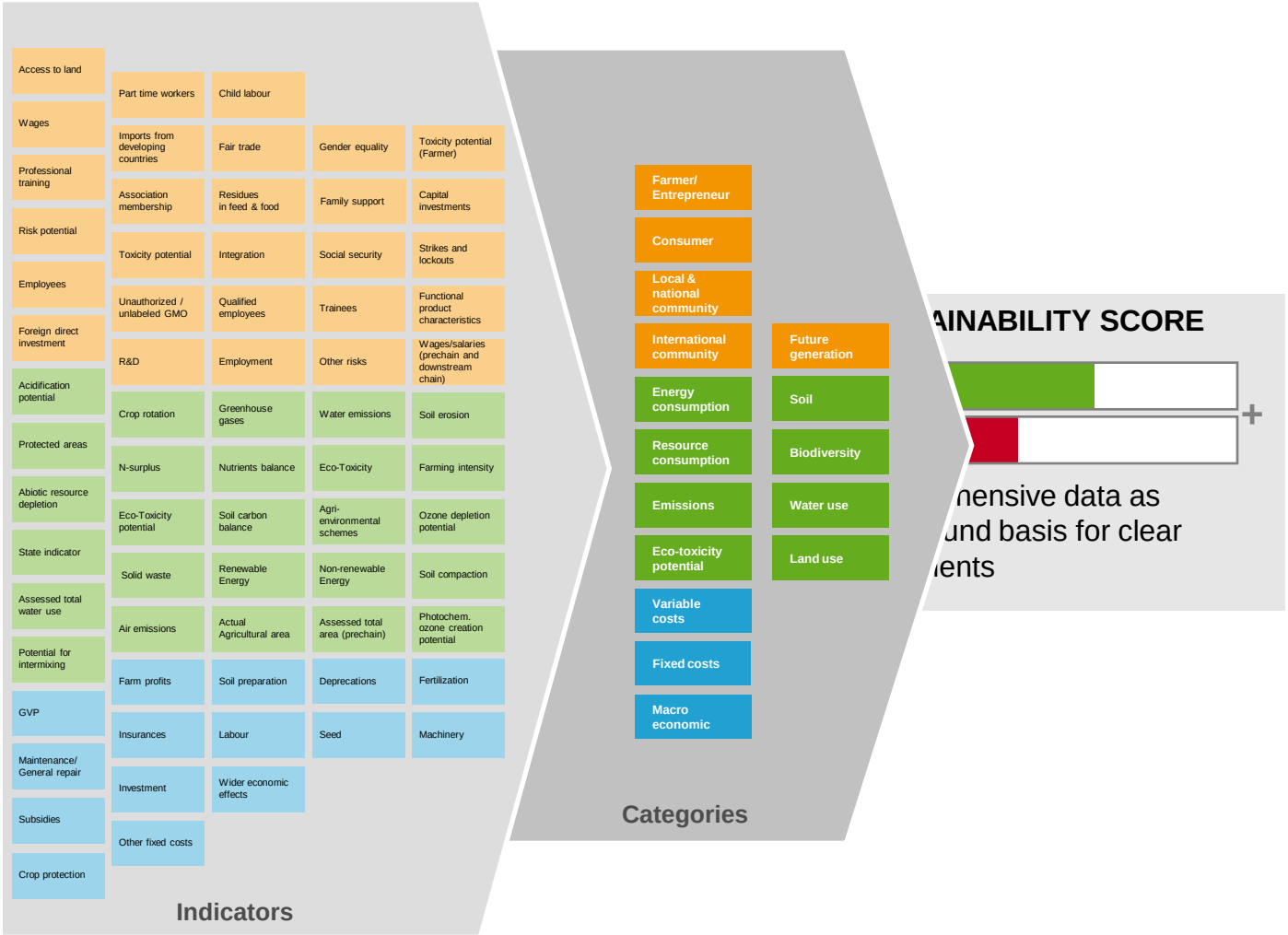
Ecological Indicators
Overview

ECOLOGY

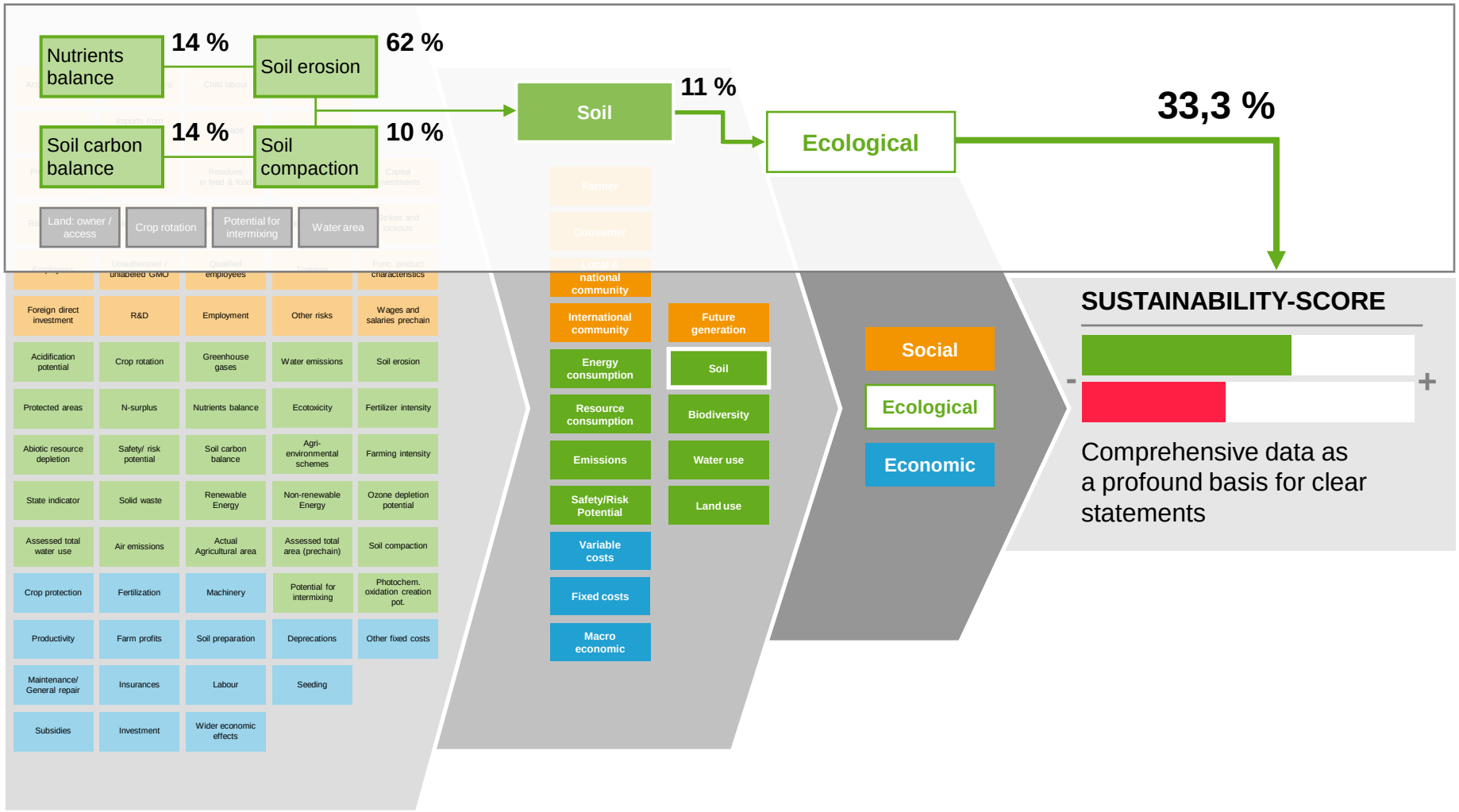
ECOLOGICAL INDICATORS

Soil	Biodiversity	Water use	Land use	Energy consumption	Emissions	Resource consumption	Eco-Toxicity
Soil Carbon Balance	State Indicator	Assessed Total Water Use	Actual Agricultural Area	Non-renewable Energy	Air Emissions	Abiotic Resource Depletion	Assessed Eco-Toxicity Potential
Nutrients balance	Agri-environmental Schemes		Assessed Total Area (prechain)	Renewable Energy	Greenhouse Gases		
Compaction	Protected Areas				Acidification Potential		
Erosion	Eco-Toxicity				Ozone depletion potential		
	Farming Intensity				Photochemi-cal Oxidation Creation pot.		
	N-Surplus				Water Emissions		
	Crop Rotation				Solid Waste		
	Intermixing Potential						

