

Efficiency in the Supply of Energy and
Energy Conservation



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MOTOR SUMMIT 08

Main Brazilian Industrial energy efficiency
Activities

D.Sc. George Alves Soares – Eletrobrás - Brazil

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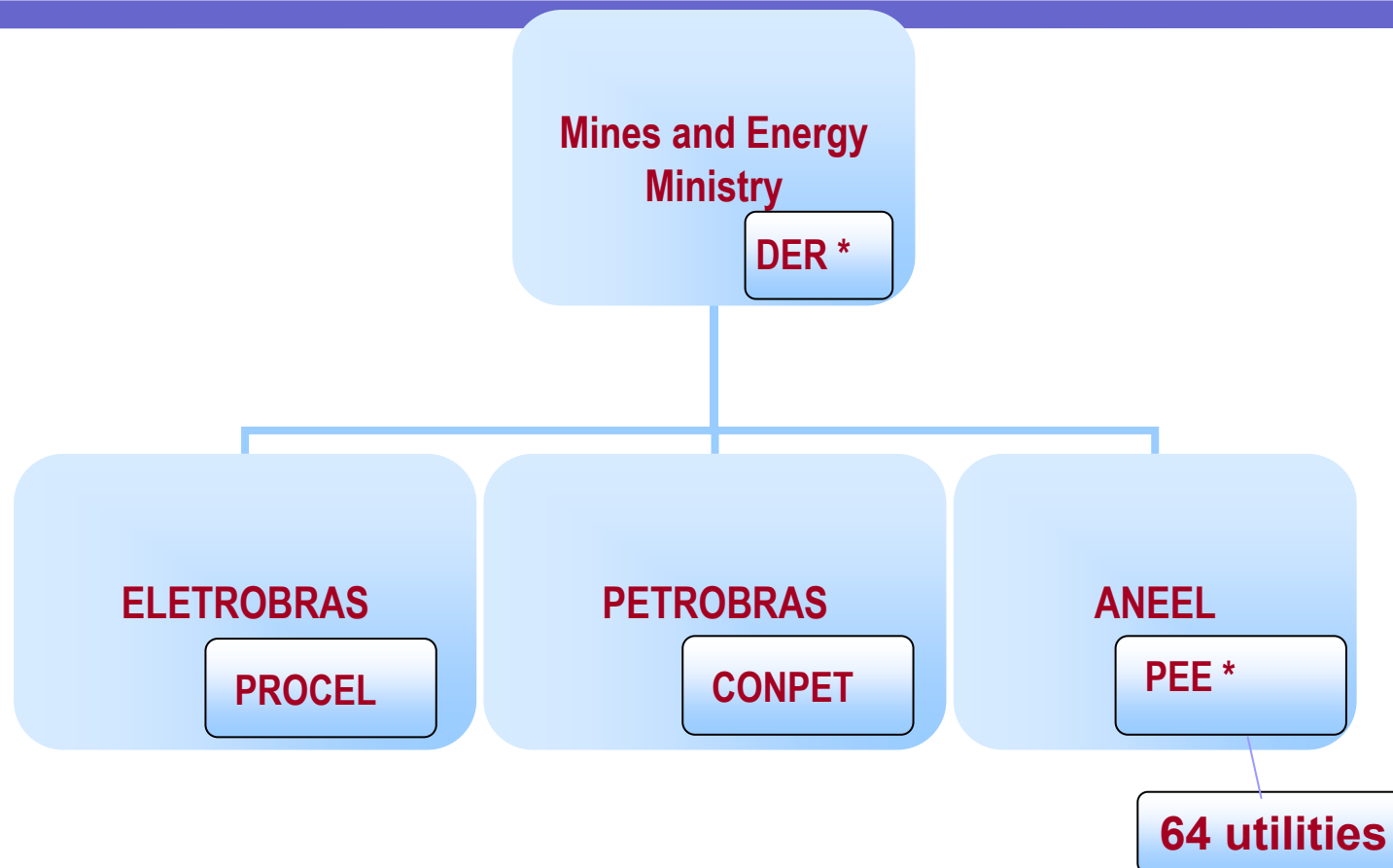


CONTENT

- EE Institutional Framework;
- Motor market
- Industrial sector characteristics
- Brazilian MEPS Process;
- Industrial Energy Efficiency Program;
- Industrial EM Standard;
- Industrial Studies;
- Supporting activities.



