



ADEME-WEC Meeting of the Energy Efficiency Policies & Indicators Committee

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Evaluation of measures in industry Mandatory audits and benchmarking Key issues

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1. Key issue in energy efficiency policy implementation in industry



Energy efficiency in Industry sector

Strategic issues

- **Is the industry sector still a priority for EE policy setting?**
 - ↙ Few policies
 - ↙ Is there a still a potential?
- **Which inovatives?**
 - ↙ Innovatives measures
 - ↙ SMEEs
 - ↙ Relevant packages of P&M
- **Energy efficiency and competitiveness**
 - ↙ Lisbon target and indicators
 - ↙ Impact of delocalisation
 - ↙ The renewall of energy intensive industries
 - ↙ Energy price rise and energy efficiency



Key Issues for auditing

- Why and when choose mandatory audits ?
- What type of audits (1 day, 3 days faisability study)
- Subsidies or not?
- Relationship between audits and others instrument (Voluntary or negociated agreement, Benchmarking, etc).
- Relatively rapidly a large number of companies participating; benchmarking made easier /Example Thailand/ Malaysia)



Key issues in auditing (cont)

- But: Problem of Motivation of Companies / Financial incentives (but then voluntary audits are as well an option). Benchmarking + Feedback to companies on performance + subsidies
- Problems related to evaluation of energy efficiency improvements (but not exclusive problem of mandatory scheme)

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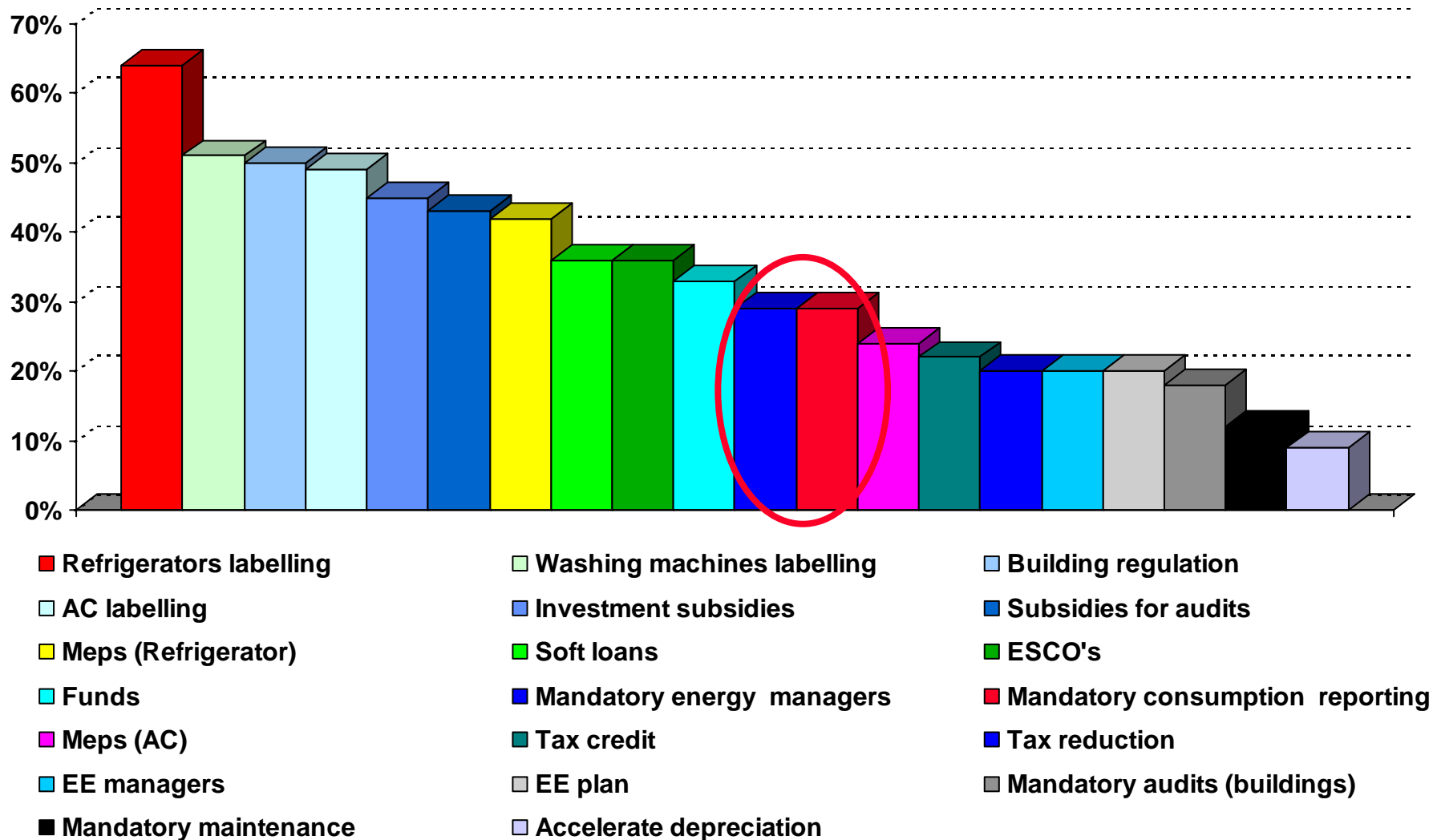


