

X SICEL 2021 – Transición Energética en la Cuarta Revolución Industrial



Oct 13 - 14 - 15, 2021



Universidad Tecnológica
de Pereira



(6) 313 7323

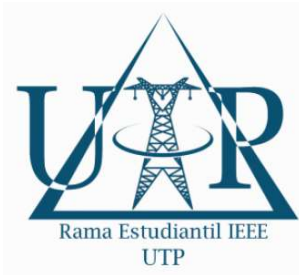


sicel@utp.edu.co



UNIVERSIDAD
NACIONAL
DE COLOMBIA

Organizadores



Patrocinadores



Comité científico

Adriana Arango Manrique (Universidad Nacional de Colombia)
 Alejandro Garcés Ruiz (Universidad Tecnológica de Pereira)
 Alexander Molina Cabrera (Universidad Tecnológica de Pereira)
 Alfonso Alzate Gómez (Universidad Tecnológica de Pereira)
 Ana Julieth Marín Hurtado (Universidad tecnológica de Pereira)
 Ana María Blanco (Technische Universiteit Dresden)
 Ana Milena martinez (Universidad Tecnológica de Pereira)
 Andrés Arias (Institución Universitaria Pascual Bravo)
 Andres Escobar Mejia (Universidad Tecnológica de Pereira)
 Andrés Pavas (Universidad Nacional de Colombia)
 Andres Ricardo Herrera (Universidad Tecnológica de Pereira)
 Antoine Rogeau (Mines ParisTech)
 Antonio Jose Bula Silvera (Fundación Universitaria del Norte)
 Armando Jaime Ustariz Farfán (Universidad Nacional de Colombia)
 Camilo Andrés Cortés Guerrero (Universidad Nacional de Colombia)
 Camilo Andrés Guerrero Martin (Fundación Universidad de América)
 Camilo Younes Velosa (Universidad Nacional de Colombia)
 Carlos Adrian Correa Flórez (Pontificia Universidad Javeriana)
 Carlos Andrés Torres Pinzón (Universidad Santo Tomás)
 Carlos Andrés Viteri Mera (Ohio State University)
 Carlos Javier Mojica Casallas (Pontificia Universidad Javeriana)
 Carlos Murillo (Universidad Nacional de Colombia)
 Carlos Zuluaga (Institución Universitaria Pascual Bravo)
 César Antonio Duarte Gualdrón (Universidad Industrial de Santander - UIS)
 César Arango Lemoine (Universidad Nacional de Colombia)
 Cesar Augusto Orozco Henao (Fundación Universitaria del Norte)
 Cristian Alejandro Vargas Riquelme (Universidad de Santiago de Chile)
 Dahiana López García (Universidad Nacional de Colombia)
 Daniel Esteban Bedoya Bedoya (Universidad Nacional de Colombia)
 Darwin Fabio Marin Yepez (Universidad Nacional de Colombia)

Diego Armando Giral Ramírez (Universidad Distrital Francisco José de Caldas)

Diego Fernando del Río Trujillo (Universidad Nacional de Colombia)

Diego Mejía Giraldo (Universidad de Antioquia)

Edgar Dario Obando Paredes (Universidad Nacional de Colombia)

Edison Andrés Soto Ríos (Universidad Nacional de Colombia)

Eduardo Antonio Cano Plata (Universidad Nacional de Colombia)

Edwin Francisco Forero García (Universidad Santo Tomás)

Ernesto Pérez (Universidad Nacional de Colombia)

Francisco Amortegui Gil (Universidad Nacional de Colombia)

Gabriel Ordóñez Plata (Universidad Industrial de Santander - UIS)

German Alfonso Osma Pinto (Universidad Industrial de Santander - UIS)

Héctor Cadavid (Universidad del Valle)

Henry Camilo Torres Valderrama (Universidad Nacional de Colombia)

Horacio Torres Sánchez (Universidad Nacional de Colombia)

Javier Solano (Universidad Industrial de Santander - UIS)

Jennyfer Thatiana Marin Pinilla (Universidad Nacional de Colombia)

