

IGOR GUTMAN

Igor Gutman received his M.Sc. degree and Ph.D. degree (both in High Voltage Engineering) from State Polytechnic University, Leningrad, Russia in 1981 and 1989, respectively. He has about 40 years of professional experience in power engineering, starting at HVDC Research Institute Leningrad, Russia. He also worked in PPEIU, Russia, as Lecturer and Docent since 1992 and as a consultant with marketing functions for the manufacturer "Composite Insulator", Russia. In 1994-2017 he worked for STRI (Sweden), being a Senior Expert in Insulation. His field of work has been optimal selection, dimensioning and maintenance of outdoor insulation intended to operate in clean and polluted (iced) environments; ageing characteristics of composite insulators and accelerated ageing tests for composite insulators and diagnostic techniques for outdoor insulation. Since October 2017 he works for Independent Insulation Group in Sweden.



He has published more than 250 technical papers (more than 210 papers in English). He is a Distinguished Member of CIGRE, member of Swedish IEC TC 36 "Insulators", Senior Member of IEEE and has served as Convener of CIGRE Working Group D1.44, "Testing of naturally polluted insulators".

MAIN FIELDS OF COMPETENCE

- Optimal selection, dimensioning and maintenance of outdoor insulation intended to operate in clean and polluted (iced/snow) environments (profiles, materials, grading/corona rings)
- Statistical selection of insulation for upgrading and AC/DC conversion projects and for DC lines and substations
- Ageing characteristics of composite insulators and accelerated ageing tests for composite insulators
- Innovative test methods for composite insulators (pollution, ice & snow, adhesion core/housing, etc.)
- Diagnostic techniques for outdoor insulation (glass, porcelain, composite, hybrids, coatings)

EMPLOYMENT

2017 –	Independent Insulation Group, Sweden, Marketing Director and Senior Expert Insulation
1994 -2017	STRI AB, Sweden, Senior Expert Insulation
1992 - 1993	Composite Insulator, Russia, Consultant
1989 - 1993	PPEIU, Russia, Lecturer and Docent since 1992 (half time)
1981 - 1993	HVDC Science Research Institute (NIPT), Leningrad, Russia, Senior Researcher since 1989

EDUCATIONAL DEGREES

1989	PhD degree in High Voltage Engineering from State Polytechnic University, Leningrad
1981	MSc with honors in High Voltage Engineering, St Petersburg Polytechnic University

LANGUAGES

Russian (native), Swedish (fluent), English (professional level)

AWARDS

2014	Distinguished Member of CIGRE
2013	IEC 1906 Award in recognition of services to international technical standards

2012 Claude de Turreil Memorial Award for Lifetime Achievement in the field of Electrical Insulators
2011 Honorary Professor at St Petersburg Power Engineering Institute of Professional Development

MEMBERSHIP OF TECHNICAL COMMITTEES

Swedish IEC TC 36 "Insulators"
IEC MT 11: Revision of IEC 60815
IEC MT 19: Revision of IEC 62217
CIGRE Working Group B2.57 "Application Guide for Line Composite Insulators"
CIGRE Working Group B2.69 "Coatings for Power Network Equipment"

