



EDD-CF-2009-11-17-Doc08

CECIMO Self-regulatory Initiative

Consultation Forum,
Brussels, 17 November
2009



Overview

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2. Method for the evaluation of machine tools
 - Description of complexity and challenges of assessing machine tools
 - Basis of the method: Investigation of a Life Cycle Assessment
 - Modular approach and List of Improvement Potentials
 - Principle of calculation
 - Evaluation matrix – example
 - Calculator (principle of application)
 - Current obstacles and challenges in the implementation
3. Benefits of the concept
4. Network for implementation of SRI
5. Concept – coverage of EuP directive Annex VIII
6. Current status of development of SRI concept and method
7. Implementation plan



Introduction CECIMO

CECIMO's position

CECIMO is the single and representative European industrial association in the machine tool production sector.

Facts

Member Associations cover 1.600 companies

Market coverage of CECIMO (2008)

Production of manufacturers associated in CECIMO:	44 % of global market	24,6 bn €
Export to non-European countries	37% of production	9,1 bn €
Sales in Europe of CECIMO members		15,5 bn €
Sales volume in Europe (including import)		18,0 bn €
Market coverage of manufacturers ass. in CECIMO	86 % of European market	

Source: national indicator + Eurostat

CECIMO's potentials

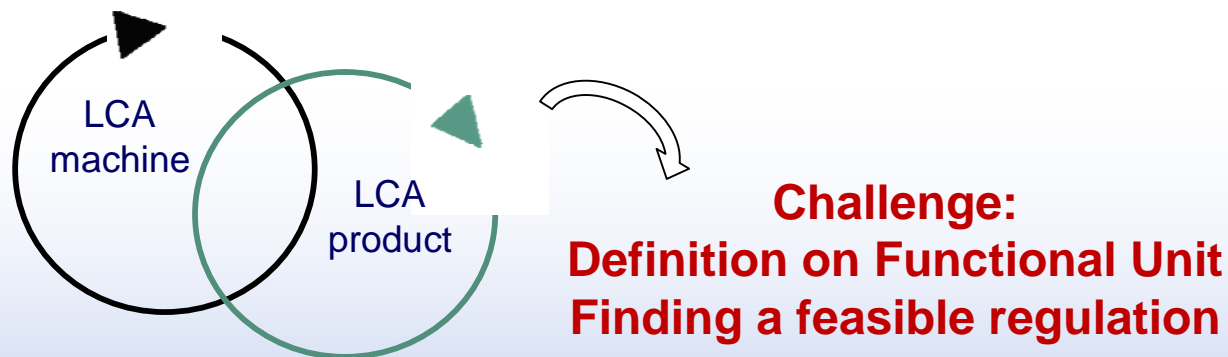
- § Pool of comprehensive knowledge
- § Access to best practice technology
- § Monitoring of ongoing development
- § Global network
- § Market influence

