Promoting Sustainability on a Global Scale

Biomass 2013

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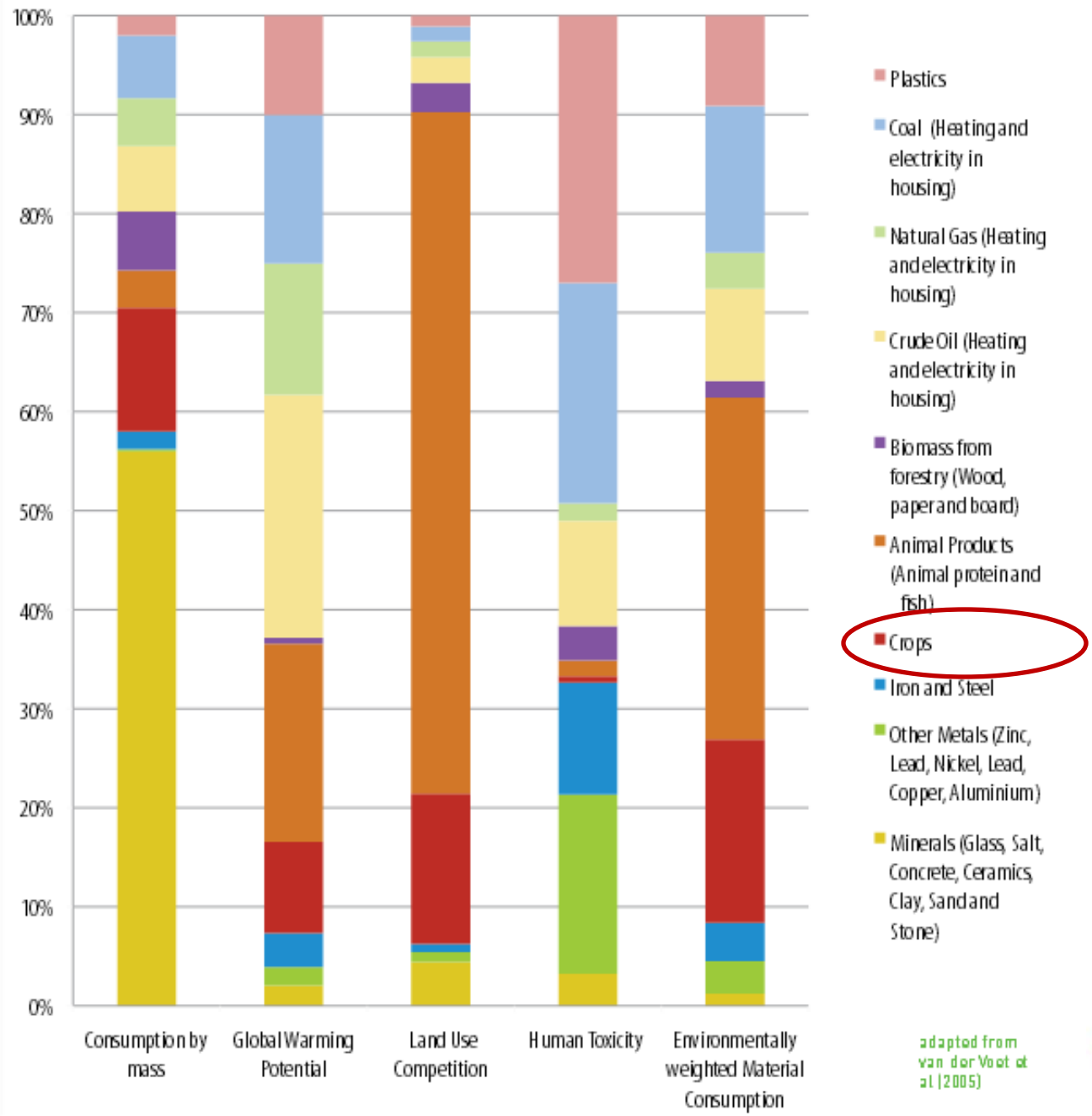
