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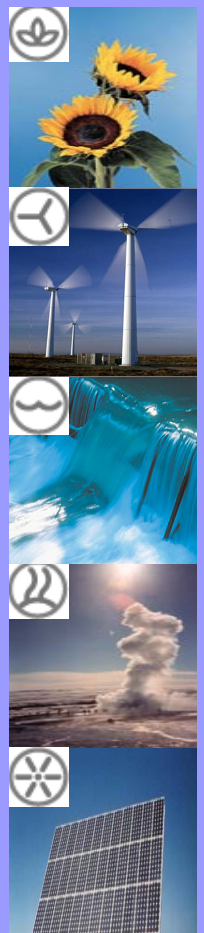

Environmental Due Diligence for Bio-Energy Systems

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What is SEFI?

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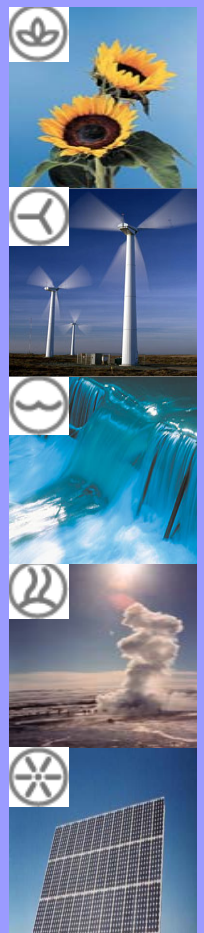

UNEP - Sustainable Energy Finance Initiative

1. Provide Information

   "Development of resources and tools to lower investment barriers…"

2. Facilitate Networks

   "Platform for investors and developers to facilitate deal origination and project capitalization…"

3. Develop Partnerships

   "Linking donor funding with commercial finance to mitigate and share risks…"

"Helping conceive and manage investments in clean energy technologies…"

Who is SEFI?

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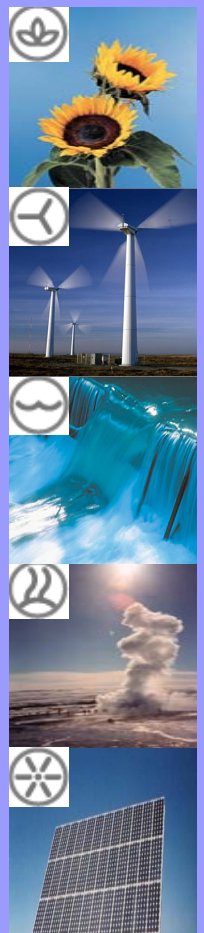

A Joint Initiative of:

UNEP-DTIE Energy Branch

www.uneptie.org/energy

Basel Agency for Sustainable Energy

www.energy-base.org

More info at: www.sefi.unep.org

Bio-Energy Development: Key Drivers

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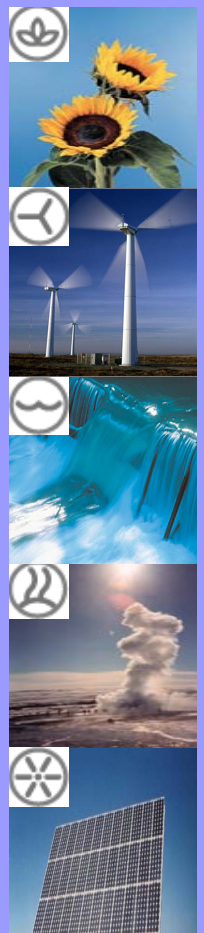

OECD Country Interest

- Energy security
- GHG reduction potential

Developing Country Interest

- Rural access to energy
- Rural incomes and employment
- Reduce import burden

⇒ *Both interest are convergent and constitute strong drivers.*

MEAs and Bio-Energy: Key Opportunities

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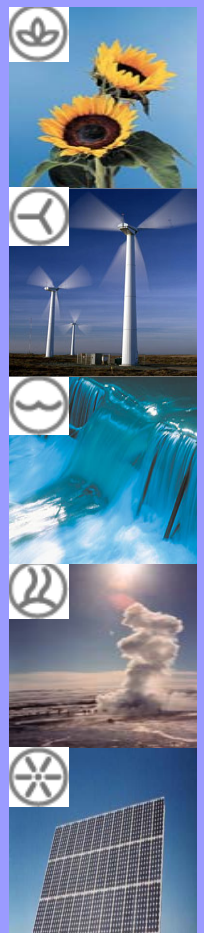

- **UN Convention on Biological Diversity (UNCBD)**
  Opportunities: Preservation of specific genes/species/habitats, restoration of lands

- **UN Convention to Combat Desertification (UNCCD)**
  Opportunities: Increase of tree cover, mitigation of soil erosion, increased sustainability of wood fuel use, restoration of degraded lands

- **UN Framework Convention on Climate Change (UNFCCC)**
  Opportunities: Wide range of *commercially viable* JI/CDM possibilities (CO_2 removal, efficiency improvements, emission reduction)

⇒ *Bio-energy is a big opportunity for all 3 conventions…*

MEAs and Bio-Energy: Key Threats

- **UN Convention on Biological Diversity (UNCBD)**
  Threats: Monocultures, displacement of species
- **UN Convention to Combat Desertification (UNCCD)**
  Threats: Unsustainable soil and water use
- **UN Framework Convention on Climate Change (UNFCCC)**
  Threats: Displacement of natural CO2 sinks by unsustainable monocultures

…but on a large scale, bio-energy is also a significant threat.