Jesus Maria Lopez Lezama (Universidad de Antioquia)

Jhon Edwin Candelo Becerra (Universidad Nacional de Colombia)

Joan Montanyà (Pontificia Universidad Javeriana)

Johny Hernán Montaña Chaparro (Universidad Técnica Federico Santa María)

José Luis Paternina Durán (Universidad Santo Tomás)

Juan Camilo Giraldo Mejia (Universidad de San Buenaventura)

Juan Carlos Velez Díaz (Universidad del Norte)

Juan D. Molina Castro (Colombia Inteligente)

Juan David Marin Jimenez (Universidad Nacional de Colombia)

Juan José Mora Florez (Universidad Tecnológica de Pereira)

Juan M. Rey (Universidad Industrial de Santander - UIS)

Julián Peláez Restrepo (Instituto Tecnológico Metropolitano de Medellín - ITM)

Laura Escobar (Universidad Tecnológica de Pereira)

Luis Fernando Díaz Cadavid (Universidad Nacional de Colombia)

Luis Fernando Grisales (Instituto Tecnológico Metropolitano de Medellín - ITM)

Mauricio Granada Echeverri (Universidad Tecnológica de Pereira)
 Moritz Meinck (Technische Universiteit Dresden)
 Nicolas Toro (Universidad Nacional de Colombia)
 Omar Fredy Prias Caicedo (Universidad Nacional de Colombia)
 Oscar Danilo Montoya Giraldo (Universidad Distrital Francisco José de Caldas)
 Ramón Alfonso Gallego Rendón (Universidad Tecnológica de Pereira)
 Ricardo Alberto Hincapié Isaza (Universidad Tecnológica de Pereira)
 Rusber Octavio Rodríguez (Universidad Industrial de Santander - UIS)
 Sandra Milena Pérez Londoño (Universidad Tecnológica de Pereira)
 Sandra Milena Téllez Gutiérrez (Universidad Nacional de Colombia)
 Sandra Ximena Carvajal Quintero (Universidad Nacional de Colombia)
 Sergio Armando Gutiérrez Betancur (Universidad Autónoma Latinoamericana)
 Steven Ospina Hurtado (Universidad Tecnológica de Pereira)
 Victor Meza (Universidad Nacional de Colombia)
 Walter Julián Gil González (Universidad Tecnológica de Pereira)
 Wilson González Vanegas (Universidad Nacional de Colombia)
 Yennifer Sarmiento Ariza (Universidad Industrial de Santander - UIS)
 Yulieth Jiménez Manjarres (Universidad Industrial de Santander - UIS)

Directores de sesión

Compatibilidad electromagnética - Johny Hernán Montaña Chaparro
 Transición energética & Sistemas fotovoltaicos - Andrés Ricardo Herrera Orozco
 Protecciones - Ernesto Pérez González
 Calidad de la potencia - Edison Andrés Soto Ríos & Fabio Andrés Pavas
 Aplicaciones de microrredes y redes inteligentes – Andrés Escobar Mejía & Oscar Danilo Montoya Giraldo
 Gestión e integración de la energía – Gabriel Ordoñez Plata & Ricardo Hincapié Isaza
 Integración de recursos energéticos distribuidos – Camilo Younes Velosa
 Transición energética en la cuarta revolución industrial – Alexander Molina Cabrera & César Orozco

