IAEA 12th Scientific Forum

Energy for Development

Vienna International Centre, Vienna

September 15-16, 2009

Energy & Food Security:

Faris Hasan
Director of Corporate Planning
OPEC Fund for International Development

- “A doubling of food prices over the past three years could potentially push 100 million people in low income countries deeper into poverty”

  president of the World Bank, April 2008

- “ More than half of the increase in in use of both coarse grain and vegetable oil was due to higher use in the biofuels industry”

  OECD 2008” rising food prices”

Outline

Biofuels and Food Security: *Implications of an accelerated biofuels production*

An OFID study prepared by IIASA

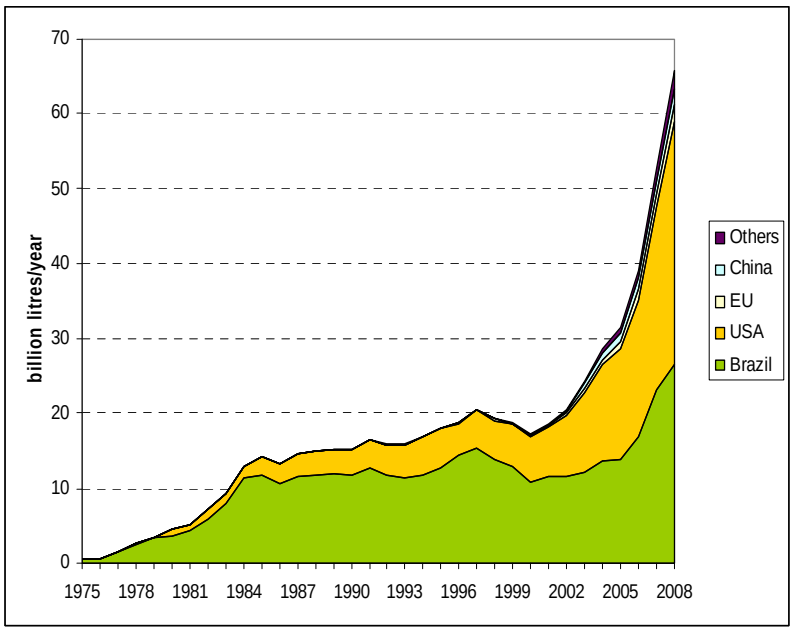
(International Institute for Applied Systems Analysis)

- Methodology
- Key Findings
  - *Social, Economic, Environmental*

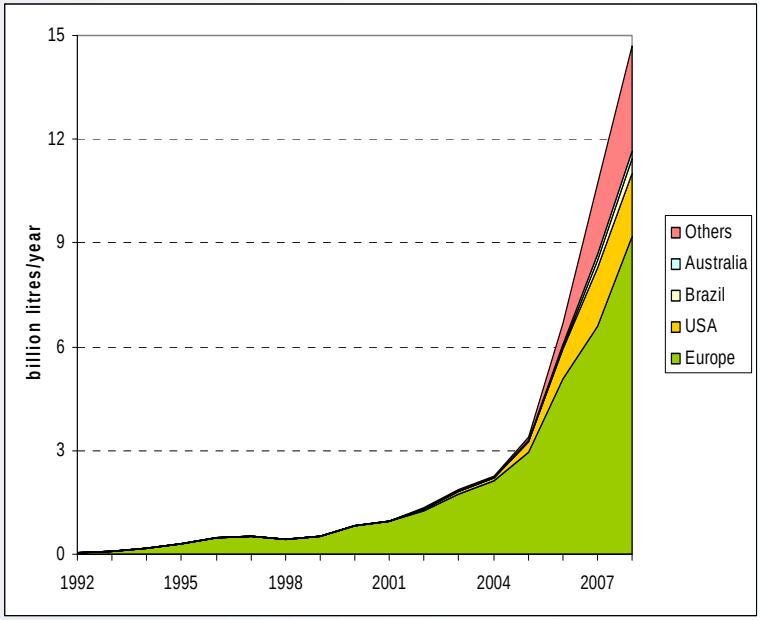
Biofuels today

- ✓ Mitigate Climate Change
- ✓ Enhance Energy Security
- ✓ Foster Rural Development

Fuel ethanol production 1975-2007



Biodiesel production1992-2007



Source: F.O. Licht World Ethanol & Biofuels Report, October 2007 and May 2008.

Biofuels Mandates and Targets

Country/ Region	Mandatory, voluntary or indicative target
Australia	At least 350 million liters biofuels by 2010
Canada	5 percent renewable content in gasoline by 2010
European Union	5.75 percent by 2010 10 percent by 2020
Germany	6.25 percent by 2010 10 percent by 2020
France	7 percent by 2010, 10 percent by 2015, 10 percent by 2020
Japan	0.6 percent of auto fuel by 2010; a goal to reduce fossil oil dependence of transport sector from 98% to 80% by 2030
New Zealand	3.4 percent target for both gasoline and diesel by 2012
United States	12 billion gallons by 2010, rising to 20.5 billion gallons by 2015 and to 36 billion gallons by 2022 (with 16 billion gallons from advanced cellulosic ethanol)

Country/ Region	Mandatory, voluntary or indicative target
Brazil	Mandatory 25 percent ethanol blend with gasoline; 5 percent biodiesel blend by 2010.
China	2 million tons ethanol by 2010 increasing to 10 million tons by 2020; 0.2 million tons biodiesel by 2010 increasing to 2 million tons by 2020.
India	5 percent ethanol blending in gasoline in 2008, 10 percent as of 2009; indicative target of 20 percent ethanol blending in gasoline and 20 percent biodiesel blending by 2017.
Indonesia	2 percent biofuels in energy mix by 2010, 3 percent by 2015, and 5 percent by 2020.
Thailand	2 percent biodiesel blend by 2008, 10 percent biodiesel blend by 2012; 10 percent ethanol blend by 2012.
South Africa	2 percent of biofuels by 2013

Two key Scenarios

Scenario TAR-V1

- **Biofuels targets implemented by 2020**
- **Transport fuel as projected by IEA/WEO 2008**
- **Gradual deployment of Second-generation (>2015)**

Scenario TAR-V3

- **Same as TAR-V1, except:**

Accelerated development of second-generation conversion technologies

Biofuel Feedstocks

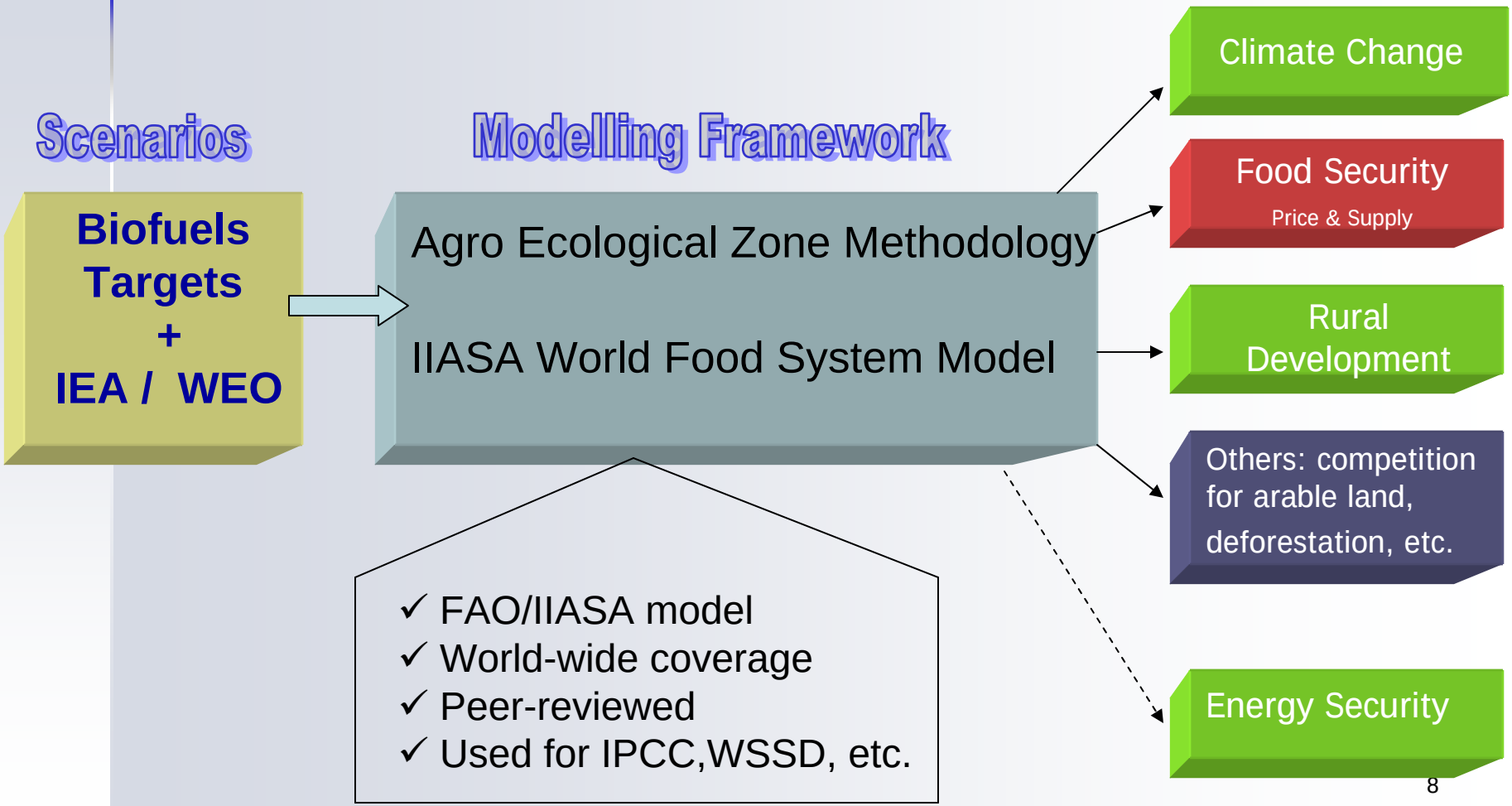
First-generation

- **Oil crops**
  Rapeseed; Sunflower; Soybean; Oilpalm; Jatropha
- **Sugar crops**
  Sugarcane; Sugar beet; Sweet sorghum
- **Starch crops**
  Wheat; Rye; Triticale; Maize; Sorghum; Cassava

