Daily Program

Please click on the day or session for more details.
If you are a participant and want to download the abstracts, please *login here*
Sunday 03/11 Monday 04/11 Tuesday 05/11 Wednesday 06/11 Thursday 07/11

09:00	**Plenary Session: Sector Coupling and Technology Integration**	*El Parque 2*
10:30	*Coffee/Tea Break*	
11:00	**Keynote**	*El Parque 2*
11:00	**Keynote**	*El Parque 1*
11:30	**Session 1-A: Theme 2.2**	*El Parque 2*
11:30	**Session 1-B: Theme 6.1**	*El Parque 1*
11:30	**Session 1-C: Theme 4.2**	*Araucarias 2*
11:30	**ISREE: Forum on Global Solar Energy Training**	*Araucarias 1*
11:30	**Forum: Atmospheric Attenuation of DNI for Solar Tower Power Plants**	*El Coigue*
11:30	**Session 1-D: Theme 8.2**	*El Canelo*
13:00	*Lunch*	
14:00	**Industrial Forum - Research meets Business**	*El Parque 2*
14:00	**Poster Session**	*El Parque 3*
P6.1	A Robust Machine Learning Based Simulation of Solar District Heating Systems Mohamed Abokersh, Departament d'Enginyeria Mecànica, Universitat Rovira i Virgili	
P6.2	A Study on New and Renewable Energy Policy Changes and Market Analysis in Korea Sang Min An, KRIEA (Korea Research Institute of Eco-Environmental Architecture)	
P6.3	Generation Expansion Planning Considering Storage Systems and Inertia Constraints Pablo Ernesto Gonzalez Inostroza, Departamento de Ingeniería Eléctrica, Universidad de Chile	
P6.5	Analysis of the Integration of an Electric Bus and an Electric Vehicle with Grid-Connected PV Systems and a Storage System	

Alexandre de Albuquerque Montenegro, Universidade Federal de Santa Catarina/Brasil

P6.6 Models for the Optimization and Evaluation of Photovoltaic Self-Consumption Facilities
Llanos Mora-López, Universidad de Málaga

P6.7 Community Solar in Brazil: The Cooperative Model Context and the Existing Shared Solar Cooperatives Up to Date
Kathlen Schneider, Universidade Federal de Santa Catarina / Fotovoltaica-UFSC

P6.8 A Software for Dimensioning of Small Microgrids with PV-Battery Systems
Jose Luis Torres-Moreno, Department of Engineering. Universidad de Almeria

P6.9 How to Measure the Resilience of a Fully Renewable Multi-Vector Energy System?
Gabriela Vera-Hofmann, University of Chile

P7.1 Optimal Sizing of Stand-Alone Hybrid Photovoltaic-Wind-Battery Energy System Using PSO
Pollyanne de Oliveira Carvalho Malaquias, Universidade Federal de Campina Grande - UFCG

P7.2 Towards the Optimal Sizing of Solar-Powered Pump-Pipe-Storage Systems
Tawanda Hove, Energy Research Center

P7.3 Solar Cooking – Achieving Sustainable Solutions to Global Challenges
Arun Raman, Solar Cookers International

P7.5 Passive Solar System to Store Heat for Cooking
Ole Jorgen Nydal, Norwegian University of Science and Technology

P7.6 Performance Analysis of a Stand-Alone Building Integrated Photovoltaic System
Ochuko Kelvin Overen, University of Fort Hare

P7.7 Testing the Thermal Performance of Open-Source Solar Cooker Designs Relative to Commercial Cookers
Arun Raman, Solar Cookers International

P7.8 A PV System for Remote Power and Shea Nut Processing in Burkina Faso
David Wood, University of Calgary

P3.2 Modeling of the Nominal Power of a PV Generator Under Clear and Cloudy sky Conditions
Jose Ruben Angulo Abanto, Pontificia Universidad Catolica del Peru

P3.3 Location Study of Solar Thermal Power Plant in the State of Bahia Using Geographic Information Systems (GIS) and Economic Methods
Verônica Azevedo, Universidade Federal de Pernambuco

P3.4 Impact Study of Operating Temperatures and Cell Layout Under Different Concentration Factors in a CPC-PV Solar Collector in Combination with a Vertical Glass Receiver Composed by Bifacial Cells
Diogo Cabral, University of Gävle

P3.5 Transient Simulation of a Solar Cavity Receiver for Application in a Low-Latitude Field
Renan Carvalho, University of São Paulo

P3.6 Performance Evaluation and Characterization of Different Photovoltaic Technologies Under the Coastal, Desertic Climate Conditions of Lima, Peru
Luis Angel Conde Mendoza, Pontificia Universidad Católica del Perú