Ponencias realizadas

Código	Título	Autores	Sesión paralela asignada
84728	Power Shunt Capacitor Bank Management Model Based on Life Expectancy and Risk Overtime	Camilo Trujillo Arboleda, David L. Alvarez, Rodolfo Garcia S & Fernando A. Herrera	SP5 - Energy transition - 4th industrial revolution
95268	Convex Optimization Methods for the Restoration Topology and the Switching Sequence Restoration in Distribution Systems	John Franco, Norberto Martínez, Alejandra Tabares, Christoffer Bezão & Lucas Faria	SP4 - Smart grids applications
95585	Visualization Proposal for Power System Control Rooms Based on Situational Awareness	Daniel Betancur Trujillo, Eros David Escobar Cardenas, Anderson Quintero, Jorge Wilson González Sánchez, Gabirel Jaime López Jiménez, Idi Amin Isaac Millan	SP4 - Energy management II
95759	Modeling the Stochastic Security-Constrained Unit Commitment Problem Considering Distribution Shift-Factors	Victor Hinojosa Mateus, Alex Chicaiza Portero, Esteban Gil Sagás & Guillermo Gutierrez Alcaraz	SP4 - Energy integration and management
95849	Characteristics of the Initial Breakdown Pulses in Negative Cloud-to-Ground Flashes Occurred in the Central Region of Colombia	Camilo Alejandro Granados Vivas, Herbert Enrique Rojas Cubides, Francisco Román Campos	SP1 - Electromagnetic compatibility
96094	Inverter-Based Generation EMT Model for Protection and Short Term Stability Studies based on Voltage Controlled Current Source	David Sanchez Muñoz, Ernesto Perez González, Juan Fernando Pineros & Laura Agudelo Zapata	SP2 - Power quality I
96191	Expansion Planning of Distribution Networks Comprising Reliability: An Enhanced Model Incorporating Post-Fault Reconfiguration	Alejandra Tabares Pozos, Leonardo Macedo, Jhon Fredy Franco	SP1 - System protection
96236	Challenges and recommendations for the massification of energy management systems in Colombian industry	José David Beltrán Gallego, Mauricio Quintero Ríos, Dahiana López García, Sandra Ximena Carvajal Quintero	SP2 - Energy management I
96245	Branch Optimal Power Flow Model for DC Networks with Radial Structure: a Conic Relaxation	Oscar Danilo Montoya Giraldo, Andrés Arias-Londoño & Alexander Molina-Cabrera	SP4 - Energy integration and management
96246	Impacts of the Inclusion of Distributed Generation on Congestion of Distribution Networks and in the Islanding Operation Capability	Jose David Beltrán Gallego, Leidy Daniela Castro Montilla, Alexandra Castro Valencia, Camilo Augusto Giraldo Muñoz & Dahiana López García	SP5 - DER integration
96252	Demand Response Program Implementation Methodology: A Colombian Study Case	Juan D. Molina, Luisa F. Buitrago, Sandra Y. Giraldo, Jaime A. Uribe & Sandra Téllez	SP2 - Demand response

96262	Voltage Forecasting Methods for Voltage Monitoring and Control Strategies	Voltage Forecasting Methods for Voltage Monitoring and Control Strategies	SP4 - Smart grids applications
96263	Demand-Side Management Strategies, a Model of Expected Effects	Sandra Téllez Gutiérrez, Oscar Duarte Velasco	SP2 - Demand response
96264	Approach of energy indicator by end use to improve energy performance at the National University of Colombia - Bogotá, under the parameters of the ISO 50001 standard	Pierre Anthony Medina Wintaco & Sandra Milena Tellez	SP4 - Energy management II
96332	Small-Signal Stability and Sensitivity Analysis for Grid Following Converters	Simón Sepúlveda García & Alejandro Garcés Ruíz	SP3 - Microgrid applications
96340	Power Factor Correction in Converters for PV Systems using Convex Optimization	Oscar Danilo Montoya Giraldo, Alejandro Garcés & Alexander Casilimas Peña	SP1 - Energy transition - Photovoltaic systems
96345	Hourly Impact Analysis of PV Systems and Electric Vehicles in a distribution network from deterministic and probabilistic approaches	Cristian David Cadena Zarate, Juan Caballero-Peña & German Osma-Pinto	SP1 - Energy transition - Photovoltaic systems
96392	Review of charging load modeling strategies for electric vehicles: A grid-to-vehicle probabilistic approach comparison	Carlos D. Zuluaga, Sergio D. Saldarriaga, Daniel F. Florian & Miguel A. Rojo	SP4 - Energy integration and management
96404	A Comprehensive Sustainability Review in the Isolated Colombian Microgrids	Alejandra Rodriguez Zabala, Dahiana López García, Sandra Carvajal Quintero & Adriana Arango Manrique	SP3 - Energy transition
96481	Constructing a Composite Indicator to Analyze Buildings Energy Performance	Marlon Millan-Martinez, German Osma-Pinto & Julián Jaramillo-Ibarra	SP2 - Energy management I
96659	Analysis of Asset Management Models for a Transformer Fleet in the National Laboratory of Smart Grids (LAB+i)	Kevin Steven Morgado Gómez & Javier Rosero García	SP5 - Energy transition - 4th industrial revolution
96675	Zero Energy Buildings: Colombian perspective	Santiago Osorio, Sandra Carvajal & Juan Marín Jiménez	SP2 - Energy management I
96683	Business model for the introduction of aggregators to Colombian electricity distribution networks through demand response	Leidy Daniela Castro-Montilla & Sandra Ximena Carvajal Quintero	SP2 - Demand response
96689	A Framework for Resilience of LV Electrical Networks with Photovoltaic Power Injection	Rusber Rodríguez Velásquez, German Osma Pinto, Javier Solano Martínez, Robin Roche & Daniel Hissel	SP5 - DER integration

