International Energy Agency
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The *How2Guide for Bioenergy* in the context of the IEA technology engagement

Expert workshop for the How2Guide for Bioenergy

27-28 November2014, Brazil

Simone Landolina and Anselm Eisentraut, IEA

www.iea.org

INTERNATIONAL LOW-CARBON ENERGY TECHNOLOGY PLATFORM

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Overview

- **Introduction**
  - The IEA worldwide engagement and the Technology Platform
  - *How2Guides*: concept and key elements
- **IEA analysis on Bioenergy**
  - Global Technology Roadmap for Heat and Power
  - Global Technology Roadmap for Biofuels
- ***How2Guide for Bioenergy***
  - Structure and approach
  - Previous regional events
  - Closing remarks

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The 3 ‘E’s of Sound Energy Policy

- Energy security
- Economic growth
- Environmental sustainability

And a fourth ‘E’

- Engagement worldwide

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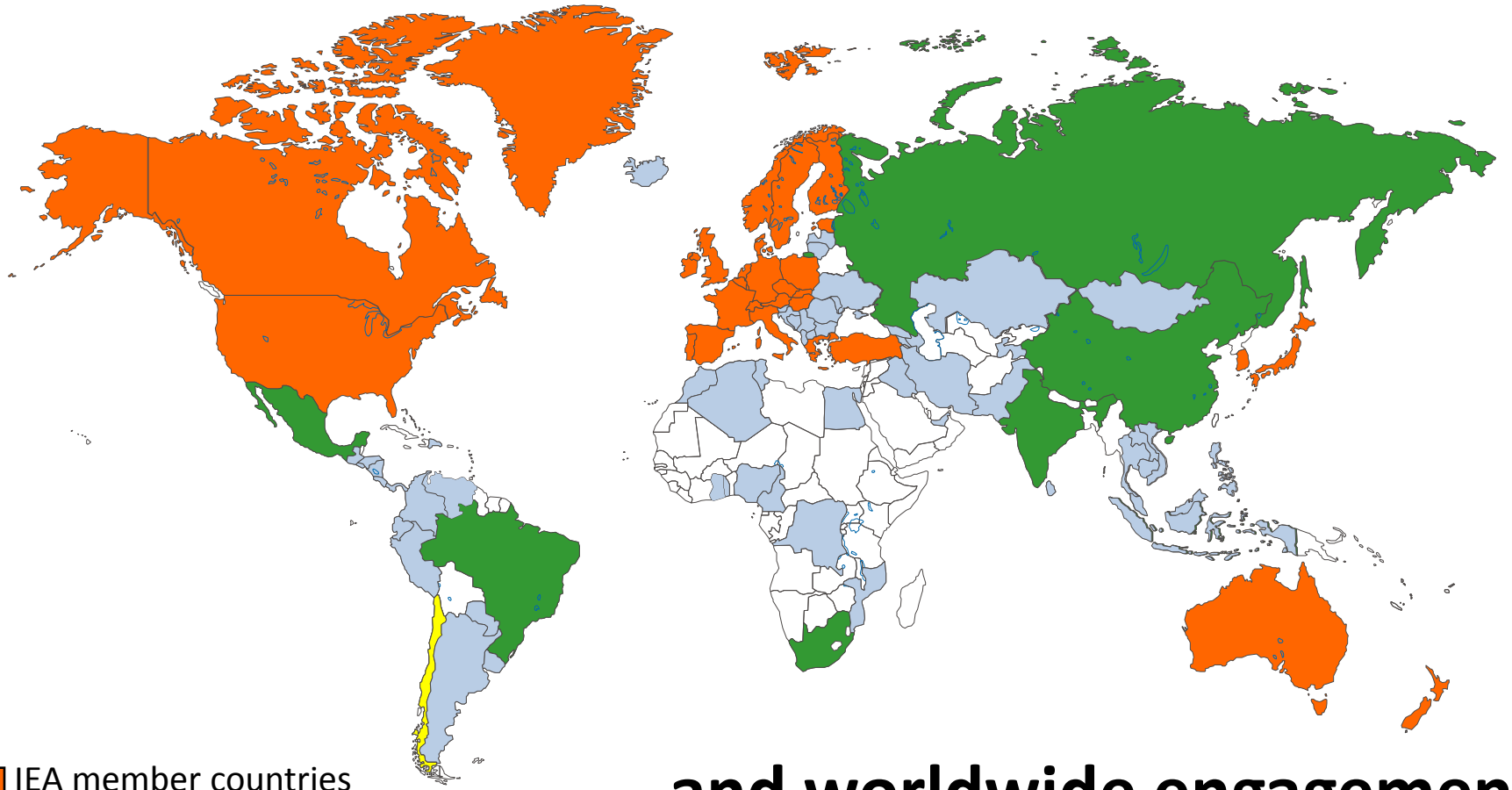
IEA Member countries…



- IEA member countries
- Accession countries
- Key Partner countries
- Countries co-operating through IEA programmes

…and worldwide engagement

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International Low-Carbon Energy Technology Platform

- Operative since 2010 upon mandate of the IEA Ministers to foster international collaboration on low-carbon energy technologies
- **First event was the Sustainable Hydropower Conference in Rio de Janeiro, Brazil (23-24 Nov 2010)**

Mission:

- Disseminating IEA analysis and policy recommendations aimed at accelerating the deployment of low-carbon energy technologies, in line with 2DS efforts
- Enhancing multilateral engagement with emerging and developing economies