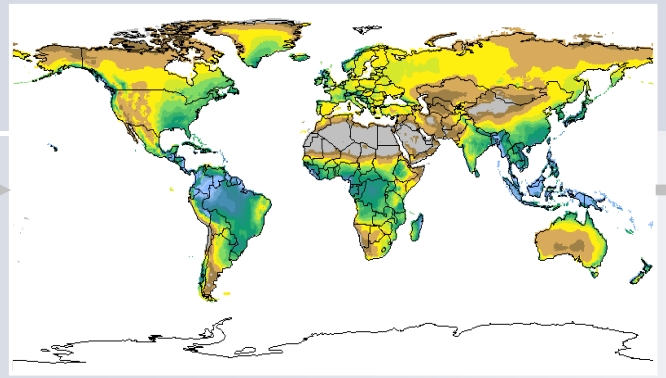
Second-generation

- **Herbaceous ligno-cellulosic plants**
  Miscanthus; Switchgrass; Reed canary grass
- **Woody ligno-cellulosic plants**
  Poplar; Willow; Eucalyptus

OFID study commissioned to IIASA



AgroEcological-SocioEconomic Assessment



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Climate model

Climate impact response relations

4

1

Development scenario

Production

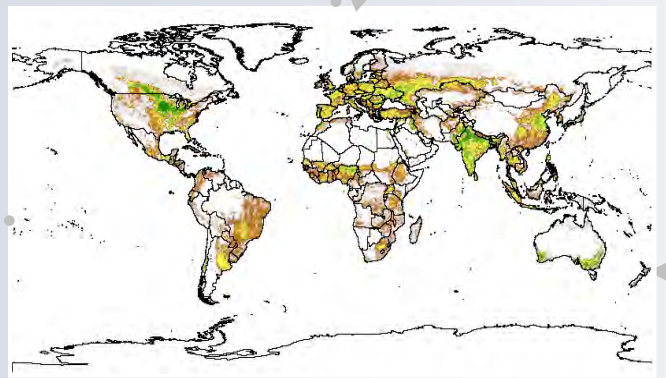
Demand

Trade

Global Food, Feed, Biofuels System

World Market

5



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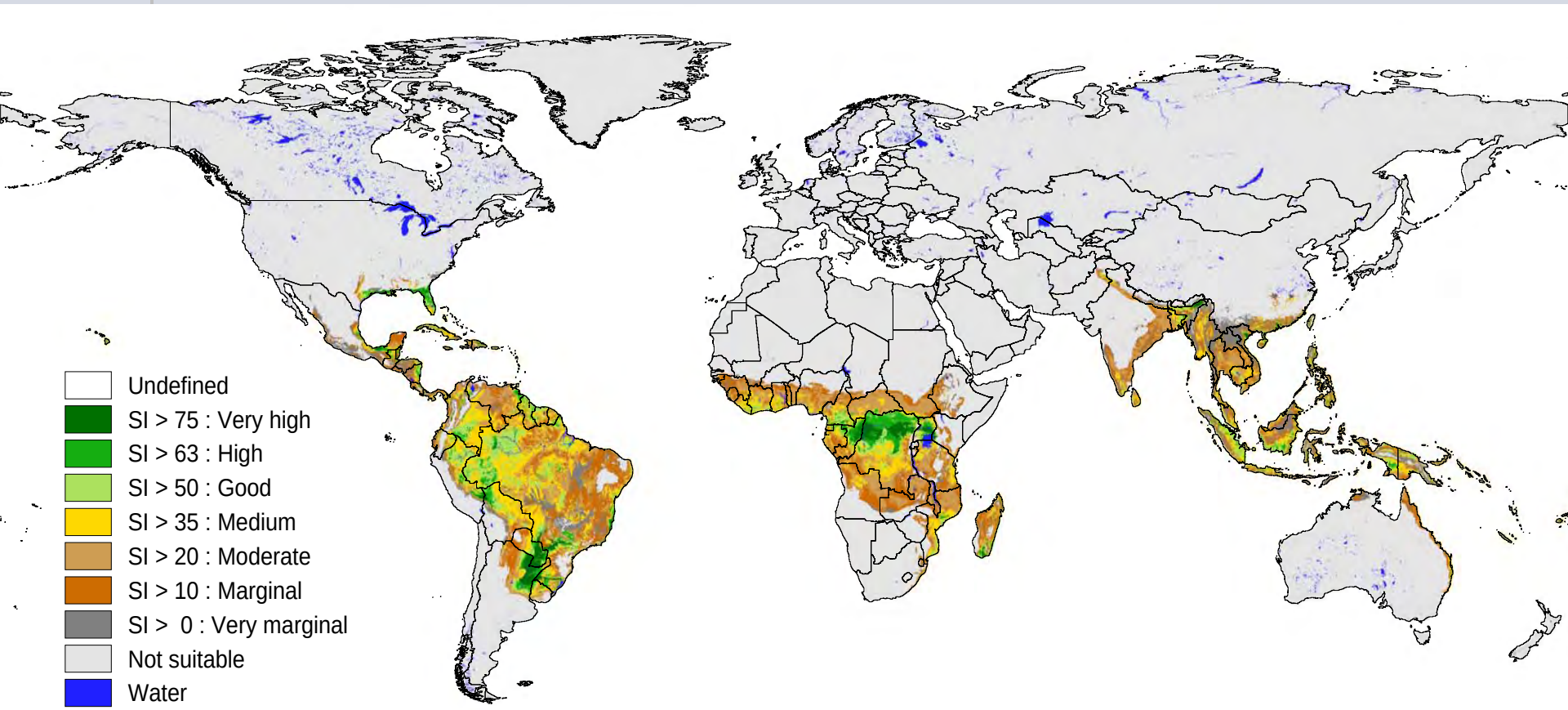
Suitability for rain-fed sugarcane production, high input level



Potential VS and S Land

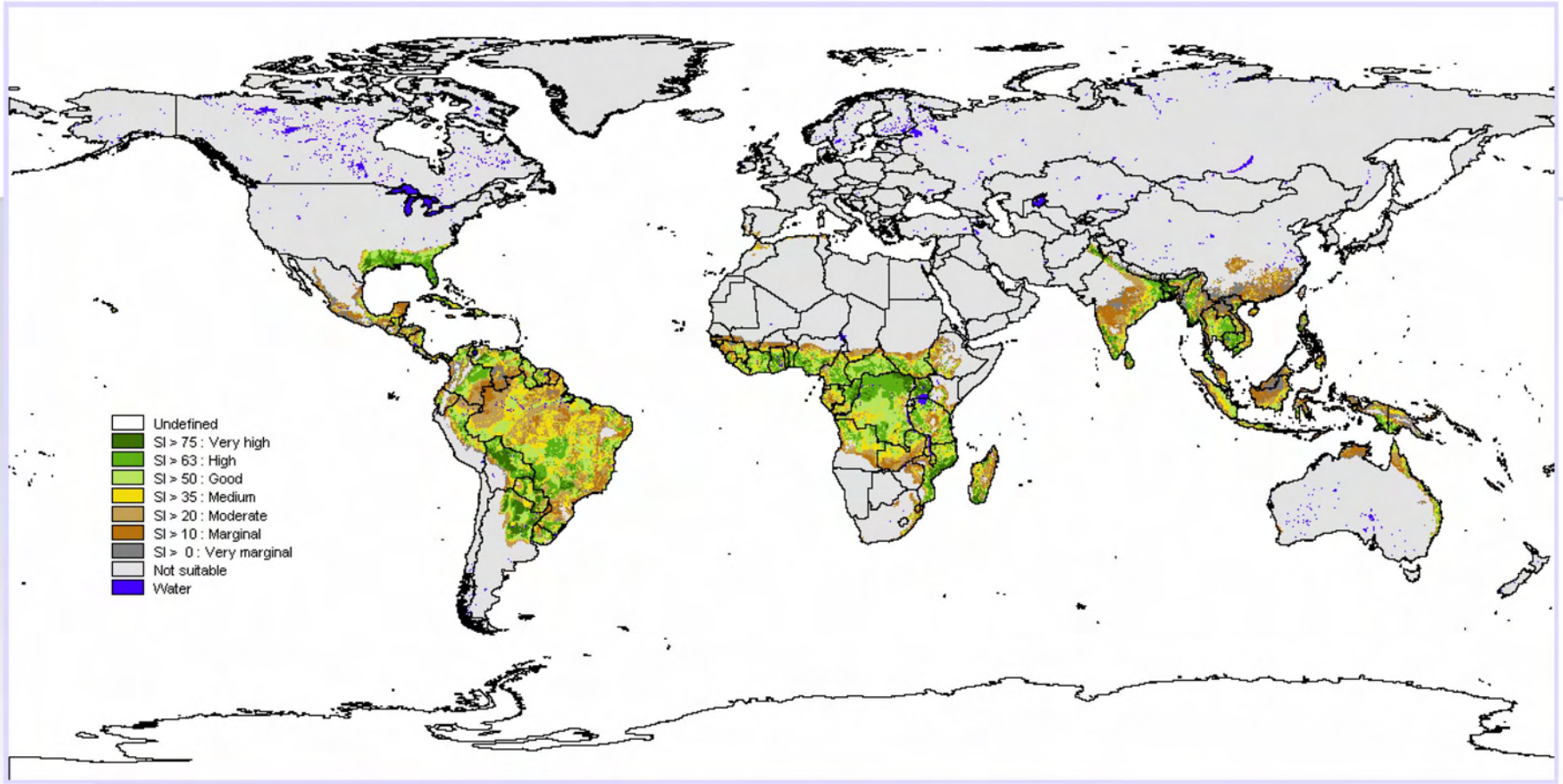
Current Land 65 Mill ha

Forests 159 Mill ha

Grasslands 74 Mill ha

Current Sugarcane Land 22 mill ha(Brazil + India 50%)