LIST OF MAIN PUBLICATIONS

- I.Yu. Gutman, E.A. Solomonik, V.N. Solomatov, Yu.N. Yashin: "Operation and Field Tests of Overhead Line Composite Insulators with Silicone Rubber Cover", 8th ISH, Yokohama, Japan, 1993, 47.13
- A. Eklund, I. Gutman, R. Hartings: "Conditioning of Silicone Rubber Insulators: Loss and Recovery of Hydrophobicity", 9th ISH, Graz, Austria, 1995, 3236
- I. Gutman, R. Hartings, R. Matsuoka, K. Kondo: "Experience with IEC 1109 1000 h Salt Fog Ageing Test for Composite Insulators", IEEE Electrical Insulation Magazine, May/June 1997, Vol.13, No. 3, p.p. 36-39
- I. Gutman, R. Hartings, W.L. Vosloo: "Field testing of composite insulators at Natal test stations in South Africa", 11th ISH, London, UK, 1999, paper 4.50.S19
- I. Gutman, R. Hartings, U. Åström, D. Gustavsson: "Procedure to obtain a realistic degree of hydrophobicity on artificially polluted silicone rubber insulators", 12th ISH-2001, Bangalore, India, 2001, paper 5-2
- A.J. Maxwell, I. Gutman, C. S. Engelbrecht, S. M. Berlijn, R. Hartings, W. L. Vosloo, D. Loudon, R. Lilja, A. Eriksson: "Selection of composite insulators for AC overhead lines: implications from in-service experience and test-station results", CIGRE Session 2002, 33-402
- I. Gutman, L. Stenström, D. Gustavsson, D. Windmar, W.L. Vosloo: "Optimized use of HV composite apparatus insulators: field experience from coastal and inland test stations", CIGRE Session 2004, A3-104
- C.S. Engelbrecht, I. Gutman, R. Hartings: "A practical implementation of statistical principles to select insulators with respect to polluted conditions on overhead a.c. lines", IEEE PowerTech 2005, St. Petersburg, Russia, paper 129
- L.L. Vladimirovsky, E.A. Solomonik, N.N. Tikhodeev, I. Gutman: "Methods of statistical dimensioning of the outdoor insulation with respect to polluted conditions", IEEE PowerTech 2005, St. Petersburg, Russia, paper 670
- I. Gutman: "Selection Criteria for Line Insulators Based on Availability Requirements", World Congress & Exhibition on Insulators, Arresters & Bushings, Hong Kong, 27-30 November 2005
- I. Gutman, J. Lundquist, K. Halsan, L. Wallin, E. Solomonik, W. Vosloo: "Line Performance Estimator Software: Calculations of Lightning, Pollution and Ice Failure Rates Compared with Service Records", CIGRE Session 2006, B2-205
- I. Gutman, J. Lundquist, T. Ohnstad, D. Hübinette: "Requirements on the Insulation for Different Applications of 400 kV Circuit Breakers in Pollution, Ice and Snow Environments", CIGRE Session 2006, A3-305
- C.S. Engelbrecht, I. Gutman, R. Hartings: "A Practical Implementation of Statistical Principles to Dimension A.C. Line Insulators with Respect to Contaminated Conditions", IEEE Transactions on Power Delivery, Vol. 22, N.1, January 2007, p.p. 667-673
- I. Gutman, H. Wieck, D. Windmar, L. Stenström, D. Gustavsson: "Pollution Measurements to Assess the Performance of Naturally Exposed Silicone Rubber Composite Insulators", IEEE Transactions on Fundamentals and Materials, Vol. 127, No. 9, 2007, p.p. 513-518