National EE Programs Institutional Scheme



Annual investment budget U\$ 200 millions

*DER – Department of EE and Renewable Energy

* PEE – Energy Efficiency Program



Motor Market

- **One of the biggest of the world for three phase induction motor**
 - **Production: \approx 1,2 millions unit;**
 - **Well established manufacturers;**
 - **70 % of the motor are bought by the OEM;**
 - **Installed units \approx 12 millions (2003);**
- **IEC frame X 60 Hz frequency**

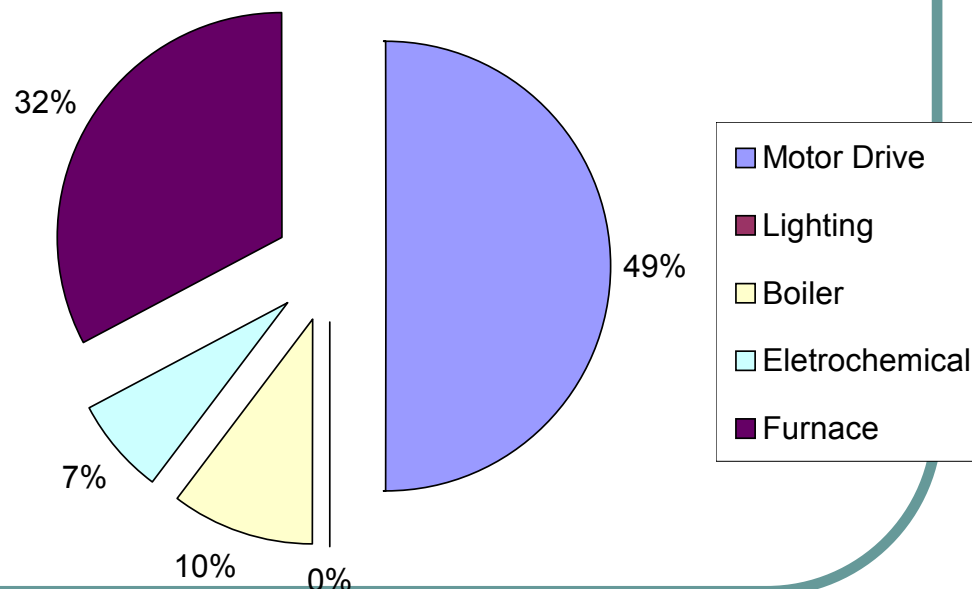


Industrial sector

Industrial sector is huge and consumes 174 TWh from the grid per year – 46 % of the total;

40 greatest industries consumes 63 TWh which corresponds to 17 % of the total energy consumption

The motor systems consumes 49 % of the industrial sector





Some Historical Aspects for EE in Motors and Industry

1985-1990 – Market knowledge, audits and dissemination

1992 - 2000 – Labeling system and pilot projects

2000 – Creation of Utilities Programs

2001 – Minimum Efficiency level Law

2002 – Minimum Efficiency level for standards and high efficient motor

2003 – Creation of PROCEL INDUSTRIA – implementation environment

2005 – Launch of the Minimum Efficiency level for 2009

2006 – Insertion of EE in the energy supply matrix of 2030

2008 – Starting the working group for ISO 50001



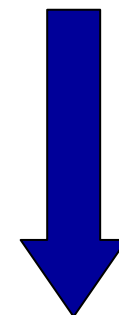
MEPS for Industrial Motor

- Labeling system started in 1992
 - Selection of test procedure – NBR 5383 \approx IEEE 112 – Method B
 - Mounting of the laboratories capability;
 - Revision of the related standards;
 - Seals for the most efficient for standard and high efficient motor;
 - Started the negotiation with voluntary agreement for minimum efficiency for two lines -1998;



MEPS for Industrial Motor

- Creation of small technical group, ^{Mandatory phase} After 2001
- Negotiation with manufacturers;
- Two public hearings;
- Publication of decree
- 2002 – Minimum efficiency levels for standard and high efficient motors –similar to NEMA’s values
 - Big scope 80% of the market
 - alone and part of machine;
 - 2,4,6,e 8 poles, many IP levels and many types of





MEPS for Industrial Motor

- Difficulties to implement the importation procedures and legal framework and the market inspections – inspector's training and new procedures for importation licenses;
- 2005 – Launch of the target plan – Table similar to EPACT's levels
 - After December of 2009 is prohibited to manufacture and import motors with efficiency below of the high efficient levels;
 - After June of 2010 is prohibited to commercialize them ;
 - There is a committee that monitors the status of implementation conditions like availability and price of electric and silicon steel and manufacturer production capability
 - **Six months reports**
- Energy savings up to 1,58 TWh/year \Rightarrow 0,5 % of total electric energy consumption. It is equivalent to
 - **Hydroelectric plant of 365 MW \Rightarrow L.F. = 0,52 and η = 95 %**
 - **Thermoelectric plant of 867 MW \Rightarrow L.F. = 0,40 and η = 52 %**



