

20 – 24 NOVEMBER, 2023
SCIENTIFIC SCHOOL

Sun-2C

Solar Energy for Buildings :
From components to cities.



Le Bourget du Lac
& Yenne

73 FRANCE



Sun-2C

aims to participate both in the dissemination of knowledge and the state of the art, but also in the popularization of advances in the following themes :

Development of materials, components and systems for capturing and converting solar energy (Photovoltaic, Solar Thermal, etc.)

Innovative technologies for the integration of clean energy in existing or new buildings

Analysis and design of integrated solar buildings in cities (solar urban development)

You will have the opportunity to learn about new topics, to share your research with the scientific community during a poster session and to develop your network.

Also plenary sessions, workshops, visit of experimental facilities at INES (French National Institute for Solar Energy).

Sun-2C

PLENARY SESSIONS PROGRAM MONDAY



	Monday
08:00 - 9:00	Welcome Coffee ATRIUM HELIOS 08:00-09:00
09:00 – 12:00	Visits : INES LOCIE LEPMI
12:00 -13:00	Lunch
	Plenary session Solar resource - AMPHI - IUT
13:00-13:30	INTRODUCTION
13:30 - 14:30	Third generation photovoltaics L. FLANDIN
14:30 -14:45	Coffee break
14:45 -16:45	Photovoltaic Systems and their Applications B. NORTON
17:00	17:00 BUS TO YENNE

Sun-2C

PLENARY SESSIONS PROGRAM TUESDAY – FRIDAY



	Tuesday	Wednesday	Thursday	Friday
	Plenary session Solar material	Plenary session Solar technologies	Plenary session Integration from building to City	Plenary session System Integration & Energy management
08:00 - 10:00	Colorless dye sensitized solar cells for building integration N.BARBERO PV in energy networks M.P.COMECH	Concentrated solar thermal technologies and their applications A.FERRIERE	Passive Radiative Cooling for the Topical Climate B.FENG Cool surfaces for urban cooling in Singapore – A case for tropical city. M.P.WAN	Multi-pronged performance and degradation D.HASSAN DAHER
10:00-10:30			Coffee Break	
10:30 - 12:30	From the beginnings to modern collectors and applications D.ROUSSE	Experimental Heat Transfer Characterization of Outdoor PV Modules H.PABIOU PVT - Heat or Electricity From Solar V.DELACHAUX	Urban Metabolism C.MENEZO BIPV: PV energy in buildings P.THONY	Renewables, flexibility and sector coupling M.PATEL
12:30 -13:30	Lunch			
	Workshop	Workshop	Workshop	Plenary session – Prospective
14:00 - 16:00	Rotating Workshop	Rotating Workshop	Rotating Workshop	14:00 BUS TO BOURGET DU LAC & CHAMBERY.
16:00 -16:30	Break			
16:30 - 18:00	Posters	Rotating Workshop	BIP's Presentations	
19:00 -19:30			Closing cocktail	
19:30 -21:00	Dinner			

ROTATING WORKSHOP PROGRAM



DAY	HOUR	OUTSIDE	ROOM1	ROOM2
TUE 21/11	14h00-15h30	PV WORKSHOP 1 Anne MIGAN 6 - 8 students	PV WORKSHOP 2 Anne MIGAN 6 - 8 students	DECARBONISATION OF BUILDINGS Brian NORTON 20 - 24 students
	15h30 - 17h00	PV WORKSHOP 1 Anne MIGAN 6 - 8 students	PV WORKSHOP 2 Anne MIGAN 6 - 8 students	DECARBONISATION OF BUILDINGS Brian NORTON 20 - 24 students
	17h00 - 17h30	BREAK		
	17h30 - 18h30	POSTER SESSION		
WED 22/11	14h00 - 16h00	PVT WORKSHOP Valentin DELACHAUX 3 * 40min sessions 3 * 6 students		QGIS WORKSHOP Apolline FERRY 18 students
	16h00 - 16h30	BREAK		
	16h30 - 18h30	PVT WORKSHOP Valentin DELACHAUX 3 * 40min sessions 3 * 6 students		QGIS WORKSHOP Apolline FERRY 18 students
THU 23/11	14h00 - 16h00		BIPV WORKSHOP Benjamin RIEDEL (to be confirmed) 3 * 40min sessions 3 * 6 students	PVGIS WORKSHOP Philippe THONY 18 students
	16h00 - 16h30	BREAK		
	16h30 - 18h30	BIP Restitution (12 groups - 10min)		