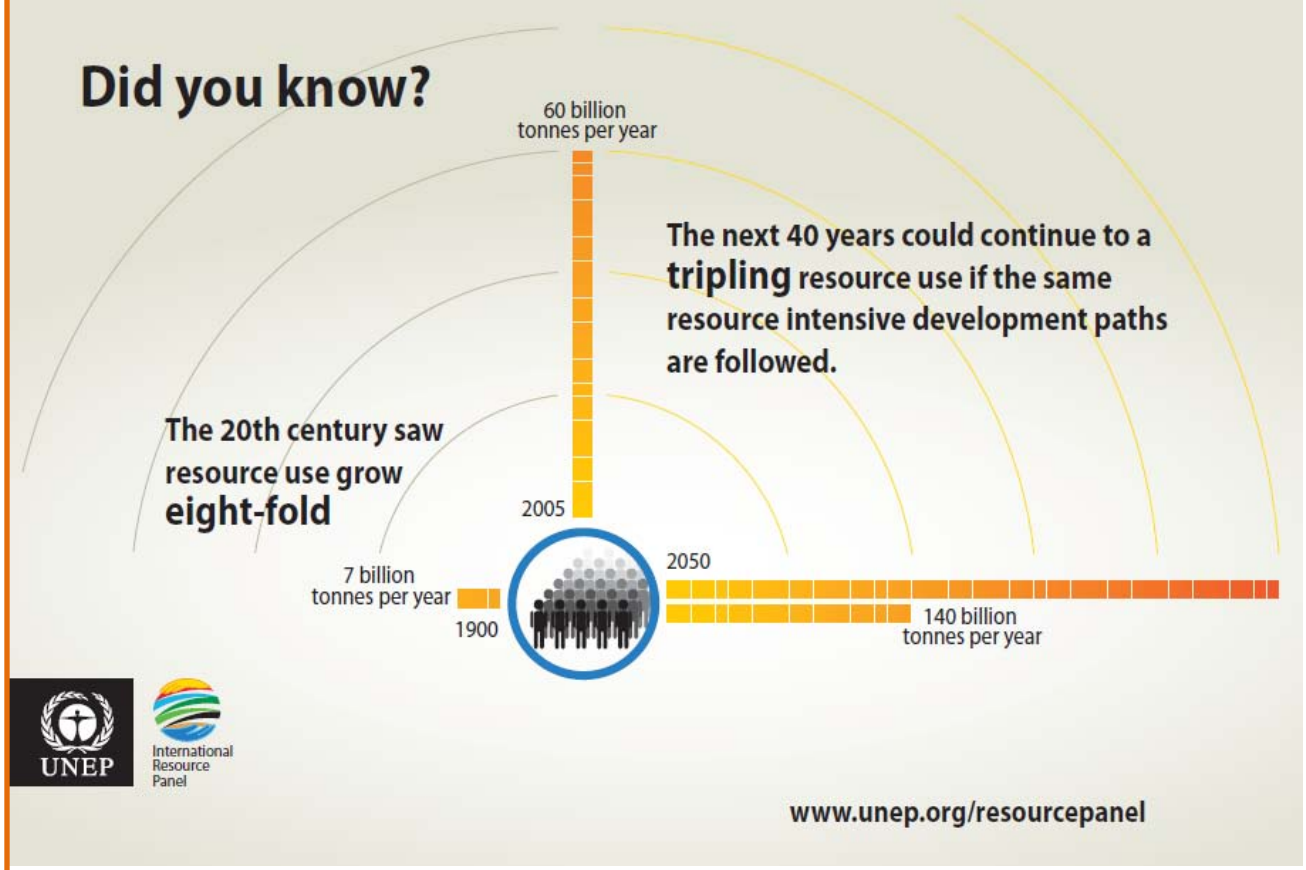
Martina Otto
Head of Policy Unit, Energy Branch
United Nations Environment Programme
www.unep.org/energy/bioenergy