PROCEL INDÚSTRIA

INDUSTRIAL ENERGY EFFICIENCY PROGRAM

MOTIVATION

- Lack of knowledge about the motor system integrated performance in industry. Indeed they are complex and quite different;
- There's no engineering that focus all components of the motor system and its integrated performance;
- Computational tools / training / course do not meet all expected targets;
- Few interactions between the buying sector and the technical staff;
- The need of management commitment;
- Absence of structured plan to installed motor driven systems;



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PROCEL INDÚSTRIA

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First focus: Motor-driven system

49% of Industrial consumption

OBJECTIVES

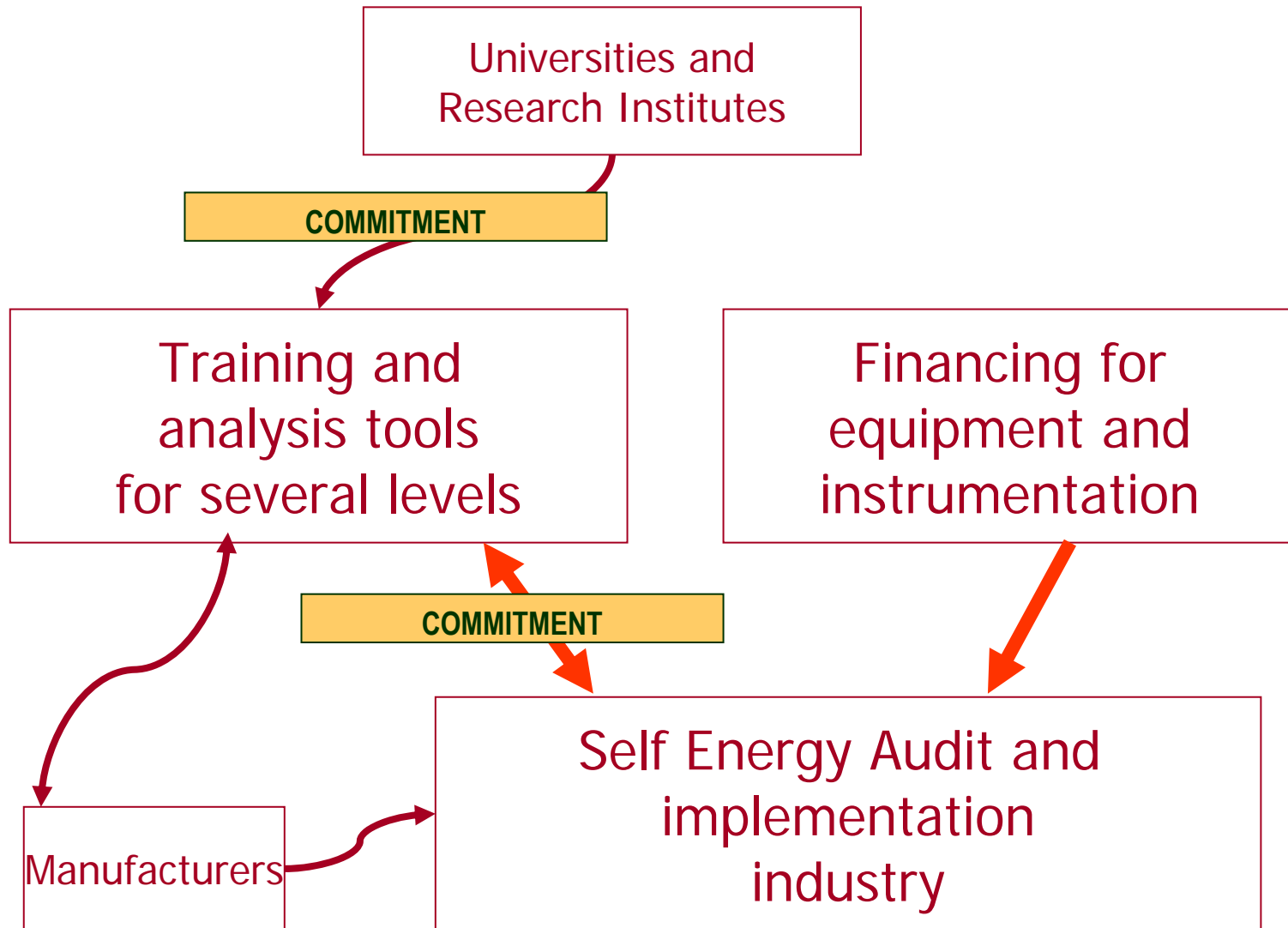
- Minimizing losses in motor-driven systems already installed in the Brazilian industry;
- Increasing the market penetration of high-efficient three-phase induction motors and efficient motor loads;
- Strengthening the technical support in this area and the engineering formation through motor driven laboratories.