Suitability for rain-fed jatropha production

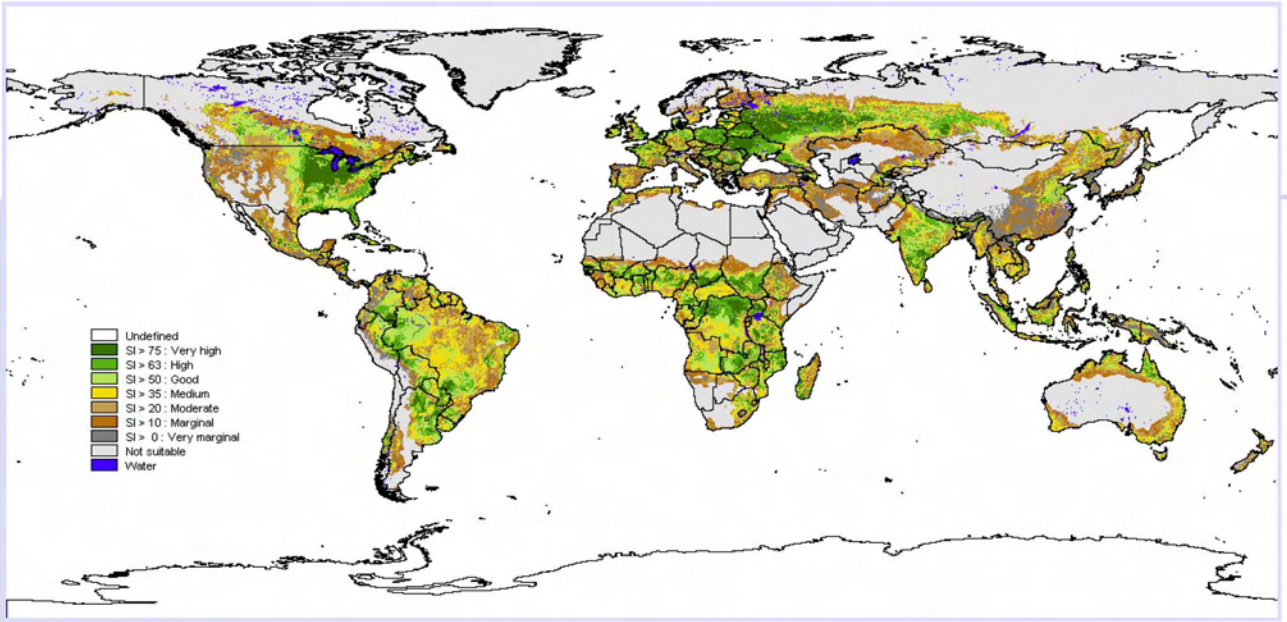


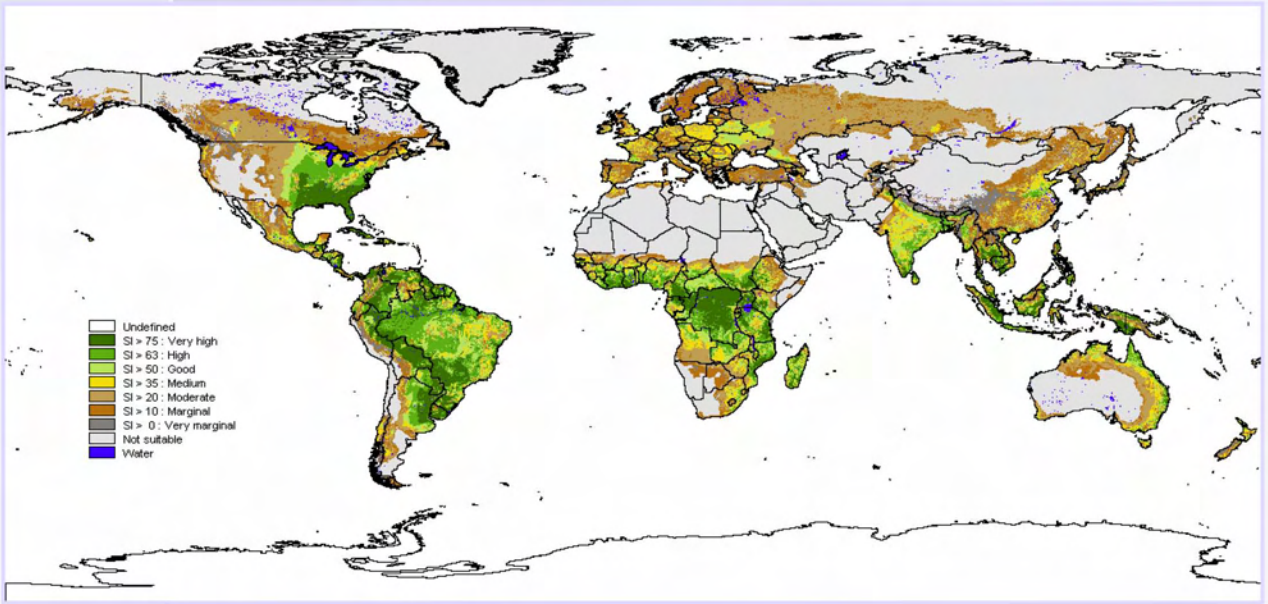
Potential VS and S Land Mill ha

Jatropha	Developed	Developing
Current Land	17	286
Forests	28	360
Grasslands	6	273
Current Land	-	1.5

Global Land Suitability for 1st and 2nd Gen. Biofuels

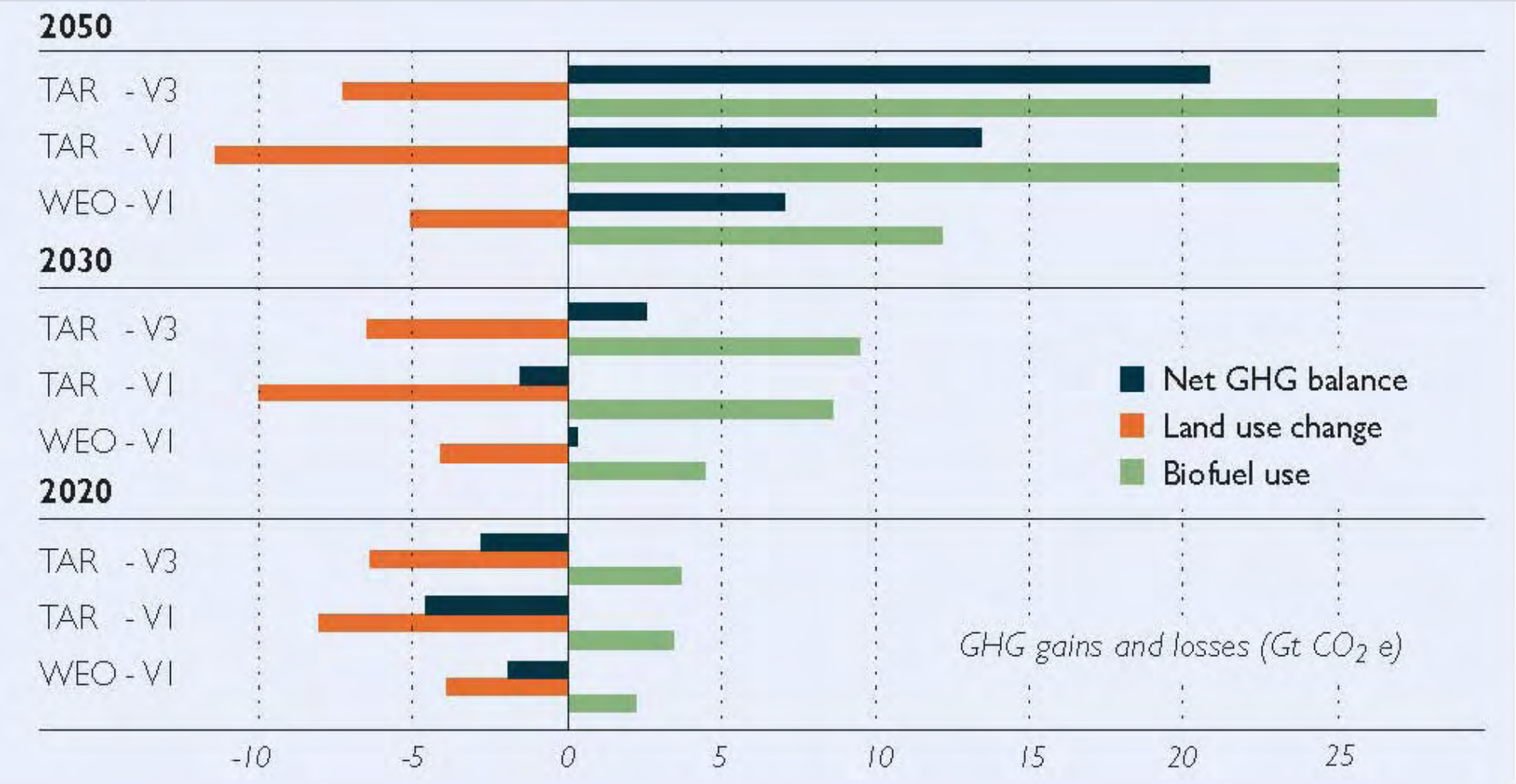
First Generation





Second Generation

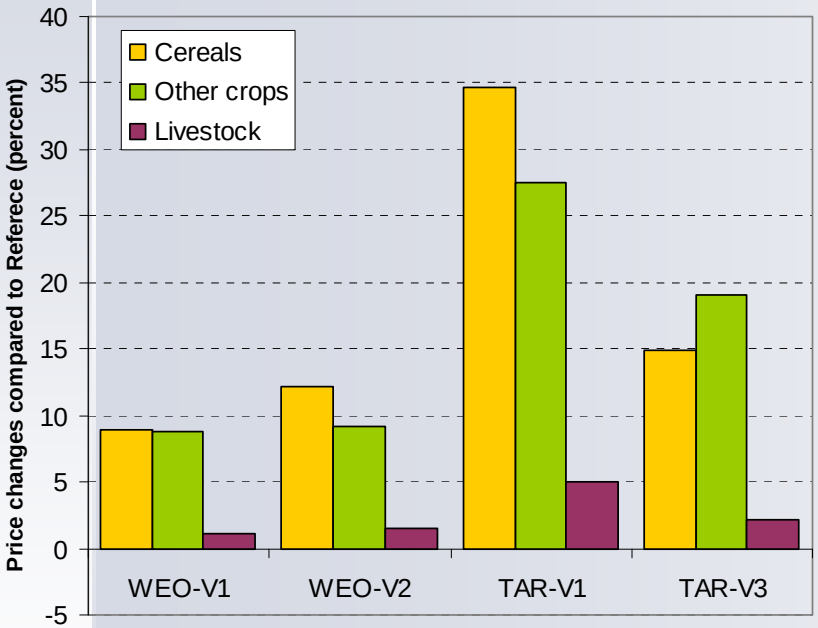
Net greenhouse gas savings achieved in selected scenarios

