

## Summary report on research accreditation

### I. General information

Name of organization	Institute of Power Engineering of the ASM
Organization type ( <i>to underline</i> )	<b>Research institute</b> High education institution Ministerial research institute
Research mission of organization	Identification of efficiency measures for energy sector, development of new technical solution for decreasing of energy intensity, scientific support of responsible units in future development and fortification of power system, new innovative solutions of renewable energy conversion
Strategic research direction (s)	06. Efficiency of power sector and ensuring of energy security, including use of renewable resources
Evaluated period	2005-2009
Web of organization	<a href="http://www.ie.asm.md">www.ie.asm.md</a>

### II. Research capacity (annual average for evaluated period)

Total number of employees	<b>63,5</b>					
Number of scientific researchers	<b>32,6</b>					
Number of researchers who possess honorific titles, scientific degrees, scientific and scientific-didactical titles	ASM full members 1,6	ASM corresp. members 0,4	Professor	Associated professor	Dr.hab. 7	Dr. (PhD) 13
Number of researches involved in international projects	FP7 1,0	STCU 0,4	Bilateral 1,8	Others 5,2		
Number of young researchers (under 35 years old)	Dr. (PhD) 0,4		PhD students 2,6		Others 9,6	
Financial resources (thousand MDL)	Public budget 2469,4		International projects/grants 45,2		Research contracts 86,9	
Distribution of expenditures (thousand MDL)	Salary 1706,7		Infrastructure development 152,5		Other 762,4	
Expenditures for infrastructure development (thousand MDL)	Equipment 132,4		IT infrastructure 20,1		Endowment of experimental resort	
List of 3 basic research methods, installations, technologies (per accredited field)	1. Mathematical model of power system (RASTR) 2. Device for measurement of energy quality TS3600 3. Simulink modeling of power system elements (MATLAB)					
List of provided scientific services	Estimation of influence of new power plants with capacity of 400MW on power mode at their construction in north part of country (Balti)					

	<p>Analysis of functioning mode and power flow distribution in new electrical line at their construction (Balti-Suceava, 400kV)</p> <p>Analysis of possibilities to reduce losses in municipal heating system</p> <p>Estimation of causes conducting at breakdown of 6,3MW generator at TPP-1 and analyzing of partial discharges in stator winding</p> <p>Calculation and design of 5kW wind installation for private company</p> <p>Estimation of technical state and necessity of renovation of Overhead Line 110kV TPP-1/Vadul lui Voda</p>
List of editorial activities	Journal “Problems of the Regional Energetics” of Institute of Power Engineering of Academy of Sciences of Moldova

### III. Distribution of number of research projects and themes during of evaluating period

Institutional projects	2005	2006	2007	2008	2009
	2	2	2	2	2
Projects in the frame of State Programmes	2005	2006	2007	2008	2009
	2	2	2	4	3
Technological transfer projects	2005	2006	2007	2008	2009
	1	1	1	2	
Projects for equipment procurement	2005	2006	2007	2008	2009
Projects for young researchers	2005	2006	2007	2008	2009
			1	1	
Projects in the frame of bilateral programmes	2005	2006	2007	2008	2009
				1	1
International projects/grants	2005	2006	2007	2008	2009
	6	4	4	2	2
List of the 3 representative international projects/grants	<p>1. Project 06.512MD “Research of wave phenomena in high voltage cable and establishment of defect place on base of partial discharges”. INTAS Ref. Nr 05-115-5129.</p> <p>2. MOE2-2612-CH, Project "Novel Methods of Synchronized Pulse width Modulation for Control of Large Converters", in frame of the program Cooperative Grants Program of the US Civilian Research &amp; Development Foundation (CRDF).</p> <p>3. Newsletter of PROMITHEAS – „The Energy and Climate Policy Network” Program „PROMITHEAS-1/EU-BSEC “.</p>				
Research contracts	2005	2006	2007	2008	2009
	1			1	2
List of 3 representative research contracts	<p>1. Calculation of energy losses and elaboration of optimal functioning modes of RED Nord-Vest distribution electrical network (2005)</p> <p>2. Test of thermal network and experimental evaluation of heat losses in magistral thermal pipes from Chisinau (2008)</p> <p>3. Estimation of technical state and necessity of renovation of Overhead Line 110kV TPP-1/Vadul lui Voda (2009)</p>				