Bio-Energy Sustainability: Key Threats

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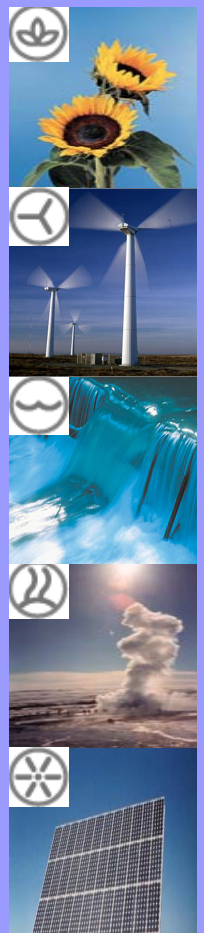

Typical risks of large scale bio-energy production

- Soil degradation and water scarcity
- Threat to biodiversity
- Threat to local populations
- Child-/underpaid labour
- Increase of food prices

⇒ *Bio-energy systems can be unsustainable in many ways.*

Bio-Energy Sustainability: Key Criteria

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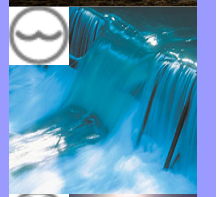
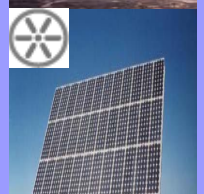
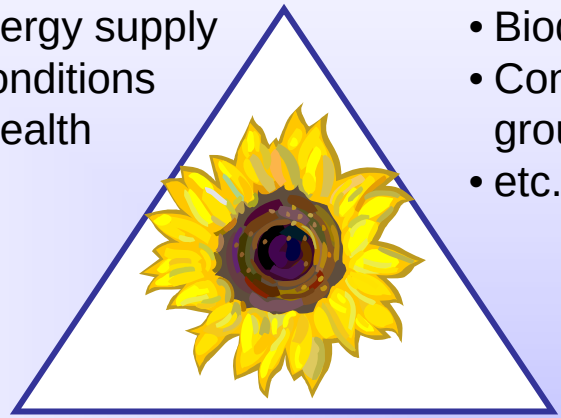




Social Criteria
- Food/energy supply Labor conditions
- Safety/health
- etc.

Ecological Criteria
- Biodiversity
- Conservation of ground/surface water
- etc.



Economic Criteria
- Profitability of business model
- Steady revenue stream
- etc.

Financial Perspective:
Complex risk environment with few measurable indicators.

Bio-Energy Development: Key Challenges

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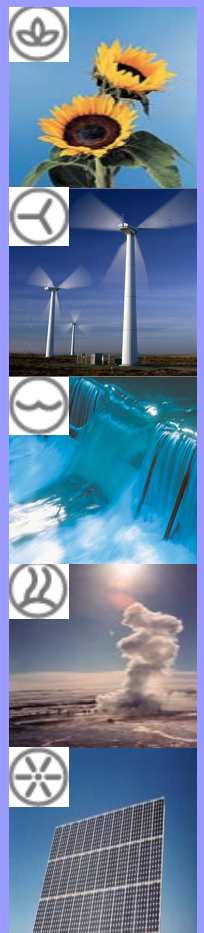

- Fast growing market (accelerated by JI/CDM)
- Only limited attention to sustainability issues
- Limited regulatory leverage of MEAs
- In many countries effective regulatory framework not yet in place

⇒ *Need to push sustainability into the centre of investment decisions.*

What is Environmental Due Diligence?

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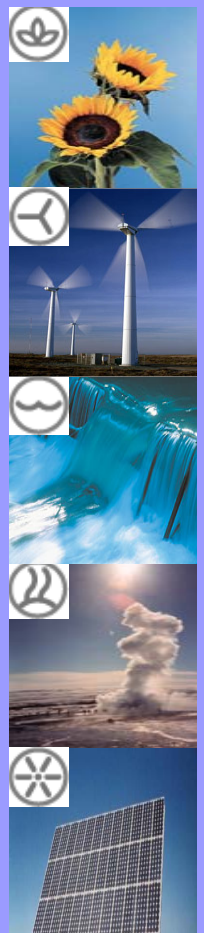

A risk assessment…

- for investors and analysts,
- involving the collection data relative to all environmental conditions,
- or impacts prior to a transaction.

With the goal to…

- identify and quantify
- all related financial, legal, and reputational risks.

⇒ *In reality often a poorly defined ad-hoc procedure.*

The EDD Process – Schematic Overview

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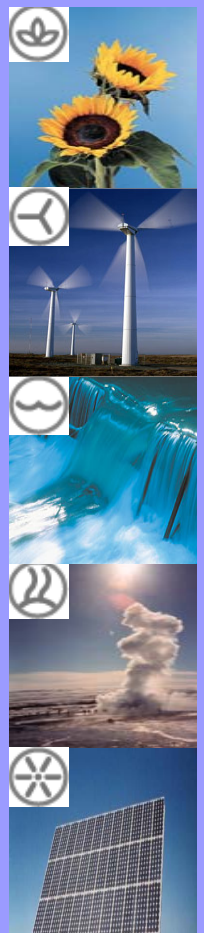

1 **Establishing the regulatory framework**

2 **Environmental appraisal**

3 **Monitoring the project after approval**

Environmental appraisal at the core of a 3-staged process.

Stage 1:
Establishing the Regulatory Framework

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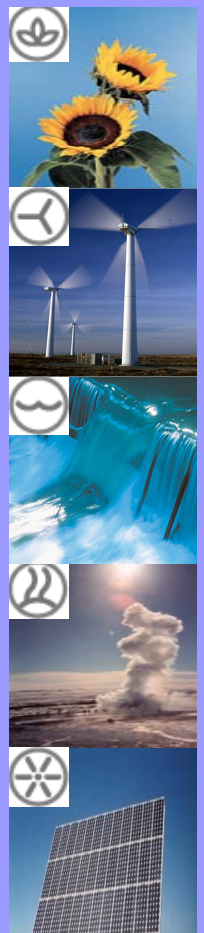

- International standards
- National/regional regulation
- Best practice guidelines

2 relevant timeframes:

1.) **existing** regulation

2.) **anticipated** regulation

In many countries, the 2nd timeframe is the most important one.