- S.M. Berlijn, I. Gutman, K.Å. Halsan, M. Eilersten, I.Y.H. Gu: "Laboratory Tests and Web Based Surveillance to Determine the Ice- and Snow Performance of Insulators", IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 14, No. 6, December 2007, p.p. 1373-1380
- H. Wieck, I. Gutman, T. Ohnstad: "Investigation of Flashover Performance of Snow-covered Breakers, IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 14, No. 6, December 2007, p.p. 1339-1346
- I. Gutman, T. Ohnstad, L. Wallin, D. Windmar, U. Åkesson: "Field experience and test verification of HV composite apparatus insulators", CIGRE Session 2008, A3-302
- I. Gutman, X.D. Liang, B. Luo, Z.Y. Su, E. Solomonik, W.L. Vosloo: "Evaluation of OHL performance based on environmental stresses and pollution laboratory testing of composite insulators", CIGRE Session 2008, C4-112
- K. Halsan, D. Loudon, I. Gutman, J. Lundquist: "Feasibility of upgrading 300 kV AC lines to DC for increased power transmission capability", CIGRE Session 2008, B2-110
- I. Gutman, K. Halsan, L. Wallin, T. Goodwin, G. Sakata: "Application of Helicopter-Based IR Technology for Detection of Internal Defects in Composite Insulators", World Congress & Exhibition on Insulators, Arresters & Bushings, Crete, 11-13 May 2009
- I. Gutman, A. Dernfalk: "Pollution tests for polymeric insulators made of hydrophobicity transfer materials", IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 17, Issue 2, pp. 384-393, April 2010
- M. de Nigris, I. Gutman, A. Pigni: "Live-Line Maintenance of AC Overhead Lines Equipped with Non Ceramic Insulators (NCI)", 2010 IEEE PES, New Orleans, Louisiana, USA, April 19-22, paper TD2010-000054, 2010
- I. Gutman, J. Lundengård, L. Wallin, A. Mjelve, T. Ohnstad: "Evaluation of old substation porcelain insulators in service: input for risk assessment and replacement options", CIGRE Session 2010, B3-207
- I. Gutman: "Helicopter & Ground-Based Methodologies to Detect Damaged Insulators", World Congress & Exhibition on Insulators, Arresters & Bushings, Seoul, Korea, 17-20 April 2011
- I. Gutman, J. Lundquist: "Optimization of AC and DC Insulation Using Software for Statistical Dimensioning", World Congress & Exhibition on Insulators, Arresters & Bushings, Seoul, Korea, 17-20 April 2011
- I. Gutman, J. Lundengård, N. Gustavsson, A. Bosma: "Comparative Performance of Hollow Silicone Rubber and Porcelain Apparatus Insulators under Specific Ice and Salt Fog Conditions of Iceland", IWAIS-2011, Chongqing, China, 8-13 May 2011, paper P1_01_ID8
- I. Gutman, I. Djurdjevic, S. Berlijn, Á.J. Elíasson, P. Söderström, L. Wallin: "Influence of air-borne volcano ashes on outdoor insulation", 17th ISH, Hannover, Germany, 2011, C-014
- I. Gutman, J. Lundquist, V. Dubickas, L. Carlshem, R. Kleveborn: "Design of corona/arcing rings when replacing cap-and-pin insulators by composite insulators", 17th ISH, Hannover, Germany, 2011, A-007
- I. Gutman, K. Kondo, R. Matsuoka, R. W. Garcia: "CIGRE Round Robin Pollution Test for polymeric insulators: results in four high-voltage laboratories", 17th ISH, Hannover, Germany, 2011, C-013
- G. Heger, I. Gutman, W.L. Vosloo: "Determining Insulation Levels for 220 kV Transmission Lines in Namibia using the IST Software", 17th ISH, Hannover, Germany, 2011, E-030
- I. Gutman, T. Hayashi, A. Phillips, A. Pigni, J. Seifert, F. Schmuck, M. R. Shariati, V. Sklenicka: "Guide for the Assessment of Composite Insulators in the Laboratory After Their Removal from Service", Working Group B2.21, CIGRE TB 481, December 2011
- I. Gutman, E. Solomonik, W.L. Vosloo: "Birds: More Threat to Lines or Threatened by Lines?", INMR, Issue 96, Quarter 2, Volume 20, N. 2, 2012, p.p. 76-83
- I. Gutman, J. Seifert, C. Greyling: "Recovery of Hydrophobicity of a New Nano-composite Coating for Ceramic Insulators", IEEE ISEI-2012, paper 12, p.p. 48-52