Clear conclusions
Based on comprehensive measurement system



Weighting is needed for
Aggregation and Finalization



Assessment of Biodiversity

”Squaring the Circle”

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Birds …

... easy to identify

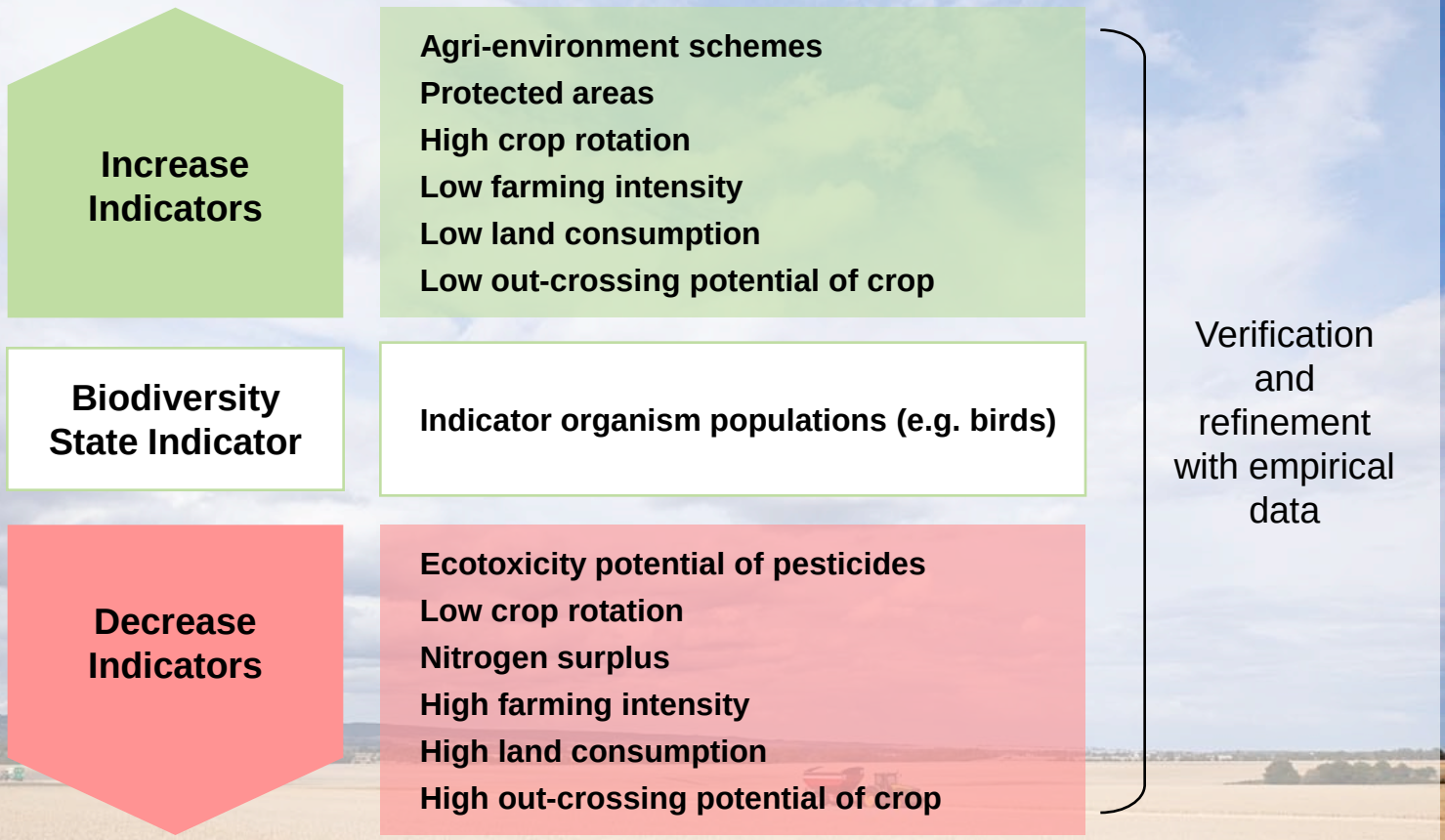
Microorganisms …

… difficult or impossible to identify

For a prediction of biodiversity levels, specific indicators are required

Biodiversity in AgBalance

Our approach



AgBalance assesses the potential for biodiversity development

Case study
Winter oilseed rape in Northern Germany

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The Study

Show changes in the agricultural practice of winter oilseed rape production in Mecklenburg-Vorpommern, Germany.

Focus: Agricultural Practice in 1998 and in 2008

Data sources: Landesforschungsanstalt, KTBL, farmers polls, EUROSTAT

Key Facts

Increased yield from 2.7 to 4.1 tons/ha

Intensified production (Increased ag input uses)

Sustainability improved by 40%

ECONOMY

- Increased profitability