Stage 2: Environmental Appraisal

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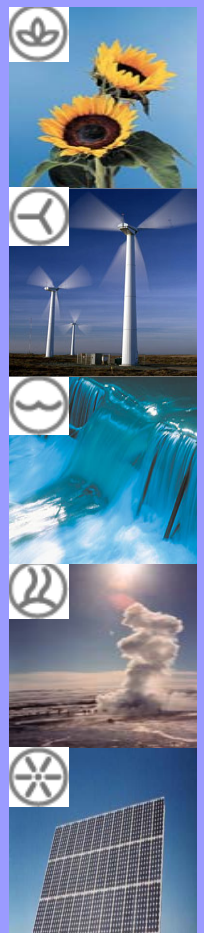

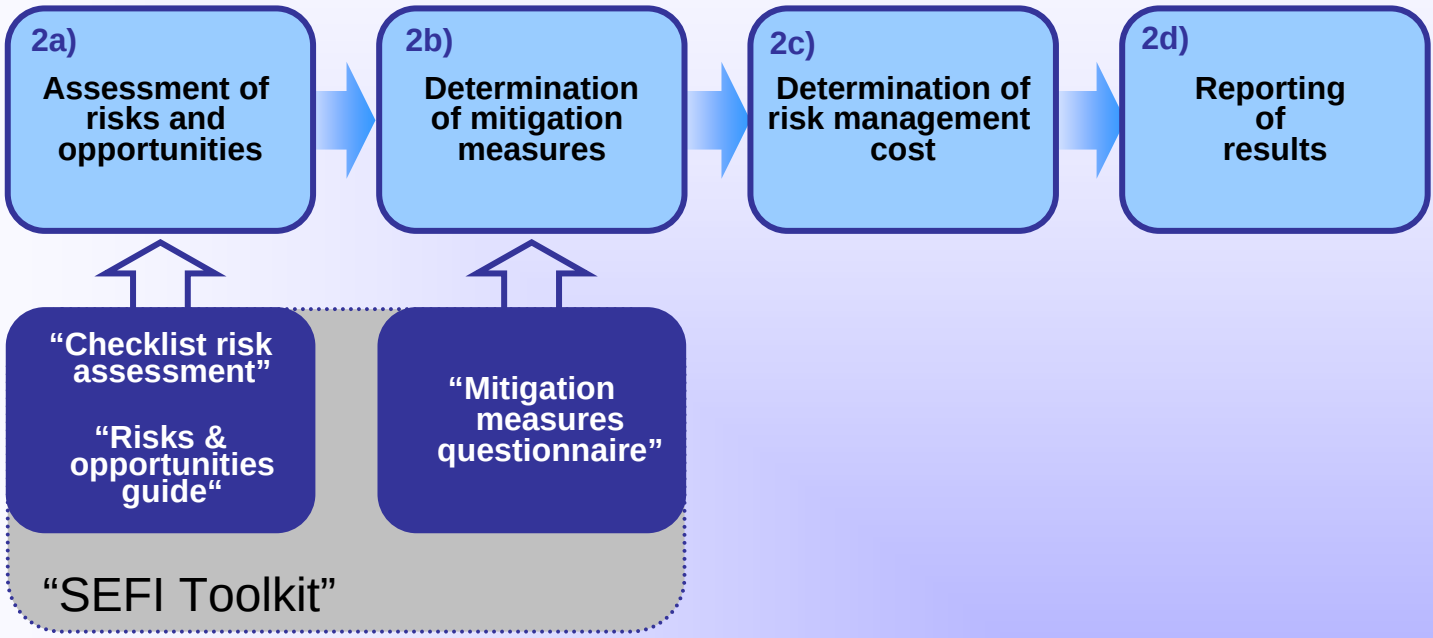

SEFI Toolkit intended to complement, not replace tools used by investment analysts.

Stage 2a:
Assessment of risks and opportunities

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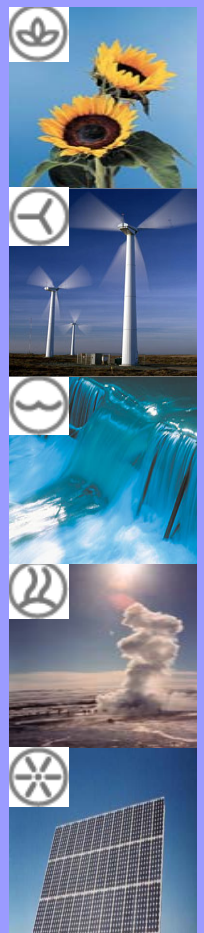