Method for the evaluation machine tools

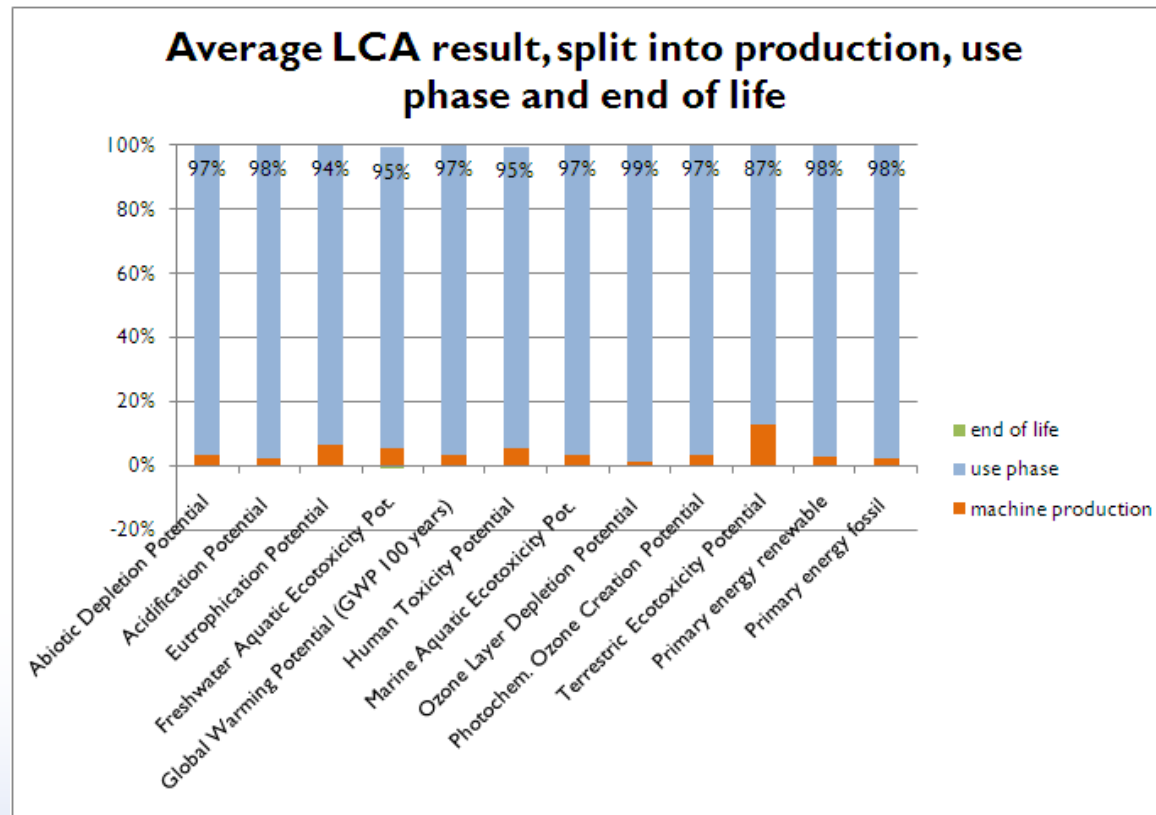
Complex situation

Talking about machine tools means:

- Describing a product group with about 400 different types / machine categories
- Definition of a product group with about 2.000 different machine tools
- Elaborating an evaluation method for a complex Life Cycle due to interconnecting system boundaries



Method for the evaluation of machine tools LCA



**Starting point:
Life Cycle
Assessment on whole
life cycle of a machine
tool**

Representative set of
machine tools;
including milling and
turning

**The use phase is the
dominating influence
for all environmental
impacts***

LCA scope:

Materials for production of the machine tool with average consumptions for machining
100.000 hours productive operating with specific average energy consumption (20h/d, 250d/a, 20a)

Consumption of 4.000 kg coolant lubricant in 20 years (assumption)

Consumption of 400 l hydraulic oil in 20 years (assumption)

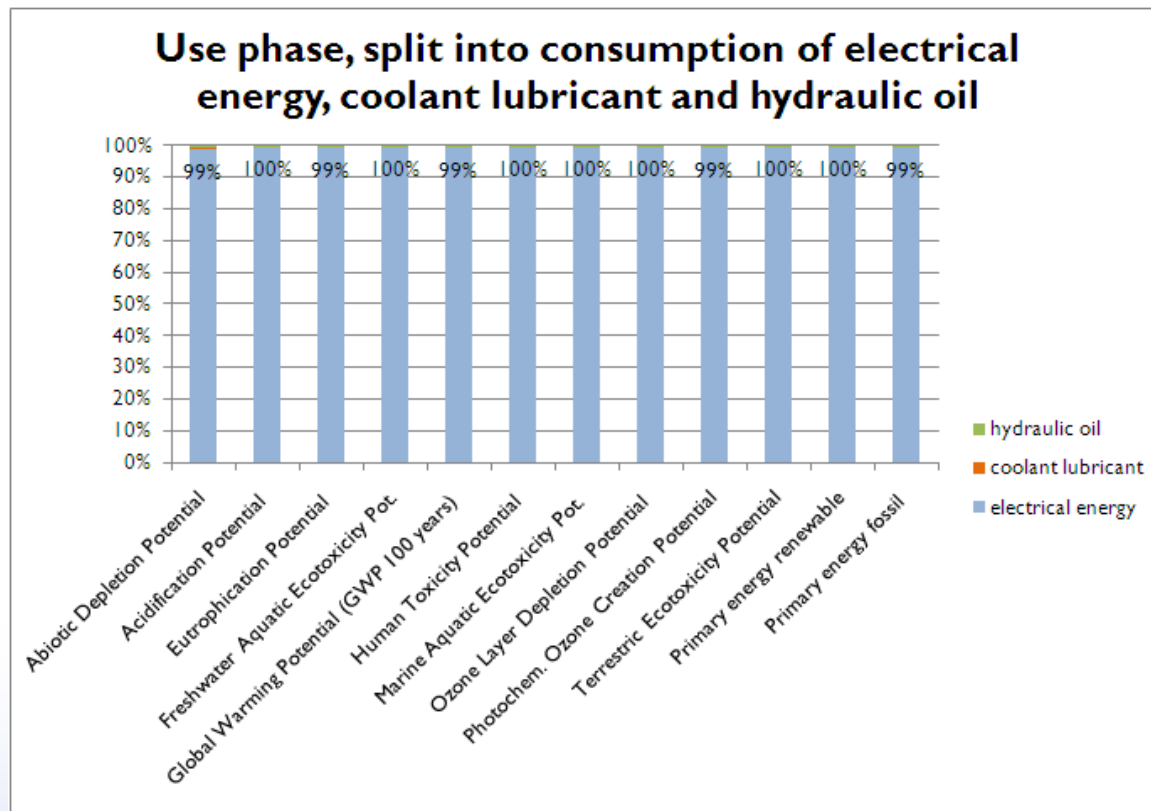
End-of-Life scenario with credits for recycling of metal and incineration of plastics