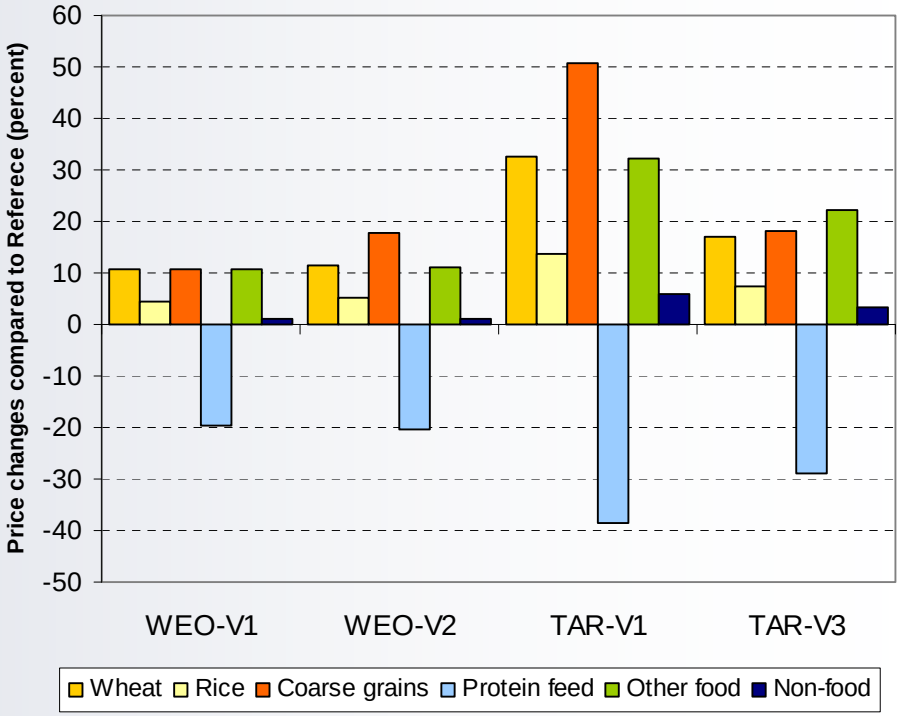


Note: computations for first-generation biofuels are based on greenhouse gas saving coefficients in Commission of the European Communities (2008) & IPCC Tier 1 approach for carbon losses due to land usechanges (IPCC, 2006). For second-generation biofuels a greenhouse gas saving of 85 percent was used.

Agricultural prices

Impact of first-generation biofuels on agricultural prices in 2020
Price changes compared to reference scenario





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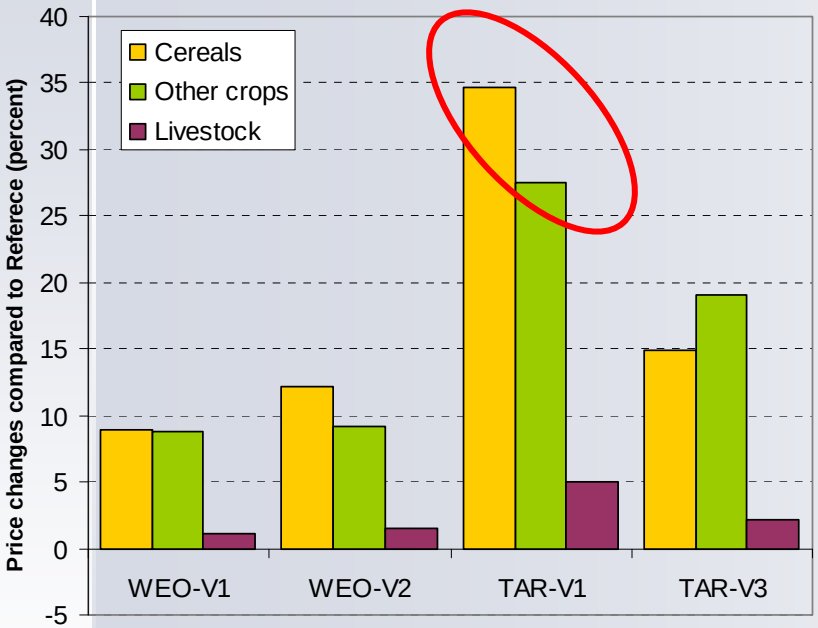

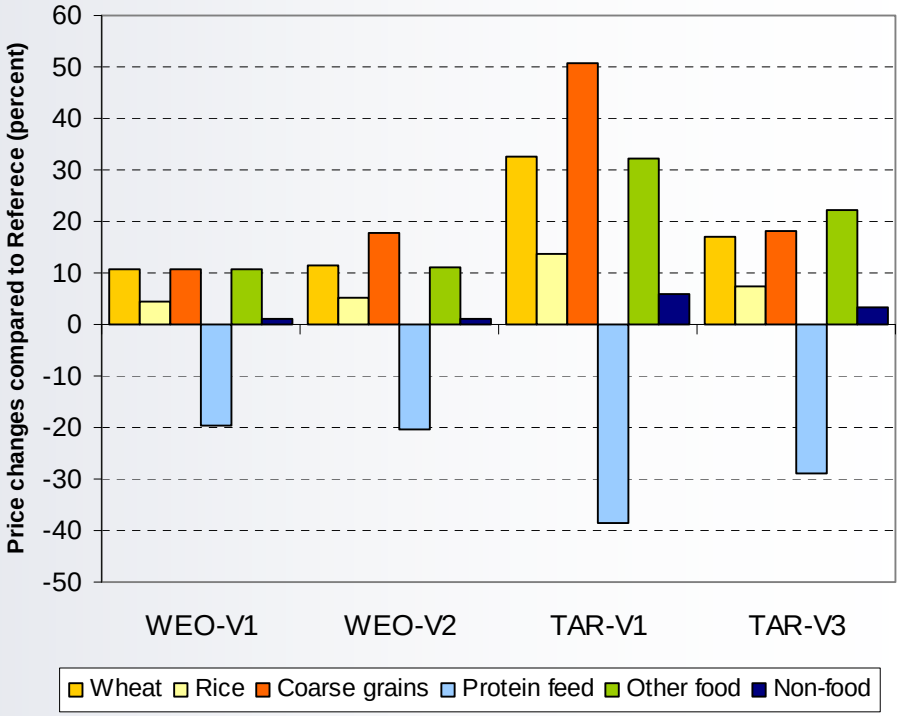

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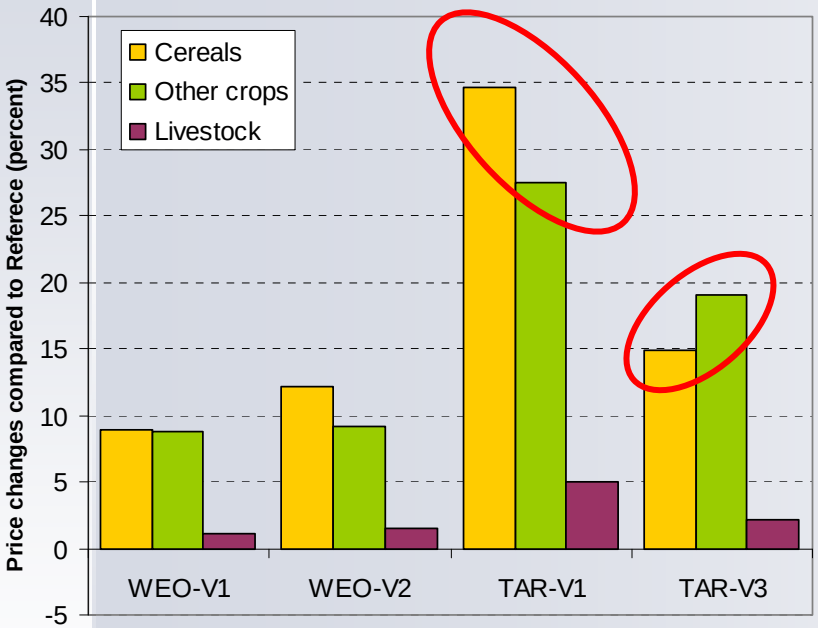