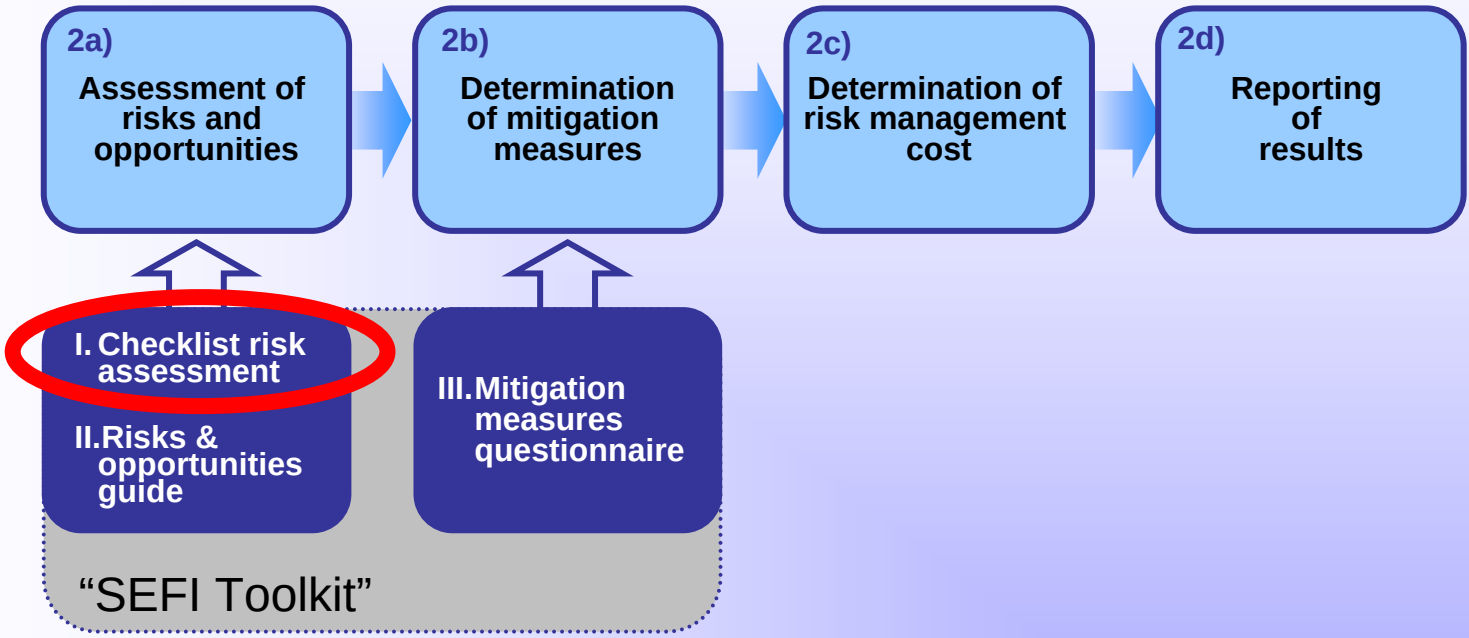

“Checklist Risk Assessment”

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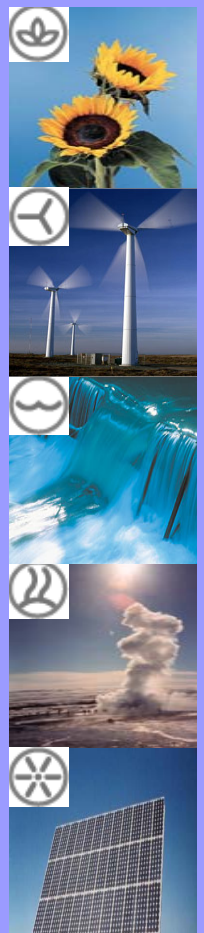

Emissions

1. **Use of pesticides**

   Volume, choice, storage and disposal; method of application; waste water releases, runoff/leaching

2. **Use of chemical fertilizers**

   Rate, timing, methods of application; waste water releases, runoff/leaching

3. **Brownfield location**

   Previous land use, soil and groundwater check

4. **Emissions of NOx, Sox, CO, particulates, VOC**

   Previous land use, soil and groundwater check

5. **Solid Waste**

   Volume, chemical disposition, disposal methods

“Checklist Risk Assessment”

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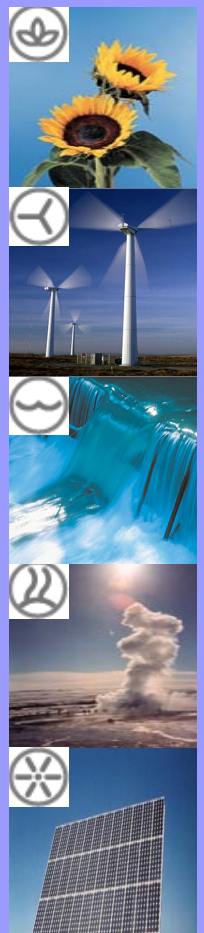

Biodiversity

7. Introduction of non-native species

- Suitability of chosen crop,
- Sensitivity of local ecosystems to introduced species,
- Containment practices to control spread of non-native species

8. Use of GMOs

- Containment practices to control spread of non-native species

“Checklist Risk Assessment”

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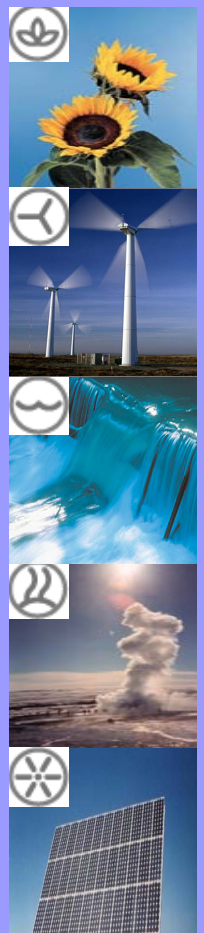

Worker health and safety

9. Pesticide application

- Compliance with local regulations
- Compliance with international guidelines
- Outstanding worker compensation claims

10.+11. Accidents from crop cultivation / generation activities

- Compliance with international. national, local regulations
- Operation and maintenance routines
- Training of personnel
- Emergency plans
- Outstanding worker compensation claims

“Checklist Risk Assessment”

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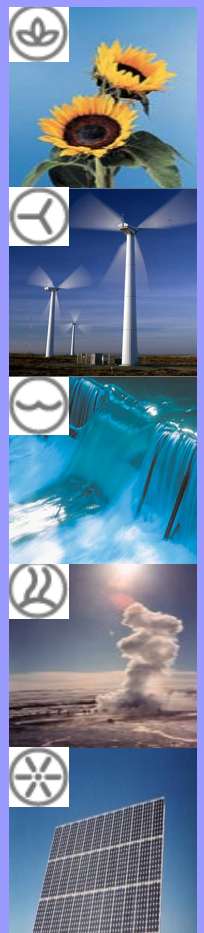

Issues sensitive to public

12. Pesticide application
13. Soil Erosion
14. Contamination of soil/groundwater/surface water
15. Water depletion
16. Loss of biodiversity
17. Visual impact
18. Noise from generation activities

