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*William M. Bazilio<sup>1</sup>, Rudy Kawabata<sup>1</sup>, Luciana Pinto<sup>2</sup>, Daniel Micha<sup>3</sup>, Patricia Lustoza de Souza<sup>2</sup>, Guilherme Torelly<sup>1</sup>*  
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*Alessia Núñez-Osorio<sup>1</sup>, María José García-Salinas<sup>2</sup>, Manuel Pérez-García<sup>2</sup>, Joaquín Alonso-Montesinos<sup>1</sup>, Antonio Manuel Puertas López<sup>1</sup>, Maria Jesus Ariza Camacho<sup>2</sup>*

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*Nicolas Otto<sup>1</sup>, Christof Schultz<sup>1</sup>, Guillermo Farrias-Basulto<sup>2</sup>, Wuai Zhang<sup>2</sup>, Ayman Maqsood<sup>2</sup>, Tadeus Ranisch<sup>1</sup>, Yoko Schirmer<sup>1</sup>, Jonas Preuschoff<sup>1</sup>, Stefan Gall<sup>2</sup>, Emil List-Kratochvil<sup>2</sup>, Rutger Schlatmann<sup>1</sup>, Bert Stegemann<sup>1</sup>*

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*Antoine Bourgeois<sup>1</sup>, Stella Hadiwidjaja<sup>1</sup>, Zoltan Nicot-Senneville<sup>1</sup>, JiaYi Ye<sup>1</sup>, Kwan Bum Choi<sup>1</sup>, Qilin Zhou<sup>1</sup>, Yi Hou<sup>1</sup>*

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*Mohammad Hossein Mohammadi<sup>1</sup>, Narendra Bandaru<sup>1</sup>, Rasmus Schmidt Davidsen<sup>1</sup>*

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*Kimihiko Saito<sup>1</sup>, Kanji Takahashi<sup>1</sup>, Hirotaka Shishido<sup>1</sup>, Ryouyuke Ishikawa<sup>1</sup>, Makoto Konagai<sup>1</sup>*

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*Amalraj Peter Amalathas<sup>1</sup>, Tereza Staňková<sup>2</sup>, Lucie Landová<sup>2</sup>, Neda Neykova<sup>2</sup>, Jakub Holovsky<sup>2</sup>*

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*Mohammad Istiaque Hossain<sup>1</sup>, Yongfeng Tong<sup>1</sup>, Brahim Aissa<sup>1</sup>*

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*Syed Fawad Ali Shah<sup>1</sup>, Hyeonwook Park<sup>1</sup>, Muhammad Rehan<sup>2</sup>, Donghyeop Shin<sup>2</sup>, Kihwan Kim<sup>2</sup>, Jae Ho Yun<sup>3</sup>*

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*Bahri Eren Uzuner<sup>1</sup>, Konstantin Tsoi<sup>1</sup>, Gorkem Gunbas<sup>1</sup>, Selcuk Yerci<sup>1</sup>*

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Jens Froebel<sup>1</sup>, Matthias Pander<sup>1</sup>, Bengt Jaeckel<sup>1</sup>, Andreas Maixner<sup>2</sup>, Pouya Pourshafi<sup>2</sup>, Afshin Bakhtiari<sup>2</sup>, Hamed Hanifi<sup>2</sup>

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Yasushi Sobajima<sup>1</sup>, Kouzen Wakazono<sup>1</sup>, Keisuke Ohdaira<sup>2</sup>

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*Pouya Pourshafi<sup>1</sup>, Alexander Protti<sup>2</sup>, Max Mittag<sup>2</sup>, Christian Reichel<sup>2</sup>, Andreas Maixner<sup>1</sup>, Hamed Hanifi<sup>1</sup>*  
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*Mengdi Liu<sup>1</sup>, Wenhao Xu<sup>1</sup>, Yating Zhang<sup>1</sup>, Giorgio Bardizza<sup>2</sup>, Christos Monokroussos<sup>1</sup>*  
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Ciel et Terre, Lille, France; <sup>4</sup> TNO, Eindhoven, The Netherlands

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*João Victor Oliveira Santos<sup>1</sup>, Daniel Ory<sup>2</sup>, Christine Abdel Nour<sup>1</sup>, Damien Barakel<sup>3</sup>, Olivier Palais<sup>3</sup>, Julien Dupuis<sup>1</sup>*

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*Kabir Paúl Sulca<sup>1</sup>, Rodrigo del Prado Santamaria<sup>2</sup>, Thøger Kari<sup>2</sup>, Julian Anaya<sup>1</sup>, Gisele A. dos Reis Benatto<sup>2</sup>, Sergiu Viorel Spataru<sup>2</sup>, Oscar Martinez<sup>1</sup>*

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*Sophia Jahreis<sup>1</sup>, Bengt Jaeckel<sup>1</sup>, Ringo Koepge<sup>1</sup>, Jens Froebel<sup>1</sup>, Paul Schenk<sup>1</sup>, Matthias Pander<sup>1</sup>*