Figure 5.6: Relative contribution of groups of finished materials to total environmental problems (total of the 10 material groups set at 100%), EU-27+Turkey, 2000



adapted from van der Voet et al (2005)

International Panel for Sustainable Resource Management



UNEP Global Environment Outlook - GEO-5:

- We are already observing changes to the Earth System, unprecedented in human history.
- Efforts to slow the rate or extent of change have resulted in moderate successes but have not succeeded in reversing adverse environmental changes.
- We need transformational changes and innovative integrated solutions based on integrated assessments.

UNEP's approach to bioenergy

Bioenergy is neither good nor bad per se and context matters.
To avoid unintended consequences in the short and long-term, bioenergy development requires solid planning and management, both on the national policy and strategy and the project levels.

Scientific assessments:

International Panel for Sustainable Resource Management: Assessing Biofuels report (2009)

The Bioenergy and Water Nexus, UNEP, IEA Bioenergy Task 43, Oeko Institut (2011)

Issue Paper series on emerging issues: Land use and land use change ; Bioenergy and Water; Invasive species; Stakeholder consultation; Group Certification; Facilitating Energy Access; REDD+

Assessments & Guidelines for Sustainable Liquid Biofuel Production in Developing Countries, funded by GEF, implemented with FAO and UNIDO; settings approach.

Tools:

Global Bioenergy Partnership (GBEP):
-Methodological framework for GHG calculations
-Sustainability criteria & indicators

Roundtable on Sustainable Biofuels (RSB):
-solid multi-stakeholder process
-all major issues are covered

UN Energy Decision Support Tool for Sustainable Bioenergy (DST), developed by UNEP and FAO to provide stepwise guidance to decision makers in governments to develop sustainable bioenergy policies and strategies, and to assess investment proposals.

Finance:

CASCADe: enhancing African expertise to generate carbon credits in the forestry and bioenergy sectors by providing technical assistance, institutional support and training workshops.

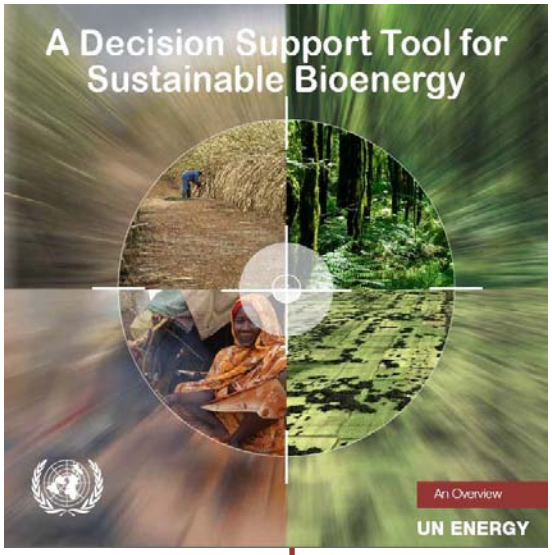
Jatropha-based PoA: assessing the feasibility of a CDM Programme of Activities for rural energy generation from Jatropha oil in Mali.

African Rural Energy Enterprise Development promoting rural energy enterprises, includes a bioenergy component that demonstrate environmental and social co-benefits resulting from 'local production for local use' projects.

Regional and national support:

Bioenergy Policy Support Facility, providing advisory services to governments developing and implementing bioenergy policies, strategies and measures, capacity building in use of planning and management tools; and guidance on processes to facilitate integrated decision-making.

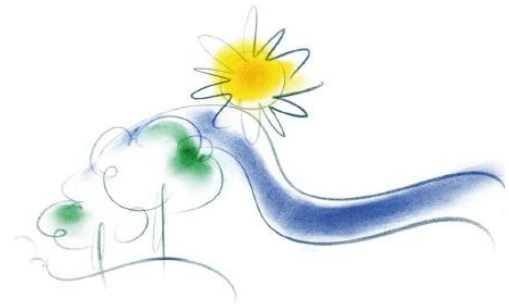
Mapping of land suitable and available for bioenergy development:
-Methodology refined (GIS and groundtruthing)
-completed in Kenya, Uganda, Senegal



www.bioenergydecisiontool.org

a web-based tool and living document
developed by FAO and UNEP
under the framework of UN Energy
to assist countries to manage risks and challenges,
in a process anchored in each country's specific context:

- **step-wise guidance** for strategy formulation and investment decision-making processes
- **repository of technical resources** and links to existing tools, guidelines and resources
- **guidance on identification and inclusion of stakeholders** in the bioenergy decision-making process and on adopting transparent processes for good governance