Stage 2a:
Assessment of risks and opportunities

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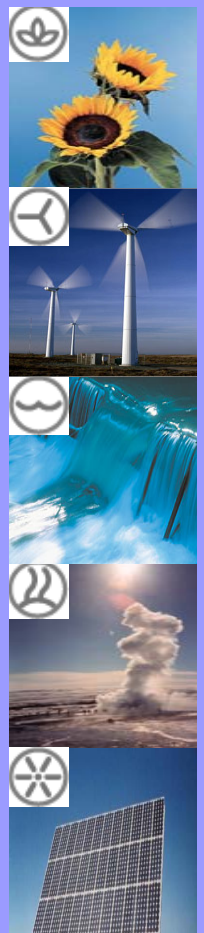

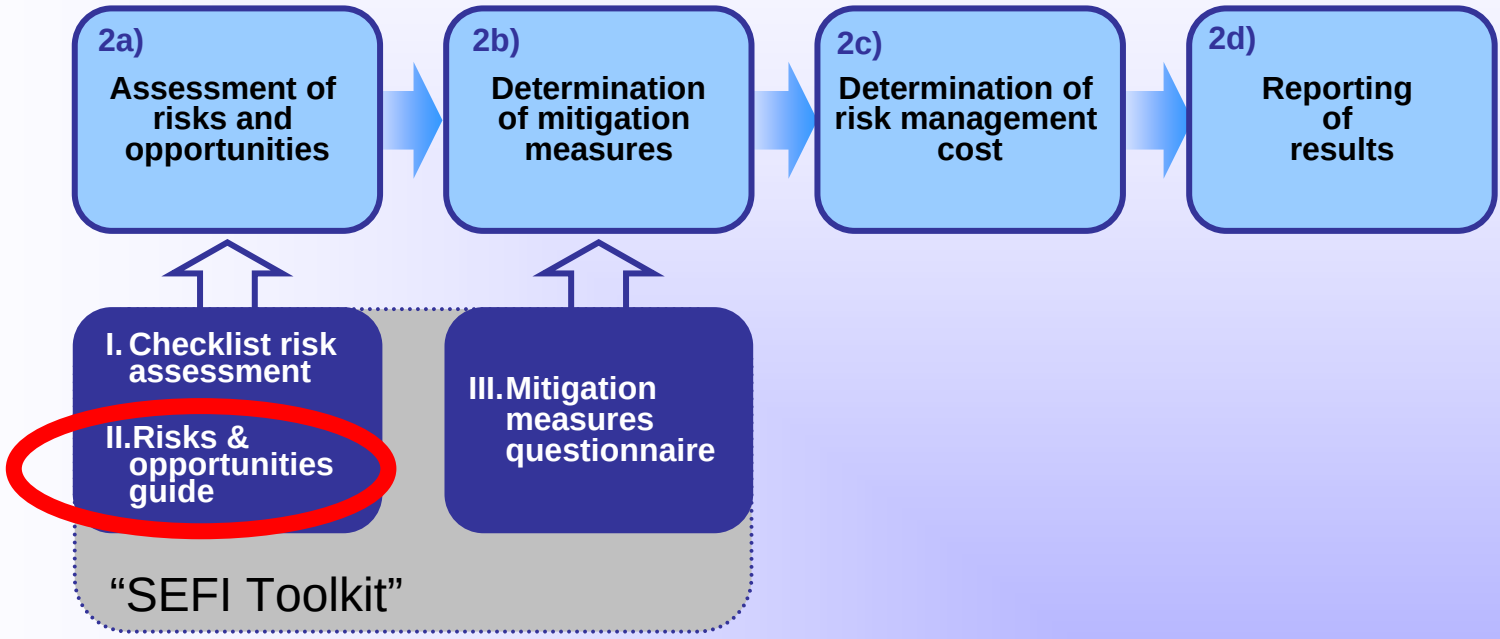

“Risk & Opportunities Guide”

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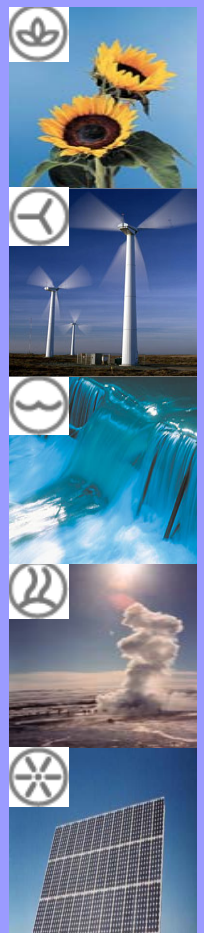

Risk rating
L, M, H
to be entered here

Activity	Environmental and social risks					Environmental opportunities
	Issue 1	Issue 2	Issue 3	Issue 4	Issue 5	
Crop cultivation	1. **H**	**L**				Soil stabilisation in degraded lands
Crop harvesting	2. **M**	**M-H**				

Provides an overview of all relevant environmental and social risks involved.

Stage 2b:
Determination of Mitigation Measures

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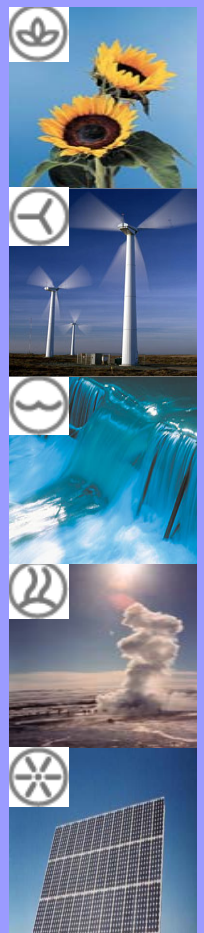