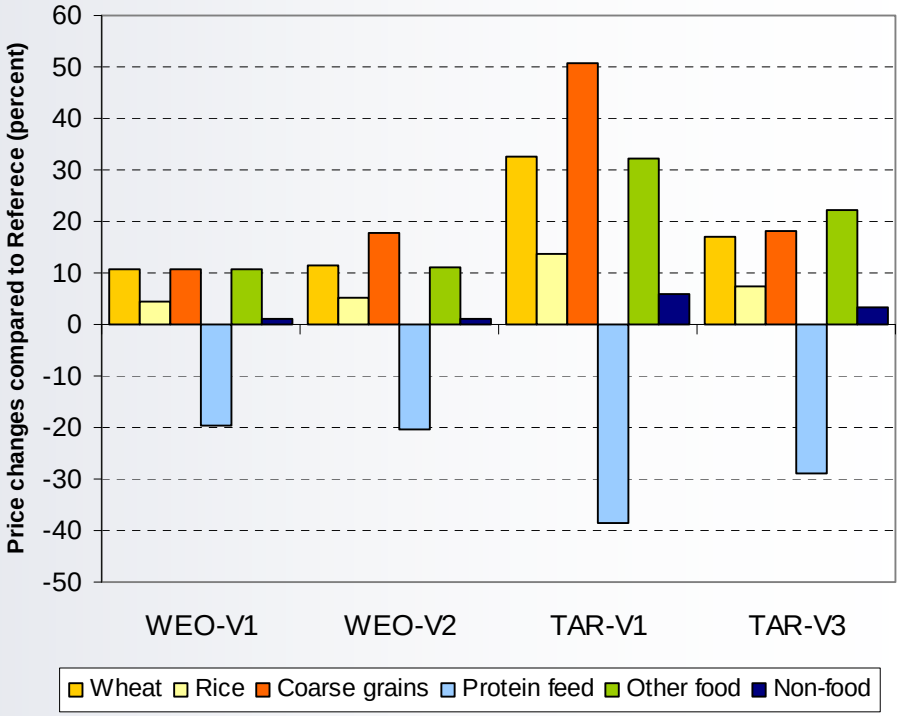

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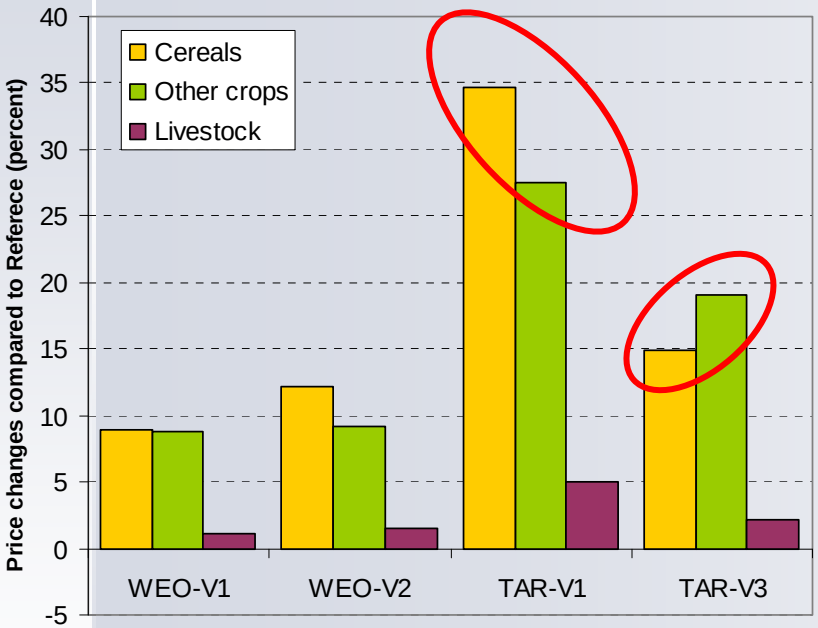
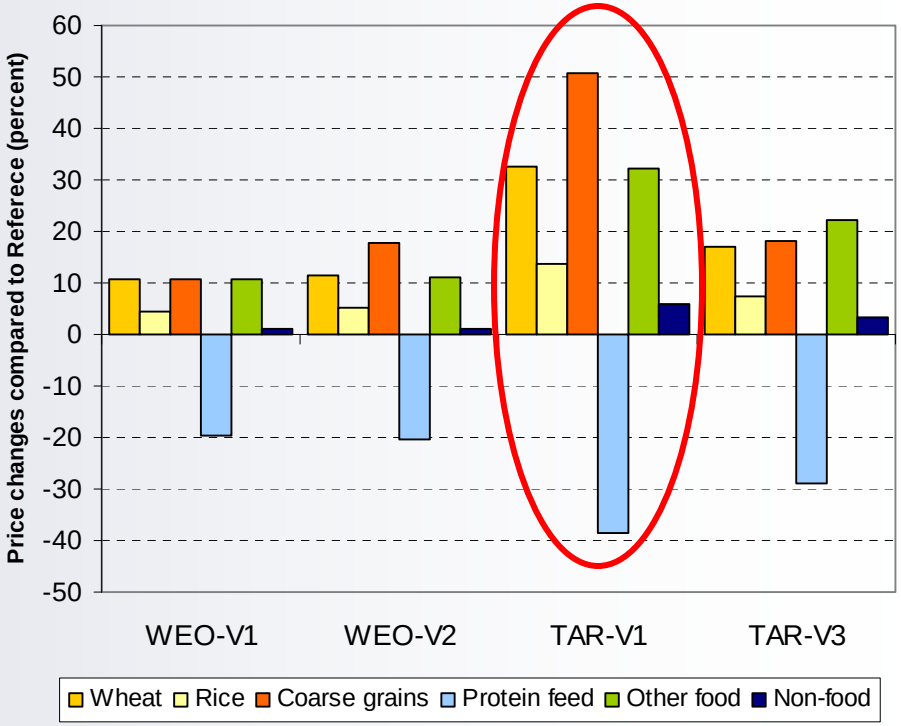
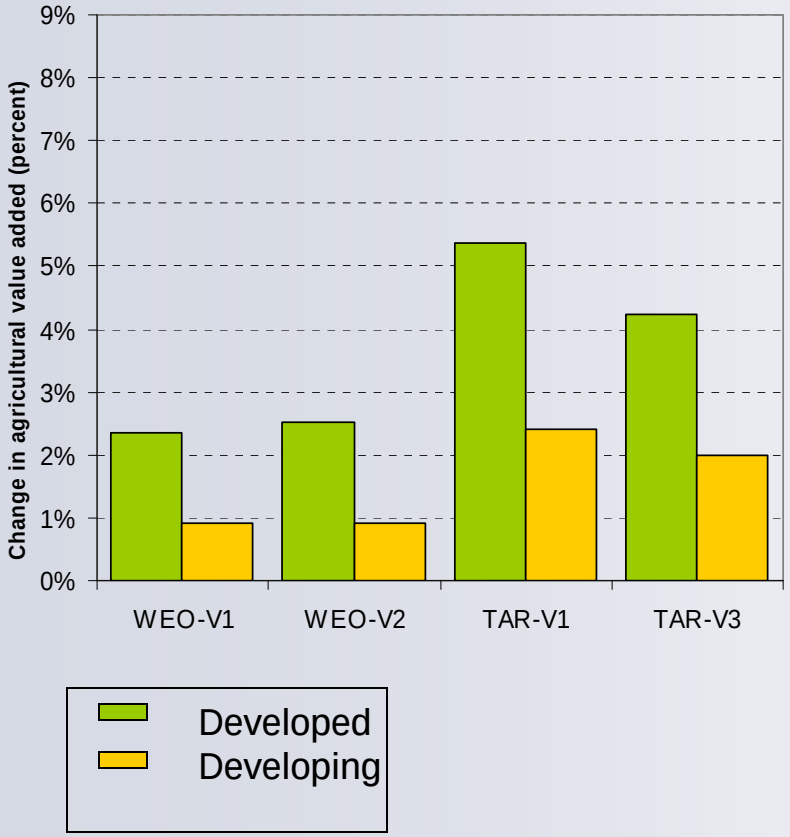