MONDAY, 20TH

PROGRAM

08:00–09:00 *WELCOME COFFEE*
LE BOURGET DU LAC - HELIOS HALL

09:00–12:00 VISITS : LOCIE / LEPMI
9H, 10H, 11H (10 PERSONS)

12:00–12:45 *LUNCH*
LE BOURGET DU LAC - HELIOS HALL

13:00–13:30 INTRODUCTION - IUT AMPHITHEATRE

13:30–14:30 PLENARY SESSION - IUT AMPHITHEATRE
LIONEL FLANDIN - THIRD GENERATIONS PHOTOVOLTAICS

14:30–14:45 COFFEE BREAK - IUT AMPHITHEATRE

14:45–16:45 PLENARY SESSION - IUT AMPHITHEATRE
BRIAN NORTON - PHOTOVOLTAICS SYSTEMS AND THEIR APPLICATIONS

17:00 BUS TO YENNE - HELIOS PARKING

18:00 INTALLATION IN ROOMS - CLOS DES CAPUCINS, YENNE

19:30–21:00 *DINNER* - CLOS DES CAPUCINS, YENNE

MONDAY, 20TH SPEAKERS

LIONEL FLANDIN

THIRD GENERATIONS PHOTOVOLTAICS

Our presentation will begin with an introduction to various energy-related concepts, covering topics such as order of magnitudes, classifications, conversion processes, scales, and practical applications. Following this, we will delve into an extensive exploration of photovoltaic (PV) technologies, with a primary emphasis on the widely employed Silicon technology. Subsequently, we will turn our attention to the competitive landscape of emerging solar cell technologies, placing particular focus on what is often referred to as the "third generation." This category includes Dye-sensitized, Organic, and Perovskite solar cells, which will be discussed in detail. In the concluding section, we will provide insights into the latest and forthcoming technologies anticipated in the realm of solar energy.



BIOGRAPHY :

Lionel Flandin is a Professor at LEPMI UMR 5279 in Chambéry, France, specializing in materials with energy-related applications (Solar and Fuel Cells). He serves as the vice-Director of LEPMI since 2011. His research focuses on the durability and functional characteristics of materials for energy generation and transport. With previous experience as a Visiting Professor in Ohio, USA, his research has delved into micro and nanostructured polymers. Additionally, he has worked as an Engineer in Research at the Centre de Recherche de Rhodia (CRA) in Paris, where he explored applications of precipitated silicas and the properties of pigments containing rare earth materials. Lionel Flandin's career highlights his extensive expertise in materials science, cultivated across different countries and within diverse research domains.

MONDAY, 20TH

SPEAKERS

BRIAN NORTON

PHOTOVOLTAICS SYSTEMS
AND THEIR APPLICATIONS



This lecture presents the key drivers that have led to the realisation of many different photovoltaic systems from devices, windows, buildings and larger scale arrays.. The relationship between application type and energy storage is described. The importance of thermal management and of land-use optimization to the growth in agriphotovoltaics and floating photovoltaics is discussed. The importance is stressed of information flow to ensure use of different scales of energy storage to match photovoltaic electricity production to end demand.