### IV. Scientific publications

Total number of publications abroad	Books	Chapters in books 2	Journal papers 117
Total number of publications in ISI journals and books	Books	Chapters in books	Journal papers 50
Total number of publications in the country	Books 20	Chapters in books 2	Journal papers 99
Total number of conference abstracts	International abroad 89	International in the country 58	National 44
List of 5 representative publications (per accredited field)	<ol style="list-style-type: none"> <li>1. <b>Tîrșu M., Berzan., V.P., Rimschi V.X., Postolache P. M.</b> Research on influence of high-voltage cable un-homogeneities on process of short waves distribution./ ELECTRIC POWER SYSTEMS RESEARCH (EPSR), n. 78/2008 published by Elsevier.(ISSN: 0378-7796), Canada, pp. 2046-2052 <a href="http://dx.doi.org/10.1016/j.epr.2008.06.011">http://dx.doi.org/10.1016/j.epr.2008.06.011</a> Impact factor 1,259</li> <li>2. <b>Kalinin L., Tirsu M., Zaitsev D.</b> Innovative Variant of Phase Shifting Transformer (PST) WORLD ENERGY SYSTEM CONFERENCE 2008 – IASI, ROMANIA 2008, June 30- July 2, Section I.Transmission and distribution systems Analysis, planning and operation.- 4p.</li> <li>3. <b>Tirsu M., Constantinov N, Uzun M.</b> Complex system of renewable energy sources utilization for water heating. Energy Technologies. Production, transport and distribution of electrica land thermal energy, no.11/ 2008, pp.14-21. (<i>Romanian</i>)</li> <li>4. <b>Postolaty V.M., Bicova E.V.</b> Methodical approach for analyzing of energy safety of Moldova on base of extended indicators system Proceedings of 3<sup>rd</sup> international conference “Power system: control, competitiveness, teaching”, Yekaterinburg, Russia, 13-16 October 2008, vol.2, p.267-270. (<i>Russian</i>)</li> <li>5. <b>Oleschuk V.,Profumo F.,Tenconi A.</b> Analysis of Operation of Symmetrical Dual Three-Phase Converters with Hybrid Schemes of Synchronised PWM. USA, New York/Italy, Napoli, Praise Worthy Prize Publishing House, International Review of Electrical Engineering (IREE), ISSN 1827-6660, vol. 2, no. 6, published February, 2008, pp. 793-802.</li> </ol>		
List of 5 citations	<ol style="list-style-type: none"> <li>1. Dmitrii, Zaitsev, et al. "Interconexiune dirijată a sistemelor energetice." <i>Проблемы региональной энергетики</i> 3 (2010). (MLA, APA, Chicago)</li> <li>2. <a href="#">STEADY state operation of Interphase Power Controller (IPC) using power electronic converter</a>, L Kalinin, D Zaitcev, M Tirsu - PowerTech, 2009 IEEE Bucharest, 2009</li> <li>3. <a href="#">Research on influence of high-voltage cable un-homogeneities on process of short waves distribution</a> M Tîrsu, V Berzan, V Rimschi, P Postolache - Electric Power Systems Research, 2008</li> <li>4. <a href="#">Modeling of dynamic processes processes nonhomogeneous nonhomogeneous nonhomogeneous circuits with circuits with ...</a> V Berzan, V Patsiuk, G Rybakova et all</li> <li>5. M. Tîrsu, V. Berzan, V. Rimschi, P. Postolache, Research on influence of high-voltage cable un-homogeneities on process of short</li> </ol>		

	waves distribution, Electric Power Systems Research, Volume 78, Issue 12, December 2008, Pages 2046-2052, ISSN 0378-7796, 10.1016/j.epr.2008.06.011.
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## V. Innovation outputs

Total number of patents	Registered in the country 20	Registered abroad	Implemented
Total number of new developed methods and technologies	Registered 24	Non-registered	Implemented
Total number of new scientific products	Registered 5	Non-registered 2	Implemented 3
Total number of scientific outputs for central and local authorities (draft of law, strategies etc.)	31		
Total number of scientific outputs for educational institutes	Hand books for high education 7	Handbooks for pre-university institutions	Delivered university courses 16
List of 5 representative innovation outputs (per accredited field)	<ol style="list-style-type: none"> <li>1. Installation of phase shift regulation controlled by power keys MD 2652. H02J 3/06; H02M 5/12; H02M 5/257, MD2652, 2005.10.31.</li> <li>2. Voltage stabilizer of low speed asynchronous generator MD 3607 G2 2008.05.31. BOPI nr. 5/2008.</li> <li>3. Device for wetted gas purification MD3990 F2. 2009.12.31, BOPI 12/2009.</li> <li>4. Multi-bladed wind turbine, experimental sample of 3kW</li> <li>5. Non-destructive method for on-line testing of high voltage insulation, experimental sample was developed and tested on site.</li> </ol>		