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*Paul Gebhardt<sup>1</sup>, Tannaz Katouli<sup>1</sup>, Thomas Kaltenbach<sup>1</sup>, Tamara Bretzel<sup>1</sup>,  
Lisa-Marie Bieber<sup>1</sup>, Ingrid Haedrich<sup>1</sup>*  
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*Luca Antognini<sup>1</sup>, Michele Oliosi<sup>1</sup>, Auriane Canesse<sup>1</sup>, Robin Vincent<sup>1</sup>, André Mermoud<sup>1</sup>, Bruno Wittmer<sup>1</sup>*  
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*Jose Domingo Santos<sup>1</sup>, Eneko Setien<sup>1</sup>, Alberto Del Pozo<sup>1</sup>, Liviu Stoicescu<sup>2</sup>,  
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*Ahmad Hashem<sup>1</sup>, Zonghan Jiang<sup>1</sup>, Guido Willers<sup>2</sup>, Leila Mortazavifar<sup>1</sup>, Bengt Jaeckel<sup>2</sup>, Ralph Gottschalg<sup>2</sup>*  
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*Mohanad Diab<sup>1</sup>, Lukas Koester<sup>1</sup>, Jordi Veirman<sup>1</sup>, Atse Louwen<sup>1</sup>, David Moser<sup>1</sup>, Luis Fialho<sup>1</sup>*  
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*Danuta Paraficz<sup>1</sup>, Ralf Jandl<sup>1</sup>, Natasa Sarafijanovic-Djukic<sup>2</sup>, Ebrar Özkalay<sup>3</sup>,  
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*Cristian Terrados<sup>1</sup>, Eva de la Viuda<sup>1</sup>, Kabir Paul Sulca<sup>1</sup>, Julian Anaya<sup>1</sup>,  
Miguel Ángel González<sup>1</sup>, Oscar Martínez<sup>1</sup>*

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*Wenhao Xu<sup>1</sup>, Yating Zhang<sup>1</sup>, Mengdi Liu<sup>1</sup>, Christos Monokroussos<sup>1</sup>, Werner Herrmann<sup>2</sup>, Giorgio Bardizza<sup>2</sup>, Harald Mülleians<sup>3</sup>*

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- 3BO.12.2** Characterization of Vehicle Integrated Photovoltaic Modules 020209

*Ricardo Moruno<sup>1</sup>, Francisco José Martín<sup>1</sup>, Juan Manuel Redondo<sup>1</sup>, Javier Malo<sup>1</sup>, Luis Javier San José<sup>1</sup>, Guido Vallerotto<sup>1</sup>, Steve Askins<sup>1</sup>, Rubén Núñez<sup>1</sup>, César Domínguez<sup>1</sup>, Ignacio Antón<sup>1</sup>, Rebeca Herrero<sup>1</sup>*

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- 3BO.12.4** Estimating the Energy Yield of Bifacial Photovoltaics with the JRC's Photovoltaic Geographic Information System 020210

*Nigel Taylor<sup>1</sup>, Teodora Lyubenova<sup>1</sup>, Lavanya Malarkannan<sup>2</sup>, Nikos Alexandris<sup>1</sup>, Alexandros Falangas<sup>3</sup>, Robert Kenny<sup>1</sup>, Ewan D. Dunlop<sup>1</sup>, Blago Mihaylov<sup>1</sup>*

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- 3BO.12.5** An Update on Energy Rating Amendments – Integration of Bifacial Modules 020211

*Stefan Riechelmann<sup>1</sup>, Hendrik Sträter<sup>1</sup>, Ana María Gracia Amillo<sup>2</sup>, Sophie Pelland<sup>3</sup>, Anton Driesse<sup>4</sup>*

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- 3BO.14.1** Outdoor Measurements of Perovskite Modules 020213

*Hanna Ellis<sup>1</sup>, Harald Mülleians<sup>1</sup>, Ewan D. Dunlop<sup>1</sup>, Tony Sample<sup>1</sup>*

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*Moira Itzel Torres Aguilar<sup>1</sup>, Pascal Ortega<sup>2</sup>, Jordi Badosa Franch<sup>3</sup>, Johan Parra<sup>3</sup>*

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*Ioannis (John) A. Tsanakas<sup>1</sup>, Frédéric Mezzasalma<sup>1</sup>, Maxime Babics<sup>1</sup>, Alexandre Mignonac<sup>1</sup>, Hervé Colin<sup>1</sup>, Romain Couderc<sup>1</sup>, Lionel Sicot<sup>1</sup>, Philippe Marechal<sup>1</sup>, Guillaume Capron<sup>1</sup>, Jérémie Aimé<sup>1</sup>*