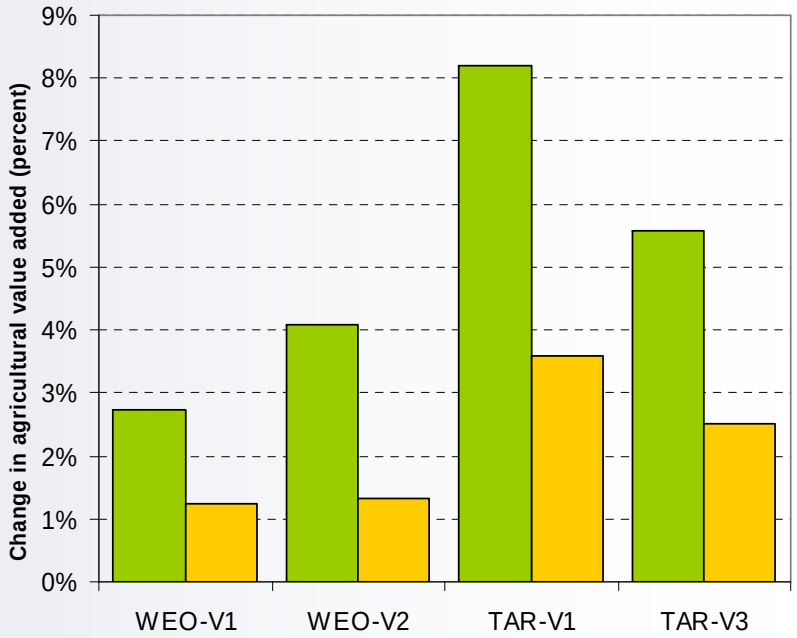
Impact on agricultural value added

Change relative to reference scenario

In 2020



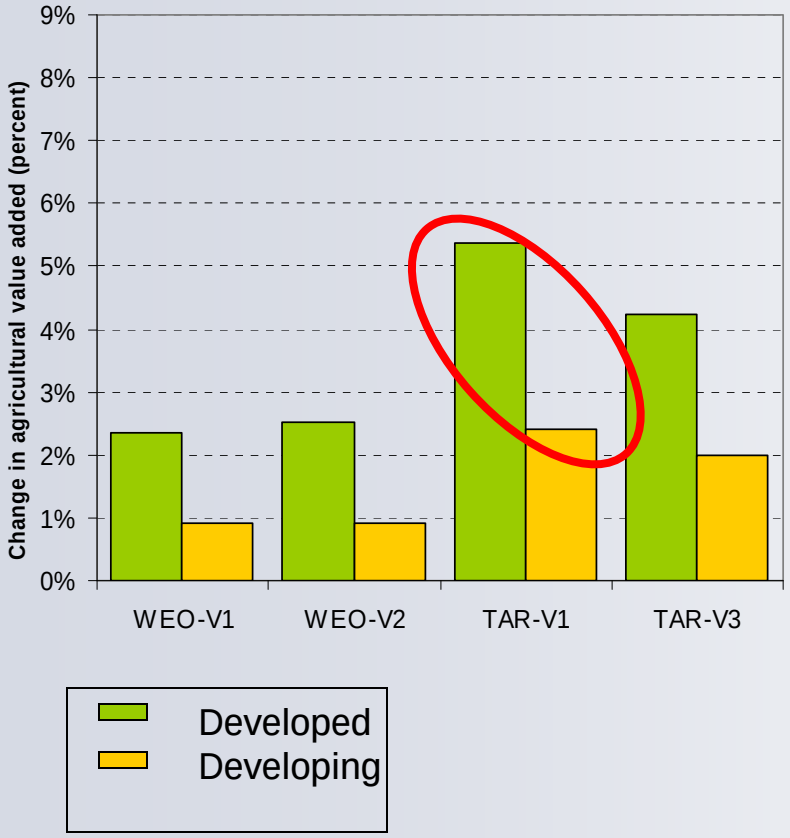
In 2030



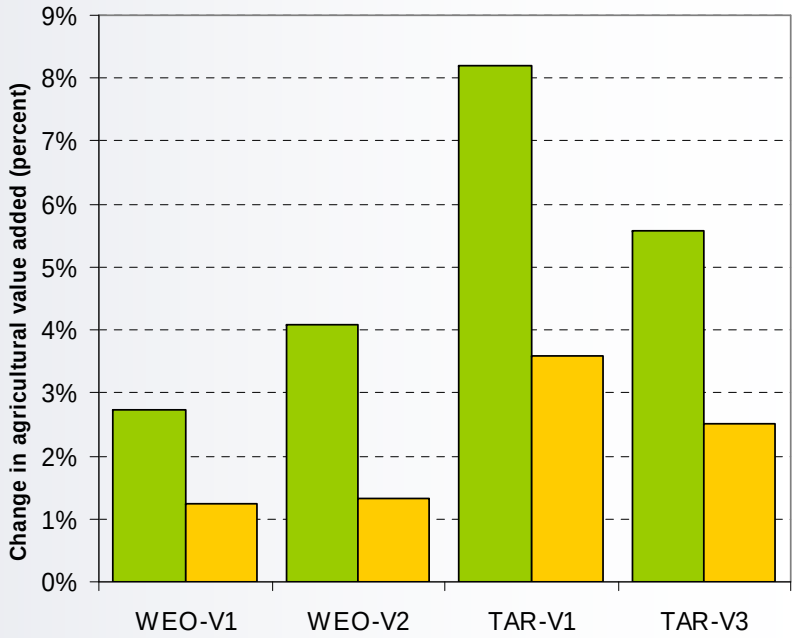
Impact on agricultural value added

Change relative to reference scenario

In 2020

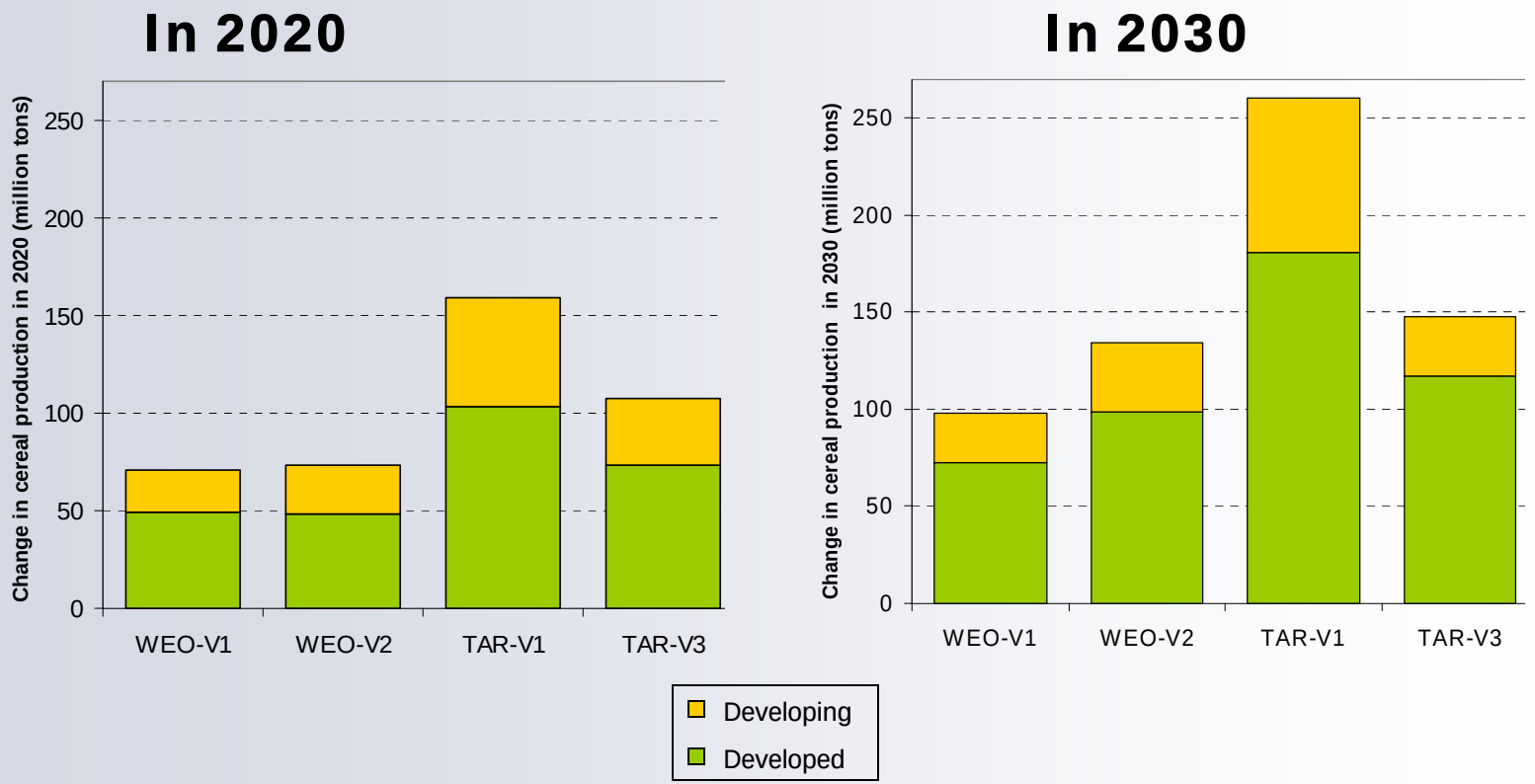


In 2030



Cereal production

Change in cereal production relative to baseline REF-01, in 2020



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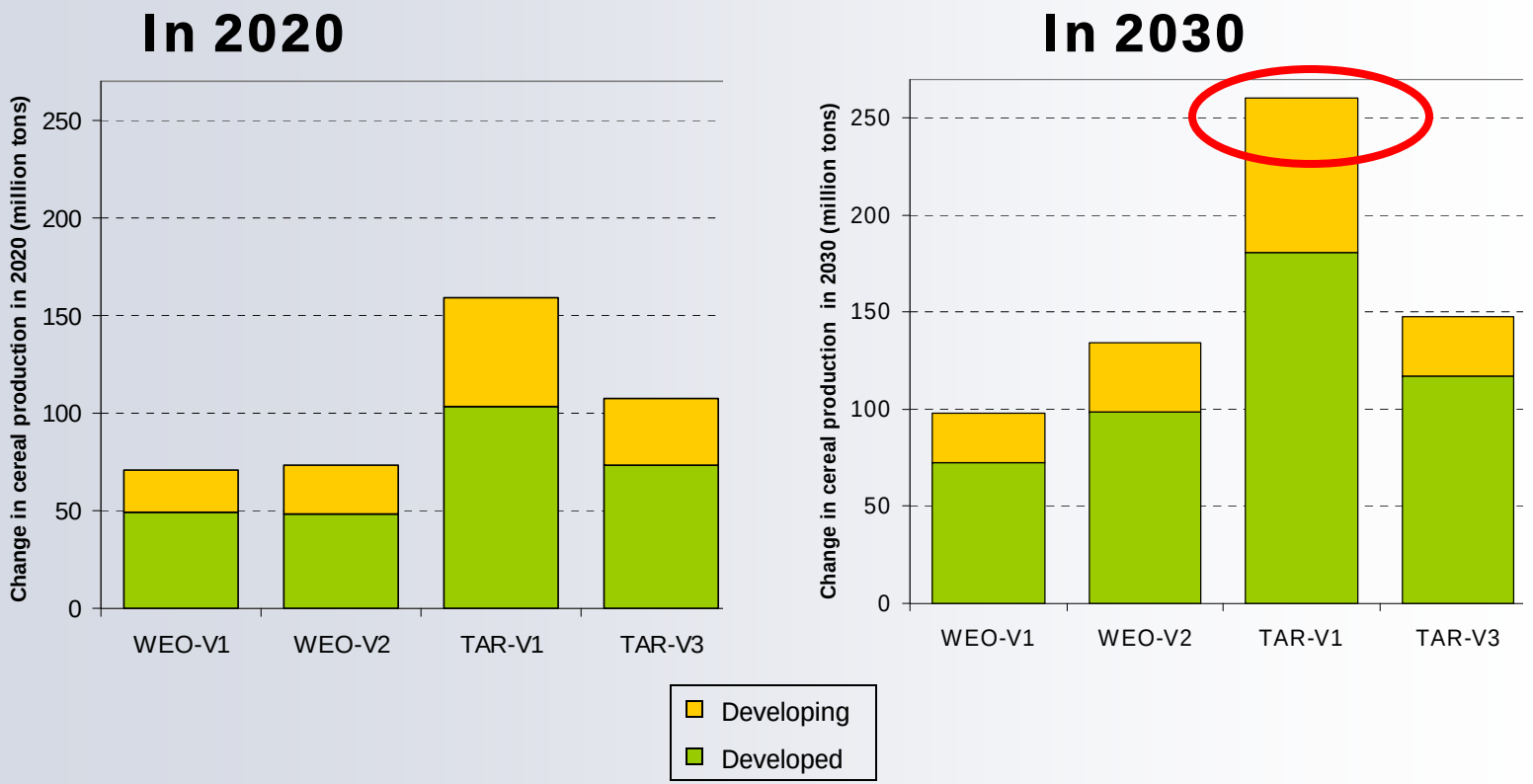