THE GLOBAL BIOENERGY PARTNERSHIP SUSTAINABILITY INDICATORS FOR BIOENERGY
FIRST EDITION

GBEP
Global Bioenergy Partnership

24 indicators

18 themes

3 pillars of sustainability

- Environment
- Social
- Economic

- Price and supply of a national food basket
- Access to land, water and other natural resources
- Labour conditions
- Rural and social development
- Access to energy
- Human health and safety

- Lifecycle GHG emissions
- Productive capacity of land and ecosystems : soil quality, wood harvest levels
- Air quality: non-GHG air pollutant emissions
- Water availability, use efficiency and quality
- Biological diversity in the landscape
- Land-use change, including indirect effects

- Resource availability & use efficiencies in bioenergy production, conversion, distribution and end-use
- Economic development
- Economic viability & competitiveness of bioenergy
- Access to technology and technological capabilities
- Energy security

Project level standards / voluntary schemes

An estimated 67 sustainability certification schemes operational / being developed.

Scope - feedstock specific, biofuels, bioenergy, ag and forestry

Depth – EU RED compliant to comprehensive schemes following ISEAL guidance, and covering all three pillars of sustainability.

The higher the standard, usually the higher the cost of compliance, but the higher also the gains – standards are also a management tool to reduce environmental and social as well as reputational risk.

Need for convergence and cooperation between schemes.

Standards alone do not solve all the issues – national policy and planning needs to go hand in hand.

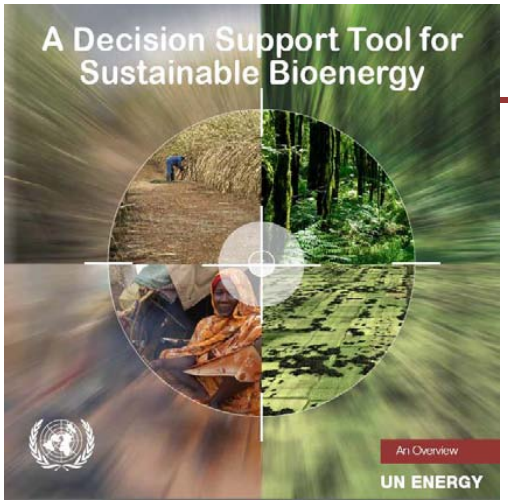
Pressure on land:

- Simultaneously raising demands for food, livestock feed, energy, and raw materials but also housing and infrastructure by a growing population striving for economic development collectively intensify pressure on land, causing land-use conversion, land degradation, soil erosion and pressure on protected areas.
- Gross expansion of cropland under business as usual conditions is estimated to be increasing from 21 - 55% from 2005 to 2050.

  This, in turn, threatens the very basis for human development and well being: Since 1970 conversion and degradation has resulted in declines of 20 per cent of some natural habitats.
- Land use needs into be taken into consideration on the national policy and project levels.

  The following are examples of tools that were for bioenergy where the issue of competition for resources has been researched and discussed extensively.

  These tools could be expanded to all biomass production and use.



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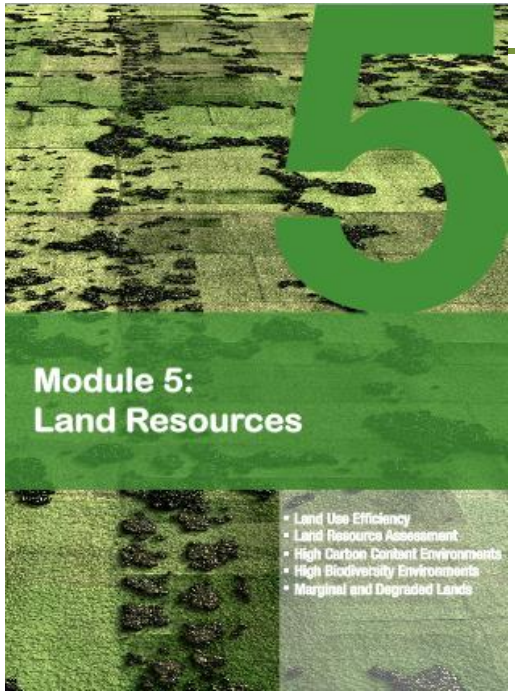
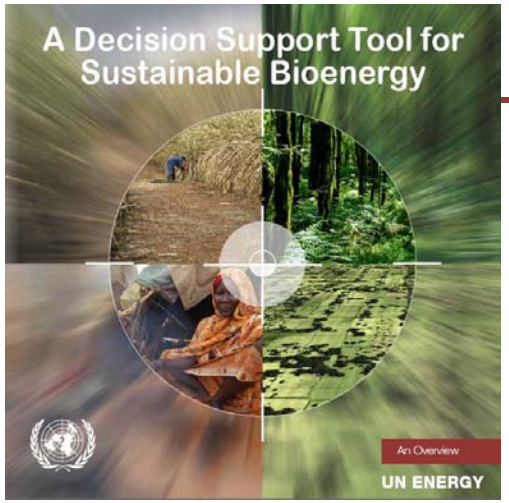
Where?