96711	Proposal for the optimal management of a DC microgrid	Ricardo Alzate & María Mantilla	SP4 - Energy integration and management
96715	Energy Management System For A Microgrid With Biomass Inclusion	Albert Deluque Pinto, Ernesto Pérez González & Gail Gutiérrez Ramírez	SP3 - Energy transition
96716	Synchronization of Isolated Microgrids with Renewable Energy Sources under Distorted Voltages	Ricardo Álzate, María Mantilla & Fabian Forero	SP3 - Power quality II
96758	Harmonic interaction of LED lamps in islanded	Moritz Meinck, Ana Maria Blanco, Shrinath Kannan, Andres Pavas & Jan Meyer	SP3 - Power quality II
96761	Methodology for characterization and planning of electricity demand in an isolated zone: Mitú Approach	Santiago Bedoya Sánchez, Juan Felipe García Franco, Jairo Pineda Agudelo, Cesar Arango Lemoine & Sandra Ximena Carvajal Quintero	SP3 - Energy transition
96763	Comparison between Electrogeometric Model and Leader Progression Model for Transmission Lines Shielding Failure Rate	Sergio Zumaran Rivera, Johny Montana Chaparro & Roger Schurch Brandt	SP1 - Electromagnetic compatibility
96767	Integration of DER in the Planning of Low Voltage Electric Distribution Networks	Alejandro Valencia Diaz, Ricardo Hincapié Isaza & Ramón Gallego Rendón	SP5 - DER integration
96781	Overcurrent protection of active distribution networks: A comparison	Brayner Steven Grisales Soto, Juan José Mora Flórez & Sandra Pérez Londoño	SP1 - System protection
96782	Conceptual Design of Protection Scheme for Active Distribution Network using a Smart Grid Architecture Model framework	Juan David Orozco Álvarez, Andrés Ricardo Herrera Orozco & Juan José Mora Flórez	SP4 - Smart grids applications
96783	Analysis of quasi-resonant inverter for domestic induction heating applications	Adolfo Escobar, Luz Adriana Trejos Grisales & Mariana Durango Florez	SP2 - Power quality I
96787	Optimal Flexible Load Programming Based on Time of Use Pricing for the Colombian Energy Market	Sergio Daniel Montaña Salas & Carlos Adrián Correa Flórez	SP2 - Demand response
96792	Optimal coordination of overcurrent relays in microgrid environments	Andres Ricardo Herrera Orozco, Juan José Mora Flórez, Daniela Escobar Urrea & César Augusto Orozco Henao	SP4 - Smart grids applications
96793	Technical and economic approach of electricity generation using the Medellín (AMVA) aqueduct network.	Manuel Fula Rojas, Jorge Cardona & Alejandro López	SP5 - Energy transition - 4th industrial revolution