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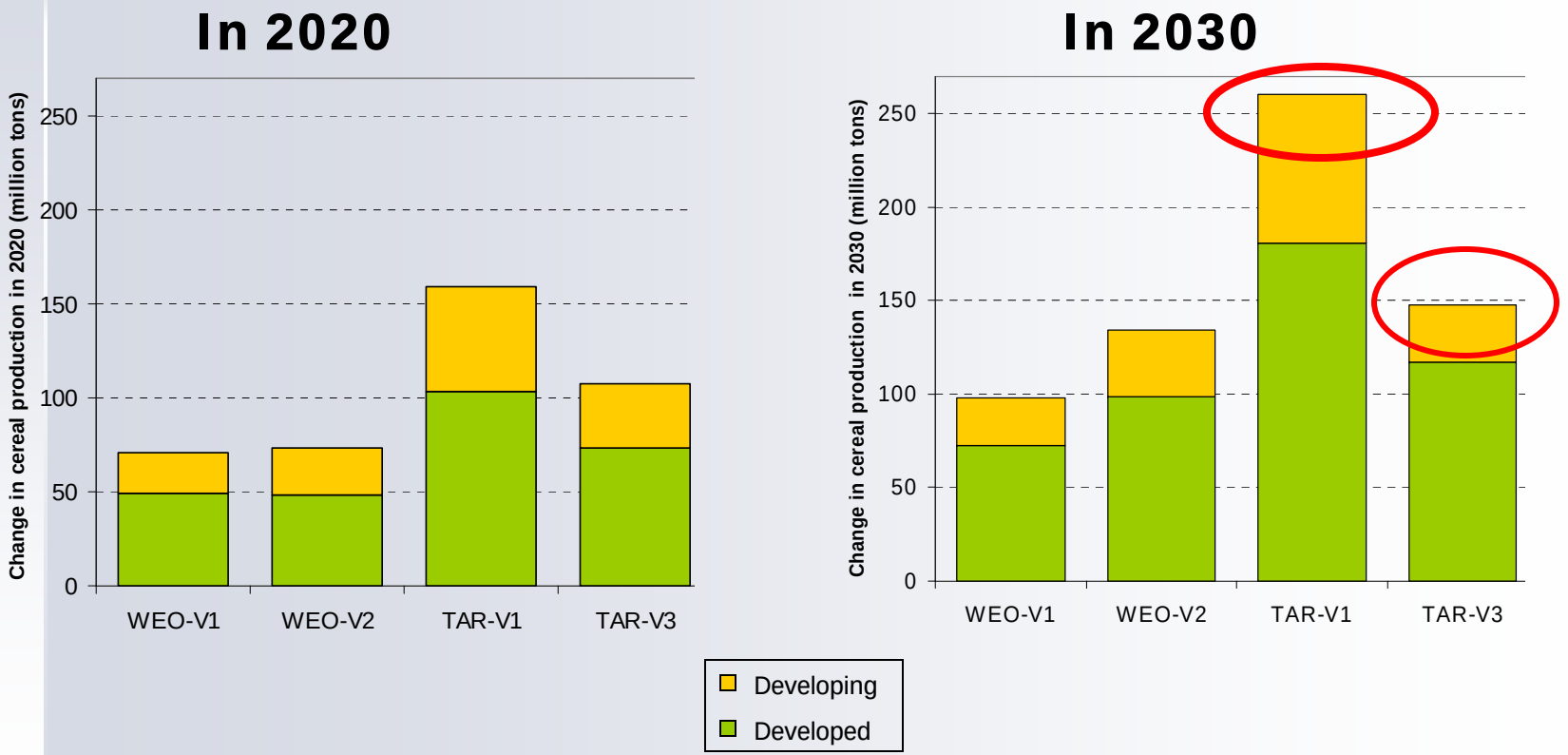
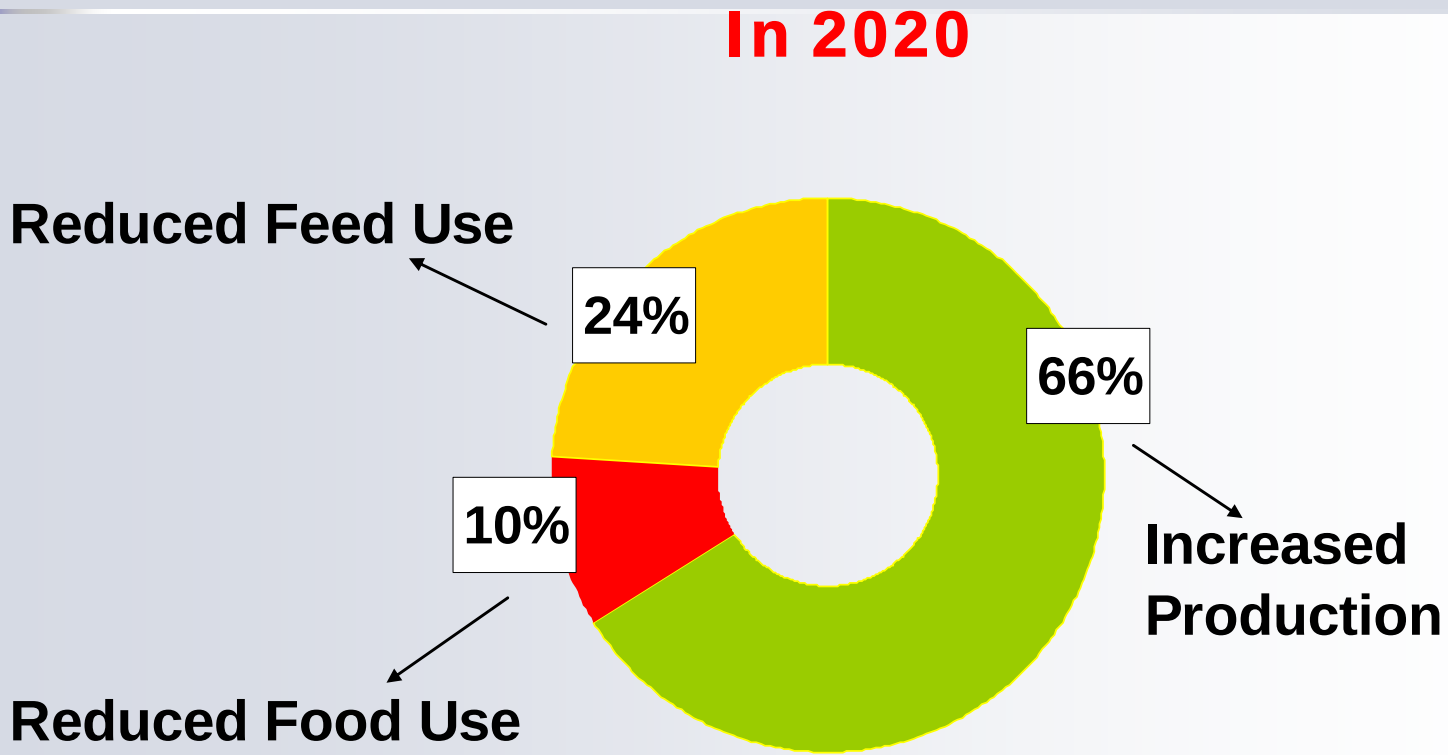


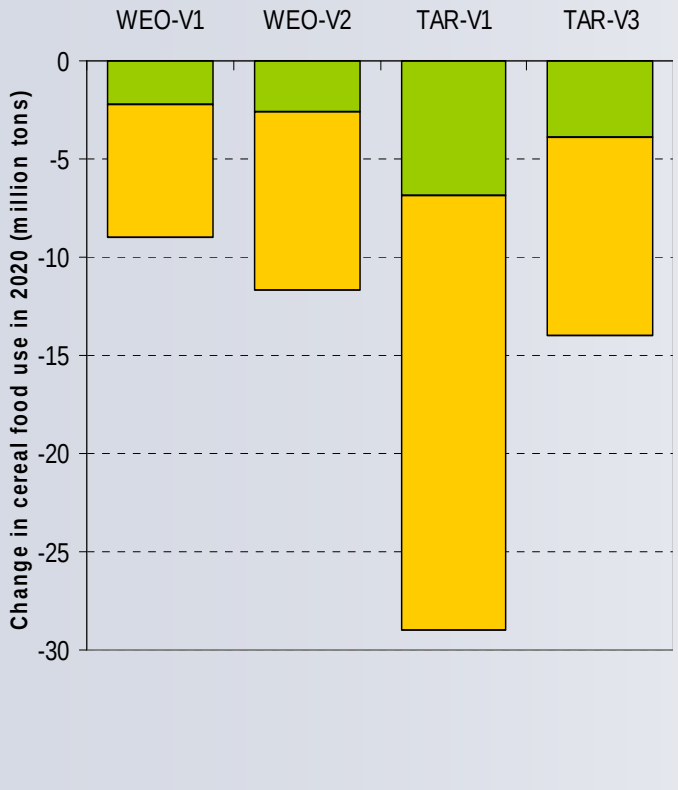
Where do the cereals needed for biofuel production come from?



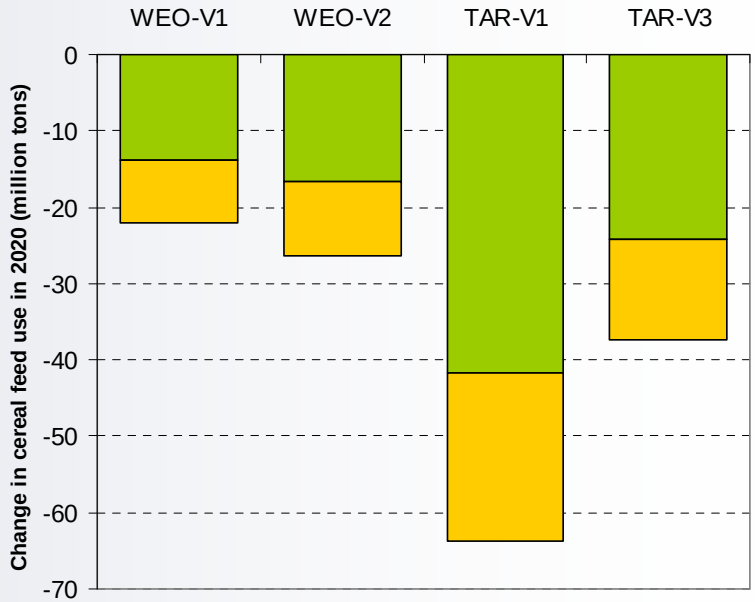
Food and feed consumption

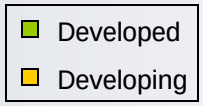
Change of cereal food and feed consumption relative to baseline REF-01, in 2020

Food



Feed





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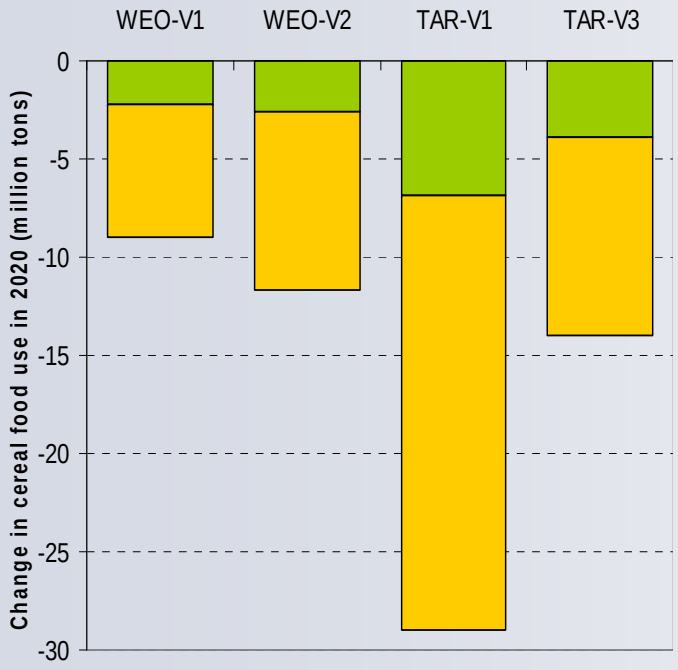
Food