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*Daniel Tune<sup>1</sup>, M. Ignacia Acevedo Devoto<sup>1</sup>, Raphael Shanmugam<sup>1</sup>, Karl Wienands<sup>1</sup>, Nils Kopp<sup>2</sup>, Carina Hallensleben<sup>2</sup>, Rihoko Kizukuri<sup>2</sup>, Matthias Helbig<sup>1</sup>, Andreas Halm<sup>1</sup>*

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*Atse Louwen<sup>1</sup>, Jordi Veirman<sup>1</sup>, Alexander Astigarraga<sup>1</sup>, Juan José Stivanello<sup>1</sup>, David Moser<sup>2</sup>, Perrine Carroy<sup>3</sup>, Vincent Barth<sup>3</sup>, Delfina Muñoz<sup>3</sup>, Markus Lenz<sup>4</sup>, Anika Sidler<sup>4</sup>, Jorge Ferrando<sup>5</sup>, Maximiliano Alejandro Senno<sup>5</sup>, Henk J. Bolink<sup>5</sup>, Talat Özden<sup>6</sup>, Hisham Nasser<sup>6</sup>, Shuai Feng Hu<sup>7</sup>, Xinyi Shen<sup>7</sup>, Henry Snaith<sup>7</sup>*

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*Baloji Adothu<sup>1</sup>, Shahzada Pamir Aly<sup>1</sup>, Bengt Jaeckel<sup>2</sup>, Matthias Pandar<sup>2</sup>, Ralph Gottschalg<sup>2</sup>, Vivian Alberts<sup>1</sup>*

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*Thomas Weber<sup>1</sup>, Moritz Heiser<sup>1</sup>, Abdullah Abu Sayed<sup>1</sup>, Roman Joziak<sup>1</sup>, Eduardo Tellez Rodriguez<sup>1</sup>, Nattapark Pongthanacharoenkul<sup>1</sup>, Sören Rindert<sup>1</sup>, Benjamin Lippke<sup>1</sup>, Craig Wong<sup>1</sup>, Steven Xuereb<sup>1</sup>, Mahyar Nezhad<sup>2</sup>, Don Cowan<sup>2</sup>, Matthew Lu<sup>3</sup>, Claudia Buerhop-Lutz<sup>4</sup>, Ian Marius Peters<sup>4</sup>*

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*Jochen Markert<sup>1</sup>, Aditya Girish Belawadi<sup>1</sup>, Enzo Job<sup>1</sup>, Pascal Romer<sup>1</sup>, Ingrid Haedrich<sup>1</sup>, Daniel Philipp<sup>1</sup>*

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*Jishnu Ramachandran Nair<sup>1</sup>, Marius Lüdemann<sup>1</sup>, Paul-Tiberiu Miclea<sup>1</sup>, Kai Zhang<sup>2</sup>, Kaining Ding<sup>2</sup>, Andreas Lambert<sup>2</sup>, Ralph Gottschalg<sup>1</sup>, Robert Heidrich<sup>1</sup>, Anton Mordvinkin<sup>1</sup>*

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*Nikolina Pervan<sup>1</sup>, Jutta Geier<sup>1</sup>, Christian Veas<sup>1</sup>, Gernot Oreski<sup>1</sup>*  
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*<sup>1</sup> DLR, Almeria, Spain*
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*<sup>1</sup> ISFH, Emmerthal, Germany*

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*<sup>1</sup> Solargis, Bratislava, Slovakia*
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*Adrián Blanco Aguiar<sup>1</sup>, Brais González Rodríguez<sup>2</sup>, María Martínez-Barbeito<sup>1</sup>, Miguel Sánchez de León Peque<sup>1</sup>*

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*Christophe Vernay<sup>1</sup>, John Coutel<sup>1</sup>, Aina Razanajao<sup>1</sup>, Sébastien Pitaval<sup>1</sup>*

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*Guido Vallerotto<sup>1</sup>, Anderson Bermudez-Garcia<sup>2</sup>, Gerald Siefer<sup>3</sup>, Maïke Wiesenfarth<sup>3</sup>, Almudena Garcia-Sanchez<sup>1</sup>, Ignacio Antón<sup>1</sup>, Carsten Baur<sup>4</sup>, Pier Luigi Coz<sup>4</sup>, César Domínguez<sup>1</sup>*

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*Anna-Maria Sigounis<sup>1</sup>, Andreas Athienitis<sup>1</sup>*

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*Markus Babin<sup>1</sup>, Gabriele C. Eder<sup>2</sup>, Thomas Friesen<sup>3</sup>, Martina Pelle<sup>4</sup>, Gabriella Gonnella<sup>5</sup>, Fabrizio Leonforte<sup>6</sup>, Yuliya Voronko<sup>2</sup>, Helen R. Wilson<sup>7</sup>, Sune Thorsteinsson<sup>1</sup>, Laura Maturi<sup>4</sup>, Niccolò Aste<sup>6</sup>, Claudio Del Pero<sup>6</sup>, Janne Halme<sup>8</sup>, Jun-Tae Kim<sup>9</sup>, Susanna Santamaria Fernández<sup>10</sup>, Anna-Maria Sigounis<sup>11</sup>, Hua Ge<sup>11</sup>, Gabi Friesen<sup>12</sup>, Francesco Frontini<sup>12</sup>*