- I. Gutman, J. Shamsujjoha, C. Lumb, J.-M. George, S. Roude: "Investigation of Rapid Flashover Solid Layer Pollution Testing As An Alternative To Current Standard Methods", IEEE ISEI-2012, paper 17, p.p. 73-77
- F. Schmuck, J. Seifert, I. Gutman, A. Pignini: "Assessment of the condition of overhead line composite insulators", CIGRE Session 2012, B2-214
- IS. Berlijn, K. Halsan, R. I. Jonsdottir, J. Lundquist, I. Gutman, K. Kupitz: "Voltage Uprating of Statnett's 300 kV Transmission Lines to 420 kV", CIGRE Session 2012, B2-102
- I. Gutman, W.L Vosloo, L. Appollis: "Example of refurbishment of overhead lines 400 kV at Western Cape after major pollution event in February 2006", CIGRE Session 2012, B2-302
- I. Y.H. Gu, S. Berlijn, I. Gutman, M.H.J. Bollen: "Practical applications of automatic image analysis for overhead lines", 22nd International Conference on Electricity Distribution CIRED-2013, 10-13 June 2013, Kista, Stockholm, Sweden, Paper 0560
- I. Gutman, N. Mahatho, A. Phillips, A. Pignini, G. Pirovano, F. Schmuck, J. Seifert, M. R. Shariati, V. Sklenicka, W. Vosloo, R. Wesley: "Assessment of composite insulators by means of online diagnosis", CIGRE Technical Brochure 545, August 2013
- S. Berlijn, K. Halsan, I. Gutman: "Summarizing knowledge from laboratory ice and snow tests on glass and composite insulators for overhead lines", IWAI-2013, St. John's, NL, Canada, 2013, Session 4, p.p. 22-26
- P. Sidenvall, I. Gutman, J. Schulte-Fischedick, J. Seifert, J-F. Goffinet: "Methodology of Modern E-field Calculations – Case Study for Insulated Cross-Arm", CEIDP-2013, p.p. 334-337
- I. Gutman, C. Ahlholm, U. Åkesson, A. Holmberg, D. Wu, L. Jonsson: "Long-term service experience and inspection results of HV equipment made of silicone rubber insulators", CIGRE Symposium, Auckland, New Zealand, September 14-20, 2013, A3-412
- I. Gutman, A. Pignini: "Evaluating Performance of Polluted Insulators, Simplified IEC Approach vs. Statistical Approach" INMR, Issue 101, 2013, Q.3, p.p. 54-52
- C.S. Engelbrecht, I. Gutman, R.W. Garcia, K. Kondo, C. Lumb, R. Matsuoka, G. Pirovano, S. Rowland, V. Sklenicka: "Artificial Pollution Test for Polymer Insulators. Results of Round Robin Test", CIGRE Technical Brochure 555, October 2013
- P. Sidenvall, N. Sundin, I. Gutman, L. Carlshem, R. Kleveborn: "Development of test method to verify composite insulators from water induced corona point of view", 32nd Electrical Insulation Conference (EIC), Philadelphia, Pennsylvania, USA, 2014, paper S11-3
- I. Gutman, C. Ahlholm, K. Halsan, R. Eide, L. Carlshem, W. L. Vosloo, J-F. Goffinet: "Application of weather models for the evaluation of design ESDD for harsh pollution conditions", CIGRE Session 2014, D1-212
- I. Gutman, A. Pignini, J. Rickmann, J. Fan, D. Wu, E. Gockenbach: "Atmospheric and altitude correction of air gaps, clean and polluted insulators: state-of-the-art within CIGRE and IEC", CIGRE Session 2014, D1-213
- B. Sander, J. Lundquist, I. Gutman, C. Neumann, B. Rusek, K.-H. Weck: "Conversion of AC multi-circuit lines to AC-DC hybrid lines with respect to the environmental impact", CIGRE Session 2014, B2-105
- IK. Halsan, I. Gutman, J. Lundengård, L. Carlshem, J. Velek, K. Välimaa, J. Lachman: "Impact of quality of glass cap-and-pin insulators on life cycle costs and proposals for screening tests", CIGRE Session 2014, B2-209
- IH. Homma, K. Yaji, T. Aso, M. Watanabe, G. Sakata, A. Dernfalk, I. Gutman: "Evaluation on Flashover Voltage Property of Snow Accreted Insulators for Overhead Transmission Lines, Part III - 154 kV Full-scale Flashover Voltage Test of Snow Accreted Insulators -", IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 21, No. 6, December 2014, p.p. 2568-2575
- J.-M. George, S. Prat, C. Lumb, F. Virlogeux, I. Gutman, J. Lundengård, M. Marzinotto: "Field Experience and Laboratory Investigation of Glass Insulators Having a Factory-Applied Silicone Coating", IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 21, No. 6, December 2014, p.p. 2594-2601