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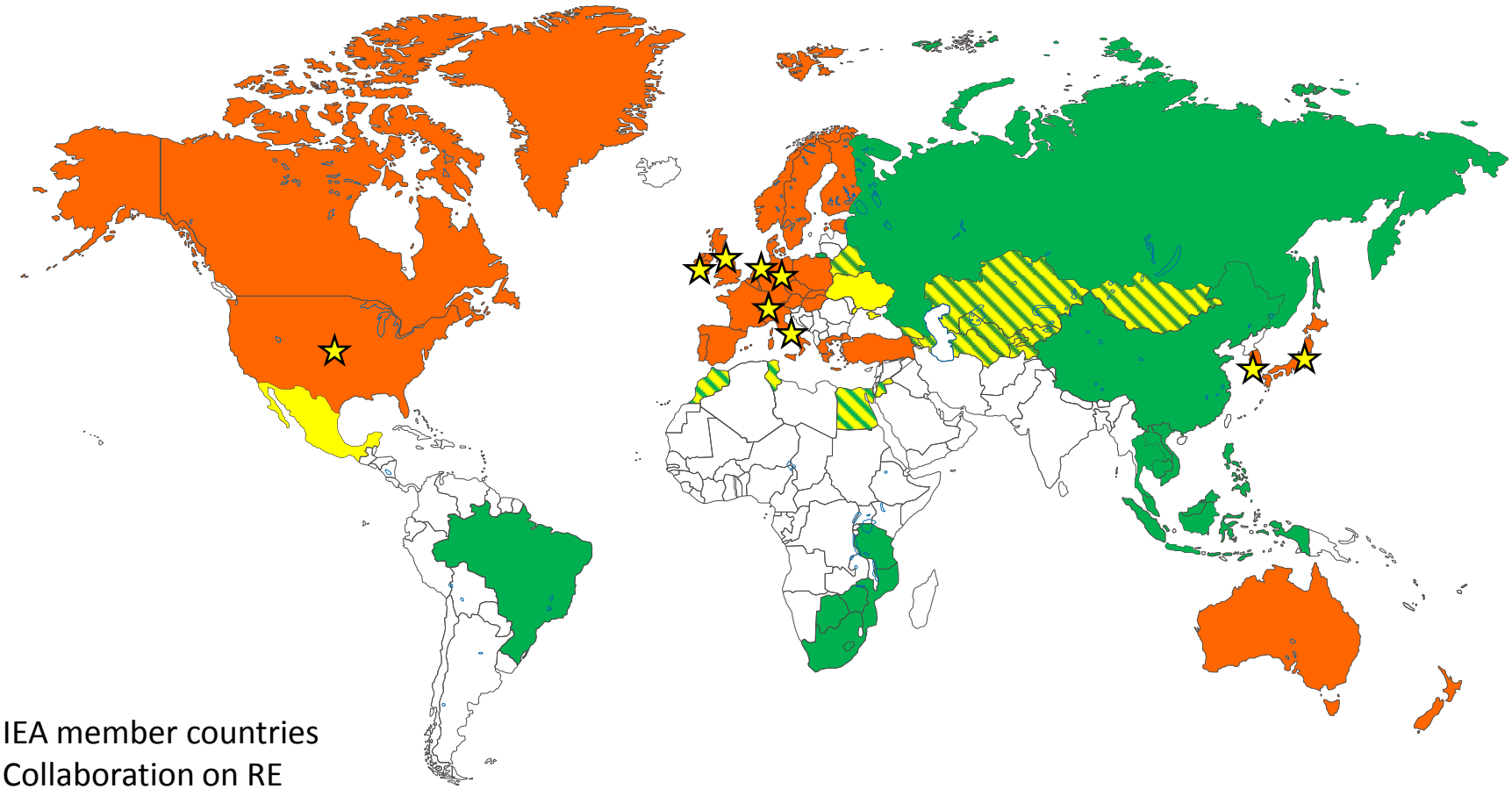
2013-2014

Overview of activities by geographic and technology scope



- IEA member countries
- Collaboration on RE
- Collaboration on EE / smart grids
- Collaboration on RE and EE/SG
- Funding countries / partners

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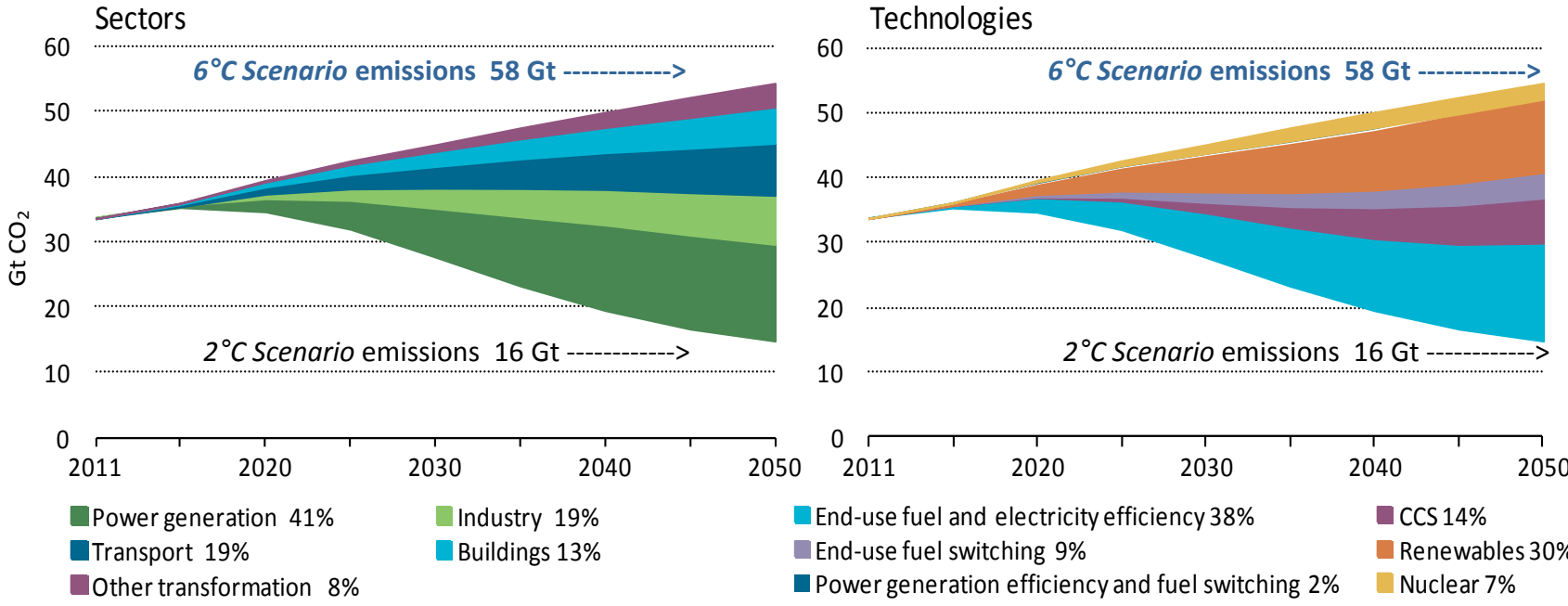
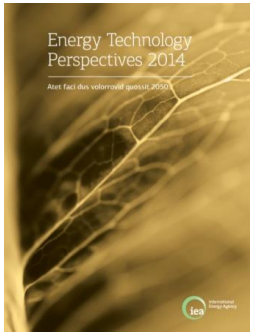
Key technologies for reducing global CO2 emissions