* According the methodology of the Institute of Environmental Sciences, University of Leiden, NL, 2007

supported by



Method for the evaluation of machine tools LCA



Energy consumption in the use phase is the dominating influence for all environmental impacts*

LCA scope:

- Materials for production of the machine tool with average consumptions for machining 100.000 hours productive operating with specific average energy consumption (20h/d, 250d/a, 20a)
- Consumption of 4.000 kg coolant lubricant in 20 years (assumption)
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Environmentally focused legislation

Link/cross reference to other directives and regulations

- RoHS
- WEEE
- REACH regulation
- Emission Trading Scheme Directive
- Integrated Pollution Prevention and Control Directive



CECIMO involvement in eco design

Research projects with CECIMO involvement funded by the Commission focusing on eco- design:

- Prolima – Best Environmental Practice Manual, LCA Software, LCC software

PROLIMA

- NEXT - concept of green machine



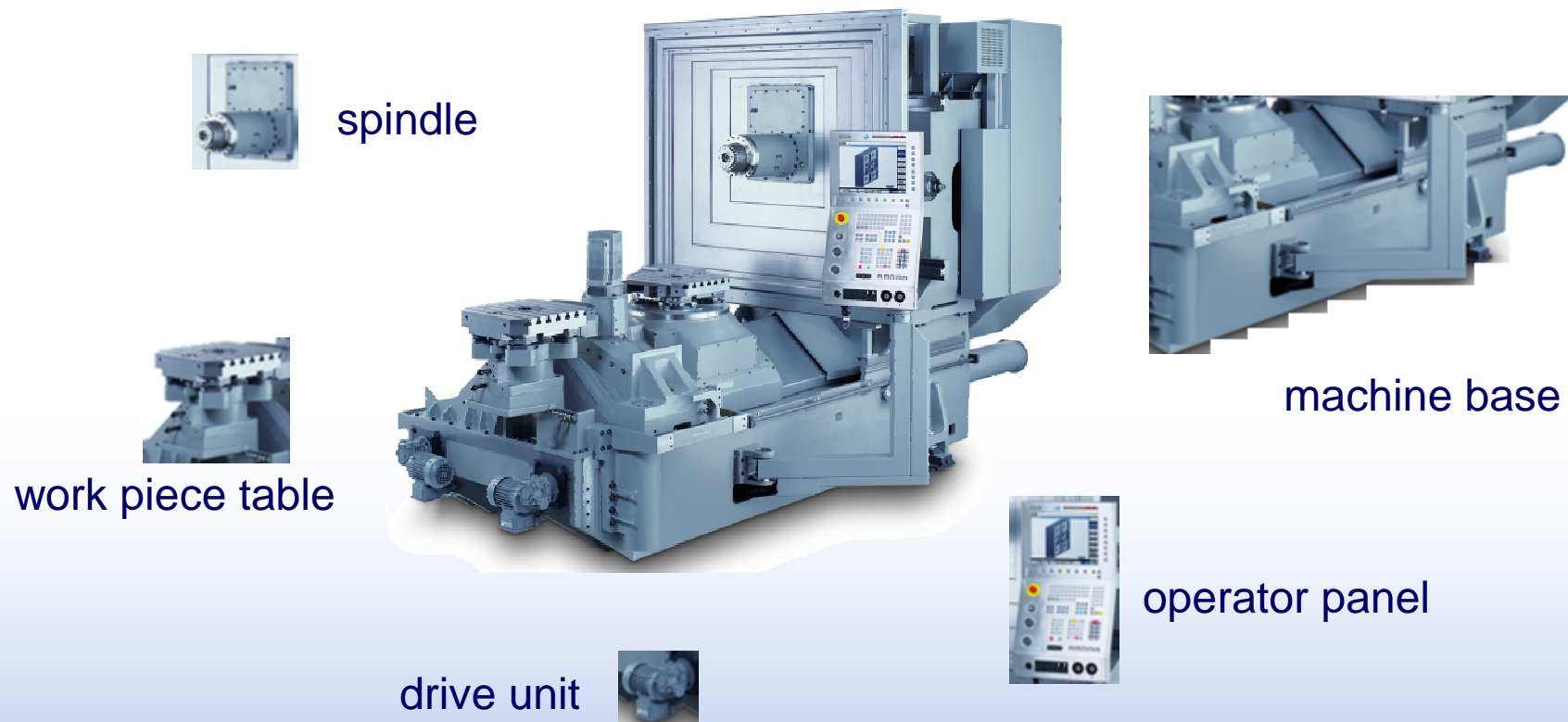
- Integmicro - dry ultra-high speed cutting at micro- meso domain process (to eliminate the use of cutting fluid to get the target of zero emission)