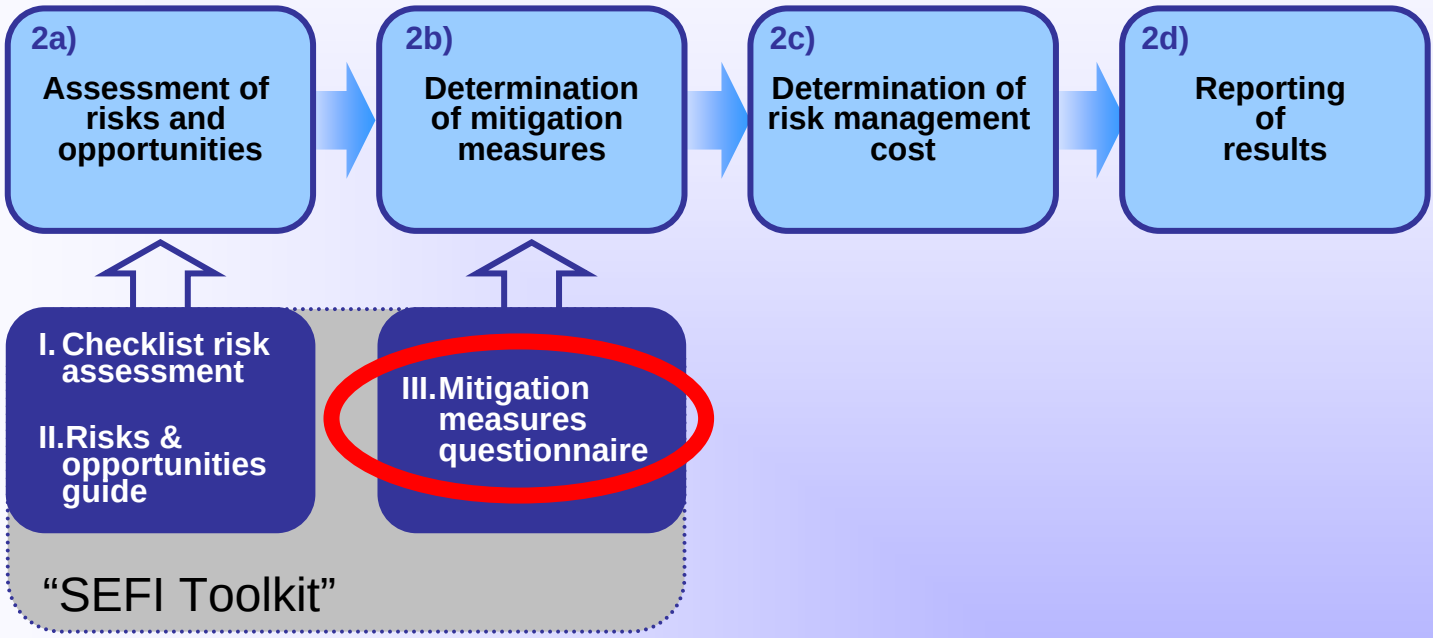

“Mitigation Measures Questionnaire”

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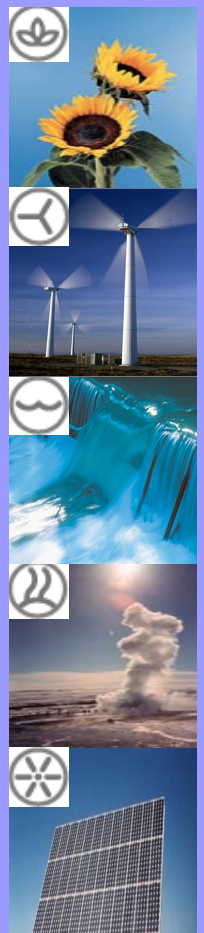

Level	Questions
LEVEL I: All projects	1. Has the project complied with all legislated requirements for operation, receiving all necessary licences and permits? (Land use for crop plantation, plant operational permits, requirements from local and national governmental authorities, etc.)
	2. Has the plantation been established according to best practice guidelines to mitigate visual impact? (E.g. Avoid straight edges, follow natural topography, promote species diversity in plantation)
	3. Are good farming practices used for the plantation of the crops? (Including agrochemical use and application, soil protection measures such as no tillage, winter covers, etc., sustainable management of water used for irrigation, etc.)
	4. Are best practices followed for pesticide storage and disposal? (Labelling of containers containing pesticides, fire prevention systems, secondary containment to prevent leakages, locked and posted area for pesticide storage, etc.)
	5. Are prevention and mitigation measures for worker health and safety considered at the plantation? At the generation plant? (Emergency plans, basic medical facilities on site, sanitary facilities, etc.)

Provides assistance in determining the extent of compliance with regulations, standards and best practice guidelines.

Stage 2c: Determination of risk management cost

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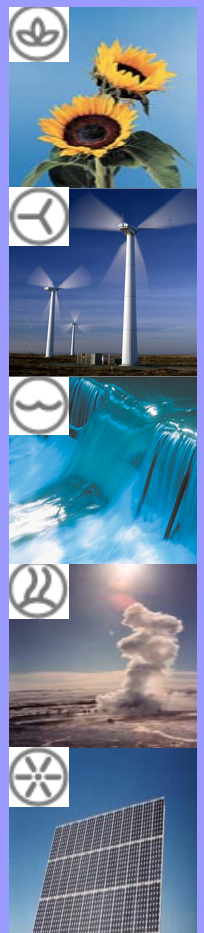