Source: Energy Technology Perspectives 2014



- 6°C Scenario – business-as-usual; no adoption of new energy and climate policies
- 2°C Scenario - energy-related CO2-emissions halved by 2050 through CO2-price and strong policies

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Technology roadmaps provide answers

- **Where is technology today?**
  - GW installed capacity/kWh of savings
  - Leading countries/regions
  - Cost, efficiency
- **What is the deployment pathway needed to achieve 2050 goals?**
  - Use IEA Energy Technology Perspectives 2DS
- **What are the priority near-term actions?**
  - R&D gaps and how to fill them
  - Identify barriers and obstacles and how to overcome
  - Market requirements and policy needs

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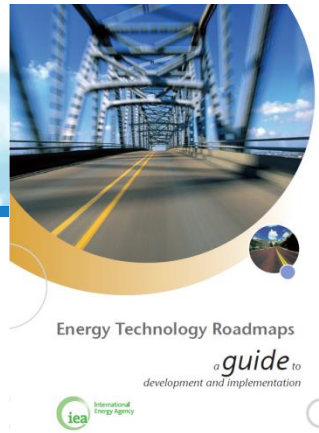
How2Guides: concept

- Building on the IEA global series of technology roadmaps (20+ publications) and IEA established roadmap methodology (updated 2014)

- Growing interest of Partner Countries for collaboration and IEA desire to scale-up capabilities to provide support for national roadmap development

- How2Guides are a response to this context:

Manuals for policy and decision makers to develop and implement technology roadmaps tailored to national / regional frameworks



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How2Guides

National / regional roadmaps can be powerful tools:

- Aligning interests and expectations of diverse stakeholders
- Identifying steps and timing needed to achieve a chosen future
- Generating buy-in and support that leads to real action
- Monitoring progress against milestones and adjusting the plan as needed

Work streams

- *How2Guide for Wind Energy* (released on 10 March 2014)
- ***How2Guide for Bioenergy*** (expected H1 2015)
- *How2Guide for Smart Grids* (expected in 2015)

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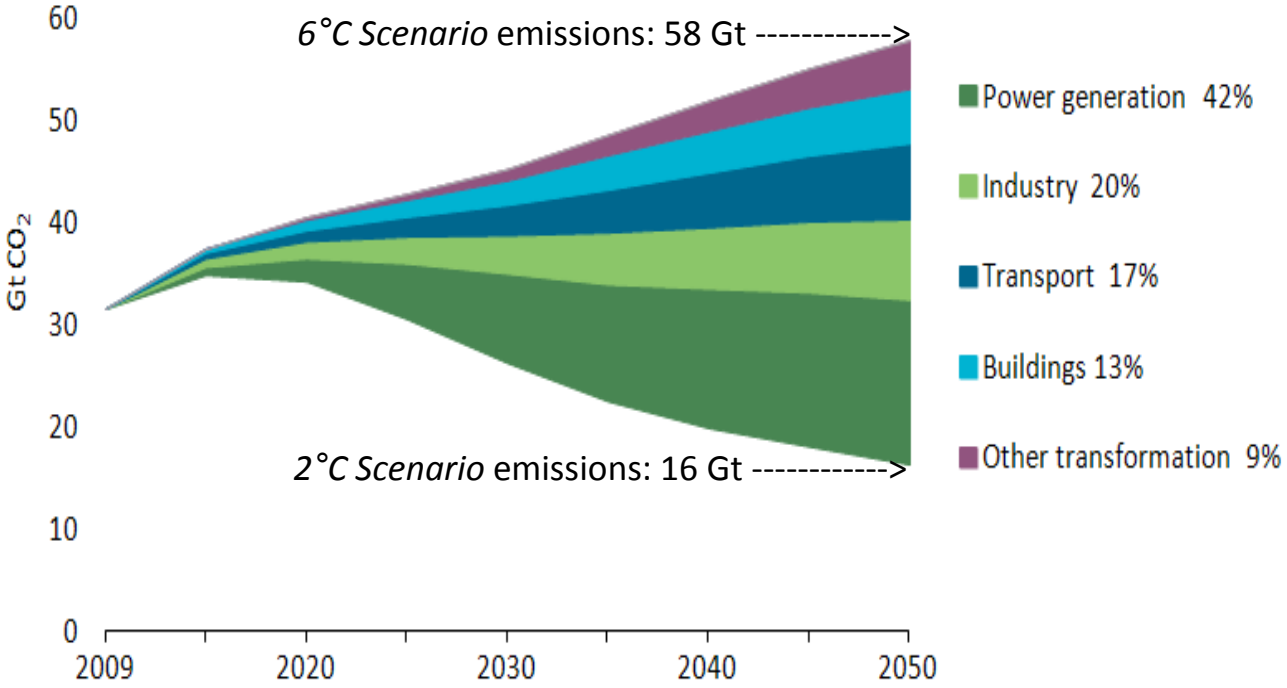
Key role of bioenergy in a low-carbon future



Bioenergy technologies	Emissions reduction in 2050
Bioenergy power	1.0 Gt $CO_{2\text{-eq}}$
Bio-power + CCS	0.3 Gt $CO_{2\text{-eq}}$
Bioenergy heat (industry)	0.5 Gt $CO_{2\text{-eq}}$
Bioenergy heat (buildings)	0.1 Gt $CO_{2\text{-eq}}$
Biofuels	2.1 Gt $CO_{2\text{-eq}}$
Total	**4.1 Gt $CO_{2\text{-eq}}$**

Source: Energy Technology Perspectives 2012

- Reaching the 2DS will require **42 Gt CO_2 annual emissions reduction** by 2050
- Biomass is the only renewable energy source that can make a contribution in all sectors, providing **around 10% of total CO2 emissions reduction**