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- 4BO.16.6** Predicting Light Scatter in Structural Colored BIPV Modules and Textured Glass Using Radiance 020250

*Nanna Lysgaard Andersen<sup>1</sup>, Markus Babin<sup>1</sup>, Jan Svatos<sup>1</sup>, Karlis Petersons<sup>2</sup>, Leif Yde<sup>2</sup>, Jan F. Stensborg<sup>2</sup>, Catarina G. Ferreira<sup>3</sup>, Ananta Paul<sup>3</sup>, Jani Lamminaho<sup>3</sup>, Joel D. Cox<sup>3</sup>, Morten Madsen<sup>3</sup>, Peter B. Poulsen<sup>1</sup>, Sune Thorsteinsson<sup>1</sup>*

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*Jean-Paul Calin<sup>1</sup>, Jacques Levrat<sup>2</sup>, Antonin Faes<sup>2</sup>, Fahrudin Mujović<sup>2</sup>, Paul Rémondeau<sup>3</sup>, Kléber Nicolet-dit-Félix<sup>3</sup>, Bénédicte Bonnet-Eymard<sup>2</sup>, Didier Dalmazzone<sup>1</sup>, Aïcha Hessler-Wyser<sup>3</sup>, Christophe Ballif<sup>3</sup>*  
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*Juan Ignacio Martinez<sup>1</sup>, Julien Van Overstraeten<sup>2</sup>, Philippe Macé<sup>2</sup>, José Maria Vega de Seoane<sup>1</sup>, Elina Bosch<sup>2</sup>, Mélodie de l'Epine<sup>3</sup>*  
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*Francesco Frontini<sup>1</sup>, Angele Reinders<sup>2</sup>*  
<sup>1</sup> SUPSI, Mendrisio, Switzerland; <sup>2</sup> TU Eindhoven, Eindhoven, The Netherlands
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*Gabriella Gonnella<sup>1</sup>, Alvaro De Gruijter<sup>1</sup>, Jordi Veirman<sup>1</sup>, Martina Pelle<sup>1</sup>, Laura Maturi<sup>1</sup>, David Moser<sup>2</sup>, Luis Fialho<sup>1</sup>*  
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*Astrid Schneider<sup>1</sup>, Karin Stieldorf<sup>1</sup>, Christian Schranz<sup>1</sup>, Harald Urban<sup>1</sup>, Alfred Waschl<sup>2</sup>, Markus Feichtner<sup>3</sup>, Fedele Rende<sup>4</sup>, Andrea Aiello<sup>4</sup>, Martin Hauer<sup>5</sup>, Kurt Battisti<sup>6</sup>, Markus Dörn<sup>6</sup>, Jacqueline Scherret<sup>6</sup>, Martin Treberspurg<sup>7</sup>, Christoph Treberspurg<sup>7</sup>*  
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*Almudena Garcia-Sanchez<sup>1</sup>, Guido Vallerotto<sup>1</sup>, Jaime J. Hernández<sup>2</sup>, Alejandro Garcia-Cañas<sup>2</sup>, Steve Askins<sup>1</sup>, Ignacio Antón<sup>1</sup>, Isabel Rodríguez<sup>2</sup>, César Domínguez<sup>1</sup>*  
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*Mohammad Nazififard<sup>1</sup>, Erwin Franquet<sup>1</sup>*

<sup>1</sup> Côte d'Azur University, Nice, France

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*Wiebke Wirtz<sup>1</sup>, Kevin Meyer<sup>1</sup>, Rolf Brendel<sup>1</sup>, Henning Schulte-Huxel<sup>1</sup>*

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*Lukas Koester<sup>1</sup>, Sandra Gallmetzer<sup>1</sup>, Mousa Sondoqah<sup>1</sup>, Giampaolo*

*Manzolini<sup>2</sup>, David Moser<sup>1</sup>, Atse Louwen<sup>1</sup>, Luis Fialho<sup>1</sup>*

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*Ioannis (John) A. Tsanakas<sup>1</sup>, Stéphane Mollier<sup>1</sup>, Hervé Colin<sup>1</sup>, Ismaël*

*Lokhat<sup>2</sup>, Branislav Schnierer<sup>3</sup>, Daniel Chrkavy<sup>3</sup>, Martin Opatovsky<sup>3</sup>, S.*

*Prithivi Rajan<sup>4</sup>, Jesús Robledo<sup>4</sup>, Jonathan Leloux<sup>4</sup>*