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INDUSTRIAL ENERGY EFFICIENCY PROGRAM CONCEPTION



Implementation through industrial federation



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INDUSTRIAL ENERGY EFFICIENCY PROGRAM

PROGRAM GOALS - 1st PHASE -2007

- To reach 800 industries (large and medium);
- 0,8 billion KWh / year (13% of Brazil's potential);
- 270 multipliers;
- 3,700 agents;
- 12 federations;
- Interaction among different agents, division of costs and responsibilities.



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BUILDING CAPACITY FOR MULTIPLIERS

MÓD.	DISCIPLINE	H/L
I.	ELECTRIC POWER CONCEPTS, POWER QUALITY AND TARIFFS	8h
II.	ELECTRIC MOTOR	16h
III.	ELECTRONIC ADJUSTABLE SPEED DRIVE	16h
IV.	PUMPS	16h
V	COMPRESSORS	16h
VI.	FANS AND EXHAUST FANS	16h
VII.	CONVEYOR BELTS	8h
VIII	MOTOR-LOAD COUPLING	8h
IX.	INSTRUMENTATION AND CONTROL	8h
X.	ECONOMIC ANALYSIS OF INVESTMENTS	8h
XI.	ORIENTED PEDAGOGY	8h
XII.	MARKETING AND SALES	8h
XIII.	INDUSTRIAL SAFETY	8h
XIV.	MONITORING AND TARGET	8h
XV.	METHODOLOGY FOR ENERGY AUDIT ON THE MOTOR DRIVEN SYSTEM	8h
XVI.	TECHNICAL VISIT AND EVALUATION	8h
XVII.	CASE STUDY	8h
	TOTAL	176h