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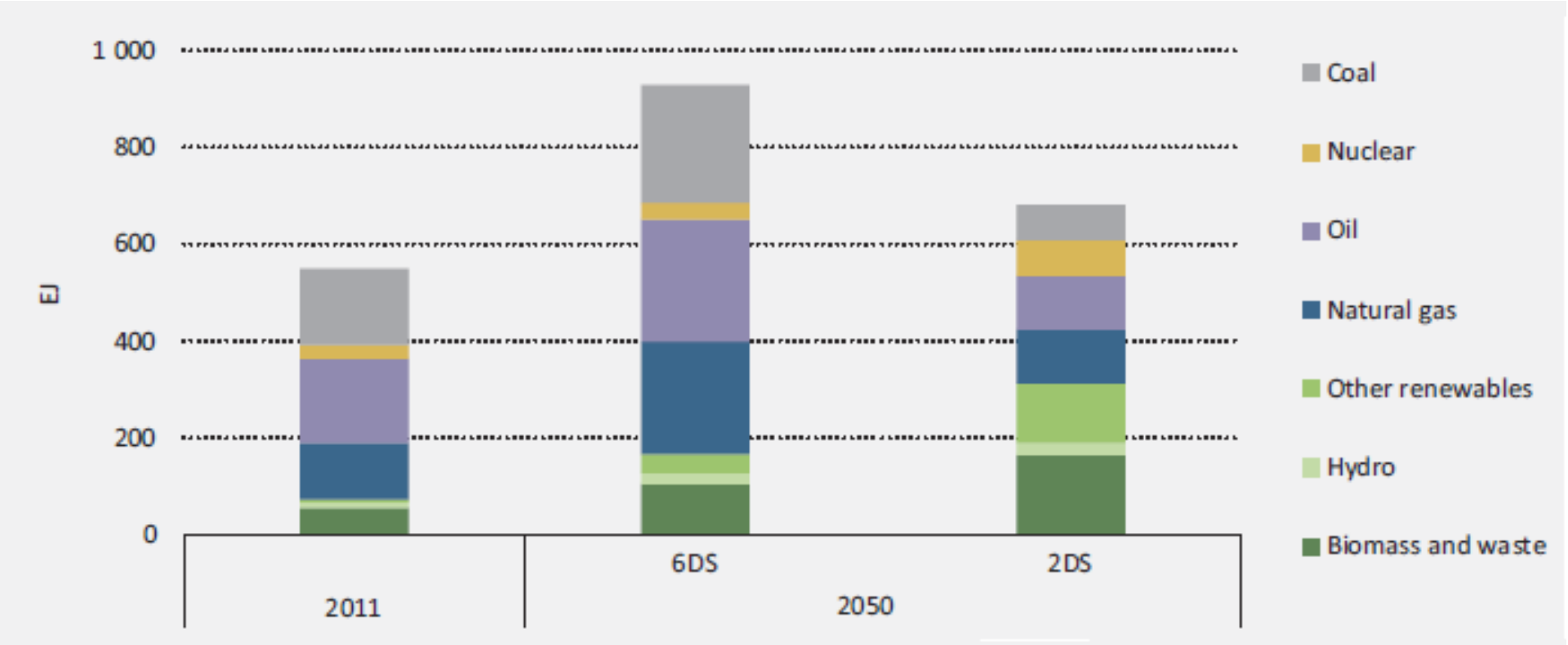
Biomass becoming largest primary energy source in in the 2 Degree Scenario



In the 2DS, biomass (and wastes) contribute one quarter of primary energy supply in 2050

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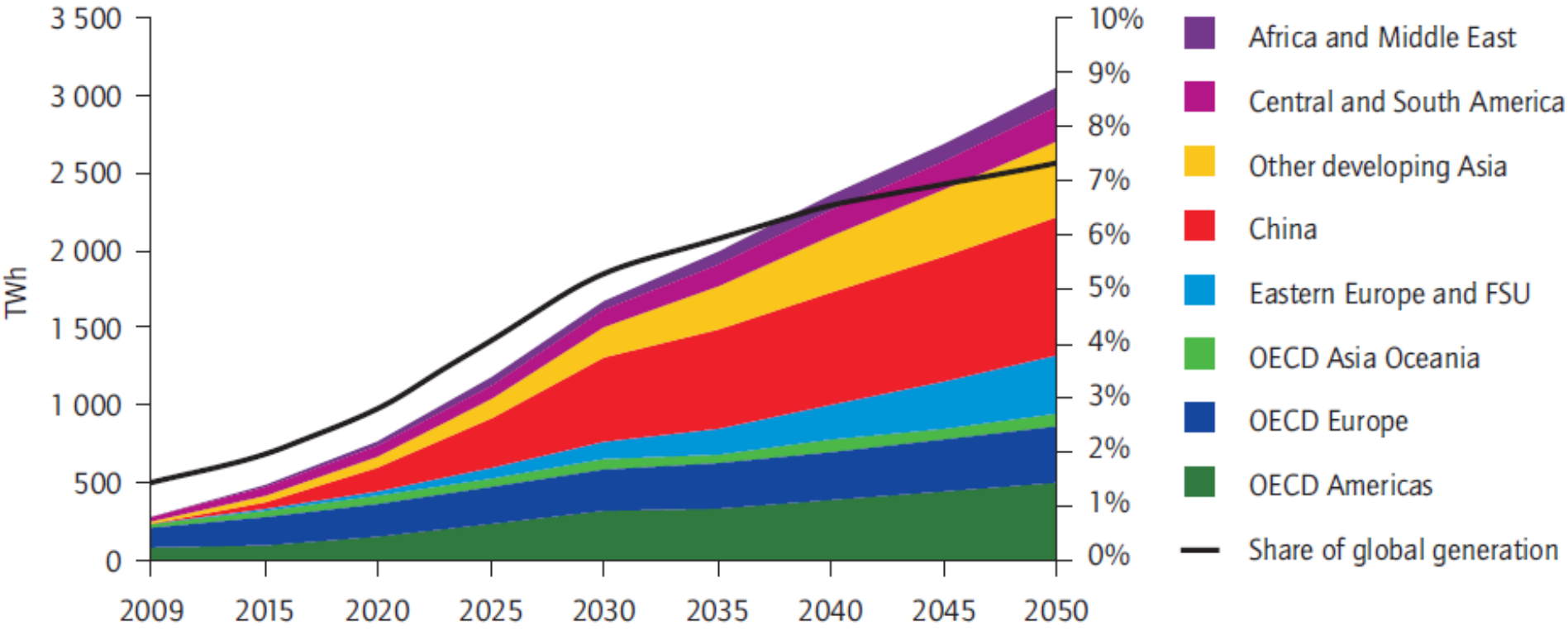
World bioenergy electricity supply to grow more than ten-fold



- **Share in total electricity generation increases from 1.5% today, to 7.5% in 2050**
- **Bioenergy provides firm capacity and dispatchable electricity**