2. Results of the surveys



WEC survey on energy efficiency policies

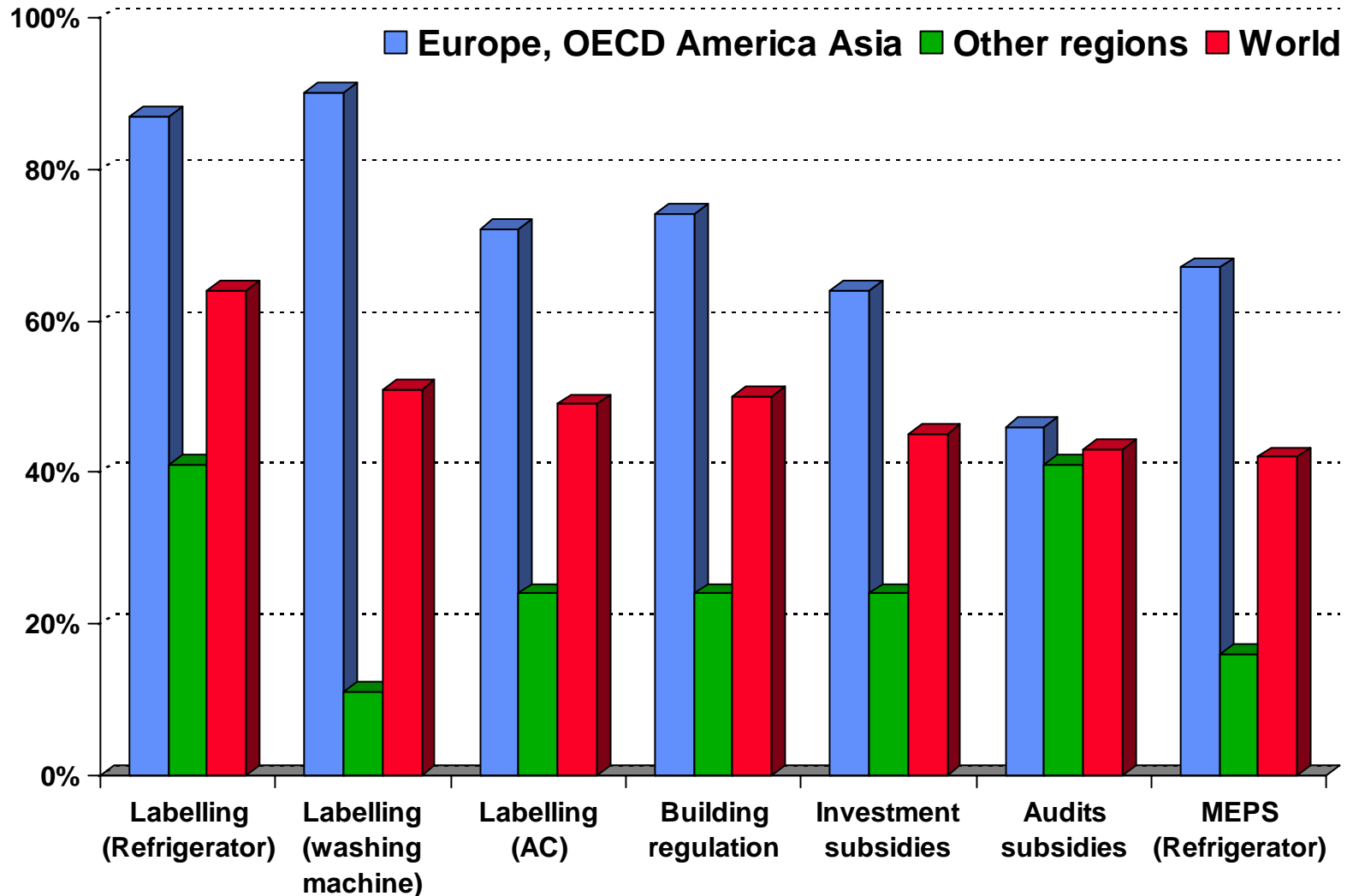