Integ- μ

Method for the evaluation of machine tools

Modular approach

Example of a machine tool and its modules



Method for the evaluation of machine tools

List of Improvement Potentials

No.	Improvement	Category 1	Category 2	Category 3	Improvement potential
	Drive unit				
1-1	Regenerative feedback of inverter unit	<p>Single machine component</p> <p>Under-component improvement value to overall improvement potential</p>	<p>Overall machine (Evaluation of effect of various operating modes)</p> <p>Energy/material saving with intelligent control system (-> operating modes) and simulation</p>		
1-3	Use of...				
1-7	Inverter auxiliary...				
...	...				
2-1	Reduction of friction			X	+
...*	...				



standard (BAU)

improved (1-1)



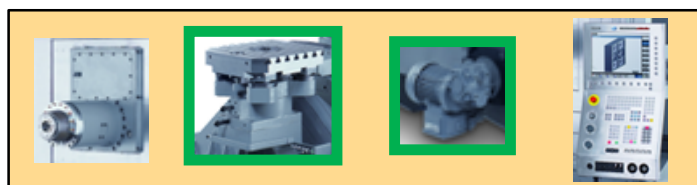
standard (BAU)

improved (1-3)

*present extent: ca. 50 potential measures

Method for the evaluation of machine tools Principle

Real machine with improved modules and intelligent control unit (A)



2,2	1,5	3,0	0,8
Average energy consumption in working mode			
1,5	0,5	1,5	0,8
Average energy consumption in stand-by mode			
0,5	0,5	0,5	0,2
Average energy consumption in power-safe mode			

operating scenario (24 h)

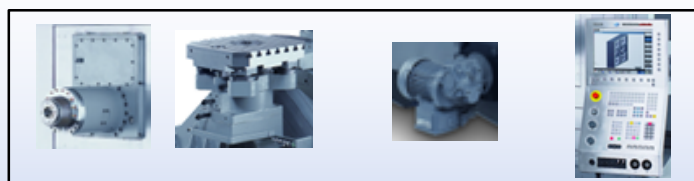
8h working mode
2h setting mode
2h stand-by mode
4h power safe mode
8h off

consumption

90,4

• = -77,6

Individually related standard machine (As) (BAU)



2,2	3,5	4,0	0,8
Average energy consumption in working mode			

8h working mode
8h setting / idle mode
8h off

168

Evaluation: (A-As)/As

(90,4-168)/168 = -46%

Method for the evaluation of machine tools

Principle



Why this method?