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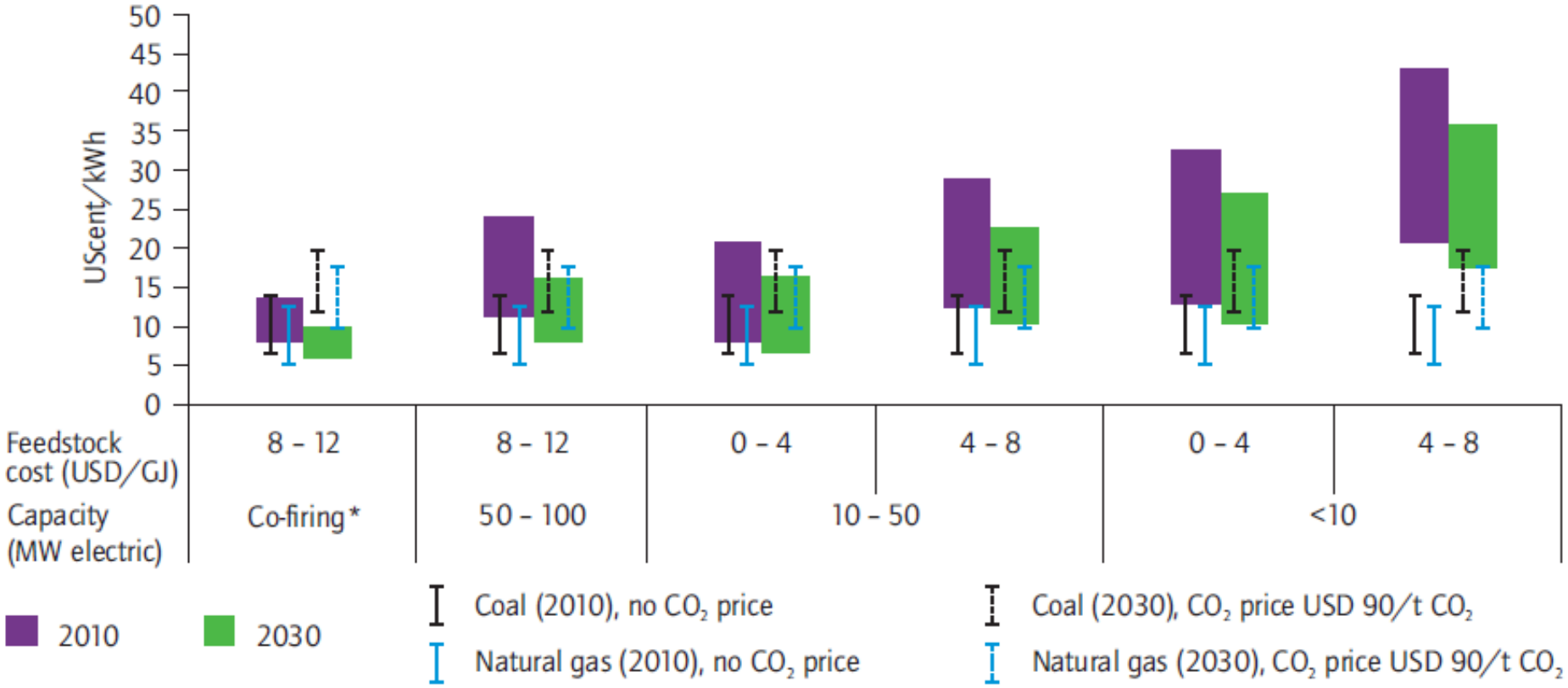
Bioenergy electricity generation costs are strongly scale-dependent



*Co-firing costs relate only to the investment in additional systems needed for handling the biomass fuels, with no contribution to the costs of the coal-fired plant itself. Fossil electricity generation costs are not capacity specific.

Source: IEA analysis based on DECC (2011), IPCC (2011), Mott MacDonald (2011), Uslu *et al.* (2012).

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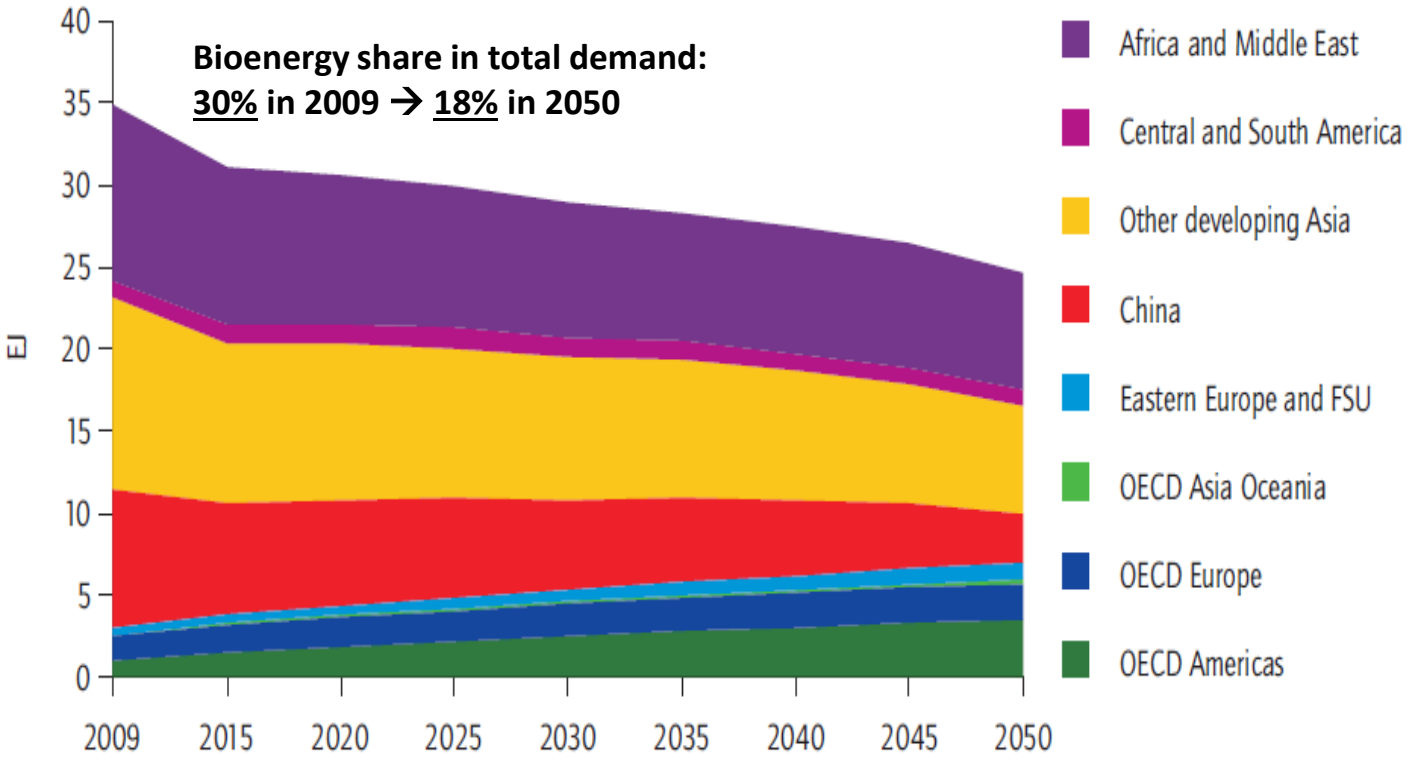
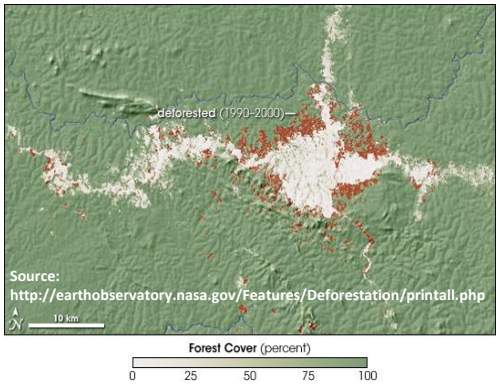
Bioenergy consumption in buildings declines