frequency of measures





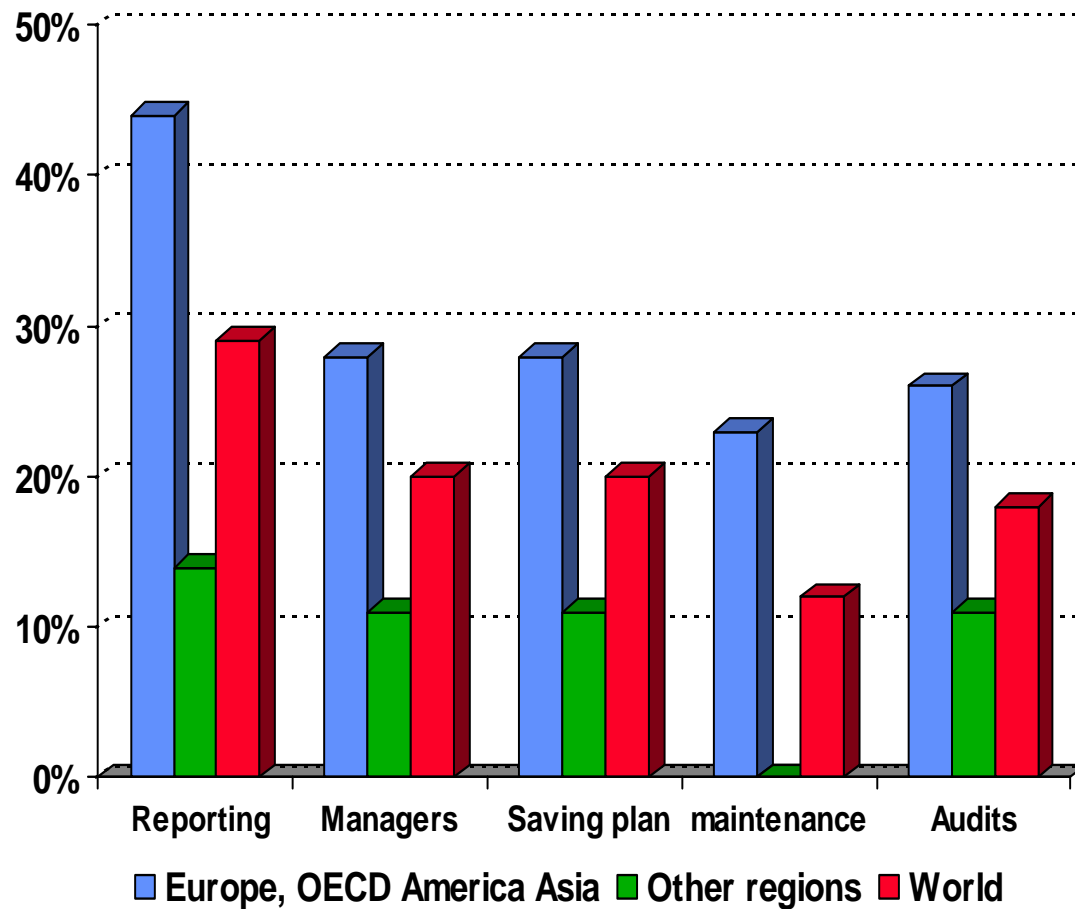
WEC survey on energy efficiency policies