BIOGRAPHY:

Professor Brian Norton' co-chaired the work of the European Academies Science Advisory Council that led to the major report published in 2021 on decarbonisation of buildings in Europe. He has supervised over 50 PhDs, holds several patents and has authored over 220 journal papers receiving over 15,000 citations (h-index 61). His awards include a Honorary Doctorate from Universite de Technologie de Troyes; the Honorary Fellowship of the Chartered Institute of Building Services Engineers and Honorary Membership of the Daylight Academy. He was recognized as a "Solar Energy Pioneer" at the 50th Anniversary Solar World Congress of the International Solar Energy Society. He is a elected member of the Royal Irish Academy and the Irish Academy of Engineering. He is a Principal Investigator in the Irish National Centre for Energy, Climate and Marine. He is currently Secretary for Policy and International, Royal Irish Academy and Vice-President of the European Sustainable Energy Innovation Alliance.

TUESDAY, 21ST PROGRAM

 CLOS DES CAPUCINS, YENNE

07:30–08:00 *BREAKFAST*

08:00–09:00 PLENARY SESSION – NADIA BARBERO
COLORLESS DYE SENSITIZED SOLAR CELLS FOR BUILDINGS INTEGRATION

09:00–10:00 PLENARY SESSION – MARIA PAZ COMECH
GRID INTEGRATION OF PV SYSTEMS

10:00–10:30 *COFFEE BREAK*

10:30–11:00 PLENARY SESSION – DANIEL ROUSSE
FROM THE BEGINNINGS TO MODERN COLLECTORS AND APPLICATIONS

12:30–13:30 *LUNCH*

AFTERNOON :

ROTATING WORKSHOP

COFFEE BREAK

POSTERS SESSION

19:30–21:00 *DINNER*

TUESDAY, 21ST

SPEAKERS

NADIA BARBERO

COLORLESS DYE SENSITIZED SOLAR CELLS
FOR BUILDINGS INTEGRATION



Dye-Sensitized Solar Cells (DSSC) emerged to be one of the most interesting semitransparent/transparent PV technologies. Details of all the components, interplay, and an opinion on the technological limitations to reach colorless and transparent NIR-DSSC will be discussed in relationship with building integration applications.

BIOGRAPHY :

Nadia Barbero is Associate Professor in Organic Chemistry at the University of Turin. After obtaining a PhD in 2007, she started to work on the synthesis, purification and structural characterization of new organic dyes as photosensitizers for DSSC during a Post-Doc at the University of Torino (2008-2009) and as senior researcher for Dyepower Consortium (2010-2011). She then worked at the CNRS/Université de Picardie (2012-2013) on the synthesis of near infra-red (NIR)-dyes and large band-gap inorganic semi-conductors for the development of NIR-DSSC. In 2023 she was visiting professor at the University of Zaragoza, Spain and at the West University of Timisoara, Romania for the summer school "Energy communities in mountain villages" in the framework of UNITA project. In the recent years, among other projects, she was involved in the IMPRESSIVE H2020 RIA project working on the synthesis of functional materials for the development of transparent dye-sensitized and perovskite solar cells. She is currently involved in CANVAS project working on semi-transparent DSSC. She is (co)author of 86 peer-reviewed articles (h-index 28, > 2400 citations).

TUESDAY, 21ST

SPEAKERS

MARIA PAZ COMECH

GRID INTEGRATION OF PV SYSTEMS



The connection of renewable generation to the distribution network continues to entail challenges in managing and operating the electric power system. In the case of photovoltaic generation, significant growth of small and medium-sized installations is observed within towns and cities, making it difficult to control the network in these areas due to the variability and seasonality of the solar resource and the differences in their behaviour with respect conventional synchronous generation. On the other hand, its connection can impact the stability, quality and safety of the electrical system, which would affect users.

In this session, we will talk about the challenges regarding the massive connection of distributed generation, especially photovoltaic energy, and the aspects to consider so that the quality of the power received by end users is not affected.