- **Bioenergy in buildings is pre-dominantly traditional biomass**
  → subject to low efficiency; negative health and environmental impact
- **New stoves, alternative fuels and more energy-efficient buildings key to reduce traditional biomass use**

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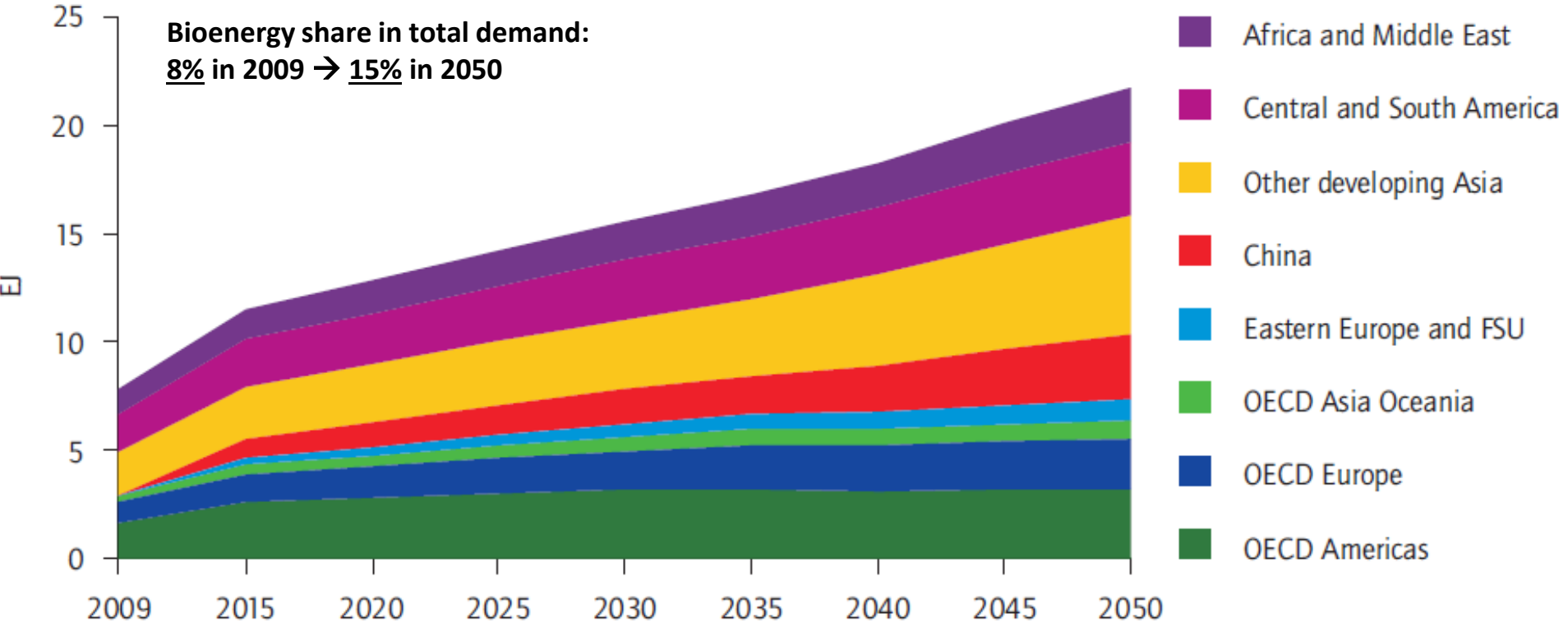
Industry set to triple consumption of bioenergy for heat



- **Bioenergy is becoming increasingly important for production of high temperature heat**

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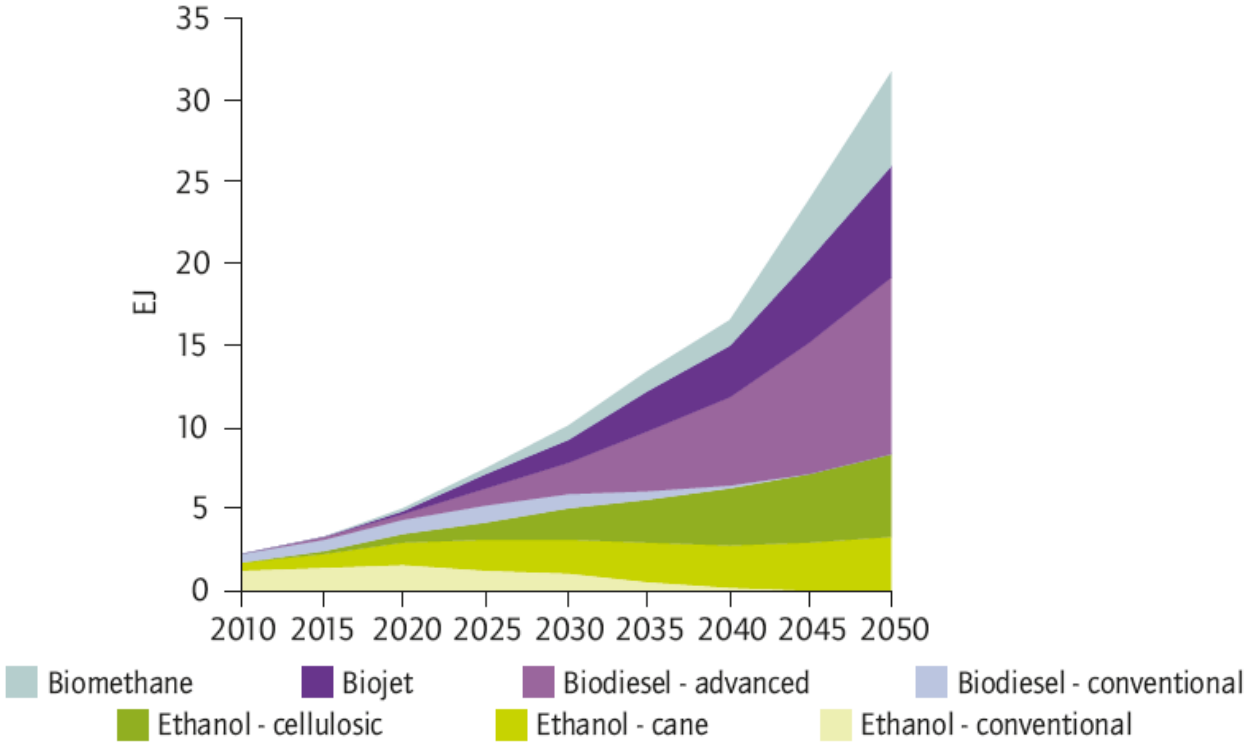
Advanced biofuels to play a key role in the long-run