P3.7 On the Estimation of Energy Production in PV Plants. A Comparative Study of

Methodologies
Marcelo Cortes-Carmona, Universidad de Antofagasta

P3.8 First Principles Mathematical Model and Control of a Solar Thermal Power Plant
Diogo Machado, UFSC

P3.9 Thermophotovoltaic Energy Conversion Systems: a Review
Philippe Gentillon, The University of New South Wales

P3.10 Agrivoltaic in Chile – Integrative Solution to Use Efficiently Land for Food and Energy Production and Generating Potential Synergy Effects Shown by a Pilot Plant in Metropolitan Region
Patricia Gese, Fraunhofer Chile Research

P3.11 Thermo-Economic Evaluation of CSP Technologies for Their Application in Uruguay
Agustín Ghazarian, Instituto de Ingeniería Mecánica y Producción Industrial

P3.12 Energy and Exergy (2E) Analysis of an Optimized Linear Fresnel Reflector for a Conceptual Direct Steam Generation Power Plant
Eduardo González-Mora, Facultad de Ingeniería. Universidad Autónoma del Estado de México

P3.13 Optimizing the Grid Connection of Hybrid PV and Wind Power Plants
Andreas Staiger, Fraunhofer Chile Research Center for Solar Energy Technologies

P3.14 Passive Cooling of Photovoltaic Modules in Qatar by Utilizing PCM-Matrix Absorbers
Abdelhakim Hassabou, Qatar Environment & Energy Research Institute

P3.15 Renewable Energy Sources of the Far Eastern and Arctic Coasts of Russia
Valeriy Knyazhev, Institute of Marine Technology Problems FEB RAS

P3.16 Analysis and Design of a Solar Parabolic Trough - ORC - Biomass Cooling Plant for a Commercial Centre
Ana Lazaro, Aragón Institute for Engineering Research (I3A), Thermal Engineering and Energy Systems Group, Univ

P3.17 Towards Optimizing Solar PV Collector Deployment in Inter-Row-Shaded Arrays
Stephen Makwembere, Sinet Africa

P3.18 From 76.6 to 80.1 %; PV-System Performance-Ratio in Mexio City
Ruben Dorantes, Universidad Autonoma Metropolitana

P3.20 Photovoltaic Distributed Generation Connecting to the Grid: Analysis of Solar Incident Irradiation and Electricity Generation in the Federal University of Ceara
Douglas Costa, Instituto Federal de Educação, Ciência e Tecnologia do Ceará, Campus Cedro

P3.21 Grid Connected PV Systems in Dairy and Poultry Farms in Brazil: Evaluation of Different Installation Approaches
Adriano Moehlecke, PUCRS - CATHOLIC UNIVERSITY

P3.22 Smart Grid System Using Electricity from Photovoltaics, Renewable Sources and Alternative Fuels
Jan Najser, VSB – Technical University of Ostrava, ENET Centre

P3.23 Low Cost Electroluminescense Lab Implementation
Manoel Henrique Oliveira Pedrosa Filho, IFPE

P3.24 Optical Simulation of a Polar Parabolic Trough Collector in a Subtropical Region

Dario Panaroni, Comisión de Investigaciones Científicas de la Provincia de Buenos Aires

P3.25 The Influence of Resource Variability on the Electric Production of a CSP Power Tower Plant Located in High Desert Conditions
Ismael Pérez, Pontificia Universidad Católica de Chile

P3.26 Characterization of PV Soiling Losses in Urban Mediterranean Environment
Jesús Polo, CIEMAT

P3.27 Energy and Entropy Characterization of the Tolokatsin Solar Collector Designs for Multiple Applications
Eduardo A. Rincón-Mejía, Energy Program. Universidad Autónoma de la Ciudad de México

P3.28 Estimation Model of Soiling Based on Environmental Parameters
Iván Rosas, Facultad de Ciencias Físicas y Matemáticas Universidad de Chile

P3.29 Effect of Unified Workflow on PV Projects Development
Andrejs Snegirjovs, Institute of Physical Energetics

P3.30 Urbanfarm-PV (UFPV): A Case Study About Pilot Plants in Chile
Sebastian Teichert, Fraunhofer Chile Research - Center for Solar Energy Technologies (CSET)

P3.31 Organic Photovoltaic Panels for Bus Rapid Transit Stations in Curitiba – A Viability Study
Anna Gabriella Tempesta, Group of Nanostructured Devices, Universidade Federal do Parana (UFPR)