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*Xiaoqi Xu<sup>1</sup>, André M. Nobre<sup>2</sup>, Han Cao<sup>1</sup>, Yu Xu<sup>1</sup>, Ian Marius Peters<sup>3</sup>, Thomas Reindl<sup>1</sup>*

<sup>1</sup> SERIS, Singapore, Singapore; <sup>2</sup> PV Doctor, Singapore, Singapore; <sup>3</sup> Forschungszentrum Jülich, Erlangen, Germany

- 4BO.7.4** Modeling the Electrical Mismatch Caused by Potential Induced Degradation in Crystalline Silicon Photovoltaic Modules and Strings 020265

*Aysha Mahmood<sup>1</sup>, Gisele A. dos Reis Benatto<sup>1</sup>, Sune Thorsteinsson<sup>1</sup>, Peter B.*

*Poulsen<sup>1</sup>, Sergiu V. Spataru<sup>1</sup>*

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*Jacob K. Thorning<sup>1</sup>, Adam R. Jensen<sup>1</sup>, Sergiu V. Spataru<sup>1</sup>, Peter B. Poulsen<sup>1</sup>*

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- 4BV.3.5** New Empirical Model for Backside Irradiance 020269

*Kristijan Brecl<sup>1</sup>, Emilio Muñoz Cerón<sup>2</sup>, Juan de la Casa Higuera<sup>2</sup>, Marko Topič<sup>1</sup>*

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*Alfredo Sanchez Garcia<sup>1</sup>, Berhane Darsene Dimd<sup>1</sup>*

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*Renzo Vargas<sup>1</sup>, Givaldo dos Reis<sup>1</sup>, Rodrigo P. Maruyama<sup>1</sup>, Alex Manito<sup>1</sup>, Marcelo Pinho Almeida<sup>1</sup>, Roberto Zilles<sup>1</sup>*  
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*Chao-Wei Ou<sup>1</sup>, Han-Chang Liu<sup>2</sup>, Cheng-Yu Peng<sup>1</sup>*  
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*Eneko Ortega<sup>1</sup>, Gerardo Aranguren<sup>1</sup>, Julius Denafas<sup>2</sup>, Paulius Laurikėnas<sup>2</sup>, Ricardo Alonso<sup>3</sup>, Juan Carlos Jimeno<sup>1</sup>*

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*David Daßler<sup>1</sup>, Stephanie Malik<sup>1</sup>, Dharm Patel<sup>1</sup>, Andreas Dietrich<sup>2</sup>, Jan Spihola<sup>2</sup>, Kai Kaufmann<sup>3</sup>, Carsten Hennig<sup>4</sup>, Robert Klengel<sup>1</sup>, Carola Klute<sup>1</sup>, Ulrike Jahn<sup>1</sup>, Matthias Ebert<sup>1</sup>*

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*Amirhossain Aghamohammadi<sup>1</sup>, Seyyed Majid Esmailifar<sup>1</sup>, Mohammad Kolahi<sup>2</sup>, Amirmohammad Moradi Sizkouhi<sup>3</sup>, Mohammadreza Aghaei<sup>4</sup>*

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*Woo Gyun Shin<sup>1</sup>, Young-Chul Ju<sup>1</sup>, Hye-Mi Hwang<sup>1</sup>, Jin-Seok Lee<sup>1</sup>, Suk Whan Ko<sup>1</sup>*

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*Sandra Riaño<sup>1</sup>, Ricardo Alonso<sup>2</sup>, Jose Domingo Santos<sup>1</sup>, Miguel Esteras<sup>1</sup>, Ainhua Pereda<sup>1</sup>, Antonio Salvador<sup>3</sup>, Jose Antonio Osuna<sup>3</sup>, Javier del Ser<sup>4</sup>*

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*Maximilian Schönau<sup>1</sup>, Darwin Daume<sup>2</sup>, Sasikumar Krishnan<sup>1</sup>, Marius Weiß<sup>1</sup>, Alexander Kusch<sup>1</sup>, Christian Knausdorf<sup>1</sup>, Sahereh Obeidavi<sup>1</sup>, Achim Schulze<sup>3</sup>, Dieter Landes<sup>1</sup>, Bernd Hüttl<sup>1</sup>*