- Global biofuel supply grows from **2.5 EJ** today to **32 EJ in 2050**
  - Biofuels share in total transport fuel increases from **2%** today, to **27%** in 2050
- Biofuels are the only low-carbon fuel alternative for heavy, long-distance transport
- Trade will be needed to balance supply and demand for feedstocks and biofuels

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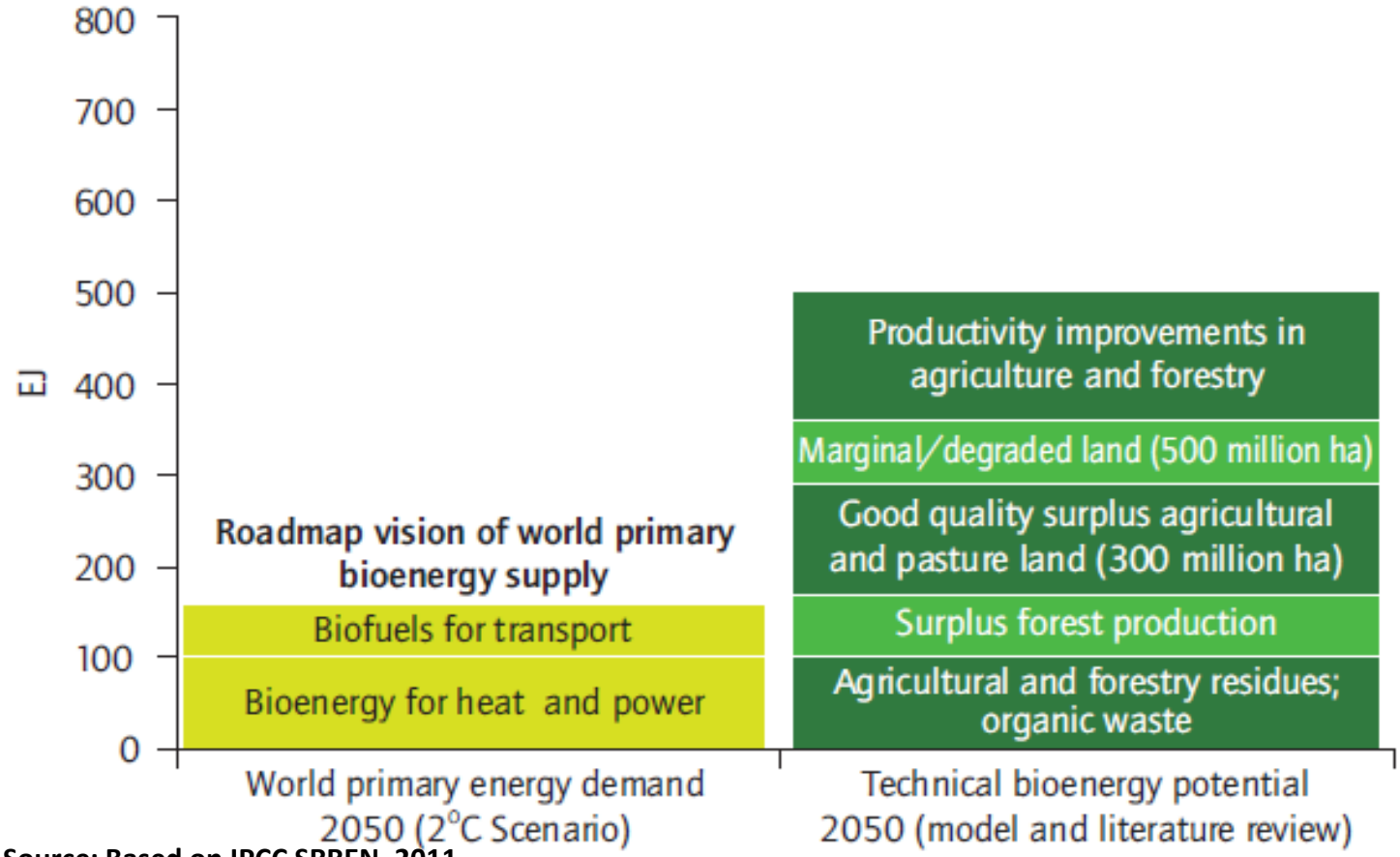
Biomass Supply Prospects – Uncertainties Remain



Source: Based on IPCC SRREN, 2011

- **Total biomass demand for heat, power and biofuels reaches 8-11 billion tons in 2050**
- **Intermediate targets should be adopted to enhance international biomass trade, and assess costs and impact on sustainability**

