

Sustainable Energy for Africa

2017, October 23 – 25, Palace of the Academies, Brussels

International Conference organized by the "Royal Academy for Overseas Sciences" (RAOS) of Belgium

CONFERENCE PROGRAMME

The conference papers are assigned as either lectures or poster presentations. The lectures will be delivered in plenary session in Auditorium Albert II of the Palace of the Academies (there are no parallel sessions). Authors of posters may have a 5-minute time slot for oral presentation in the plenary session. The posters will be displayed in the Marble Room (same building as Auditorium Albert II) where also the Walking Dinner of 24/10 is organised.

Later on, lectures and poster presentations will be peer reviewed before publication by the Royal Academy for Overseas Sciences of Belgium.

Registration and information: http://www.kaowarsom.be/en/conferences.

The conference will treat successively three Topics, consisting in a total of 28 invited lectures and 38 scientific posters, namely:

- <u>Topic 1 Energy is crucial for achieving the Sustainable Development Goals</u> (23 October, late morning and afternoon)
- <u>Topic 2 Energy mix: towards robust, equitable and socially acceptable energy systems</u> (24 October, whole day + 25 October, early morning)
- <u>Topic 3 Research, innovation and education in support of sustainable energy policies</u> (25 October, late morning)

In addition, there are 5 keynote speeches, namely: 3 in Introduction and 2 in Conclusion. Closure of Conference is scheduled on 25 October at 16:30.

The registration fees (100 Euros for full participants) includes the programme folder, entry into the conference and exhibit halls as well as the welcome reception of Monday evening. There are no registration fees for plenary speakers and authors of posters. Walking dinner in the Palace of the Academies on Tuesday evening 24 October (40 Euros / person).

Monday 23 October morning, 10:00 – 12:30

Introductory session

3 keynote speeches (20 min each)

Chair: Prof. med. Dr. Philippe Goyens, RAOS, Permanent Secretary, and Prof. Dr. Wail Benjelloun, President Mediterranean Universities Union (UNIMED)

- 10:00 **Welcome message**Georges Van Goethem, RAOS, Conference chairman
- 10:15 Carole Maman, Chief Investment Officer, Belgian Investment Company for Developing countries (BIO), representing Alexander De Croo, Deputy Prime Minister and Minister of Development Cooperation and Digital Agenda
- 10:35 **The Demography of Africa: Impacts on Economy, Energy, and Governance**Prof. John F. May, Dept. International Health, Georgetown University, Washington, DC
- 10:55 African universities and science diplomacy in favour of alternative sources of energy (based on exchanges with 100 universities during COP22 in Marrakesh)
 Prof. Wail Benjelloun, President Mediterranean Universities Union (UNIMED), Former president of the Conference of the University Presidents of Morocco

Topic 1 - Energy is crucial for achieving the Sustainable Development Goals

3 lectures (20 min each) + Q/A session (15 min)

- 11:15 Energy for sustainable development in Africa: successes, challenges and possible way forward
 - Dr. Emmanuel Kofi Ackom E.K., Haselip, J.A and Mackenzie, G.A., UNEP, DTU Partnership (UDP), Technical University Denmark (DTU), Copenhagen
- 11.35 Financement des énergies renouvelables en Afrique : principaux enjeux et perspectives d'avenir pour les partenariats-publics-privés sous l'angle européen Paul Frix, Senior Economist, specialized in International Relations and Development, DG Hon. Coopération belge et CDE/CDI, Conseiller CBL-ACP, PROPADEV SPRL
- 11.55 Governing decentralised energy provision: exploring the role of local governance in articulating nexus approaches to energy transitions

 Prof Ed Brown, UK Low Carbon Energy for Development Network, Jon Cloke, John

Harrison and Richard Sieff (Dept of Geography, Loughborough University, UK)

12:15 Q/A session

Lunch: 12:30 - 14:00

Monday 23 October afternoon, 14:00 – 18:00

5 lectures (20 min each) + Q/A session (30 min) + poster presentation (12)

Chair: Prof. Dr. Jan Rammeloo, RAOS, former Director of the National Botanic Garden in Meise, and Dr. Koffi Ekouevi, Senior Economist, The World Bank