BIOGRAPHY :

María Paz Comech received a degree in industrial engineering in 2003 and a Ph.D. in electrical engineering from the University of Zaragoza in April 2008. Her Ph.D. dissertation was titled "Analysis and Testing of Wind Systems before Voltage Dips."

Currently, she is developing her research career within Group T4I_23R: Intelligent Optimization of the Generation and Integration of Renewable Sources (SMART-e) from the CIRCE Mixed University Research Institute. Her research interests include the study of the integration of renewable generation and distributed resources and their possible impact on quality, network efficiency and security; the analysis and development of new smart grid structures and new grid control and automation algorithms; modelling, simulation, and the analysis of electrical systems in PSCAD, PSS/E, and DigSILENT PowerFactory, and the validation of computer models of systems.

TUESDAY, 21ST

SPEAKERS

DANIEL ROUSSE

FROM THE BEGINNINGS

TO MODERN COLLECTORS AND APPLICATIONS



In this interactive presentation, Daniel Rousse will test participants' knowledge, give an overview of the thermal applications of solar energy, and weave together the story of the development of these technologies through some of their most important applications. Wooclap will have to be used on either the participant's telephone or laptop. Active participation is essential for an optimal presentation.

BIOGRAPHY :

Daniel R. Rousse, founder, and CSO of Energy Solutions Associates (ESA) in 2010, is a full professor in energy at École de technologie supérieure (ÉTS) in Montréal, Canada, where he is director of the t3e Group and director of the Masters in renewable energy and energy efficiency.

Over his 30-year career in industry and research labs, Daniel R. Rousse directed more than 150 researchers, post-doctoral fellows, and graduate and undergraduate students, published more than 250 scientific and technical papers, and obtained more than 50 million \$ in grants, subsidies, contracts, and donations. He is regularly acting as an invited professor to give lectures and attend Ph D defenses.

His technologies research activities in energy and energy efficiency are focused on thermal energy transfer bearing in mind technology economical assessment, cost reduction, market development, and sales. But he is also involved in community development projects.

TUESDAY, 21ST SPEAKERS

ANNE MIGAN

ARCHITECTURE, RELIABILITY
AND DEVELOPMENT
OF PHOTOVOLTAIC SYSTEMS



WORKSHOP :

Prof Migon-Dubois will be offering a workshop highlighting the environmental factors affecting the productivity of solar PV collectors

BIOGRAPHY :

Anne Migon Dubois received the M.Sc. and Ph.D. degrees in High frequency and optical telecommunications from Limoges University, France, in 1998 and 2001, respectively. She is currently a Full Professor at Paris-Saclay University. She also develops her research activities within the Group of Electrical Engineering Paris (GeePs). She is at the head of the activities "Advanced photovoltaics characterizations in real outdoor conditions". Her field of interest includes soft integration of photovoltaics in smart-grid and smart-buildings and PV fault detection and diagnosis. She has supervised 15 Ph.D. thesis and several Master's thesis. She is an author/co-author of more than 120 papers and international communications, co-owner of 3 patents in PV and one book chapter. She is an expert for the French ANR evaluations and ERC, regular reviewer for EPJ-PV journal, Energies, (occasional for some other journals in the field of PV), Editorial Board Member of the MDPI journal "Sustainability" and guest editor of the special issue "Modeling and Forecasting for Energy Production of Photovoltaic (PV) Systems" in the "International Journal of Photoenergy".