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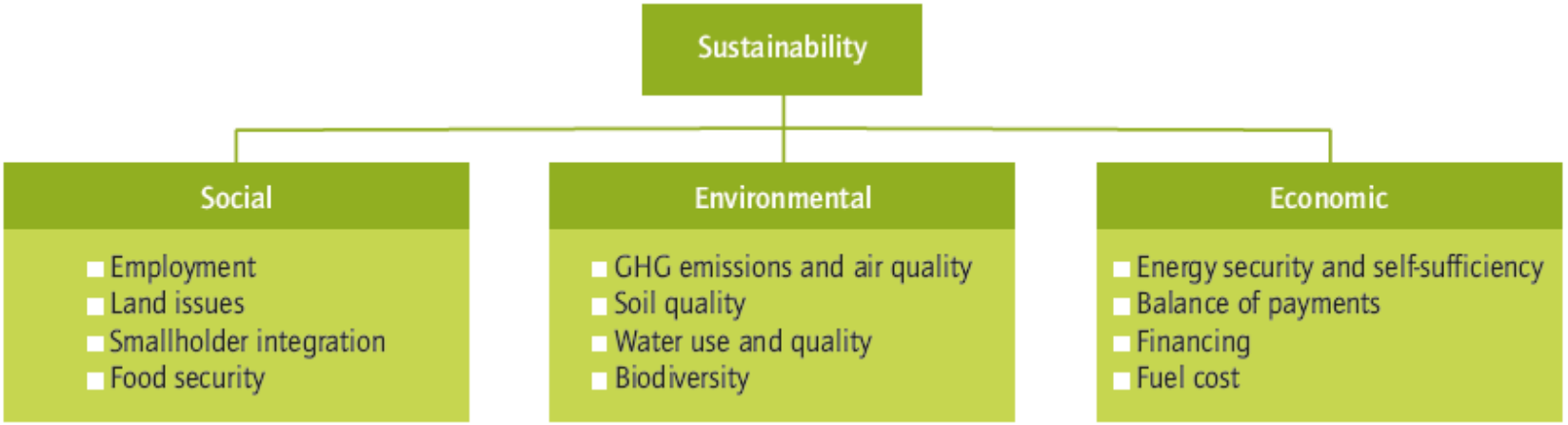
Sustainability of Biofuels



- Sound policies are needed to ensure biofuels are produced sustainably
- Adopt sound, internationally aligned sustainability certification for biofuels
  - Certification schemes should be based on international sustainability criteria (as developed *e.g.* by the Global Bioenergy Partnership, GBEP)
- However, most sustainability issues are relevant to the whole agricultural/ forestry sector
- In the long-term, all agricultural and forestry products should be certified, and an overall sustainable land-use management should be aimed for

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How2Guide for Bioenergy (1)

Key elements :

- **Defines the process of developing and implementing a bioenergy technology roadmap**
- Collaboration between the **IEA** and the **FAO**, with IRENA a key contributor
- Roadmap methodology guidance through **four steps**, illustrated by case studies
- **Case studies** from IEA Member and Partner countries (Southern Africa, Southeast Asia, South America)
- **Comprehensive decision support toolbox**, including and referencing work of other international/regional organisations

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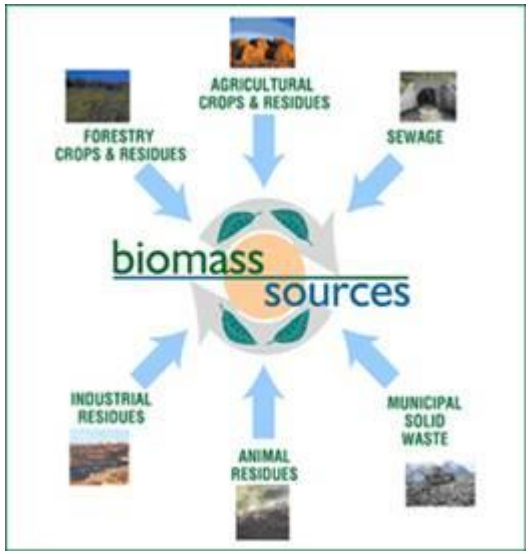
How2Guide for Bioenergy (2)

- Different applications and energy demand profiles



→ **Power**

→ **Heat**

→ **Transport**

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How2Guide for Bioenergy (3)

Process to developing the How2Guide for Bioenergy

- Identify key stakeholders and build consensus
- Identify tools and related work
- Identify barriers and solutions
- Production of the H2G publication

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How2Guide for Bioenergy (4)

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Indicative structure of the report

0
- **Introduction**
- Background and context
- Bioenergy outlook and technology perspectives

1
- **Planning and preparation**
- Conducting baseline research
- Identifying bioenergy stakeholders

2
- **Visioning**
- Strategic considerations in bioenergy policy (e.g. drivers)
- Assessing bioenergy sustainability

3
- **Roadmap Development**
- Identifying barriers and action options to the deployment of bioenergy
- Setting milestones and responsible actors

4
- **Implementation, monitoring and adjustment**
- Qualitative and quantitative indicators for monitoring progress

Short 'signposting' document (40-50 pages)

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Regional expert workshops

Objectives:

- indentify and share regional best practices as well as less successful experiences
- understand regional drivers to bioenergy policy and technology deployment
- present resources and tools which can be used in support of bioenergy roadmap planning and implementation

Thematic focus:

- Southern Africa: waste-to-energy and biogas
- South East Asia: sustainability of biomass
- South America: conventional and advanced biofuels

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Southern Africa Bioenergy Expert Workshop

29-30 April 2014 – Durban, South Africa

- Jointly organised by IEA and FAO in collaboration with South Africa National Development Institute (SANEDI) and the Renewable Energy and Energy Efficiency Partnership
- Thematic focus on biogas and waste-to-energy
- 45 participants including 6 countries of the Southern Africa region as well as the European Commission and other int. organisations.

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South East Asia Bioenergy Expert Workshop

23-24 July 2014 – Bangkok, Thailand

- Jointly organised by IEA, the FAO and IRENA in collaboration with the Thai Ministry of Energy
- Thematic focus on sustainability of bioenergy
- Over 60 participants including 7 countries in the ASEAN region as well as the European Commission and other int. organisations.

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South America Bioenergy Expert Workshop

27-28 November 2014 – Piracicaba, SP, Brazil

- Jointly organised by **IEA**, **FAO** and **Government of Brazil** through the Ministry of Mines and Energy – with support by CTC and UNICA
- Information we will seek to capture:
- *How and to what extent have policy makers and regulators in South America undertaken/supported bioenergy technology roadmaps?*
- *Which are the drivers for bioenergy roadmaps in the different countries? Are drivers in South America different from those in other world regions?*
- *Have project developers participated (and how) in the development of bioenergy technology policies and roadmaps?*
- *Which indicators have been used to track progress in the region? Were roadmaps adjusted in light of experiences gained through implementation?*

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Closing remarks

- **Toolbox approach**
  - FAO, GBEP, IRENA, IEA Bioenergy Implementing Agreement, United Nations Environment Programme (UNEP), German development organisation GIZ, Netherlands Bioenergy Programme, REEEP, European Commission….
- **Based on existing scenarios and forecast**
- **Unique value through your experiences**
- **Launching in Q2 2015** → possible collaboration with GBEP in the framework of Bioenergy Week 2015

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