- 14:00 Centralized and decentralized energy solutions for Africa: cutting edge technologies supported by and co-developed with the African actors
 Bruno Bensasson, ENGIE, Africa Business Unit, CEO, Paris
- 14:20 Making Access to Energy Services the Engine of Sustainable Development in Sub-Saharan Africa

Dr. Koffi Ekouevi, Senior Economist, The World Bank

- 14:40 Industrial Strategy to identify priorities in energy mix policies in Africa as a result of joint discussions about local needs and resources

 André Bouffioux, CEO, Siemens Belgium-Luxembourg (also responsible for the assigned countries: Algeria, Morocco, Tunisia and West-Central Africa)
- 15:00 Integrating Climate into Strategy for an Oil & Gas Company: focus on Africa Valérie Quiniou, Vice-President, Climate Strategy Innovation, TOTAL S.A., Paris
- 15:20 Sustainable energy mix for African and MENA region countries
 Prof. EL-Tayeb Idris Eisa, National Energy Research Center, Khartoum, Sudan, and
 Prof. Dr. EL-Tayeb Mustafa, President of The Future University, Sudan, Former
 Director at UNESCO, corresponding member of RAOS

Coffee break: 15:40 – 16:10

Chair: Ir Bernard Mairy, expert in engineering and materials innovation, and Dr Ir Pépin Tchouate Heteu, DEECC Consulting (Energy, Environment, Climate change mitigation)

16:10 Q/A session (30 min) and Poster presentation in plenary session

18:00 Adjourn - Networking reception in the Palace of the Academies + visit to posters

Tuesday 24 October morning, 9:00 – 12:30

Topic 2 - Energy mix: towards robust, equitable and socially acceptable energy systems

7 lectures (20 min each) + Q/A session (20 min) + poster presentation (2)

Chair: Prof. Dr. Nathalie Verbruggen, RAOS, and Prof. EL-Tayeb Idris Eisa, National Energy Research Center, Khartoum, Sudan

BACKGROUND

- 09:00 Towards a global partnership regarding mineral resources and energy production:
 contribution to sustainable development with focus on Africa
 Prof Jean-Pierre Tshibangu, Univ. Mons, Faculty of Eng., Dept of Mining Eng., RAOS
- 09:20 Sustainable Energy Transition: An Operations Research Perspective
 Prof Per J. Agrell, co-director of the "Center of Operations Research and Econometrics"
 (CORE), Prof Anthony Papavasiliou, ENGIE Chair at UCL in Energy Economics and
 Energy Risk Management, and Ignacio Aravena, senior researcher, CORE Louvain
- 09:40 **On Power System Paradigm: Opportunities and Challenges**Aymen Chaouachi, PhD, EGI (Elia Grid International, Brussels), Power System Operations & Security
- 10:00 Energy poverty in Africa: focus on challenges and solutions related to electric power and to energy for cooking

 Prof Samuele Furfari, Geopolitics of Energy, ULB, École polytechnique

Coffee break 10:20 – 10:50

- 10:50 Modèle de prospective énergétique avec évaluation des coûts et des effets sur l'environnement pour la République Démocratique du Congo Prof. Ndaye Nkanka Bernard, Institut Supérieur de Techniques Appliquées, Kinshasa
- 11:10 Renewable energy deployment in Africa: opportunities, challenges & perspectives
 Dr. Ir. Pépin Tchouate Heteu, managing Director of DEECC Consulting (Energy,
 Environment, Climate change mitigation)
- 11:30 **Steel: a key resource for a sustainable and circular economy in emerging countries** Carl De Maré, Vice-President ArcelorMittal, Group CTO, Head of Technology Strategy
- 11:50 Q/A session (20 min) and Poster presentation in plenary session

Lunch 12:30 - 14:00

Tuesday 24 October afternoon, 14:00-18:30

7 lectures (20 min each) + Q/A session (30 min) + poster presentation (11)

Chair: Prof Dr. Ir. Eric Pirard, RAOS, Mineral Eng., Materials and Environment, ULg, and Prof. Dr. Izael Pereira Da Silva, Deputy Vice Chancellor, Strathmore Univ., Kenya

HYDRO

14:00 Hydro-electricity in Africa: remaining economically exploitable capacity and impact assessment study (including social acceptance)

Henri Boyé, USAID Electrification Advisor / Electricity Sector Reform Project, and Michel de Vivo, General Secretary of International Commission on Large Dams