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<sup>1</sup> UPM, Madrid, Spain
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<sup>1</sup> CENER, Sarriguren, Spain
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<sup>1</sup> Univers, Courbevoie, France
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<sup>1</sup> Amirkabir University of Technology, Tehran, Iran; <sup>2</sup> NTNU, Ålesund, Norway
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*Sara Pereira<sup>1</sup>, José A. Silva<sup>1</sup>, Luís Fialho<sup>2</sup>, Pedro Horta<sup>1</sup>*  
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*Jeremias dos Santos<sup>1</sup>, José A. Silva<sup>1</sup>, Luís Fialho<sup>2</sup>, Pedro Horta<sup>1</sup>*  
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*Dorivaldo Duarte<sup>1</sup>, Luis Fialho<sup>2</sup>, Pedro Horta<sup>1</sup>, Sara Pereira<sup>1</sup>*  
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*Sebastián Rodríguez-Romero<sup>1</sup>, Jorge Rabanal-Arabach<sup>1</sup>, Mauricio Trigo-Gonzalez<sup>1</sup>, Gino Mondaca-Cuevas<sup>1</sup>, Christian A. Rojas<sup>2</sup>, Alejandro Stowhas-Villa<sup>3</sup>, Fernando Castro-Gallardo<sup>1</sup>, Edward Fuentealba-Vidal<sup>1</sup>*  
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*Thomas M. Kraft<sup>1</sup>, Riikka Suhonen<sup>1</sup>, Kaisa-Leena Väisänen<sup>1</sup>, Kyösti Heikkinen<sup>1</sup>, Antti Nurmesjärvi<sup>1</sup>, Mari Ylikunnari<sup>1</sup>*  
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*Lu-Jan Huang<sup>1</sup>, Simone Mancini<sup>2</sup>, Minne M. de Jong<sup>2</sup>*  
<sup>1</sup> TNO, Leiden, The Netherlands; <sup>2</sup> TNO, Eindhoven, The Netherlands
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*Carlos Meza<sup>1</sup>, Mohammad Nabipour<sup>1</sup>, Matthias Ebert<sup>2</sup>*  
<sup>1</sup> Anhalt University of Applied Sciences, Köthen, Germany; <sup>2</sup> Fraunhofer CSP, Halle, Germany
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<sup>1</sup> Côte d'Azur University, Nice, France; <sup>2</sup> Australian University, Kuwait City, Kuwait
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*Richa Parmar<sup>1</sup>, Anmol Ratan Saxena<sup>2</sup>, Prashant Misra<sup>1</sup>, Jai Prakash<sup>1</sup>*  
<sup>1</sup> NISE, Gurugram, India; <sup>2</sup> NIT, Delhi, India
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Marcus Rennhofer<sup>1</sup>, Philipp Mayer-Ullmann<sup>1</sup>, Diana Maria Krainer<sup>1</sup>,  
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Bernhard Kubicek<sup>1</sup>  
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- |                 |   |        |
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| <b>4DV.4.7</b>  | Evaluation of Front Eave Load Caused by Snow Accumulation on Photovoltaic Array<br><i>Tadanori Tanahashi<sup>1</sup>, Takahiro Chiba<sup>2</sup>, Satoru Adachi<sup>3</sup>, Hayato Arakawa<sup>3</sup>, Yuki Tsuno<sup>1</sup>, Kazuaki Ikeda<sup>1</sup>, Takashi Oozeki<sup>1</sup></i><br><sup>1</sup> AIST, Koriyama, Japan; <sup>2</sup> Hokkaido University of Science, Sapporo, Japan; <sup>3</sup> NIED, Shinjo, Japan     | 020436 |
| <b>4DV.4.9</b>  | Experimental Set-up for Validation of Maximum Power Point Tracking Algorithms for Photovoltaic Arrays<br><i>Laura Sanchez<sup>1</sup>, Gorka Torre<sup>1</sup>, Jesus Sanchez<sup>2</sup>, Alexander Maiz<sup>2</sup>, Alain Sanchez-Ruiz<sup>2</sup>, Josu Jugo<sup>1</sup>, Eneko Ortega<sup>3</sup></i><br><sup>1</sup> UPV/EHU, Leioa, Spain; <sup>2</sup> UPV/EHU, Vitoria-Gasteiz, Spain; <sup>3</sup> UPV/EHU, Bilbao, Spain | 020437 |
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- 4DV.4.18** The Impact of Virtual Net-Metering Allocation on Self-Consumption Ratios in Multi-Dwelling Building Photovoltaic Systems 020445  
*Aki Kortetmäki<sup>1</sup>, Juho Ylipaino<sup>1</sup>, Kari Kallioharju<sup>1</sup>, Juha Koskela<sup>2</sup>, Pertti Järventausta<sup>2</sup>*  
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*Felipe Ríos-Ledesma<sup>1</sup>, Laura Barrutia<sup>1</sup>, Javier R. Ledesma<sup>1</sup>, Luis Narvarte<sup>1</sup>, Eduardo Lorenzo<sup>1</sup>*  
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- 4DV.4.24** Estimating Future Soiling Losses Using Climate Change Models 020448  
*Gerardo Guerra<sup>1</sup>, Pau Mercade Ruiz<sup>1</sup>, Gaetana Anamiati<sup>1</sup>, Lars Landberg<sup>2</sup>*  
<sup>1</sup> GreenPowerMonitor a DNV company, Barcelona, Spain; <sup>2</sup> DNV Denmark, Hellerup, Denmark
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*Hyoung-Kyu Yang<sup>1</sup>, Seok Won Kim<sup>1</sup>, Dongmyoung Joo<sup>1</sup>, Yong-Su Noh<sup>1</sup>, Jin-Hong Kim<sup>1</sup>*  
<sup>1</sup> KETI, Wonmi-gu, South Korea
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*Nuria López<sup>1</sup>, Mathis Pasquier<sup>1</sup>, Nicholas Riedel-Lyngskær<sup>1</sup>, Peter B. Poulsen<sup>2</sup>, Sergiu V. Spataru<sup>1</sup>*  
<sup>1</sup> DTU, Roskilde, Denmark; <sup>2</sup> DTU, Roskilde, Denmark
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*Anton Driesse<sup>1</sup>, Maddalena Bruno<sup>2</sup>*  
<sup>1</sup> PV Performance Labs, Freiburg, Germany; <sup>2</sup> Fraunhofer ISE, Freiburg, Germany