96798	Implementation of an Energy Management System in Colombian Manufacturing - A Methodological Approach	Juan David Marín García, Sandra Ximena Carvajal Quintero & Juan David Marín Jiménez	SP2 - Energy management I
96825	Adaptive coordination of overcurrent relays with multiple setting groups in active distribution networks	Britney Amell Barón, Juan Camilo Arrauth Gómez, Cesar Augusto Orozco Henao, Juan Guillermo Marín Quintero, Andrés Ricardo Herrera Orozco & Sandra Pérez Londoño	SP1 - System protection
96831	Identification of areas and elevated structures with the greatest amount of lightning impacts (Hotspots)	Javier Mora, Julián Rojas, Brandon Ardila & Edison Soto	SP1 - Electromagnetic compatibility
96834	Events automatic simulation in microgrids for the training and validation of protection devices	Duirist Coba-Jaramillo, Lina Benavides-Bolaño, Juan Marín, Cesar Augusto Orozco Henao, Andrés Ricardo Herrera & Sandra Pérez	SP4 - Smart grids applications
96851	Using a Multi-criteria analysis to study the inclusion of ocean sources in the energy matrix of Colombia	Juan Carlos Castillo Herrera, David Andrés Serrato Tobón, Laura Salazar Peña & Juan Esteban Tibaquirá	SP5 - DER integration
96884	Reliability assessment of natural gas network and their impact on the operation of electric power distribution systems	Carlos Saldarriaga, Ricardo Hincapié & Harold Salazar	SP5 - Energy transition - 4th industrial revolution
96911	Optimal Design of a Helical Spring by Using a Genetic Continuous Algorithm	M.A. Rodriguez Cabal, J.D. Betancur Gomez & L. F. Grisales Noreña	SP5 - 4th industrial revolution
96920	Application of Distance Protection on Active Distribution Networks: A Qualitative Comparison	Sara María Velasco Gómez, Sandra Milena Pérez Londoño & Juan José Mora Flórez	SP1 - System protection
96934	Resilience Improvement Through the Protective Relaying: A Metrics Review	Juan Diego Giraldo, Sandra Pérez & Juan José Mora	SP1 - System protection
96971	Prediction model of primary solar resource with the use of Machine Learning, current results and future challenges	Edgar Dario Obando, Sandra Ximena Carvajal Quintero & Jairo Pineda Agudelo	SP1 - Energy transition - Photovoltaic systems
97041	Energy Transition for rural development: Apreliminar case study in Colombia for improving artisanal fishing	Maximiliano Bueno-López, Tatiana Rengifo Ordoñez, Diego Chacón Campo, Jairo Tocancipá-Falla, Diana María López-Ochoa & Gabriel Ernesto Barrero Tapias	SP3 - Energy transition
97070	Design of a Temperature Control Using The Simulink PLC Coder and The IEC 61131 Standard	Diego Giral, Andrés Felipe Barrera Cuestas, Marlon Giovany Mantilla Castañeda & Oscar Danilo Montoya Giraldo	SP5 - 4th industrial revolution
97072	Monitoring System for Electrical Variables Implementing Blockchain and Python	Diego Giral, Javier Andrés Muñoz Romero & Carlos Alberto Ramírez Vanegas	SP4 - Energy management II