- Functional unit: specific single machine tool
- Method independent on absolute consumption
- Applicable for any kind of complexity and machine type
- Independent on quality and requirements of work piece



Method for the evaluation of machine tools evaluation matrix - example

Machine XYZ, Manufacturer ABC

	Category 1 and 2 Single modules and Overall machine		Category 3, Machine concept
Basic requirement to fulfill the voluntary agreement	- x %		+
Quantitative improvement (ref. to customer specific operating scenario)	- y %*		++
a) Measure 1	regenerative feedback of inverter system (1-1)		
b) Measure 2		Inverter controlled pumps (1-7)	
c) Measure 3			Display of energy consumption (10-3)
.....			

* Absolute figure (ref. to 24h): kWh/h



Method for the evaluation of machine tools Calculator (principle of application)

MACHINE MANUFACTURER:	XYZ
MACHINE NAME:	ABC

EVALUATION OF MACHINE

calculation formula:
$$\frac{(\text{real machine} - \text{standard machine})}{\text{standard machine}}$$

real machine: all improved modules + intelligent control system

standard machine: standard modules, excl. intelligent control system

considered scenarios:

improvement as absolute figure
[kWh/h] ref. 24h scenario:

3-shift, productivity > 90%:	(B-As)/As	-19,9%	B-As	-3,66 kWh/h
3-shift, productivity 80%:	(D-Cs)/Cs	-24,7%	D-Cs	-4,40 kWh/h
3-shift, productivity 80% + simulation:	(E-Cs)/Cs	-28,0%	E-Cs	-5,00 kWh/h
1-shift, productivity 30%:	(G-Fs)/Fs	-24,4%	G-Fs	-1,71 kWh/h
1-shift, productivity 20%:	(I-Hs)/Hs	-36,3%	I-Hs	-2,37 kWh/h
customer specific:	(K-Js)/Js	-37,3%	K-Js	-5,83 kWh/h




ISO - ECO standards initiated

- ISO: New Working Group under ISO/TC 39 established to deal with Environmental Evaluation of Machine Tools
 - First standards under the working group:
 - Guidelines - Integrating environmental aspects into design and development for machine tools
 - Machine Tools • Test methods for electric power consumption

- ISO: New Working Item Proposal
Tools
The scope is the definition of the environmental performance of machine tools regarding design, use and end of life phases.

Environmental Evaluation of Machine Tools



NEW WORK ITEM PROPOSAL	
Date of presentation	Reference number (to be given by the Secretariat)
Proposer	ISO/TC 39 / SC N
Secretariat	
NWM im DIN	

A proposal for a new work item within the scope of an existing committee shall be submitted to the secretariat of that committee with a copy to the Central Secretariat and, in the case of a subcommittee, a copy to the secretariat of the parent technical committee. Proposals not within the scope of an existing committee shall be submitted to the secretariat of the ISO Technical Management Board.

The proposer of a new work item may be a member body of ISO, the secretariat itself, another technical committee or subcommittee, or organization in liaison, the Technical Management Board or one of the advisory groups, or the Secretary-General.

The proposal will be circulated to the P-members of the technical committee or subcommittee for voting, and to the O-members for information. See overleaf for guidance on when to use this form.

IMPORTANT NOTE: Proposals without adequate justification risk rejection or referral to originator. Guidelines for proposing and justifying a new work item are given overleaf.

Proposal (to be completed by the proposer)

Title of proposal (in the case of an amendment, revision or a new part of an existing document, show the reference number and current title)
English title Environmental evaluation of machine tools



Method for the evaluation of machine tools Obstacles and challenges

Preconditions to be prepared for operating the calculator

- Description and definition of modules/components of the machines
- Definition of average consumption of electrical energy in operating modes
by development of measurement rules, statistics, calculation algorithms
- Elaboration of an applicable list of improvement potentials
by development of measurement rules, statistics, calculation algorithms
- Definition and commitment of operating modes (stand-by mode / power safe)