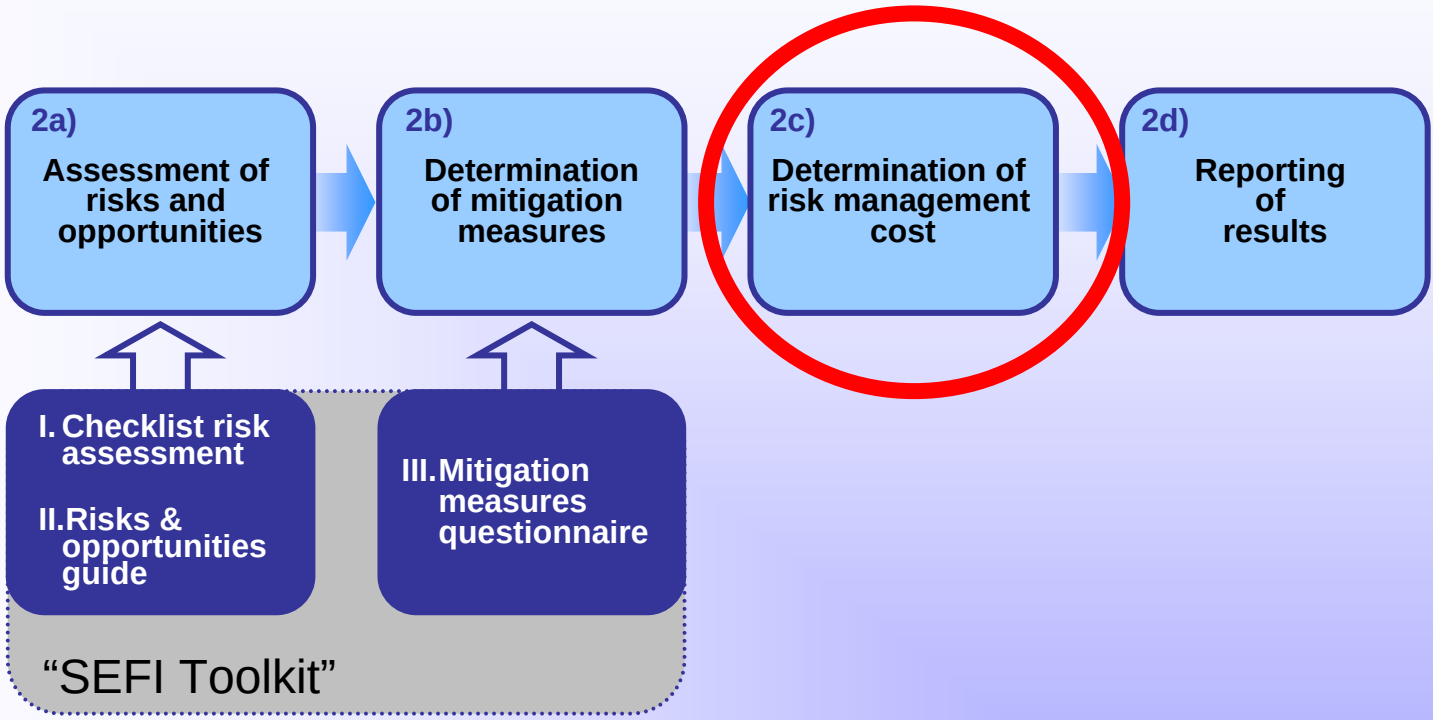

Estimate cost of risks and their management (including potential cost of non-compliance).

Stage 2d: Reporting of results

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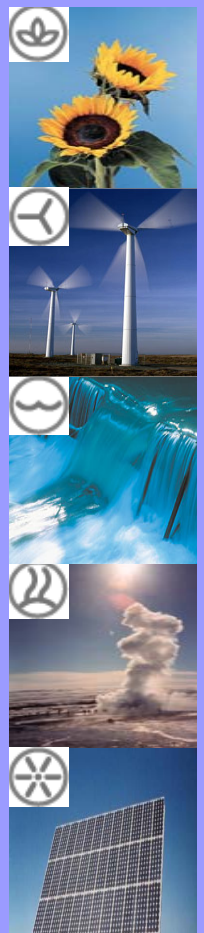

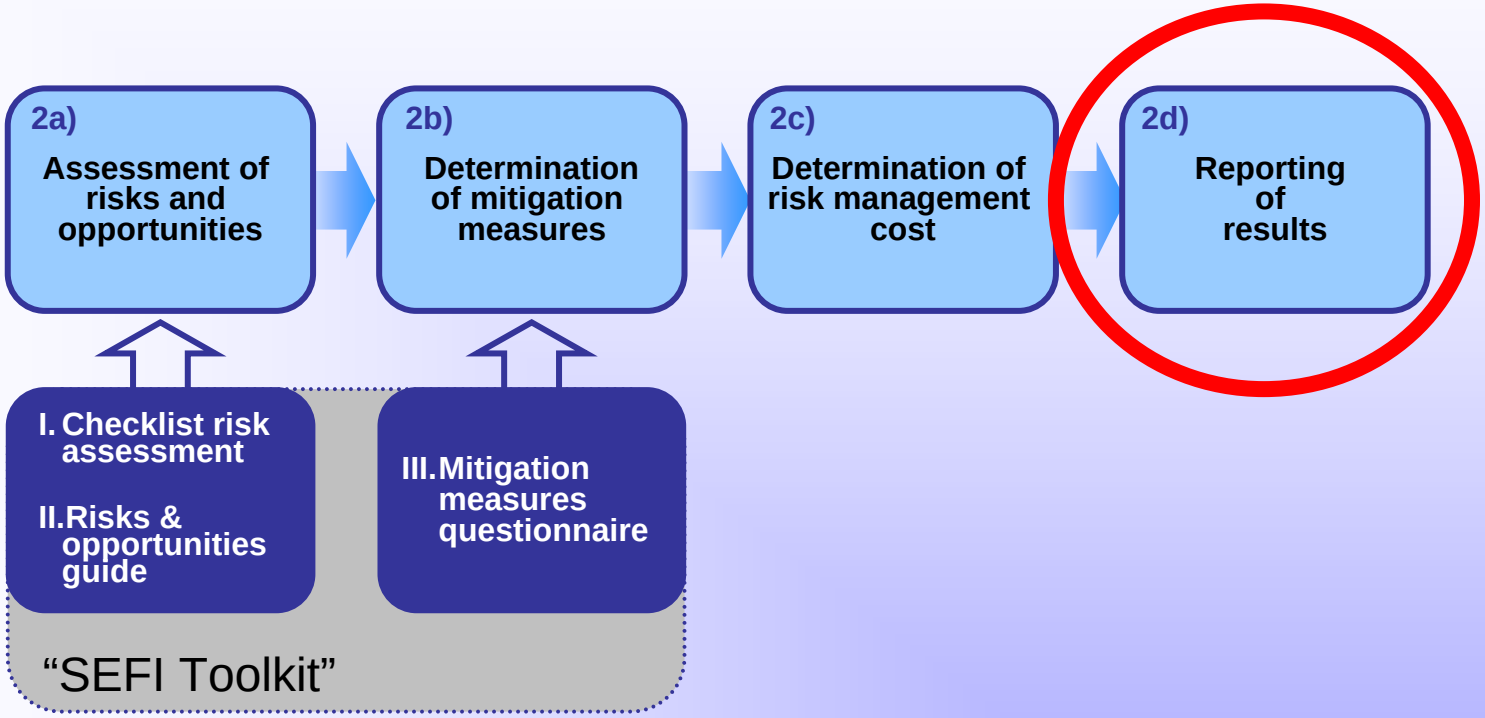

Present key findings in a format consistent with the FI's investment decision process.