Most frequent measures by regions





WEC survey regulations in Industry



- ✓ In general few other regulation in non industrialised countries (10% of countries)
- ✓ Mandatory consumption **reporting**, most popular, mainly in industry (17 countries) & services (13)
- ✓ Mandatory energy **managers** in industry (13 countries) , services (8), transport (4)
- ✓ Mandatory **saving plan** : mainly industry, transport in 6 countries, services (9), municipalities (3)
- ✓ Mandatory **maintenance** in services (5 countries) and households (5)
- ✓ Mandatory **audits**: mainly in industry (10 countries) and service sector (12); but now also with households (4 in Europe but increasing number with mandatory certification of buildings similar to audits being implemented in all EU countries)



Type of measures in industry

Subsidies or soft loans :

- Subsidies or soft loans for energy efficiency investments
- Energy audits

Fiscal measures :

tax reduction on energy (fuel / electricity) in exchange of energy efficient investment

accelerated depreciation for energy efficient equipment / investment

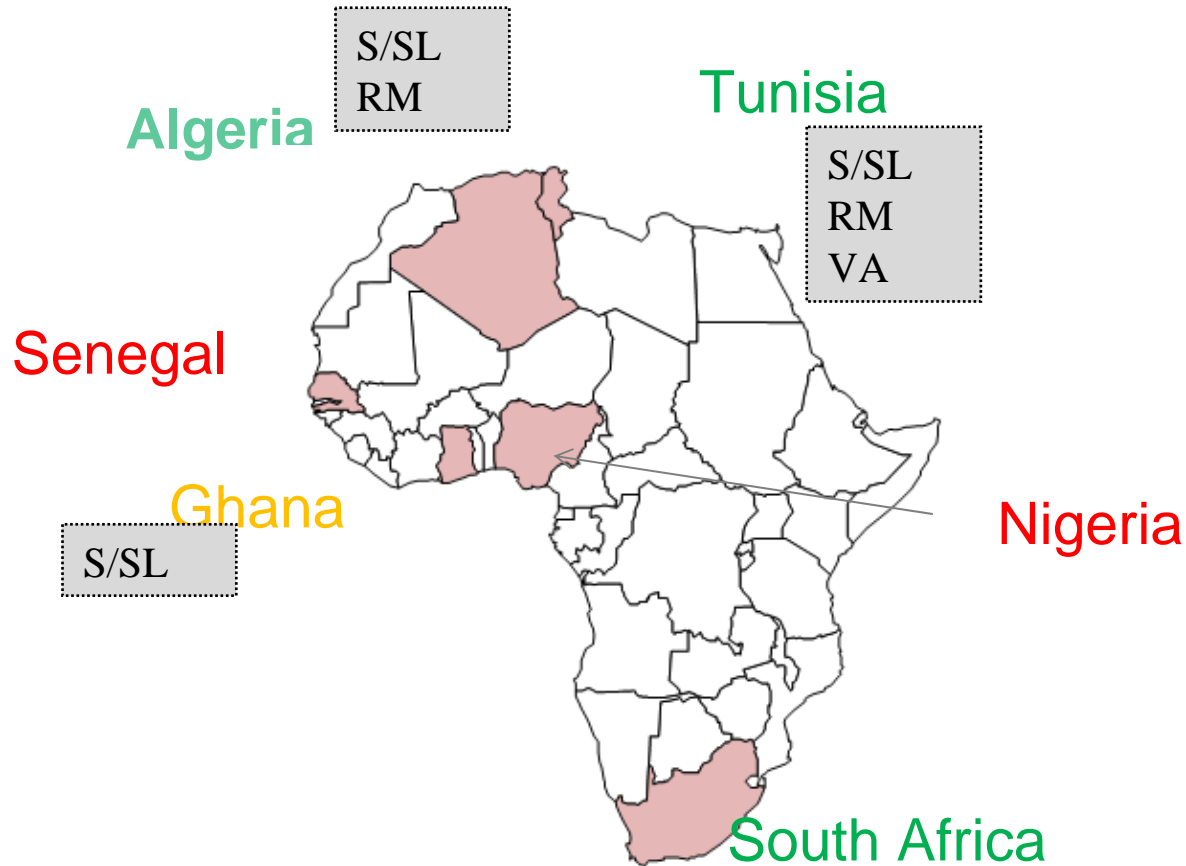
Regulatory measures :