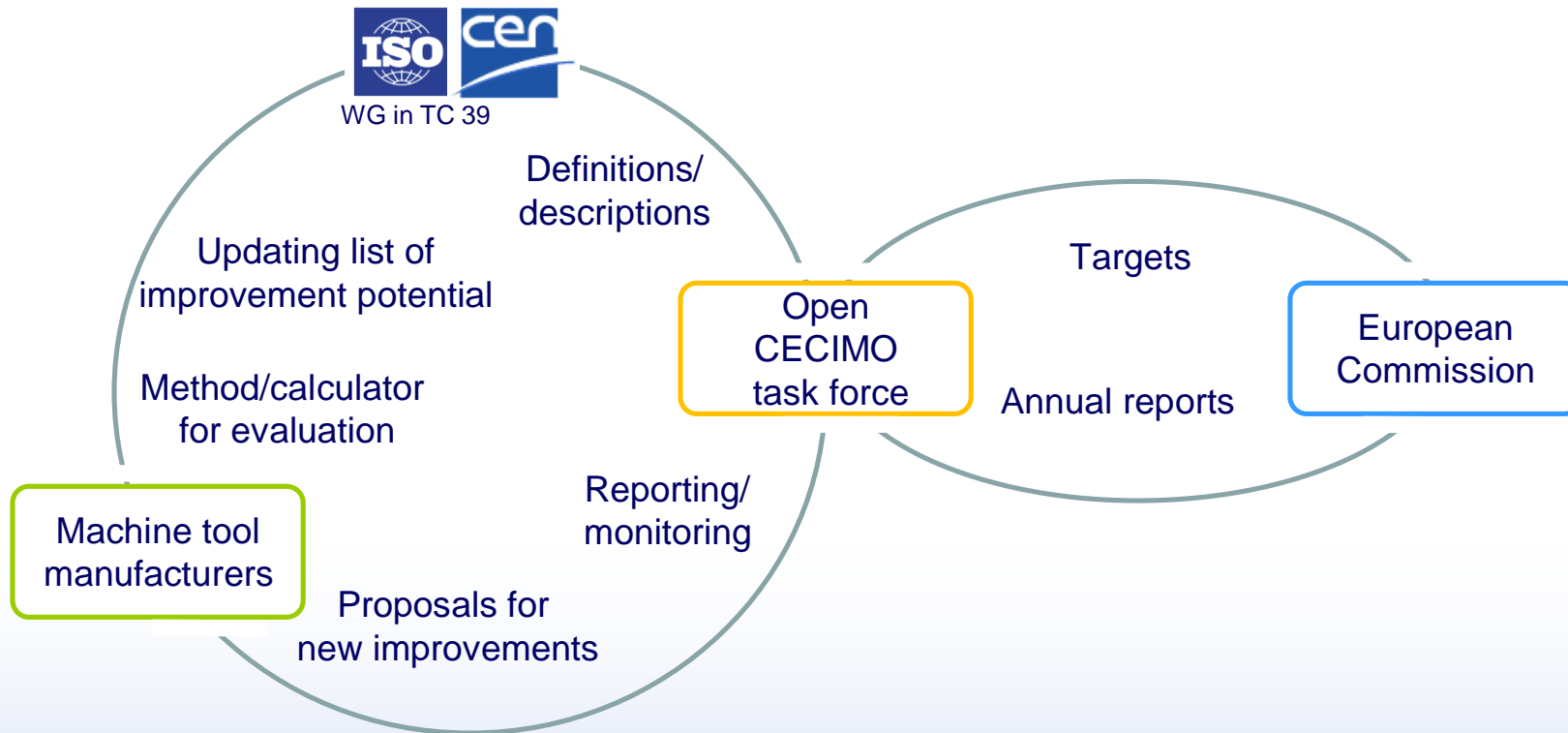


Benefits of the concept

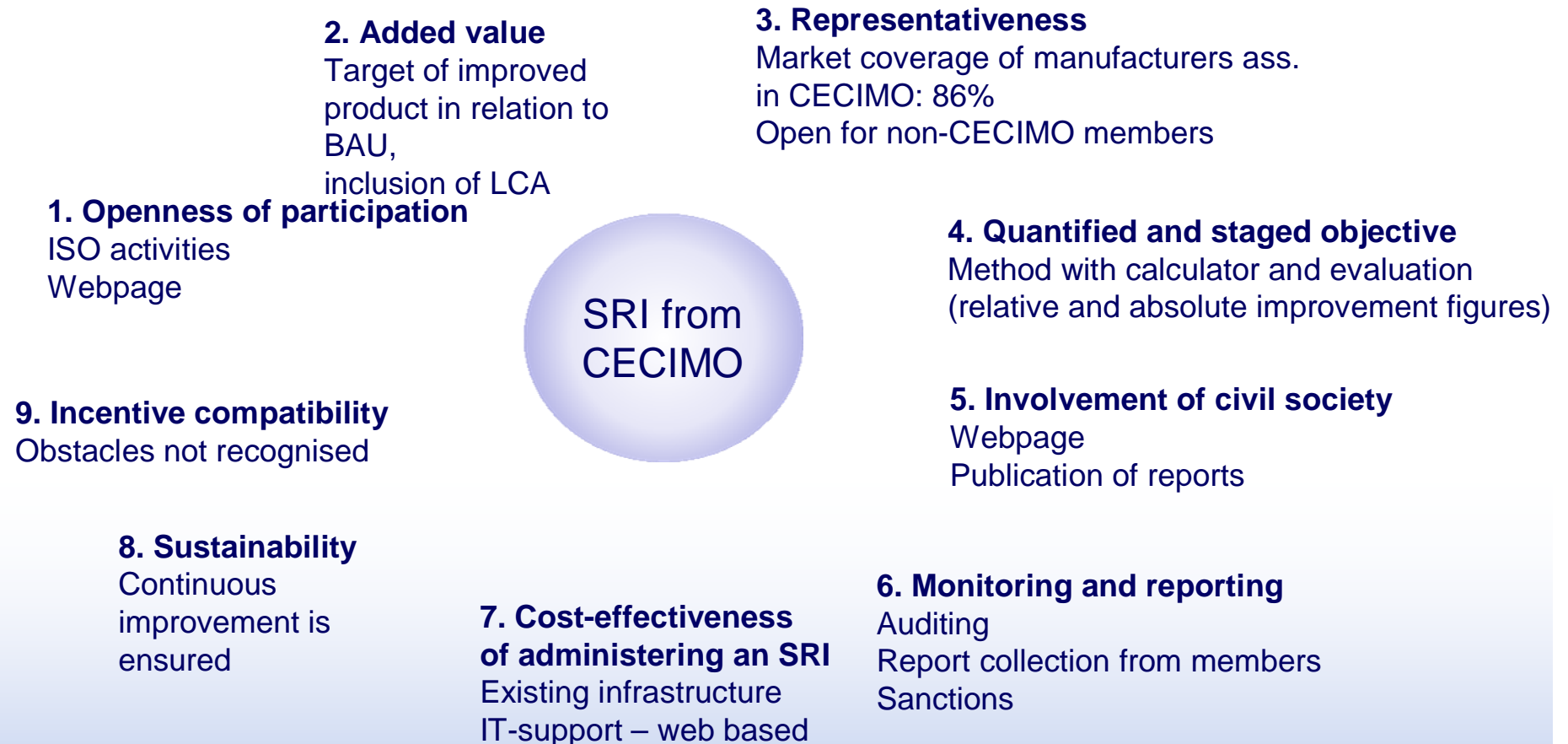
- Complexity of the product is displayed by evaluation via calculator and scenarios
- Individual evaluation of machines
incomparable products need not to be compared
- Freedom of innovation is assured
- List of improvement potentials allows free further development
description of not definable BAT is avoided
- Simplification of evaluation due to concentrating on consumption of electrical energy in the use phase
possible via prove of LCA calculation of the whole life cycle
- Extendable and applicable to all types of machines
- Positive arguments for sales
- Label is not necessary



Network for implementation of SRI



Concept – coverage of EuP directive Annex VIII



Current status of development of SRI concept and method



- Slides show the result of work from the last 6 months
- Open CECIMO task force is the centre of the concept
- The elaboration of the method can be done only by the industry itself
SRI
- The concept is open to all stakeholders, but not yet installed or launched; individual feedback is not yet available
- CECIMO waited for the CF-meeting to take place to elaborate details of the concept and to proceed
- Concept and method has been evaluated by representatives of industry positively



Implementation plan

Tasks	< 2012	• 2012	comments
Establishing of open CECIMO task force			
Description and definition of modules			
Data collection/measurements/statistics/algorithms (pre-conditions for calculator)			
Description and definition of operation modes for scenario calculation			
List of improvement with quantified statements			
Proof of new proposal by LCA (dependent on proposal)			
Target setting for the SRI			
Webpage installation and fostering			
Standardisation activities			
Monitoring and reporting			
Information exchange, training on the subject			

The tasks will be elaborated by CECIMO, the open CECIMO task force, national associations, industry members (machine tool manufacturers and users), ISO Working groups, consultants, NGOs, public authority, research institutes, academic world and other stakeholders.



Thank you for your attention