Stage 3: Monitoring the Project

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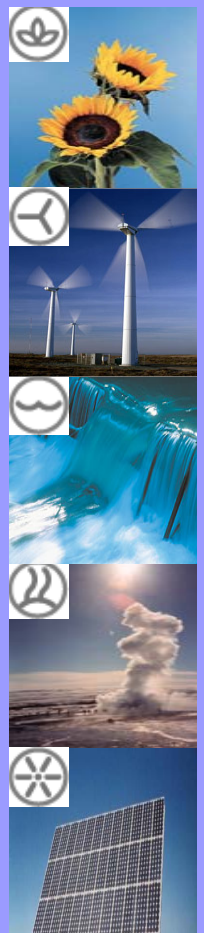

Three main purposes:

1. Ensure compliance of project sponsor
2. Keep track of environmental impacts
3. Keep track of mitigation measures

Significant changes in the project setup should always be preceded by a re-assessment of environmental risk.

The SEFI-EDD Guide for Biomass Systems

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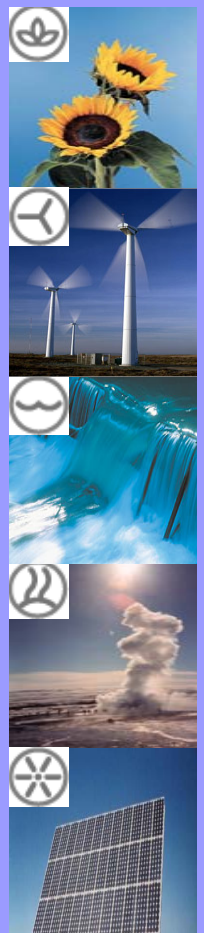

Division into 2 components:

1. Biomass Systems based on **Energy Crops**
2. Biomass Systems based on **Agricultural and Forestry Waste**

⇒ *Industrial and municipal waste not yet covered.*

Available SEFI - EDD Guidelines to date:

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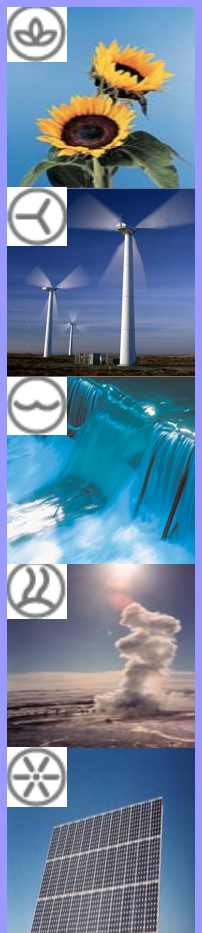
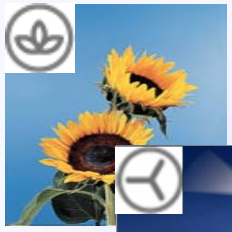
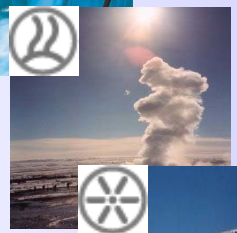




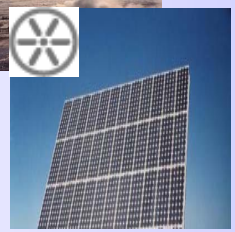
Biomass
Energy Systems

Wind
Energy Systems

Small-Scale Hydroelectric
Energy Systems



Geothermal
Energy Systems



Solar
Energy Systems

…all downloadable free of charge at: www.sefi.unep.org/tools

This is just the beginning…

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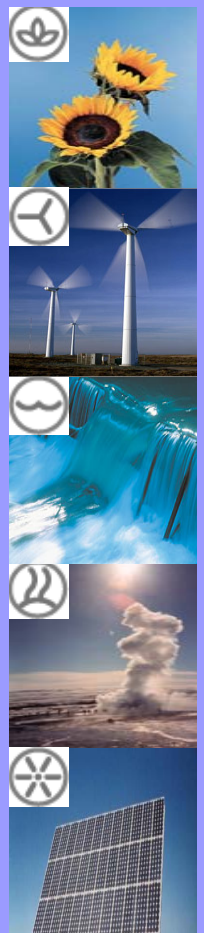

Ongoing BASE Expert Consultation Process, feedback from:

- Industry representatives,
- Associations, NGOs
- Financial institutions.
- Project developers
- other stakeholders

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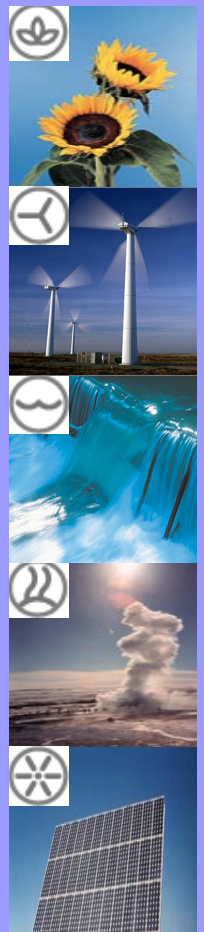

Thank You!

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