## VI. Major scientific and innovation achievements

Short description of main scientific results and its confirmation (by awards, citation, development of international project etc.)	The main scientific results of the Institute of Power Engineering of ASM were: development of model for calculating the level of energy security, which includes over 60 indicators, the mathematical model for calculating the maximum flow of power through the selected node of the electricity distribution network and determining the allowable limit regimes of networks; development of management solutions with power flows in transmission lines and increase their capacity, including through the use of FACTS Controller; development of original technical solutions regarding constructive realization of facilities like IPC (interphase power control) and PST (phase shift transformer), which allows a 20% reduction installed power; development of the theoretical basis for the use of heat pumps working with ecological agent in centralized heating systems; development of new construction of 220kV OHL (over head line), combined with 4
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	<p>circuits, and variants regarding the development of OHL configurations with OHCL (over head controlled line); elaboration of constructive method for optimizing the parameters and regimes of solar drying, allowing approximately 60% reduction in consumption necessary energy from traditional sources; development of alternatives energy sources by the year 2033, which combines self-construction of own sources of energy and its import from the neighboring states; development of numerical method for calculation of transition mode in long non-homogeneous lines; development of new solution of signal modulation in power converters etc. The importance of mentioned results are confirmed by realization of international projects:</p> <ol style="list-style-type: none"> <li>1. <b>Project</b> "Novel Methods of Synchronized Pulse width Modulation for Control of Large Converters", Cooperative Grants Program of the US Civilian Research &amp; Development Foundation (CRDF). Head d.h.ș.t. V. Olesciuk.</li> <li>2. Project 06.512MD. Research of wave phenomena in high voltage cable and establishment of defect place on base of partial discharges – INTAS Ref. Nr 05-115-5129. Head Tîrșu M.</li> <li>3. Project „MODULATED CONVERTERS”. Marie Curie International Fellowships Program of the FP6 Programme of EU.</li> <li>4. Project 08.820.06.16.BF. Scientific fundamentals for analyzing and monitoring of energy security of Republic Moldova and Byelorussia and elaboration of practical recommendations for their improvement. Fundamental research fund of Byelorussia.</li> </ol>				
Number of organization' invited speakers at international conferences	2005	2006	2007	2008	2009
	3		1	1	5
Short description of technological transfer and innovation results and its certification by implementation	<ol style="list-style-type: none"> <li>1. In result of implementation of the project 08.166.80T “Implementation of solar collectors for heating of water (social baths, private houses, mobile showers) was developed a sample of solar collector with efficiency higher than 75% using less cost materials and constructed an integral circuit for heating water in mobile shower.</li> <li>2. In result of implementation of the project 06.409.25T “Implementation of solar oven and innovation technologies for drying of fruits, vegetables and medicinal plants by solar energy” was designed a solar greenhouse using advanced technologies for drying and which has an consumption of energy with about 65% less than traditional solutions.</li> </ol>				
Number of defended dr.hab. and dr. theses per year	2005	2006	2007	2008	2009
		1	1		1

## VII. Present/further involvement in the Seventh Framework Programme (FP7):

Specific programmes (Cooperation, Ideas, People, Capacities) of interest and it sub-divisions.

### Area Energy.2.9: Cross-Cutting Issues

Topic ENERGY.2013.2.9.1: Research cooperation and knowledge creation in the area of renewable energy in Mediterranean partner countries

### Activity Energy.7: Smart Energy Networks

#### Area Energy.7.1: Development of Inter-Active Distribution Energy Networks

#### Area Energy.7.2: Pan-European Energy Networks

Activity 7.9: Reinforcing cooperation with European Neighborhood Policy countries on bridging the gap between research and innovation (FP7-INCO-2013-9, R2I-ENP). Type of project: CSA – Supporting. Targeted countries: Armenia, Azerbaijan, Belarus, Georgia, Moldova, Ukraine. Coordinator: Q-PLAN N.G.(Grecia).

### Activity Energy.8: Energy Efficiency and Savings

### Activity Energy.9: Knowledge for Energy Policy Making

### Activity Energy.10: Horizontal Programme Actions

**VIII. Accredited research field “*Engineering and technologies for efficiency of power system*” and its evaluation by the National Council for Accreditation and Attestation of the Republic Moldova “good”**

**IX. Category “B” attributed by the National Council for Accreditation and Attestation of the Republic Moldova to the organization.**

**X. Institutional development actions planed for the next 5 years (maximum ½ page)**

In the period 2010-2014 the Institute of Power Engineering will be conduct research under the strategic direction 06 “Power system efficiency and ensuring of energy security, including using of renewable resources” with the next majority priority:

1. Study in order to improve energy security
2. Studies to increasing energy efficiency and involving of renewable sources in share of energy consumption.
3. Studies to developing power generation and decreasing of losses in power system
4. Studies to strengthening of distribution, transport and interconnection electrical lines.
5. Studies to developing acceptable scenarios for merge of Moldova power system to ENTSO-E.
6. Studies to promote using of renewable energy sources in Republic of Moldova
7. Strengthening of international collaboration in the field of energy
8. Foundation of an accredited laboratory of energy services.
9. Involvement of students from technical university in research process.
10. Obtaining of legal status by conducting energy audit and training of personnel group to become energy auditors
11. Development of important documents in energy field for medium and long terms.