14:20 Grand Inga, le plus grand complexe hydroélectrique du monde : ambition nécessaire mais à mûrir

François Misser, diplômé de l'École supérieure de journalisme de Lille, chercheur indépendant, spécialiste des relations entre pouvoir et ressources naturelles en Afrique

14:40 Using small low cost, robust and easily maintained decentralized hydraulic power stations in Central Africa

Prof. Patrick Hendrick, ULB, École Polytechnique

NUCLEAR FISSION

15:00 The development of Small Modular Reactors for emerging nuclear countries in Africa

Prof. Peter Baeten, SCK•CEN & VUB Kernenergie, and Prof. Hamid Aït Abderrahim, Deputy Director-General International Affairs SCK•CEN & UCL Ecole Polytechnique

Coffee break: 15:20 – 15:50

Chair: Prof. Pierre Petit, RAOS, ULB, and Dr. Emmanuel Kofi Ackom, UNEP, DTU Partnership, Technical University Denmark

SOLAR

15:50 The potential and challenges related to photovoltaic electricity generation and local (DC) microgrids

Prof. Dr. Ir. Jozef Poortmans, Scientific Director PV@imec, Director R&D strategy@EnergyVille and Part-time Professor at KULeuven and Univ. Hasselt

16:10 The value of concentrated solar power for developing countries: another look on energy transitions

Marcel Bial, Secretary General of the European Solar Thermal Electricity Association

16:30 Development of solar energy in Africa : A challenge in terms of resource availability and recycling

Prof Dr. Ir. Eric Pirard, RAOS, Mineral Engineering, Materials and Environment, ULg, and Dr Ir Sandra Belboom, Chemical engineering, ULg

16:50 Q/A session (30 min) and Poster presentation in plenary session

18:30 Adjourn

20:00-23:00 Walking dinner in Palace of the Academies + visit to posters

Wednesday 25 October morning, 9:00 – 12:30

Topic 2 - Energy mix: towards robust, equitable and socially acceptable systems (cont'd)

3 lectures (20 min each)

Chair: Prof Emanuela Colombo, UNESCO Chair in Energy for Sustainable Development, Politecnico Milano, Italy, and Jean Albergel, Senior Scientist Coordinator of European Affairs, CNRS-IRD Joint Office in Pretoria, South Africa

BIOENERGY

- 09:00 **Overview of bioenergy policies for sustainable development in Africa**Rainer Janssen, PhD, Head of the Biomass Department at WIP Renewable Energies,
 Munich, Germany
- 09:20 Wood: an ever-present domestic energy priority for people in emerging Africa
 Jean Noël Marien (1), Régis Peltier (1); Emilien Dubiez (1); Théodore Trefon (2)
 (1) Centre de coopération internationale en recherche agronomique pour le
 développement (CIRAD) UR Forêts et Sociétés Montpellier France; (2) Musée royal
 de l'Afrique centrale (MRAC) Tervuren Belgium
- 09:40 A locally manufactured gasification technology for the valorization of agricultural wastes in West African countries

Prof Hervé Jeanmart (1), Séverin Tanoh (2), Wilfried Ouedraogo (3), Yohan Richardson (2), Sayon Sidibe (2), Frédéric Bourgois (1) and François Pinta (4)

(1) Université catholique de Louvain, Louvain-la-Neuve, Belgium; (2) Institut International d'Ingénierie de l'Eau et de l'Environnement, Ouagadougou, Burkina Faso; (3) Institut de Recherche en Sciences Appliquées et Technologies, Ouagadougou, Burkina Faso; (4) Centre de coopération internationale en recherche agronomique pour le développement, Montpellier, France

Coffee break 10:00 - 10:30

10:30 Q/A session (10 min) and Poster presentation in plenary session

Lunch: 12:00 - 13:30

Wednesday 25 October afternoon, 13:30-16:30

Topic 3 - Research, innovation and education in support of sustainable energy policies

3 lectures (20 min each)

Chair: Ir Christian De Meyer, RAOS, EPFL and Columbia University, and Prof. Ed Brown, UK Low Carbon Energy for Development Network

13:30 MOOCs for Africa: Lessons Learned

Dr Dimitrios Noukakis, program manager, Center for Digital Education (including "MOOC Afrique"), Ecole polytechnique fédérale de Lausanne (EPFL), and Prof. Pierre Dillenbourg, EPFL, academic director of Center for Digital Education (MOOC Factory)

13:50 Massive Open Online Courses: an answer to the issues facing higher education in sub-Saharan Africa?