- Mandatory energy audits
- Energy managers
- Energy consumption reporting, energy savings plans
- Obligation of energy savings

Voluntary agreement:



What measures in industry and for which countries ?



- Subsidies / soft loans (S/SL)
- Fiscal measures (FM)
- Regulatory measures (RM)
- Voluntary agreement (VA)

S/SL
 RM
 VA
 FM (not yet implemented)



What kind of measures in industry?

	Subsidies or soft loans	Fiscal measure	Regulatory measures	Voluntary agreement
Algeria	Subsidies (20-70%)	-	Energy audits, consuming reporting & energy savings plans : if consumption > 2000 toe /year	-
Tunisia	Subsidies for audits (70%), subsidies for investment (20%)	-	Energy audits, & energy savings plans : if consumption >1000 toe /year	390 companies (targets 395 ktoe till 2011)
Ghana	Soft loans	-	-	-
South Africa	Subsidies for audits (15%), subsidies for investments(15%)	-	-	45 companies (target = -15% reduction in energy demand till 2015)



Summary : what kind of measures are implemented in industry?

- **No actions in Senegal and Nigeria in industry**
- **Subsidies or soft loans are implemented in 4 countries (among 6)**
- **Regulatory measures : concern two countries (according to a certain level of consumption)**
- **Voluntary agreement : concern two countries with quantitative objectives in energy demand reduction.**

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3. Case studies

Taiwan

France



The example of Taiwan

Source Dr D Yih-Liang Chan)

Energy Management Law

Article 9

(**Energy Audit System**)

The large energy user should **establish its own energy audit system** and report the **energy conservation plan** to the relevant central authority.

Article 11

(**Energy Manager**)

The large energy user should assign an **energy manager in charge of energy topics**; whereas the relevant central authority shall define the qualification, responsibility and quota of the said energy manager.

Article 12

(**Report on energy consumption**)

The large energy user should **submit a report on data** relevant to **energy consumption** to the relevant central authority.



Taiwan (cont.)

Source Dr D Yih-Liang Chan)

Energy Management Law (cont.)

Article 21

If the large energy user **fails to complete** the remedies by the **deadline**, it shall be subject to a fine ranging from **NT\$3,000 to NT\$24,000** :

- **Fails to assign an energy manager which is in violation of provisions under Article 11.**
- **Fail to submit a report on energy consumption which is in violation of provisions under Article 12.**

Article 24

If the large energy user fails to complete the remedies by the deadline, it shall be subject to a fine ranging from **NT\$15,000 to NT\$150,000**, **restriction on use of energy** or even **suspend energy supply** for a period ranging from **7 days to 30 days** :

Fail to establish energy audit system or objectives and plans for energy conservation which is in violation of provisions under Article 9.



Taiwan: the Energy saving effect of on site energy audit (2001-2005)

Source Dr D Yih-Liang Chan)

Industries	Number of Companies	Saving Potentials		
		KLOE	CO ₂ Reduction (Tons)	Benefits (million US\$)
Iron & Steel	71	101,937	252,920	23.2
Cement & Ceramics	26	28,227	73,016	6.4
Chemical	109	101,106	294,645	23.2
Pulp & Paper	48	56,875	171,093	13.1
Textile	120	104,486	295,661	23.8
Electronics	32	27,824	73,783	6.4
Others	20	274,194	727,180	62.9
Thermal Power Plants	18	189,349	582,506	43.3
Sum	444	883,998	2,470,804	202.3

Equal to 466 days of fuel needed for one unit of power generator (300MW) in Lin-Ko thermal power plant