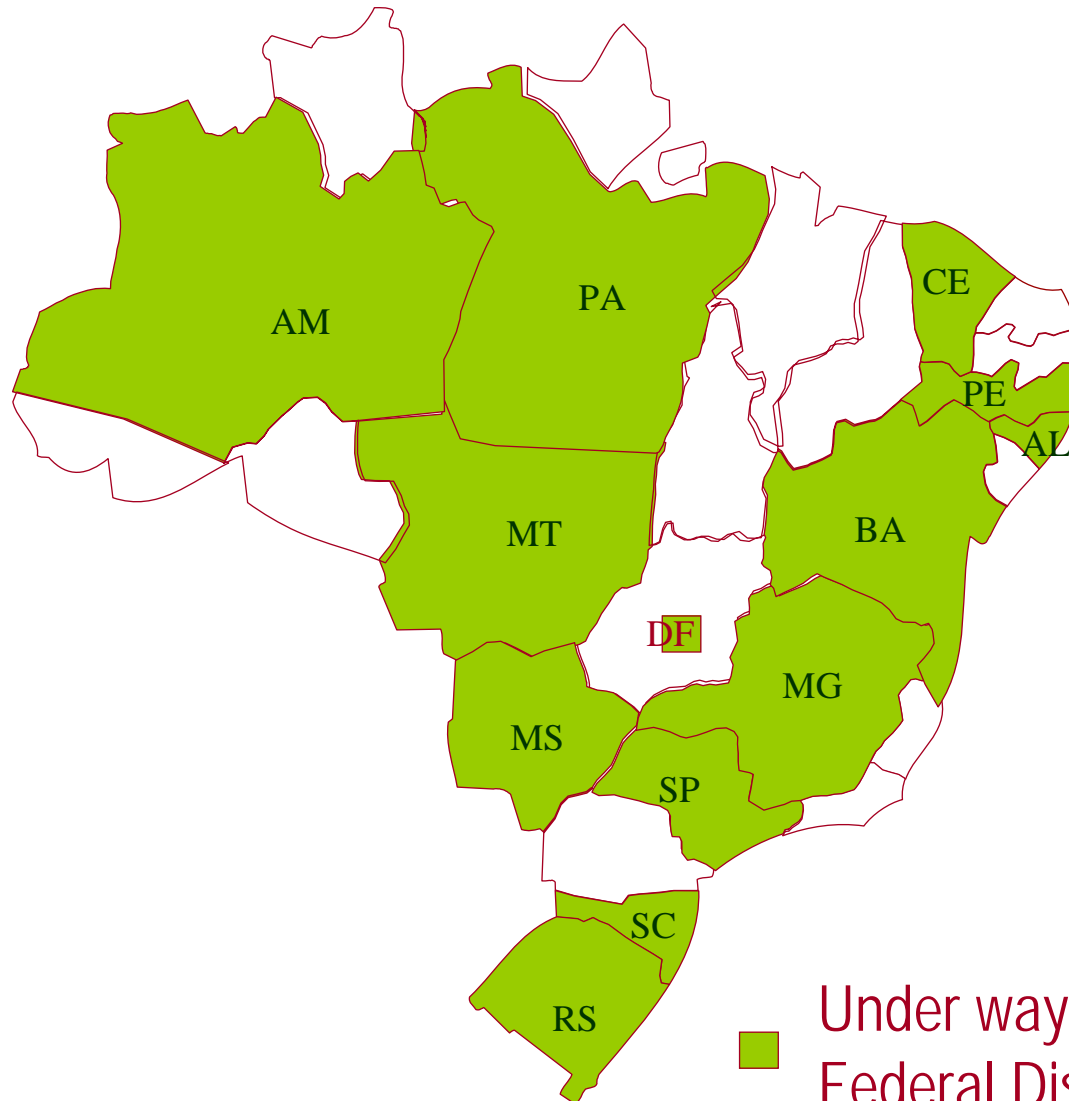


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• Current Situation



■ Under way: 12 states and Federal District -70 % of industrial GDP



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RESULTS

	Multiplier	Agent	Industry	Laborat.	scholars.
MW	35	395	74	3	27
S	18	126	46	2	14
SE	41	676	199	4	24
N	29	299	166	2	19
NE	43	882	210	3	18
Total	166	2689	594	14	102



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On-going activities with Industrial national confederation

- International survey of industrial energy efficiency programs and projects;
- National survey of industrial projects results and mechanisms – 307 projects analyzed;
- Definition of economical and energetical indicators to select five sectors for deep studies;
- Barriers for energy efficiency projects;
- Key success factors of projects.



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Analysis of Projects done by Utilities - PEE

Segmento	Projetos	Energia economizada (MWh/ano)	Demanda Evitada (kW)	Investimento (R\$)	CMP (R\$)
Siderurgia	12	146.194	23.018	33.658.853	2.804.904
Químicos	22	128.397	13.428	22.654.056	1.029.730
Mineração - Metálicos	6	62.644	7.128	2.856.668	476.111
Alimentos e bebidas	44	59.454	22.395	17.585.466	399.670
Metalurgia	14	30.982	3.808	6.003.337	428.810
Têxtil	12	13.224	2.466	3.904.561	325.380
Papel e Celulose	9	12.882	1.120	2.318.733	257.637
Automotivo	9	11.841	3.749	5.700.285	633.365
Mineração - Não Metálicos	5	2.623	287	1.233.242	246.648
Couro	9	2.487	491	1.110.720	123.413
Fundição	12	2.307	732	559.888	46.657
Cerâmico	28	1.222	94	1.421.863	50.781
Outros	44	176.423	15.359	41.937.117	953.116