P3.32 Specific Yield and Land Occupation Ratio of Solar PV Plants for Three Tracker Configurations at Twelve Latitudes in Mexico
Hussein Zeaiter, HMH SOLAR

P3.33 Hybrid CSP-PV Advanced Control, Integration and Real-time Optimization: Review and Future Line of Research
Adriano Brandão, Universidade Federal de Santa Catarina

P3.34 Energy Demand Analysis and Policy Instruments Assessment for Mining Industry in Chile
Yeliz Simsek, Pontificia Universidad Catolica de Chile

P8.1 Prediction of the Overall Heat Transfer Coefficient Using Artificial Neural Network
Yaser Imad Alamin, CIESOL-University of Almeria

P8.3 Experimental Investigation and Characterization of Façade Integrated PVT Collectors With and Without Insulation
Mark Dannemand, Technical University of Denmark

P8.4 An Investigation Into Par (Photosynthetically Active Radiation) and Energy Performances in Small-Scale Greenhouses in Northern China
Jiangtao Du, University of Liverpool

P8.5 Building Integrated Photovoltaic (PV) Systems – Energy Production Modelling in Urban Environment
Benjamin Govehovitch, University Claude Bernard Lyon 1

P8.6 Design of an Internet of Things Environment Based on Hysteresis Control in a Photovoltaic Panel Controller for the Massive Use of Solar Electric Energy in Urban Areas
Saul Huaquipaco Encinas, Universidad Nacional de Juliaca

P8.8 Global Solar Transmittance of Vertical Glazings Oriented Towards the Equator

	Gerardo Vitale, Laboratorio de Energía Solar, Departaemnto de Física - CENUR LN UDELAR	
P8.9	Study on the Guiding and Control Index for the Design of Residential Building in the Northwest China Focuses on Generalized Solar Energy Utilization Qiubo Xiao, Tongji University	
P8.10	Public Response to Installation of Building Integrated Photovoltaic System (BIPV) to Residential Buildings in Wuhan, China Wei Yang, Victoria University	
14:00	**Special Talk: Renewable Transformation Challenge Winner 2019**	*Araucarias 2*
14:30	**Workshop on how to get published in a scientific journal with Elsevier**	*Araucarias 2*
15:30	*Coffee/Tea Break*	
16:00	**Keynote**	*El Parque 2*
16:00	**Keynote**	*Araucarias 2*
16:30	**Session 2-A: Theme 3.3**	*El Parque 2*
16:30	**Session 2-B: Theme 9.3**	*Araucarias 2*
16:30	**Session 2-C: Special Theme 12.2 SE History**	*Araucarias 1*
16:30	**Workshop on SHIP task**	*El Coigue*
16:30	**Session 2-D: Theme 4.3**	*El Canelo*
19:00	*Gala Dinner + Awards Ceremony*	

Local Host

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Prediction of wall thermal transfer properties using Artificial Neural Networks

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[3] Faculty of Science and Technology, University of Algarve, Faro (Portugal) and IDMEC, Instituto Superior Técnico, Universidade de Lisboa, Lisboa (Portugal)

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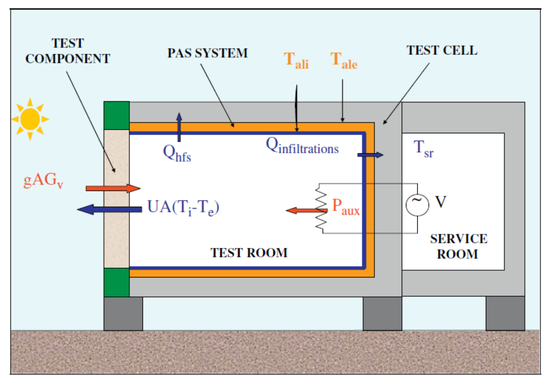
Introduction

The availability of methods to predict energy loses through the walls is extremely important mainly due to its relevance for an appropriate management and sizing of both energy demand and generation systems. Moreover, it is also very important for the implementation of suitable energy control strategies. This paper describes the development and assessment of a short-term predictive *Artificial Neural Network* (ANN) model of the overall heat transfer coefficient for a test cell located at the Plataforma Solar de Almería (Solar Platform of Almería) in Spain.

Scope of the research: The LECE building

To develop this work, the test cell of LECE (in Spanish – *Laboratorio de Ensayos Energéticos para Componentes de la Edificación*) located at "Plataforma Solar de Almería (PSA)" in Tabernas (Almería, Spain) has been used.