WEDNESDAY, 22ND PROGRAM

 CLOS DES CAPUCINS, YENNE

07:30–08:00 *BREAKFAST*

08:00–10:00 PLENARY SESSION – ALAIN FERRIERE
CONCENTRATED SOLAR THERMAL TECHNOLOGIES AND THEIR
APPLICATIONS

10:00–10:30 *COFFEE BREAK*

10:30–11:30 PLENARY SESSION – HERVE PABIOU
EXPERIMENTAL HEAT TRANSFER CHARACTERIZATION OF OUTDOOR PV
MODULES

11:30–12:30 PLENARY SESSION – VALENTIN DELACHAUX
PVT – HEAT OR ELECTRICITY FROM SOLAR

12:30–13:30 *LUNCH*

14:00–18:30 ROTATING WORKSHOP

16:00–16:30 *COFFEE BREAK*

19:30–21:00 *DINNER*

WEDNESDAY, 22ND

SPEAKERS

ALAIN FERRIERE

CONCENTRATED SOLAR THERMAL
TECHNOLOGIES AND THEIR APPLICATIONS



This lecture begins with the physical principles for the conversion of solar radiation into heat, the storage of thermal energy and the conversion of heat into electricity or fuels. The state-of-the-art of the technologies implemented in commercial projects worldwide is presented. Some driving forces and obstacles to the market growth are briefly discussed. Finally, the main challenges addressed in current research activities are exposed. Examples of research programs developed in French solar facilities are given.

BIOGRAPHY :

Alain Ferriere is an electrical engineer, he was graduated PhD in engineering sciences in 1987. He joined CNRS in 1988 and is now a senior researcher with more than 30 years of experience in concentrated solar technologies. He is an expert in solar tower systems, specialized in experimental activities and testing of components. He managed national and international research projects aiming at developing innovative high temperature solar receivers and components for thermal storage. He served as French representative at IEA Technology Cooperation Program SolarPACES for two decades. He is (co)author of more than 40 publications in peer-reviewed journals and published 8 books or chapters.

WEDNESDAY, 22ND

SPEAKERS

HERVE PABIOU

EXPERIMENTAL HEAT TRANSFER
CHARACTERIZATION OF OUTDOOR
PV MODULES



Predicting solar cell temperature is critical for PV system designers and operators to optimise performance and reduce the risk of system failure. The conventional approach of estimating solar cell temperature using thermal models based on energy balance has significant uncertainties, especially for the convective heat transfer coefficient, which is difficult to measure and depends on several parameters. This presentation focuses on the measurement protocol for the convective heat transfer coefficient and the validity of classical correlations.

BIOGRAPHY :

Hervé Pabiou is a CNRS researcher at the Centre for Energy and Thermal Sciences of Lyon (CETHIL UMR5008) in the Heat Transfer and Energy Processes in Buildings and their Environment team. His research focuses on photovoltaic components in power plants or integrated in buildings. In 2018, he set up an experimental platform for the characterisation of solar components in outdoor conditions on the roof of the building that houses the laboratory. His current research concerns, on the one hand, the measurement of heat exchanges in real conditions (particularly in the presence of solar radiation) and, on the other hand, the modelling of these exchanges as a function of the available sensor network. Hervé PABIOU is also responsible for the development of a demonstrator for the Grid4Mobility project to study the behaviour of a multi-source, multi-use energy network in an intelligent building-integrated solar charging solution.

WEDNESDAY, 22ND

SPEAKERS

VALENTIN DELACHAUX

PVT – HEAT OR ELECTRICITY FROM SOLAR



A solar Photovoltaic/Thermal (PVT) collector produces both heat and electricity thanks to a combination of a PV panel and a solar thermal collector or absorber. PVT concepts are not a new idea for the hybridization of solar energy collectors. For more than 20 years, there have been developments on possible solutions as IEA SHC Tasks 35 (2005-2010) and 60 (2018-202) show. A new PVT push came in 2016 when the PV industry reached relatively low costs for their technologies, and the solar thermal industrial market was mature.

BIOGRAPHY :

Following his engineering studies at the Ecole Polytechnique, specialising in thermal engineering, mechanics and renewable energies, Valentin Delachaux worked for a year at CVE, an independent French renewable energy producer with a decentralised regional energy model and a focus on short supply chains (solar, hydrogen, biogas). Then, for the last 2 years, he has been involved as a PhD candidate in a research and development project with the *Laboratoire de Mécanique Paris-Saclay* and DualSun. The objective is to find an optimal design of PVT collectors dedicated to solar-assisted heat pump systems.