Nicolas Roland ("ULB Podcast"), Eric Uyttebrouck, ULB, Cellule PRAC-TICE (Pédagogie, Recherche-Action & TICE), and Prof. Philippe Emplit, ULB

14:10 Sharing knowledge online and improving education using MOOCs

Prof Sandra Soares-Frazão and Emeritus Prof Yves Zech, Génie Civil et Environnemental, UCL Ecole Polytechnique

Coffee break 14:30 – 14:50

Conclusion session

2 keynote speeches and final panel discussion

Chair: Prof Dr Ir Jean-Pierre Tshibangu, RAOS and Dpt of Mining Engineering, Univ. Mons, and Dr Ir Georges Van Goethem, RAOS and former EC DG Research (Energy)

14:50 Measuring sustainable energy projects to orient strategies for access to energy: why does it matters?

Prof Emanuela Colombo, Dr Lorenzo Mattarolo, UNESCO Chair in Energy for Sustainable Development, Department of Energy, Politecnico di Milano, Dr Mariano Morazzo, Head of Climate Change and Renewable Energy Policies at Enel - Enel

- 15:10 Panel discussion, including brief communications from the floor
- **16:00 Jozef Smets, Belgian Federal Public Service, Foreign Affairs, Director for Africa,** representing Didier Reynders, Deputy Prime Minister and Minister of Foreign Affairs and European Affairs

16:20 Concluding remarks by the Scientific Committee of the Conference

16:30 Closure of the Conference

Farewell drink 16:30 – 17:30



POSTER PRESENTATIONS

Reminder: a 5-minute time slot will be allotted to each poster for oral presentation in plenary session (i.e.: approx. 5 PPT slides each)

Topic 1 - Energy is crucial for achieving the Sustainable Development Goals

Monday 23 October afternoon, 16:10 – 18:00

(1) Private sector involvement in energy production: experiences of the Belgian Development Agency from Rwanda and Mozambique

Muriel Lambert de Rouvroit, Frederik Van Herzeele, Benoît Legrand and Paul Verlé,, Infrastructure and Environment Unit, Belgian Development Agency (BTC)

- (2) Our goal: 600 million connected Africans connected to electricity by the year 2025 Smaïla Camara, ENA/Dauphine and HEC Paris Business School, Special Advisor to Jean-Louis Borloo, President of "Energies for Africa", France
- (3) Collaboration between Northern and Southern organizations with the aim to facilitate and analyse technology impact on society

Prof Dr Ir Jean-Pierre Raskin (UCL Ecole Polytechnique) and Stéphanie Merle (Louvain Coopération)

(4) Barriers to the uptake of renewable energy in the East Africa region: an enabling environment, access to finance, awareness and access to technical support services

Prof. Izael Pereira Da Silva, B.Sc. (Eng), MSc., PhD in Power Systems Engineering from the Univ. of Sao Paulo (Brazil), Deputy Vice Chancellor, Strathmore University in Kenya

(5) Mapping of the European Portfolio of Energy Development Cooperation on behalf of the EU Energy Initiative

Fiona D. Wollensack, EU Energy Initiative - Partnership Dialogue Facility (EUEI-PDF), Brussels, and Niklas Hayek, Africa-EU Renewable Energy Cooperation Programme (RECP) and EUEI PDF, c/o Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Eschborn, Germany

(6) AGORIA's views and technology contributions for energy and sustainability in emerging countries (in particular, Africa)

Christian Dierick, Lead Expert, Energy Technology Solutions, Agoria ("Development through technology"), Multisector Federation of the Technological Industry, Brussels

(7) Development of advanced energy technologies in Africa: success stories obtained and challenges left from both technological and managerial points of view

Matteo della Volta, Power Generation & Transmission Systems, Siemens

(8) Modern energy strategy implementation in Africa: success stories and challenges left in terms of central & decentralised power generation, integration of renewable energies, and power systems interconnections

Joseph Dubois, Product Director, Tractebel

(9) Growth, energy and climate: squaring the circle

Philippe Charlez, Mining Engineer, Senior Technical Advisor specialist of Unconventional Resources, former Rock Mechanics Expert in the Oil & Gas industry