This test cell has a total surface approximately equal to 6 m^2 is usually used to develop and implement thermal characterization of building envelop components methodologies. More concretely, it has four test cells equipped with Heating Conditioning and Air Conditioning (HVAC) systems and instrumentation for testing different real-scale constructive components under real environmental conditions. Its walls prevent the exchange of energy between the test cell and the outdoor environment.



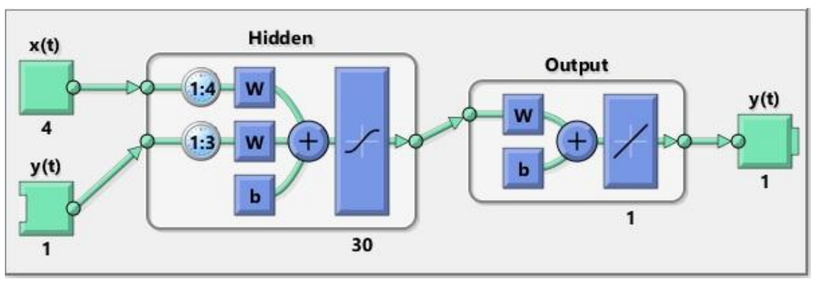
Instrumentation

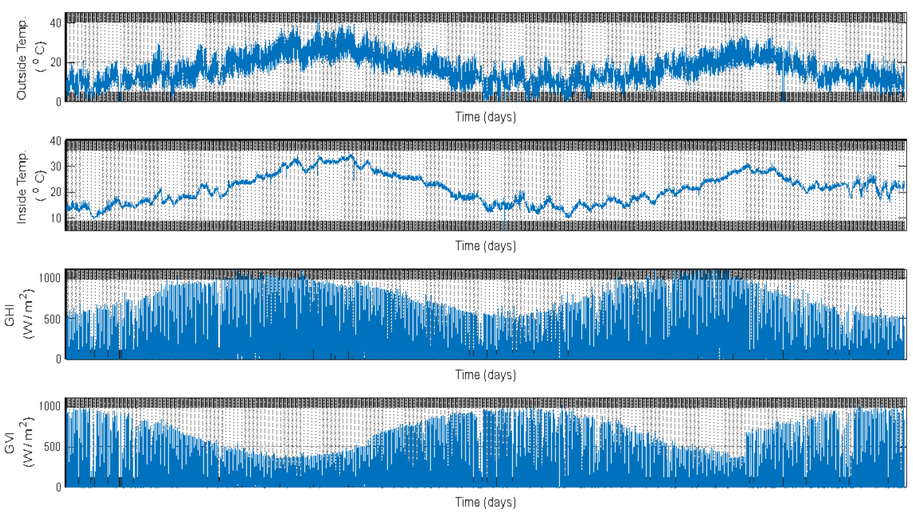
- Four indoor and one outdoor air temperatures using PT100 four wire connected, protected from solar radiation and ventilated.
- Global horizontal and vertical solar radiation using thermoelectric pyranometers.
- Heat flux density leaving the room through the ceiling, south, north and west wall using thermopile based transducers. All of them centered in each wall and embedded on its indoors surface.
- Relative humidity using capacitance transducers.
- Wind velocity sensors using optoelectronic transducers.
- Wind direction using resistance based transducers.

Methodology

The methodology used to obtain Artificial Neural Networks (ANN) to model the overall heat transfer coefficient of the proposed test cell was:

1. To select the architecture for the ANN
   - Nonlinear AutoRegressive with eXogenous "external" input (NARX)
2. Data-sets construction
   - Data from September 2017 to August 2018 with a sample time of 1 minute has been used.
   - It has been divided randomly into three subsets for training (70% of data), generalization (15% of data), and testing (15% of data).
3. Selection of inputs and outputs for the ANN
   - Inputs: average outside temperature (Tout), inside temperature (Tin), Global Horizontal Irradiance (GHI) and Global vertical Irradiance (GVI). Output: the overall heat transfer flux
4. Training and validation of the ANN
   - Five different ANNs have been trained and validated. The obtained results can be observed in the following table:





Model	Nº of Nodes hidden layer	Inputs delay	Feedback delay	RMSE
1	30	1 to 4	1 to 3	0.1478
2	15	1 to 3	1 to 4	0.1482
3	15	1 to 4	1 to 4	0.1486
4	25	1 to 4	1 to 4	0.1487
5	20	1 to 4	1 to 2	0.1490

Conclusions

This work presents the development and assessment of a short-term predictive *Artificial Neural Network* (ANN) model to estimate the overall heat transfer coefficient for a test cell located at the Solar Platform of Almería in Spain. In future works, this model will be used in a global management energy system to predict the energy requirements into the room to obtain an optimal users' thermal comfort.

Acknowledgments:

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