THURSDAY, 23RD PROGRAM

 CLOS DES CAPUCINS, YENNE

07:30-08:00 *BREAKFAST*

08:00-10:00 PLENARY SESSION - BING FENG & WAN MAN PUN
PASSIVE RADIATIVE COOLING FOR THE TROPICAL CLIMATE

10:00-10:30 *COFFEE BREAK*

10:30-11:30 PLENARY SESSION - CHRISTOPHE MENEZO
CITIES AS LIVING ECOSYSTEMS :
THE KEY ROLE OF SOLAR ENERGY IN THE URBAN METABOLISM

11:30-12:30 PLENARY SESSION - PHILIPPE THONY
BIPV : PV ENERGY IN BUILDINGS

12:30-13:30 *LUNCH*

14:00-16:00 ROTATING WORKSHOP

16:00-16:30 *COFFEE BREAK*

16:30-18:30 BIP'S PRESENTATIONS

19:00-19:30 CLOSING COCKTAIL

19:30-21:00 *DINNER*

THURSDAY, 23RD

SPEAKERS

BING FENG & WAN MAN PUN

PASSIVE RADIATIVE COOLING
FOR THE TOPICAL CLIMATE



Sub-ambient cooling can be achieved through radiative coolers that selectively emit radiation within the atmospheric window (8 – 13 μm) to outer space and suppress absorption/emission of other wavelengths. While radiative cooling has been proven successful in mid-latitude regions to achieve sub-ambient temperatures, the same performance could not be achieved in tropical regions due mainly to the higher solar irradiance and atmospheric radiation. In this presentation, we discuss the criteria to achieve sub-ambient temperatures in the challenging conditions of tropical daytime and recommend the solar reflectance and infrared emittance required to achieve sub-ambient cooling. Past and current works in radiative cooling will also be presented, providing a comprehensive overview of the current efforts in NTU in developing sustainable cooling technologies.

BIOGRAPHY:

Ng Bing Feng is Assistant Professor with the School of Mechanical and Aerospace Engineering in Nanyang Technological University, Singapore. Concurrently, he holds the appointment of Cluster Director in the Energy Research Institute @ NTU (ERI@N) in the domain of smart and sustainable building technologies. Bing Feng is heavily involved in radiative cooling research for the tropics with specific application to Singapore and has published preliminary studies using photonic and polymeric materials for daytime radiative cooling. Besides radiative cooling, he is also involved in the active control of building technologies for energy savings as well as environmental studies on emissions and 3D printing of lightweight materials.

THURSDAY, 23RD

SPEAKERS

WAN MAN PUN

COOL SURFACES FOR URBAN COOLING
IN SINGAPORE - A CASE FOR TROPICAL CITY



Singapore is subjected to hot and humid tropical climate with small seasonal and even diurnal variation in outdoor air temperature. Cooling is demanded all year-round. We studied the effectiveness of adopting cool (high albedo) surfaces on urban fabrics as a strategy for urban cooling in the tropical city of Singapore using numerical modelling and site experiments. Large-scale adoption of cool surfaces can cool down the urban air temperature by about 2oC in sunny afternoon.

BIOGRAPHY :

Dr. Wan is Associate Professor in the School of Mechanical & Aerospace Engineering, Nanyang Technological University Singapore. His research interest lies in urban sustainability, green building technologies and indoor environmental qualities. Dr. Wan has published over 100 international refereed journal and conference articles and is inventor of 3 patents. He is a member of American Society of Mechanical Engineers (ASME), American Chemical Society (ACS) and American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

THURSDAY, 23RD

SPEAKERS



CHRISTOPHE MENEZO

CITIES AS LIVING ECOSYSTEMS :

THE KEY ROLE OF SOLAR ENERGY IN THE URBAN METABOLISM

Solar energy is the basis of every ecosystem. Are cities ecosystems in the senses in which we think of classic natural and ecological areas outside of cities? In that sense urban metabolism concerns the evaluation of how much urban ecosystems produce and consume resources. Research on "urban metabolism" is a recent and growing field that encompasses multidisciplinary competences and is oriented towards a combination of engineering sciences and natural and social sciences. It focuses on analyzing the inputs, uses and outputs of elements such as material resources, energy, water, but also the outputs of 'metabolic' activity including pollution, local climate including the heat island effect.