97074	Impact of the integration of energy-saving strategies on the demand profile of residential buildings in a tropical climate: a case study	Jorge Luis Cárdenas Rangel, German Alfonso Osma Pinto & Julián Ernesto Jaramillo Ibarra	SP2 - Demand response
97080	SARFI-X Estimation in Unbalanced Distribution Systems based on Synchronized Voltage Bus Measurements and Linear Support Vector Machines	Daniel Camilo Galeano Suarez, César Antonio Duarte Gualdrón & Jairo Blanco Solano	SP2 - Power quality I
97082	Daily Pattern recognition of Harmonic Currents of Residential Low Voltage Networks	Ana Maria Blanco, Jan Meyer, Peter Schegner & Andrés Pavas	SP3 - Power quality II
97087	Analysis of the Impact of Dispatch Strategies in the Sizing and Operation of Microgrids using HOMER Pro Software	Yennifer Sarmiento Ariza, Jerson García García, Lizeth Campos Rodríguez & German Osma Pinto	SP3 - Microgrid applications
97091	Estimation of variations of electrical parameters in low voltage networks due to rapid fluctuations of solar irradiance	Néstor Alejandro Balaguera Castro & German Osma Pinto	SP2 - Power quality I
97092	Comparative Analysis of MPPT Algorithms for PV Systems under Partial Shading Conditions	Liceth T. León, Yolanda Rodríguez, David J. Rincón, María A. Mantilla & Javier E. Solano	SP1 - Energy transition - Photovoltaic systems
97097	About Grounding of Pole Transformers in the Distribution Network	C. Cárdenas, W. Villa, G. Moreno & H. Arenas	SP1 - Electromagnetic compatibility
97098	A Review of Test Systems and Tools to Evaluate the Harmonic Distortion in Low Voltage Distribution Networks with Photovoltaic Penetration	Johanna Castellanos, D. Patino, Carlos Adrian Correa-Florez & Gabriel Ordóñez-Plata	SP2 - Power quality I
97100	Energy Management in Colombian Mining Industry – An approach for Characterization Energy	Juan Camilo Giraldo Berrío, Juan David Marín Jiménez, Germán Eduardo Padilla & Sandra Ximena Carvajal Quintero	SP2 - Energy management I
97101	DSP-Based Phase Locked Loop designMethodology for Three Phase Grid Synchronization	Jose A. Lopez, Carlos A. Torres-Pinzón & Carlos J. Mojica-Casallas	SP3 - Microgrid applications
97102	Penetration of Renewable Energy Sources Analysis Using the Dispa-Set Model in Colombian Power System Projected at 2024	Ingrid García, Ernesto Perez, Ricardo Bolaños & Delio Gómez	SP5 - DER integration
97103	Optimal sizing of a grid-connected microgrid and operation validation using HOMER Pro and DigSilent	John Barco-Jiménez, Adrián Córdoba, Edisson Escobar, Andrés Pantoja & Eduardo Bravo Caicedo	SP3 - Microgrid applications
97104	Assignment of Responsibilities for Power Quality Stationary Disturbances in an Islanded Microgrids	Camilo Garzón, Andres Pavas, Miguel Romero, Vanesa Quintero, Shrinath Kannan, Ana Maria Blanco & Jan Meyer	SP3 - Power quality II

97106	Estimation of global solar radiation using NNARX neural network based on UV index	John Barco-Jiménez, Francisco Eraso-Checa, Andrés Panoja & Eduardo Caicedo	SP1 - Energy transition - Photovoltaic systems
97107	Energy Solution to Improve the Educational Conditions of a Wayúu School in Kuisa, La Guajira	Johanna Castellanos, Javier Areniz, D. Patino, Carlos Adrian Correa-Flórez, Gabriel Ordoñez-Plata, Wilman Morales Rey & Wilman Morales Torres	SP3 - Energy transition
97120	Modeling and simulation of the integration of a Power-to-Gas plant in a power system network	Iván David Serna Suárez, W. Adrián Aguas-Ramírez, Y.A. Parra-Jaimes & O.A. Quiroga-Quiroga	SP5 - DER integration
97132	Power Quality Issues in AC Islanded Microgrids: Mitigation and Commonly Used Control Strategies	Camilo Garzón, Miguel Romero, Andrés Pavas, Shrinath Kannan, Ana María Blanco & Jan Meyer	SP3 - Power quality II
97206	A low-cost lightning electric field measurement device for tropical zone. An initial result.	Leonardo Aguirre González, Camilo Younes Velosa & Diego Fernando Del Río Trujillo	SP1 - Electromagnetic compatibility
97516	Open Source Tool for Sizing Hybrid Islanded Microgrids in Colombia	Wilmer Roperro-Castaño, Nicolas Muñoz-Galeano, Eduardo Francisco Caicedo-Bravo & Pablo Andrés Maya-Duque	SP4 - Energy management II