Land use. Land use change. Land use planning. Mapping and Zoning



- conduct a land suitability assessment
- identify areas of special sensitivity, in terms of potential damage to vital ecosystem functions
- identify existing agricultural production areas
- overlay infrastructure information to evaluate market accessibility and the economic feasibility of feedstock production
- conduct ‘ground-truthing’ in areas with potential for feedstock production, involving relevant stakeholders



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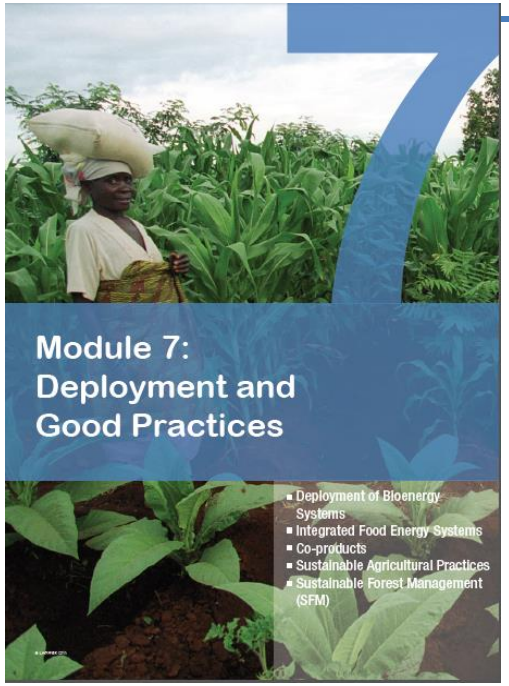
HOW

-Scales
-Business Models
-Good Practices
-- Lower risk options



Integrated Food Energy Systems
simultaneous production of food and energy

Waste, co-product and cascading use
improve resource use and energy balance as well as economic viability

Degraded and marginal lands

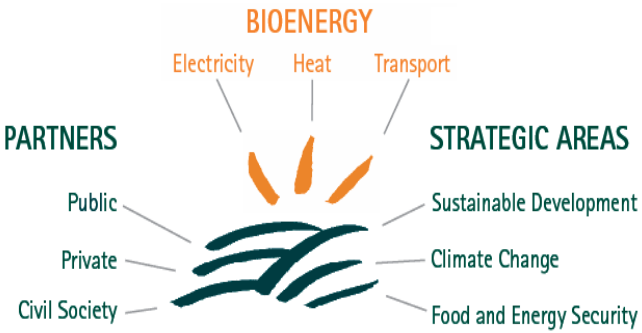
Yield improvements

Sustainable Agriculture Practices
Conservation Agriculture; Good Agricultural Practices
Integrated Pest and Invasive Species Management

Sustainable Forest Management
long-term availability of resources while maintaining ecosystem services (soil and watershed protection)

LAND TENURE RIGHTS ARE CRITICAL

GBEP
24 sustainability indicators
A tool to guide analysis and measure progress



Land use and land-use change
related to bioenergy feedstock production

Total area of land for bioenergy feedstock production, and as compared to total national surface and agricultural and managed forest land area

Percentages of bioenergy from yield increases, residues, wastes and degraded or contaminated land

Net annual rates of conversion between land-use types caused directly by bioenergy feedstock production, including the following:

- arable land and permanent crops, permanent meadows and pastures, and managed forests;
- natural forests and grasslands, peatlands, and wetlands

ASSESSMENTS and GUIDELINES for SUSTAINABLE LIQUID BIOFUEL PRODUCTION in DEVELOPING COUNTRIES

GEF Targeted Research Project

Co-executing Agencies: UNEP/FAO/UNIDO
Partners: IFEU, Utrecht University and Oeko Institute

Identify and fully assess innovative, cost-effective, and sustainable systems for the production of liquid biofuels for transport and stationary applications, in order to **enable the GEF and individual nations to set clear policies and priorities in this area, and make investment decisions**.