We will show through this lecture how an early integration of solar energy considerations into urban planning/design is necessary to ensure the sustainability and resilience of cities in the context of climate change and energy independence.

BIOGRAPHY :

Pr. Ménézo is full professor at university Savoie Mont Blanc. He is in charge of the Green/smart building topic in the French/Singaporean Network on Renewable Energy. His current research focuses on Building Integrated Solar Components (especially on photovoltaic and hybrid photovoltaic/thermal components) and on the redefinition of the envelope (roof and facades) in order to include dynamic (seasonal or daily variation) and active features (energy production and augmented ventilation). He is also working on the prediction of solar PV production at the scale of urban territories. He published 70 international papers on academic approaches as well as on applied hybrid solar technology, BIPV, adaptive façade and solar cadastre.

He has been visiting professor at the University of the New South Wales, Sydney; City-U Hong-Kong; NTU Singapore, ... He has developed several other international collaborations with: University of Genoa (Italy), Fraunhofer Institute – ISE (Freiburg_ Germany), University of the New South Wales (Sydney), Chaire T3e – ETS Montreal (Canada), NTU Singapore He is regular member of international PhD committees as external reviewer. : Unsw Sydney, City-U Hong-Kong, Indian Institute of Technology – Dehli – India. He is also regular reviewer for the Scientific Journals: Exp. Thermal Fluid Science, Energy and Buildings, Building and Environment, Solar Energy, Solar Energy Materials and Solar Cells

Head of LOCIE (process, energy, building) laboratory CNRS/USMB

Head of French Solar Energy Federation (FédEsol CNRS)

THURSDAY, 23RD

SPEAKERS

PHILIPPE THONY

BIPV : PV ENERGY IN BUILDINGS



We will provide here some insight on the actual building stock in Europe, which shows a wide disparity of constructive system, performance level regarding energy efficiency and comfort for the users. How to change these old and new buildings to get a high level of sustainability to fit with CO2 emission and energy consumption reduction targets? Photovoltaics can play a role in this rapid evolution, if the local building industry can share needs and perspectives with the mass-production of highly standardised PV modules. We will review actual PV technologies that would be able to fit buildings integration requirements: manufacturing, standards and new technologies. Buildings integration of PV encourages us to think about the usage of electrical energy, the classification of various possible PV products, the associated regulations, the stakeholders from the PV and building value chain. We will present and analyse a couple of examples, aiming at drawing pictures of actual difficulties (as mechanics, safety issues, architecture, cost...). We can then think about perspectives and future developments for BIPV.

BIOGRAPHY :

Philippe Thony began his research career in the field of solid-state microlasers for various applications as eye-safe telemetry or long-distance space telecommunication. In 2000, he joined STMicroelectronics where he participates in advanced R&D teams for the development of photolithography: immersion technics and extreme-UV scanner. In this frame, developments are carried out in optical fine metrology, with the study of the applications of ellipsometry to dimensional measurement of nanometric patterns. Then Philippe Thony joined the CEA's Photovoltaic Components Laboratory, where processes for the production of c-Si photovoltaic cells were studied. With his team, he evaluated the potential contribution of nanotechnology and nanomaterials to high-efficiency solar cells, as heterojunction PV cells. In 2014, Philippe switched activity in a different area and a different scale: buildings and particularly energy performance of buildings. Of course, PV was still in the core activities of Philippe, but he also considers construction materials and systems to lower carbon emission as much as possible along the whole buildings lifecycle.