- D. Windmar, I. Gutman, G. Olsson: "HVDC Pollution Testing of Insulation – Experience from Service, Laboratory and Test Station", IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 21, No. 6, December 2014, p.p. 2496-2502
- I. Gutman, J. Lundengård, W. Vosloo: "Development of Time- and Cost-Effective Pollution Test Methods Applicable for Different Station Insulation Options", IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 21, No. 6, December 2014, p.p. 2525-2530
- A.J. Philips, A.J. Maxwell, C.S. Engelbrecht, I. Gutman: "Electric Field Limits for the Design of Grading Rings for Composite Line Insulators", IEEE Transactions on Power Delivery, Vol. 30, No. 3, June 2015, p.p. 1110-1118
- A. Dernfalk, J. Lundengård, E. Petersson, I. Gutman, K. Tucker, S. Banerjee: "Advanced test methods for full-scale ice tests of DC insulators strings intended for ± 350 kV", IWAIS-2015
- P. Sidenvall, I. Gutman, J.-F. Goffinet: "Application of new test procedure for verification of water drop corona on innovative insulation cross-arms", 19th ISH-2015, Czech Republic, paper 262
- I. Gutman, J. Lundengård, S. Bucan, P. Sidenvall, J.-F. Goffinet: "Trends in pollution/corona testing for compact insulation systems in the form of insulated cross-arms", CIGRE SC D1 Colloquium, Rio de Janeiro, Brazil, 13-18th September 2015, paper 12
- I. Gutman, P. Sidenvall: "Optimal Dimensioning of Grading Rings for Composite Insulators", INMR, Issue 109, 2015, Q.3, p.p. 79-89
- M. Radosavljevic, T. Lindquist, I. Gutman, A. Dernfalk: "Refurbishment of 400 kV AC substation in polluted environment: pros and cons for different modern insulation options including composite/RTV/hybrid", CIGRE SC A3 & B3 Joint Colloquium, Nagoya, Japan, 28 September – 2 October 2015, paper 236
- A. Dernfalk, J. Lundquist, I. Gutman: "Typical Approach & Practical Case Studies for AC/DC Conversion Projects", World Congress & Exhibition on Insulators, Arresters & Bushings, Munich, Germany, 18-21 October 2015
- D. Windmar, I. Gutman, G. Olsson: "Practical experience in UHV DC dielectric and pollution testing", World Congress & Exhibition on Insulators, Arresters & Bushings, Munich, Germany, 18-21 October 2015
- K. Tucker, A. Dernfalk, I. Gutman: "Full-Scale Testing of HVDC Energized Insulators for High Salt/High Ice Environment", World Congress & Exhibition on Insulators, Arresters & Bushings, Munich, Germany, 18-21 October 2015
- P. Sidenvall, I. Gutman, L. Carlshem, J. Bartsch, R. Kleveborn: "Development of the Water Drop Induced Corona WDIC Test Method for Composite Insulators", IEEE Electrical Insulation Magazine, November/December 2015, Vol. 31, No. 6, p.p. 43-51
- B. Thorsteinsson, K. Halsan, I. Gutman, C. Ahlholm: "Optimal selection of insulation for NordLink ± 525 kV DC transmission line in Norway", CIGRE-IEC Colloquium on EHV and UHV (AC & DC), Montréal, QC, Canada, 2016, paper 26
- M. Radosavljevic, T. Lindquist, I. Gutman, A. Dernfalk: "Design considerations for modern 400 kV AC substation in coastal area: what is missing in IEC/CIGRE requirements", CIGRE-IEC Colloquium on EHV and UHV (AC & DC), Montréal, QC, Canada, 2016, paper 54
- K. Halsan, I. Gutman, J. Lundengård, L. Carlshem, J. Velek, T. Condon, P. Shiel, J. Lachman, R. W. S. Garcia: "Proposals for additions to IEC requirements intended to verify quality of glass cap and pin insulators", CIGRE Session 2016, B2-311
- I. Gutman, M. Gullo, M. Gårdestedt, S. Bucan, J.-F. Goffinet, J. Seifert, F. Schmuck: "Long-term performance of composite station insulators with larger diameters: laboratory tracking and erosion test vs. service experience", CIGRE Session 2016, D1-110
- P. Sidenvall, I. Gutman, L. Carlshem, J. Bartsch: "A Round Robin Test of the Water Induced Corona Test", ICOLIM-2017, Strasbourg, France, 2017, paper 0017