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*Ricardo Moruno<sup>1</sup>, Luis Javier San José<sup>1</sup>, Rubén Núñez<sup>1</sup>, Rebeca Herrero<sup>1</sup>, Ignacio Antón<sup>1</sup>*  
<sup>1</sup> UPM, Madrid, Spain
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*Judy Jalkh<sup>1</sup>, Christian Doppler<sup>1</sup>, Philip Caluori<sup>1</sup>, Manuel Ruf<sup>2</sup>*  
<sup>1</sup> Virtual Vehicle, Graz, Austria; <sup>2</sup> Robert Bosch, Stuttgart, Germany
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*David Pera<sup>1</sup>, Christian Braun<sup>1</sup>, Philippe Pinheiro<sup>1</sup>, Miguel Brito<sup>2</sup>, Ulrich Leopold<sup>1</sup>*

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*Francisco José Martín<sup>1</sup>, Rebeca Herrero<sup>1</sup>, Ignacio Antón<sup>1</sup>*

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*Alejandra Galarza<sup>1</sup>, Sebastian Nold<sup>2</sup>, Lars Oberbeck<sup>3</sup>*

<sup>1</sup> IPVF, Palaiseau, France; <sup>2</sup> Fraunhofer ISE, Freiburg, Germany; <sup>3</sup> TotalEnergies OneTech, Paris, France

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*Elisabetta Brivio<sup>1</sup>, Andrea Danelli<sup>1</sup>, Sofia Spagnolo<sup>1</sup>, Pierpaolo Girardi<sup>1</sup>*

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*Julian Reichle<sup>1</sup>, Moritz Fath<sup>1</sup>, Sraisth<sup>1</sup>, Amish Kumar Sinha<sup>1</sup>, Mehul Raval<sup>1</sup>, Wolfgang Jooss<sup>1</sup>, Peter Fath<sup>1</sup>, Gourab Das<sup>1</sup>*

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*Ana Patrícia Lopes<sup>1</sup>, Bruno Barrionuevo<sup>2</sup>, Daniel P. Albuquerque<sup>3</sup>, Diogo Cordeiro<sup>4</sup>, Cláudia Fernandes<sup>3</sup>, Athanasios T. Balafoutis<sup>2</sup>, Rui Castro<sup>1</sup>*

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*Maria Anna Cusenza<sup>1</sup>, Andrea Danelli<sup>1</sup>, Pierpaolo Girardi<sup>1</sup>, Sofia Spagnolo<sup>1</sup>*

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*Alexis Barrou<sup>1</sup>, Selin Kandiyoti-Eskenazi<sup>1</sup>, Jacques Levrat<sup>1</sup>, Bertrand Paviet-Salomon<sup>1</sup>, Christophe Ballif<sup>1</sup>*

<sup>1</sup> CSEM, Neuchâtel, Switzerland

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<sup>1</sup> bifa Umweltinstitut, Augsburg, Germany

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 United States of America

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<sup>1</sup> NTNU, Trondheim, Norway



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<sup>1</sup> DTU, Roskilde, Denmark
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*Hasret Sahin<sup>1</sup>, Asfaw A. Solomon<sup>1</sup>, Christian Breyer<sup>1</sup>*  
<sup>1</sup> LUT University, Lappeenranta, Finland
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*Pau Mercade Ruiz<sup>1</sup>, Gerardo Guerra<sup>1</sup>, Gaetana Anamiati<sup>1</sup>, Lars Landberg<sup>2</sup>*  
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<sup>1</sup> Hitachi, Tokyo, Japan
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*Azim Heydari<sup>1</sup>, Enrico Dalla Maria<sup>1</sup>, David Moser<sup>1</sup>, Davide Prando<sup>2</sup>, Alessandro Donadello<sup>2</sup>, Grazia Barchi<sup>1</sup>*  
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*Johan Lindahl<sup>1</sup>*  
<sup>1</sup> Becquerel Sweden, Knivsta, Sweden
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<sup>1</sup> EPRI, Dubai, United Arab Emirates; <sup>2</sup> Khalifa University, Abu Dhabi, United Arab Emirates