Taiwan : Distribution of recommendations after on site energy audit

Source Dr D Yih-Liang Chan)

Improvement Item Industry	Boiler & Steam	Compressed Air	Motor	Furnace	Air Conditioning	Lighting	Cooling tower & Pump	Others
Chemical	24%	18%	21%	4%	—	3%	2%	28%
Iron & steel	8%	29%	13%	30%	—	—	20%	—
Pump & paper	47%	11%	8%	—	3%	5%	11%	15%
Textile	39%	31%	9%	—	10%	6%	5%	—
Cement	17%	26%	19%	—	—	30%	8%	—
Electronics	—	25%	—	—	39%	—	10%	26%



From audits to Escos

(Source Dr D Yih-Liang Chan: Taiwan)





Taiwan : the implementation rate of the Energy audits recommendations in top 100 large energy users

Source Dr D Yih-Liang Chan)

Industry	No. of companies	Suggested Items for improvement	Items implemented	Implementation rate (%)	Total Energy Savings (KLOE)
Iron & Steel	16	301	201	66.8	15,796
Chemical	29	460	281	61.1	23,901
Pulp & Paper	12	240	163	67.9	52,892
Textile	19	374	253	67.6	49,197
Food & Beverage	2	49	25	51.0	24
Electric & Electronics	6	147	84	57.1	4,033
Metal Products	1	20	12	60.0	2,112
Cement & Glass ware & Non-Iron Metal	15	273	182	66.7	5,746
Total	100	1,864	1,201	62.3	153,699



Conclusion case study of Taiwan

- **Lacking of energy resources, energy conservation is critical to energy management in Taiwan**
- **The benefits of energy audit and SEC energy benchmarking programs in Taiwan are cost-effective**
- **Future planning for energy conservation**
 - **Conduct extensive on-site energy audits and SEC benchmarking system on high energy consuming equipment to enhance total energy efficiency**
 - **Develop computerized energy audit reporting systems to enhance the reliability of energy audit database**
 - **Provide more incentives to reach a comprehensive energy conservation purpose**
 - **Promotion of ESCO Business**



The audits scheme in France

- **Pre-diagnostic** : to sensitize the company and perform a rapid audit (2-3 days) in order to identify enjeux and need of full diagnostic.
- **Diagnostic** : in-depth audit. Compare different solutions.
- **Feasibility study** : in-depth study prealable to the investment with exact definition of the operation.



Financial aspects of the Audit scheme (France)

Procedure	Maximum cost	Rate of aid
Prediagnostic	2300 euros	90%
Diagnostic	30 000 euros	50%
Feasability study	75000 euros	50%