- J.-F. Goffinet, I. Gutman, P. Sidenvall: "Innovative insulated cross-arm: requirements, testing and construction", ICOLIM-2017, Strasbourg, France, 2017, paper 0078
- I. Gutman, J. Lundengård, M. Fairhurst: "Three-phase pollution test of diamond-shaped "suspension" insulator arrangement for T-pylon tower", 13th INSUKON-2017, Birmingham, UK, p.p. 233-237
- B. Thorsteinsson, K. Halsan, M. Gullo, I. Gutman: "Innovative pollution and ice testing of DC composite insulators for ±525 kV DC line", 20th ISH-2017, Buenos Aires, Argentina, 2017, 156
- I. Gutman, J. Lundengård, C. Ahlrot: "Need of standardized adhesion test for composite insulators: lessons learned from service experience", 20th ISH-2017, Buenos Aires, Argentina, 2017, paper 145
- D. Wu, U. Åström, I. Gutman: "Study on the required creepage distance for HVDC equipment at indoor conditions", 20th ISH-2017, Buenos Aires, Argentina, 2017, paper 127
- H. Homma, K. Yaji, A. DERNFALK, I. Gutman: "Evaluation on Flashover Performance of 154 kV Snow-accreted Composite Insulators Using Artificial Flashover Tests", 20th ISH-2017, Buenos Aires, Argentina, 2017, paper 164
- M. Radosavljevic, I. Gutman, C. Ahlholm, P. Sidenvall: "Ageing and deterioration of composite post insulators exposed to high electric field in 220 kV and 400 kV switchyards in Swedish network", 2017 CIGRE SC B3 Colloquium, Recife, Brazil, September 2017
- I. Gutman, M. Gullo, M. Fairhurst: "Innovative three-phase ice test of diamond-shaped "suspension" insulator arrangement for T-pylon tower", IWAIS-2017, Chongqing, China, September 24-29, 2017
- I. Gutman, P. Sidenvall, T. Condon, P. Flynn, P. Shiel: "Evaluation of composite insulators with internal deterioration: lessons learned from service and after-service testing", CIGRÉ Winnipeg 2017 International Colloquium & Exhibition, Winnipeg, Canada, 2017, paper 142
- I. Gutman, A. DERNFALK, M. Yarmarkin: "Biological Growths on Composite Insulators", World Congress & Exhibition on Insulators, Arresters & Bushings, Barcelona-Sitges, Spain, 5-8 November 2017
- I. Gutman, A. DERNFALK: "Innovative testing techniques for verification of corona, pollution and ice/snow performance of insulation structures", World Congress & Exhibition on Insulators, Arresters & Bushings, Barcelona-Sitges, Spain, 5-8 November 2017
- Y. Solovyev, I. Gutman, Ø. Byrkjedal, B. Thorsteinsson: "Practical methodology for calculation of corona losses induced by hoarfrost using operational measurements", Cigré Science & Engineering, N. 10, February 2018, p.p. 77-87
- M. Radosavljevic, A. DERNFALK, I. Gutman: "Development of requirements for testing and verification of RTV-coated substation support insulators for AC application", CIGRE-2018, A3-109
- A. DERNFALK, P. Sidenvall, I. Gutman: "Development of the test capable to reveal level of adhesion between fibreglass rod and housing of composite insulators", CIGRE-IEC 2019 Conference on EHV and UHV (AC & DC), April 23-26, 2019, Hakodate, Hokkaido, Japan, paper P1-10
- I. Gutman, J. Lundengård, V. Naidoo, B. Adum: "Technologies to reduce and remove ice from conductors and shield wires: applicability for Norwegian conditions", IWAIS-2019, Reykjavik, Iceland, June 23-28, 2019, paper 9
- I. Gutman, Y. Solovyev, H. Agustsson, H. Mc Innes: "Identification of Hoarfrost Corona Losses Events Based on Advanced Operational Data Analysis and Weather Modelling", 21st ISH-2019, Budapest, Hungary, August 26-30, 2019, paper 711
- I. Gutman, J. Lundquist: "Specialized Software for Electrical Design of Overhead Lines", World Congress, Tucson, USA, 20-23 October 2019
- W. Chisholm, C. Ahlholm, I. Gutman: "Dust & Sea Salt Pollution Mapping: Satellite versus Ground Truth Results", 2019 World Congress, Tucson, USA, 20-23 October 2019
-

REFERENCE PROJECTS

- 2015/2019 Participation in the book "Best Practices Guide for EHV AC OHL Design – Electrical Aspects" (CEATI Guide)
 - 2018/2019 Biological growth on composite insulators: evaluation of risks and countermeasures
 - 2017/2019 Development of rod to housing adhesion test for composite Insulators in collaboration with utilities
 - 2018 DC pollution test of composite insulator and for further pollution dimensioning
 - 2014/2018 EU project "Best Paths" (innovative test methods for the insulated cross-arm)
 - 2014/2018 Frontlines (evaluation of corona losses on overhead lines due to hoarfrost)
 - 2014 Combined ice/pollution full scale DC test
 - 2014 Development of new HV test for the verification of water drop induced corona
 - 2014 Optimal selection and quality control of line composite insulators for compact line
 - 2014 Investigation of insulation and corona issues which make possible AC/DC conversion of overhead lines
 - 2013 Innovative time and cost-effective pollution test methods for dimensioning of outdoor station insulation
 - 2012 World-wide service experience of composite apparatus insulators
 - 2012 Design pollution level for dimensioning in coastal areas
 - 2010/14 Development of test matrix to reveal quality of glass cap and pin insulators
 - 2003 Optimal methods for detection of internal defects in line composite insulators
-