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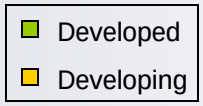

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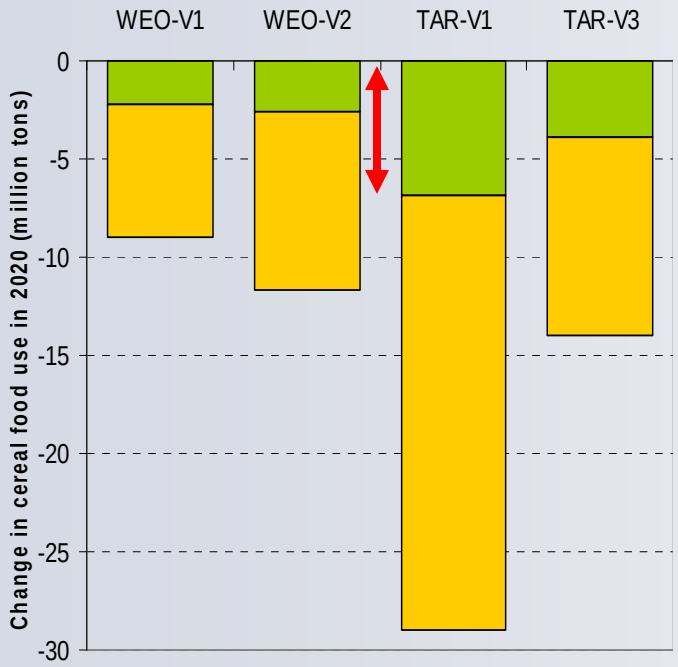

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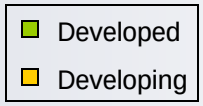
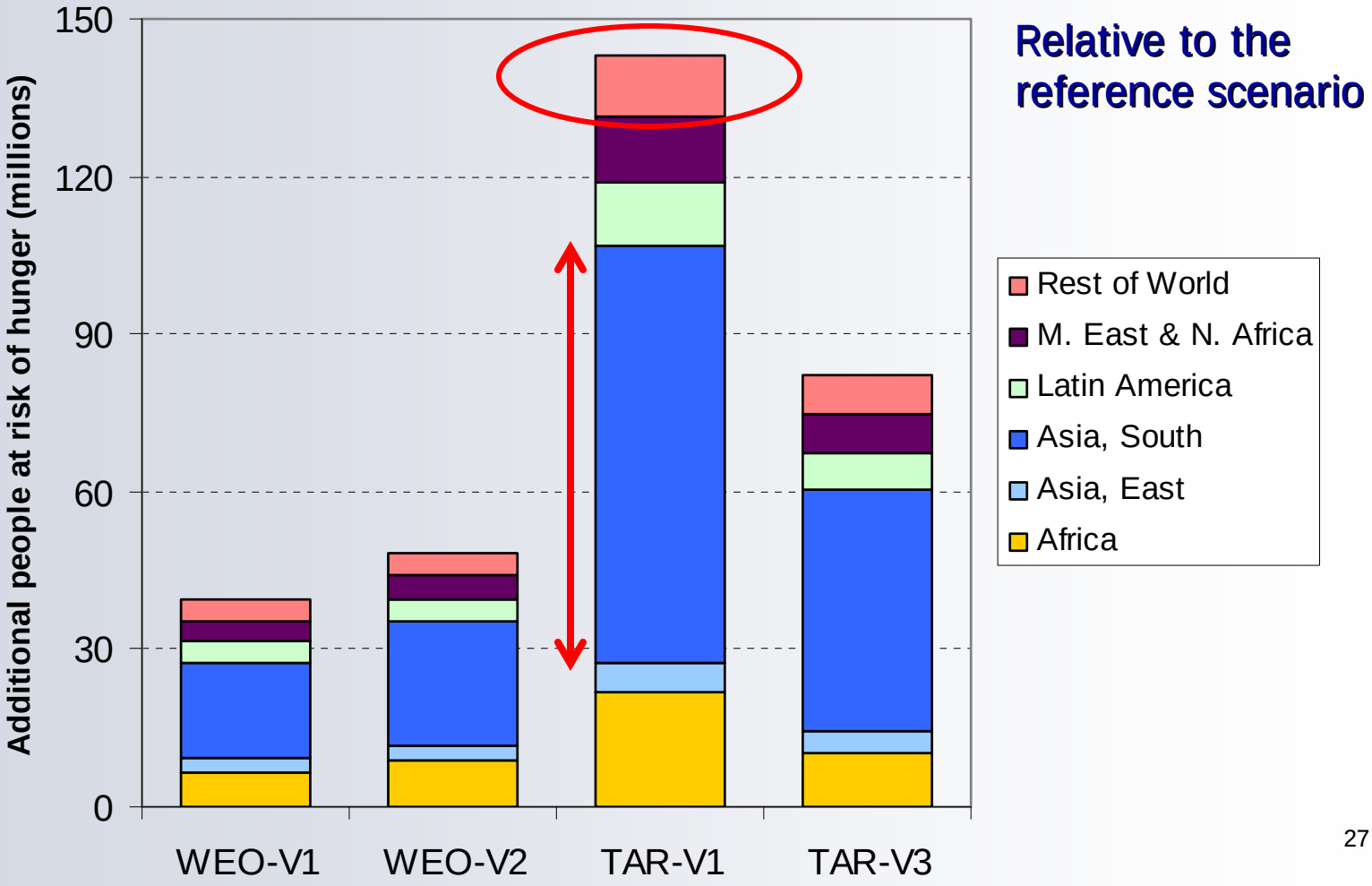
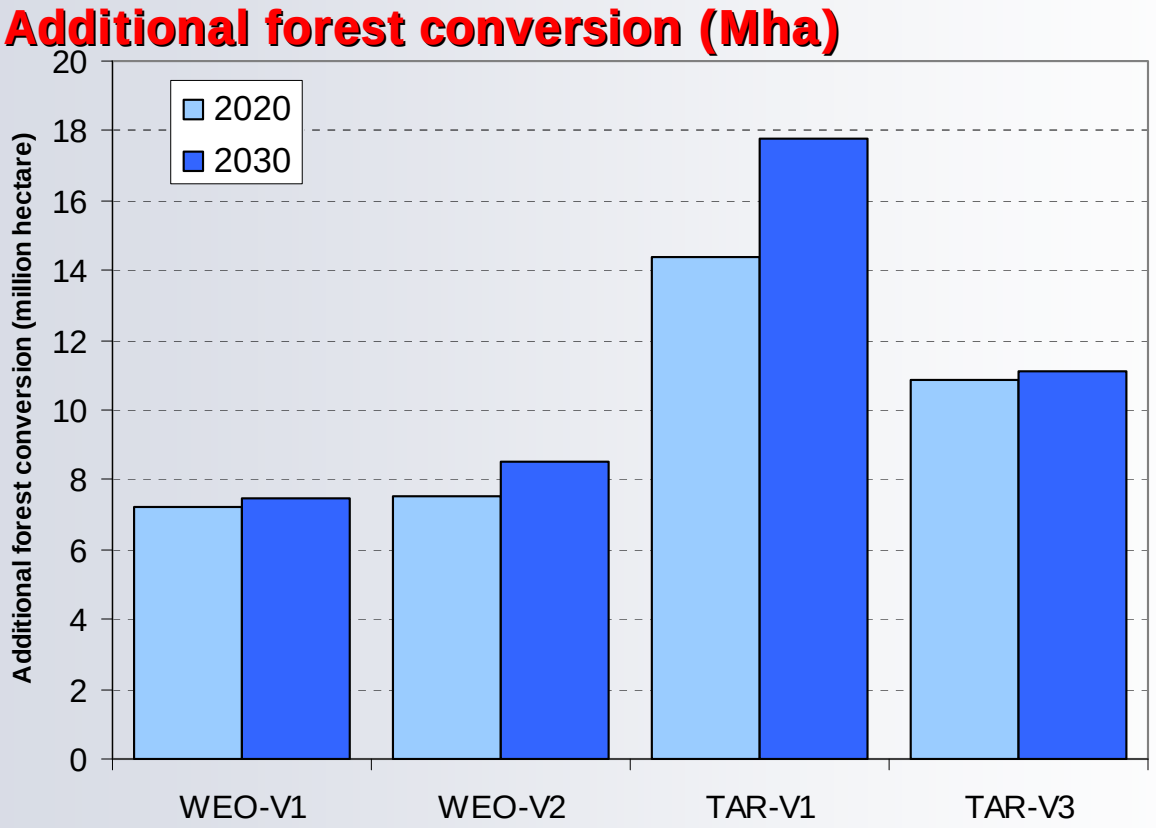


Additional number of people at risk of hunger in 2020



Deforestation



The study in a nutshell

Upwards Pressure on World Food Prices: **+ 30 to 50 %**

A Factor in Rising Hunger: **+ 140 million people**

Absorbing Cereal Production: **+ 260 million tons**

Benefits for Rural Development: **+ 3% to 8% GDPA**

Mitigating Climate Change: **12.4 Gt CO_2e; 50 years**

Competition for Arable Land: **+ 30 to 45 million ha**

Fueling Deforestation: **+ 15 to 18 million ha**

The Fertilizer Dilemma: **+ 10 million tons**

A Threat to Biodiversity **risks & opportunities**

Energy security ? **6 to 12 % in Transport Fuel**

Imperative for a transition from 1st to 2nd Generation Biofuels

The full OFID study prepared by IIASA is available upon request

info@ofid.org

***A summary is available on*:**

www.ofid.org

www. iiasa.ac.at