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*Marco Pierro<sup>1</sup>, Grazia Barchi<sup>1</sup>, Alessandro Donadello<sup>2</sup>, Davide Prando<sup>2</sup>*  
<sup>1</sup> Eurac Research, Bolzano, Italy; <sup>2</sup> Edyna, Bolzano, Italy
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*Carolina Crespo<sup>1</sup>, Rodrigo Amaro e Silva<sup>1</sup>, Miguel Centeno Brito<sup>1</sup>*  
<sup>1</sup> University of Lisbon, Lisbon, Portugal
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*Ana Belén Cristóbal<sup>1</sup>, Sergio Morales<sup>1</sup>, Daniel Sierra<sup>1</sup>, Laura Palomino<sup>1</sup>, Luis Narvarte<sup>1</sup>*  
<sup>1</sup> UPM, Madrid, Spain
- 5DO.15.4** Enhanced Value of Grid-Connected PV with Battery Storage in a Negative Price Environment 020492  
*Djaber Berrian<sup>1</sup>, Gaurang Chhapia<sup>1</sup>, Rene vanBaal<sup>1</sup>, Johannes Linder<sup>1</sup>*  
<sup>1</sup> Belectric, Koltzheim, Germany
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*Federico Andreozzi<sup>1</sup>, Gianluigi Bovesecchi<sup>1</sup>, Richard Perez<sup>2</sup>, Marco Pierro<sup>3</sup>, Cristina Cornaro<sup>1</sup>*  
<sup>1</sup> University of Rome Tor Vergata, Rome, Italy; <sup>2</sup> University at Albany, Albany, United States of America; <sup>3</sup> Eurac Research, Bolzano, Italy

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*Martin Bellmann<sup>1</sup>, Berhane Darsene Dimd<sup>1</sup>, Anne-Karin Søliland<sup>2</sup>, Arne Dahle<sup>3</sup>, Christian Landaas<sup>4</sup>, Victorien Iwaszko<sup>5</sup>, Rene Peche<sup>6</sup>, Wolfram Palitzsch<sup>7</sup>, Philippe Lenain<sup>8</sup>, Iratxe de Meaza<sup>9</sup>, Theodora Kyratsi<sup>10</sup>, Huiping Liu<sup>11</sup>, Emanuele Milani<sup>12</sup>, Guy Chichignoud<sup>13</sup>, Stefan Fischer<sup>14</sup>, Almut Schwenke<sup>15</sup>, Eirik Nordboe<sup>16</sup>, Marco Pieterse<sup>17</sup>, Roland Riva<sup>18</sup>*  
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*Cristina Leyre Pinto<sup>1</sup>, Asier Murillo<sup>1</sup>, Ana María Gracia Amillo<sup>1</sup>, Felice Alfieri<sup>2</sup>, Nieves Espinosa<sup>3</sup>, Davide Polverini<sup>4</sup>*  
<sup>1</sup> CENER, Sarriguren, Spain; <sup>2</sup> Viegand Maagøe, Copenhagen, Denmark; <sup>3</sup> University of Murcia, Murcia, Spain; <sup>4</sup> European Commission, Brussels, Belgium

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*Hanna Rodziewicz<sup>1</sup>, Anna Kuczyńska-Łażewska<sup>1</sup>, Agnieszka Witkowska<sup>1</sup>*  
<sup>1</sup> Gdansk University of Technology, Gdansk, Poland
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*Anna Kuczyńska-Łażewska<sup>1</sup>*  
<sup>1</sup> Gdansk University of Technology, Gdansk, Poland
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*Gernot Oreski<sup>1</sup>, Sonja Feldbacher<sup>1</sup>, Anika Gassner<sup>2</sup>, Gabriele C. Eder<sup>2</sup>, Ioannis (John) A. Tsanakas<sup>3</sup>, Timea Bejat<sup>3</sup>*  
<sup>1</sup> PCCL, Leoben, Austria; <sup>2</sup> OFI, Vienna, Austria; <sup>3</sup> CEA / INES, Le Bourget-du-Lac, France
- 5DV.2.10** Advancing Solar Energy Sustainability: Tackling Photovoltaic Cell Upcycling through Metal Recovery 020501  
*Alejandra Vázquez Adán<sup>1</sup>, Juan Manuel López Cuéllar<sup>1</sup>, Lucía Ríos Moral<sup>1</sup>, Luis Jaime Caballero<sup>2</sup>, Nerea Dasilva-Villanueva<sup>2</sup>, David Fuertes Marrón<sup>2</sup>, Carlos del Cañizo<sup>2</sup>, Eduardo Díez Alcántara<sup>1</sup>, Araceli Rodríguez Rodríguez<sup>1</sup>*  
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