- Fixed and variable costs reduced per ton produced, despite the fact that variable costs per hectare have increased.
- Macro-economic indicators receive better rating in 2008 mostly due to lower contribution of subsidies to farm income

SOCIETY

- Work-time efficiency has increased (less working hours per ton produced).
- Improvements: lower rate of working accidents; decreased fraction of leased land.
- Imports of oil seed rape have increased significantly from countries with lower income index

ECOLOGY

- Assessment in biodiversity is better in 2008 compared to 1998.
- Eco-toxicity and Nitrogen-Surplus indicators score better
- More protected area program (Natura 2000) resulted in an increased potential for biodiversity development.
- Improvement in land use.

Intensification of production can lead to improved sustainability

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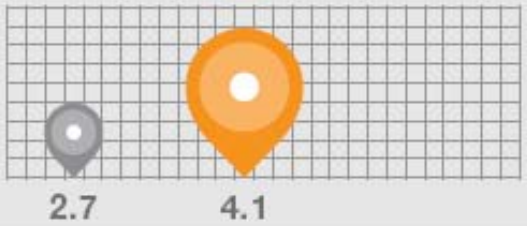
2008

- Higher yielding varieties (OP and hybrid lines)
- Conservation tillage widespred (ca. 40%)
- Use of modern pesticides
- Increased use of fertilizers
- More protected areas