- help the GEF Sec screen project proposals
- help screen sustainability of biofuel projects above and beyond the delivery of Global Environment Benefits GEF framework
- analyze potential environmental and socio-economic impacts of large scale production of biofuels

Bioenergy is not created equal – 74 selected settings

5 fuels

- SVO
- Biodiesel, 1st gen
- Biodiesel, 2nd gen
- Ethanol, 1st gen
- Ethanol, 2nd gen

8 feed-stocks

- sugarcane
- cassava
- palm
- energy grass
- soy
- short rotation coppice
- jatropha
- organic residues

2 time-frames

- 2010 & 2020 for 1st gen
- 2020 & 2030 for 2nd gen

3 crop mmt systems

- Tillage/no tillage
- Low / intermed. / high inputs
- Low /high/no level of mechnisisation

12 countries 4 regions

- Mali
  Mozambique
  Tanzania
- Argentina,
  Brazil
  Columbia
- China
  India
  Indonesia
  Malaysia
  Thailand
- Ukraine

Research Components

- Life cycle energy and GHG assessment
- Economic viability of the production of liquid biofuels
- Global non-GHG environmental impacts of biofuels
- Social impacts of liquid biofuel production
- Next generation of liquid biofuel production
- Fuel and vehicle compatibility
- Stationary applications
- Scale up and integration

Life cycle energy and GHG assessment

GHG reduction benefits are **a critical decision factor**

Guidance and information about GEF policies and interventions on GHG and energy balances, and international certification systems

Excel-based spread sheet tool to calculate full biofuel chains:

- contains 74 pre-calculated biofuel pathways covering ‘from cradle to tank’;
- serves as basic reference for each of the biofuels for a number of biofuel projects in the respective countries;
- allows anybody to adapt determined settings to actual case situations, using user-specific input data.

Screening Tool

3 levels of quantitative and qualitative **thresholds** for 10 **sustainability indicators:**

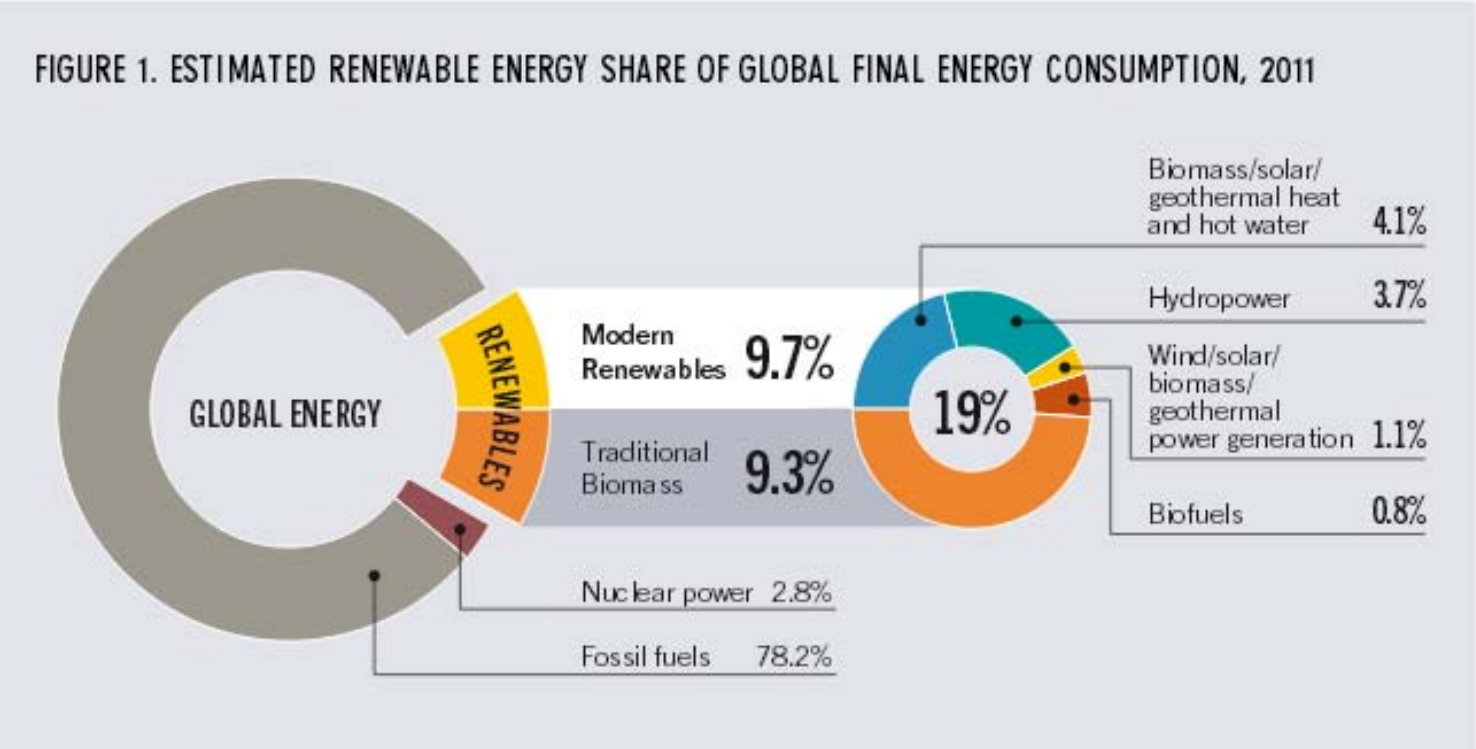
- **high** risks which cannot be mitigated (**STOP**);
- **potential** risks which **could** be mitigated by specific project designs (**CHECK**); **no** relevant risks;
- **adequate project design** mitigating such risks **(GO)**.