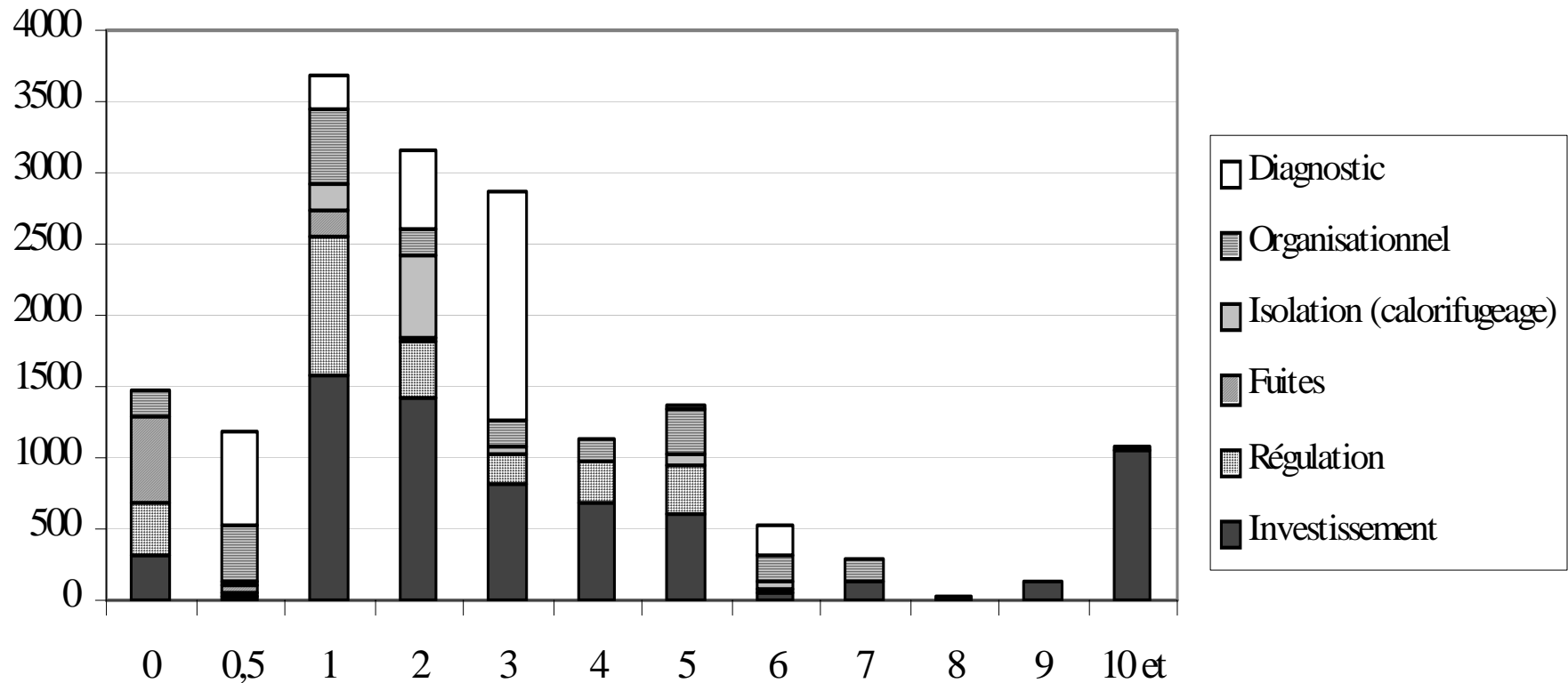


Audits in industry

	2000	2001	2002	2003	2004
Total audits	839	540	764	498	562
Prediagnosis	591	342	360	299	418
Diagnosis	216	162	367	163	106
Feasibility studies	32	36	37	36	38
Pilot studies	35	60	47	33	26
Energy savings ktoe	14	10	19	10	9
CO2 (ktCO2/year)	14	10	19	10	9



Results for Industry (France)



*Résultats issus de l'exploitation de 125 fiches de synthèse 99/00, récoltées en Mars 2001 et concernant le programme URE Industrie



The benchmarking

- **New instrument to replace or complement other instrument (V.A. in netherlands)**
- **Some applications (Netherlands, Taiwan etc)**
- **Transaction cost seems high**
- **Provide information to the administration (reduce the information gap)**



Main conclusions on energy audits in industry



- **Evaluation of Audits schemes reveals that they are very cost-effective**
- **Trends towards more programmes of energy audits and mandatory audits;**
- **Audits are almost always a evaluation component of a package of measure. May provide information to the administration**
- **Subsidies help to introduce audits**



Main conclusions on mandatory energy audits

- **Quite widespread in industry, as well as for residential and tertiary sector buildings.**
- **More and more countries opting for mandatory approaches in industry since 2000 , with a more pronounced in emerging and developing countries due to the larger weight of industry.**
- **Mandatory audits in the industrial sector quite frequent in Asian countries (India, Taiwan, Thailand with, however notable exceptions such as China or Japan), in Australia, in North African countries (Algeria, Tunisia) and EU New member countries (Bulgaria, Romania).**
- **Frequently required in the frame of agreements to conserve energy.**
- **In general strong interest for energy audits.**



Conclusion (cont,) A need for an international benchmarking

- There is a debate on the rate of implementation of the energy savings measure through investment : Only short terms measure?, horizontal measure, few measures on process?)
- The rate of implementation may depends on many factors including the confidence of the quality of the audit , the level of communication, the investment performance of the investment etc
- How to know that all options reflects the full opportunities? **The need for an international benchmarking**