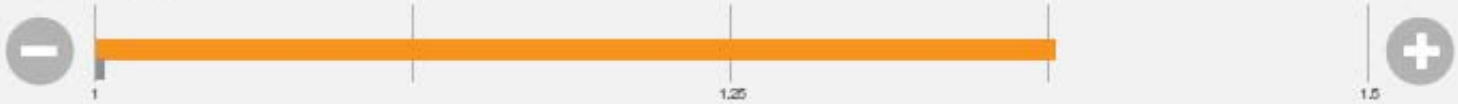
CATEGORIES
DIMENSIONS

Yield

tons/hectare



Sustainability



Indicators

ECONOMIC | SOCIAL | ECOLOGICAL

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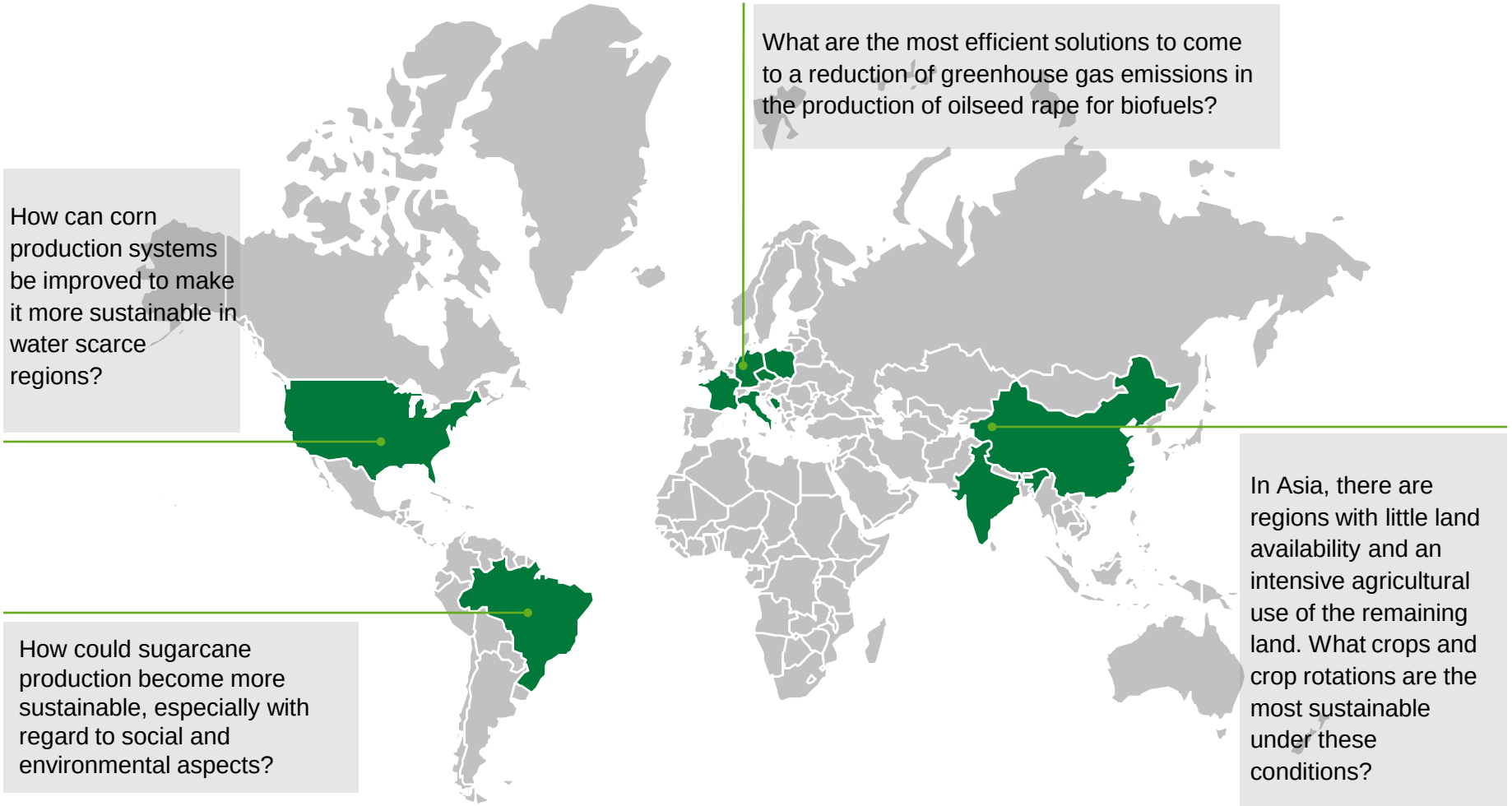
Possible contributions



What are the most efficient solutions to come to a reduction of greenhouse gas emissions in the production of oilseed rape for biofuels?

How can corn production systems be improved to make it more sustainable in water scarce regions?

In Asia, there are regions with little land availability and an intensive agricultural use of the remaining land. What crops and crop rotations are the most sustainable under these conditions?

How could sugarcane production become more sustainable, especially with regard to social and environmental aspects?

Advantages through holistic assessment
Outlook

- Identification of most effective and efficient measures to improve agricultural sustainability in all three dimensions:
  ecology, economy and society.
- Exchange of data and knowledge in transparent and tangible way with relevant stakeholder.
- Fact-based argumentation through different scenario analysis:
  What are possible impacts on costs, profitability, rural environment?
- Identifying options for improvement:
  How to reduce greenhouse gas emissions? How to maintain soil quality?

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