FRIDAY, 24TH PROGRAM

 CLOS DES CAPUCINS, YENNE

07:30–08:00 *BREAKFAST & VACATE ROOMS*

08:00–10:00 PLENARY SESSION – DAHA HASSAN DAHER
MULTI-PRONGED PERFORMANCE AND DEGRADATION

10:00–10:30 *COFFEE BREAK*

10:30–12:30 PLENARY SESSION – MARTIN PATEL
RENEWABLES FLEXIBILITY AND SECTOR COUPLING

12:30–13:30 *LUNCH*

14:00 BUS
TO LE BOURGET DU LAC
& CHAMBERY TRAIN/BUS STATION

FRIDAY, 24TH SPEAKERS

DAHA HASSAN DAHER

MULTI-PRONGED PERFORMANCE
AND DEGRADATION



Long-term performance monitoring and characterization of field-exposed solar photovoltaic (PV) modules are critical for efficient power production. This work attempts to evaluate the performance degradation of crystalline silicon technology after several years of field exposure in Djibouti's harsh desert maritime climate. Characterization techniques such as visual inspection (VI), infrared thermography (IR), ultraviolet fluorescence (UVFL), electroluminescence (EL) imaging, and electrical characterization are performed to detect predominant degradations mechanisms. The electrical characteristics have been determined and normalized at Standard Test Conditions (STC) with translation equations.

BIOGRAPHY :

Researcher & Laboratory Manager / New and Renewable Energies Laboratory , Djibouti Study and Research Center

Dr. Daha Hassan Daher holds a doctorate in thermal energy from the Institut National des Sciences Appliquées de Lyon, and is a researcher and head of the New and Renewable Energies Laboratory at the Centre d'Études et de Recherche de Djibouti (CERD). With over ten years' experience, Dr. Daha works in the field of solar photovoltaic (PV) energy: analysis of solar power plant performance, PV module diagnostics and evaluation of degradation rates, modeling of PV systems in harsh environments and development of decision support tools.

He is also :

- Member of the International Solar Energy Society (ISES);
- Member of the Institute of Electrical and Electronics Engineers (IEEE)
- Member of the Board of Directors of the Agence Djiboutienne de la Maîtrise de l'Énergie (ADME);

FRIDAY, 24TH SPEAKERS

MARTIN PATEL

RENEWABLES FLEXIBILITY AND SECTOR COUPLING



This presentation discusses a number of flexibility and sector coupling options to realize decarbonization by massive integration of renewable energy, in particular PV, in the energy system. The flexibility and sector coupling options considered include electricity storage, heat pumps, demand-side response and distribution grid expansion, along with energy efficiency measures in electrical appliances and building retrofitting. We also study conventional and smart charging of electric vehicles. In addition, we assess the economics of renewable hydrogen production as transport fuel.

To this end, different methods are applied including i) techno-economic analysis from the user and the investor perspective, ii) cost minimization for the energy system model from a social planner perspective (using our model GRIMSEL) and iii) economic input/output analysis to for macroeconomic assessment (employment and value added).

Switzerland is used as case study.

As one important finding, electricity storage is likely to be implemented at large to very large scale. However, the ultimate storage needs are strongly influenced by the extent of electrification, of building retrofit and of implementing flexibility measures.

BIOGRAPHY :

Martin K. Patel is professor at University of Geneva, where he has been holding the Chair for Energy Efficiency since 2013. He is an engineer by training and worked at the Fraunhofer Institute for Systems and Innovation Research in Germany, in an energy consultancy and at Utrecht University in the Netherlands. His research deals with energy savings and emission reduction in the built environment and industry as well as with energy storage. His group performs environmental and economic assessments of technologies, processes, products and services as well as evaluations of policy programmes. He has been involved in several national and international research projects.

CONTACTS

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