- (10) Role of renewable energies in the fight against global warming: the context of Africa Prof Yezouma Coulibaly, PhD INP Grenoble, Institut International d'Ingénierie de l'eau et de l'environnement (2iE), Ouagadougou
- (11) Generic lessons from EUROMED Research-to-Innovation projects in the field of Renewable Energy & Energy Efficiency: Innovation, Co-development, Capacity building Claude Ayache, Senior Advisor, KIC InnoEnergy, Societas Europaea (SE), Business Development & European Affairs, Brussels

(12) Building sustainable partnerships in EU-Africa Research and Innovation Initiatives: Experiences from a Finnish University Network

Eva Kagiri, Finnish University Partnership for International Development (UniPID), Senior Planning Officer FinCEAL Africa, University of Jyväskylä, Finland

Topic 2 - Energy mix: towards robust, equitable and socially acceptable energy systems

<u>Tuesday 24 October morning, 11:50 – 12:30</u>

BACKGROUND

(13) "Mini mill plants" for steelmaking: sustainable production of charcoal as fuel source while taking care of environmental and social issues in forest plantations

Roosevelt de Paula Almado, Health and Safety, Environment and Forest Research Manager, ArcelorMittal BioFlorestas Ltda., São Geraldo – Martinho Campos – Brazil, and Carl De Maré, Vice-President ArcelorMittal, Group CTO, Head of Technology Strategy

(14) Industrial waste heat recovery – Innovative solutions for steel industry

T. Steinparzer, A. Fleischanderl, M. Haselgrübler and P. Trunner, Primetals Technologies, Linz, Austria GmbH / A joint venture of Siemens, Mitsubishi HI and Co

Tuesday 24 October afternoon, 16:50-18:30

HYDRO

(15) Variable-speed pumped hydro energy storage: bringing flexibility to the South African grid in order to accommodate future developments in nuclear energy and renewables

Thomas Mercier, PhD student & Research Assistant, Université Laval and Université catholique de Louvain

(16) Archimedean screw turbine: opportunity for rural electrification in D.R. Congo? Prof. Jean Paul Katond Mbay, Université de Lubumbashi, DR Congo, and Prof. Patrick Hendrick, ULB - Belgium

(17) Small hydropower development in Burundi

Jean Bosco Niyonzima and Patrick. Hendrick, Aero-Thermo-Mechanics, ULB Polytechnic School, Belgium

(18) Turbulent Hydro - Decentralized low-head micro-hydro power for Africa, inspired by nature

Geert Slachmuylders and Wim Verheirstraeten, Turbulent Hydro

NUCLEAR FISSION

(19) Nuclear Energy and Sustainable Development in Africa: Challenges and Ways Forward

Vincent Lukanda Mwamba (1), François Kazadi Kabuya (1) and Petrus Bompere Lemo (2)

- (1) Commissariat Général à l'Energie Atomique, PO BOX 868 Kinshasa XI, DR Congo,
- (2) Comité National de Protection contre les Rayonnements Ionisants, Kinshasa, DR Congo

FUEL CELLS

(20) Fuel cells in emerging countries: a flexible device for the production of electricity from 1 W to tens of MWs

Dr. Jean-Luc Delplancke, Ecole Polytechnique - 4MAT, ULB, Belgium, former Programme Head of Unit of EU Joint Undertaking "Fuel Cells and Hydrogen"

SOLAR

- (21) Concentrated Solar Power, Battery Storage for Solar photovoltaic (PV) flexibility, Solar PV for Water pumping, and Biomass: solution for sustainable and flexible power Michel Lalmand, Vice President Solar, Sales & Marketing, Yoshie Yonekura, Marketing & Business Development Manager, and Marianne Noel, Sales Manager, Cockerill Maintenance & Ingénierie (CMI) Energy
- (22) Concentrated Solar Power (CSP) technologies for electricity generation in Harare, Zimbabwe: comparison of two options, Solar Tower (ST) and Parabolic Trough (PT) Luckywell Seyitini, Great Zimbabwe University, Department of Physics, Geography and Environmental Science
- (23) Electricity and heat generation solutions from renewable energy sources for remote households in Central Africa