- **Environmental Sustainability (5):** GHG emissions; Biodiversity; Land productivity/ resource use efficiency; Soil; Water
- **Economic Sustainability (1)**
- **Social Sustainability (4):** Food security, Labour conditions &Human health, Land tenure, Gender

Screening tool for biodiversity protection

Factors to consider	Applicable to	GO	CHECK	STOP
Conservation of areas of significant biodiversity value	All setting except those using wastes	GIS data or on-site assessment proves that cultivated land is **not** located in area of significant biodiversity value	If located in such an area: management plan to ensure cultivation and harvest do not interfere with nature protection purposes	If located in such an area and management plan is missing or not detailed enough to demonstrate non-interference
Promotion of agricultural practices with low negative impacts on biodiversity	**Not** applicable for **low-input** settings	Proof that management practices lead to cultivation practices with low negative impacts on biodiversity	Description of management practices not detailed enough to determine impacts on biodiversity	Description of management practices missing

Energy Outlook



1.2 billion people still lack electricity.
2.8 billion people depend on unsustainable solid biomass.
3.5 million premature deaths occur every year from indoor air pollution.
SE4All, Global Tracking Framework

Thanks to new technologies by 2050, 32 exajoules of biofuels will be used globally, providing 27% of world transport fuel. IEA Biofuel Roadmap

SUSTAINABLE ENERGY FOR ALL

1 ENSURE *universal access* TO MODERN ENERGY SERVICES.

2 DOUBLE THE GLOBAL RATE OF IMPROVEMENT IN *energy efficiency*

3 DOUBLE THE SHARE OF *renewable energy* IN THE GLOBAL ENERGY MIX.

Key messages

Emergence of a **more balanced approach to risks and opportunities**. Yet, uncertainty in the investor community.

Co-existence of two markets: local use and globally traded commodity. Transport, household and productive energy use.

Emergence of an **integrated systems approach to optimise provisioning services of ecosystems,** particularly land and water resources, for multiple end use - food, feed, fuel and fibre.

Some 76 countries and regions have enacted **bioenergy mandates / targets.** Recognition that they need to be set **based on science and** potentials that are feasible sustainably**; flanked by solid sustainability standards**; and **embedded in low carbon development strategies.**

Bioenergy planning, management and monitoring tools are available on the national policy and project levels. Let's apply them!