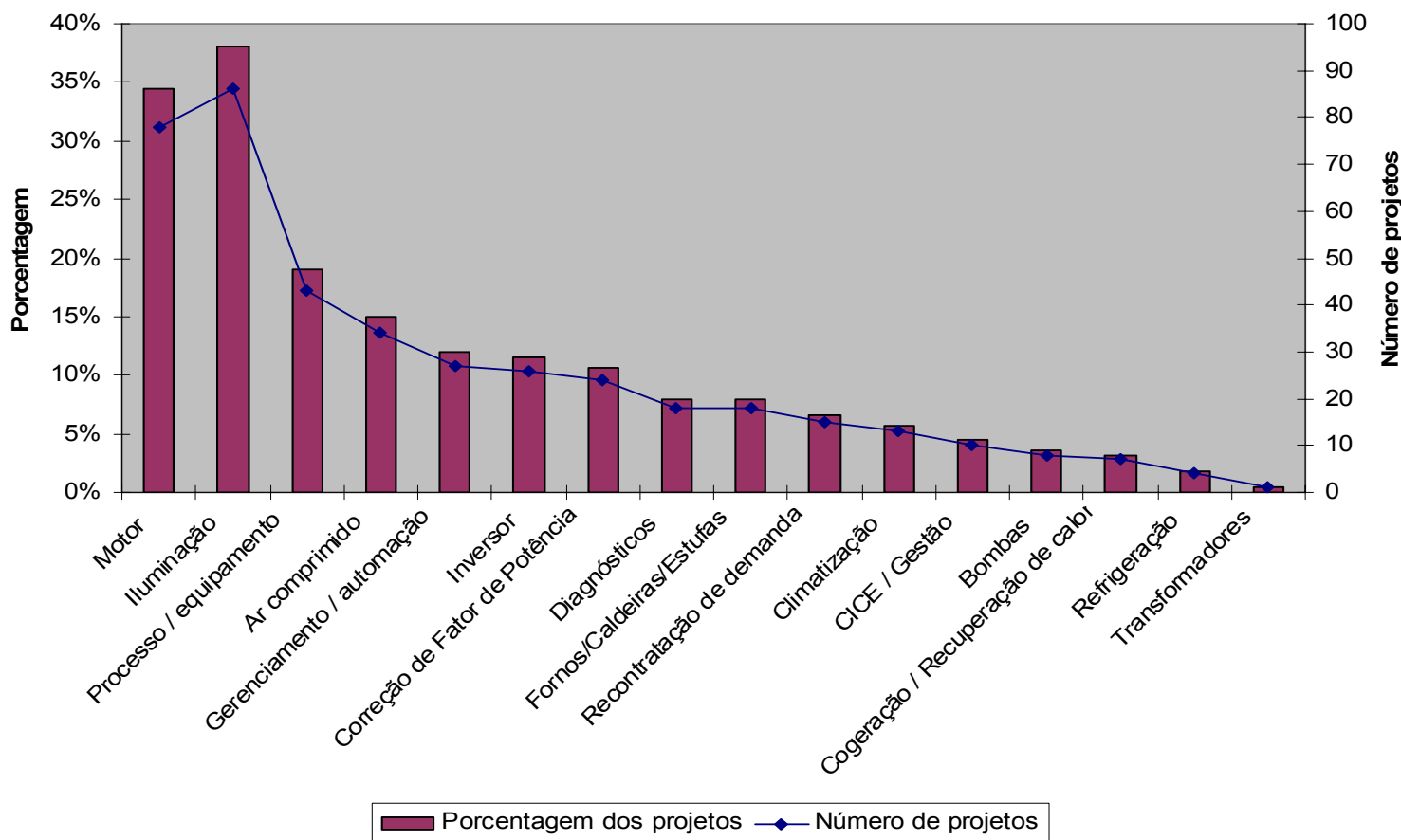


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Analysis by type of final user



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Industrial Energy Management Standards

- Participation on the global effort to establish ISO 50001
- The ABNT committee was officially opened in the end of September;
- Based on ISO/WD 50001 – N18 – Energy Management;
- The first Brazilian comment were discussed in the end of October.



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Voluntary Agreement for big industries

- Existence of well-established international experiences;
- Fit to our industrial sector characteristics;
- The negotiation was started in this semester;
- It was postponed to the next year due to the global financial crisis



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INDUSTRIAL ENERGY EFFICIENCY PROGRAM

SUPPORTING ACTIVITIES

Publications and Guides

- Electric Motor;
- Adjustable speed drive
- Pumps, air compressor and fans;
- Couplings;
- Energy management;
- How to create the industrial energy conservation commissions;
- and others – about 25 publications.



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INDUSTRIAL ENERGY EFFICIENCY PROGRAM

SUPPORTING ACTIVITIES

Computational Tools

- Electric Motor;
- Adjustable speed drive
- Air compressor;
- Energetic audits.



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SUPPORTING ACTIVITIES

Procel Info

Virtual Office

- Downloads of publications and softwares;
- Networks
- Chat
- Forum;
- Agenda of events



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Other related activities

- Labeling for pumps
 - Residential water pump
- Mounting independent laboratory capacities for compressors and pumps;
- Projects demonstration and courses for small industries;
- Survey to characterize industrial sectors with industries and unido.



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We have done a good job but we can do it better, faster with the support of this kind of global initiatives.



THANK YOU FOR THE ATTENTION

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