Maarten Vergote, Dr Ir, Major – Associate Professor, Department of Physics, Ecole Royale Militaire - Koninklijke Militaire School, Brussels, Belgium

(24) Development of energy efficiency and passive technologies in buildings for improving users' comfort: experience of the Belgian Development Agency in Uganda, Senegal and Palestine

Benoît Legrand and Paul Verlé, Infrastructure and Environment Unit, Belgian Development Agency (BTC), and Jan Van Lint, BTC- Uganda

(25) Affordable Mobile Solar Water Pumps for Small Farmers

Ahmed Abbas, SunCity Energy / The American University in Cairo, Egypt

Wednesday 25 Oct morning, 10:30 - 12:00

Final poster presentation

BIOENERGY

(26) The cogeneration in sugar mill: an energetic deposit opportunity for sustainable development in Sub-Saharan Africa

Kana-Donfack P., Kapseu C. and Tcheukam-Toko D., University of Ngaoundere, Cameroon

(27) ECOmakala: meeting energy needs, fighting poverty and protecting the forests of the Virunga National Park, eastern Democratic Republic of Congo

Mone Van Geit, WWF Belgium

"MISCELLANOUS"

(28) Science and diplomacy in Central and Western Africa: remarkable achievements and challenges

César Kapseu, Ambassador of science, and Liliane D. T. Atoukam, Humanities and Social Sciences, University of Ngaoundere, Cameroon

(29) Hydrocarbon resources in the Democratic Republic of Congo – a potential source of development for the country?

Bernard Respaut, Chief Executive, European Copper Institute, Brussels

(30) Zero Emissions Energy in an African context

Tim Berckmoes, CEO, Anglo Belgian Corporation, Belgium

- (31) Use of Distributed generation to improve operation of overloaded grids in Africa Okana M.N., Kitoko L.S., Kamabu T., Atundezi A. G., Laboratoire de Génie électrique, Département d'Electricité, Faculté Polytechnique, Université de Kinshasa, R.D. Congo
- (32) Linking Sustainable Energy with Soil Health and Carbon Sequestration through Frugal Innovation

Venkata Ramayya Ancha, Professor of Mechanical Engineering & Sustainable Energy Engineering, Institute of Technology, Jimma University, Ethiopia

(33) Sustainability of Solar Mini-Grids in Nigeria

Adedoyin Adeleke and Chuks Diji (1) and Debora Ley (2)

- (1) Centre for Petroleum, Energy Economics and Law, University of Ibadan, Nigeria,
- (2) Central America Regional Clean Energy Initiative, Guatemala City, Guatemala
- (34) Historical path of sustainable energy promotion in African rural areas: case study with the FERDEDSI Network (« Forum Énergies Renouvelables pour le Développement Durable par la Solidarité Internationale »)

Dr Marthe Djuikom Vandenbergh (1) and Benjamin Bender (2)

- (1) FERDEDSI / IPEED (Institut Populaire de l'Eau et l'Energie pour le Développement),
- (2) University of Kassel & Baobab.ev.

(35) EU-Africa Research & Innovation partnership on climate change and sustainable energy – a RINEA technical paper for priorities

Guischet A. (1), Sellami M. (2) and Albergel J. (1)

- (1) IRD, French Research Institute for Sustainable Development,
- (2) MESRS Ministry of Higher Education and Scientific Research

Venue of the event: Palace of the Academies (Palais des Académies)

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Conference programme and registration forms are posted in ARSOM - KAOW website:

- http://www.kaowarsom.be/documents/Conferences/Energy/PROGRAMME_S http://www.kaowarsom.be/documents/Conferences/Energy/PROGRAMME_S https://www.kaowarsom.be/documents/Conferences/Energy/PROGRAMME_S https://www.kaowarsom.be/documents/Conferences/Energy/Programme_gov/ https://www.kaowarsom.be/documents/Conferences/Energy/Programme_gov/ https://www.kaowarsom.be/documents/Conferences/Energy/Programme_gov/ https://www.kaowarsom.be/documents/Conferences/Energy/ https://www.kaowarsom.be/documents/Conferences/Energy/ <a href="https://www.kaowarsom.be/documents/Conferences/En
- http://www.kaowarsom.be/en/registration_29092017#overlay-context=en/Sustainable_Energy_for_Africa

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