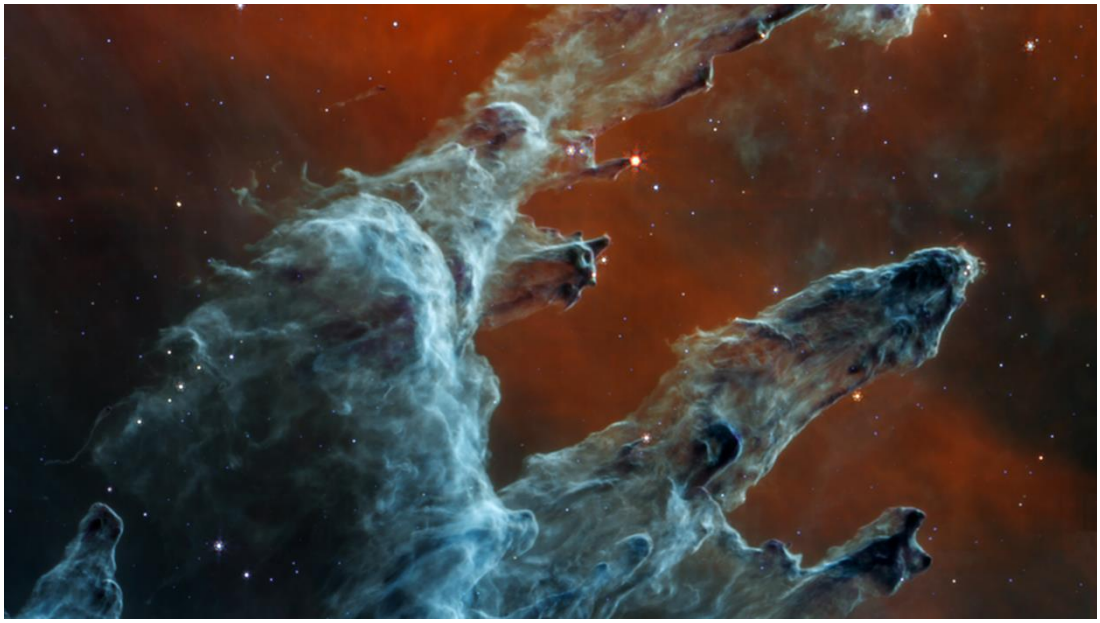

2022 Summary

SCIENCE FOR SUSTAINABLE DEVELOPMENT

Vidvuds Beldavs, Chairman
RIGA PHOTONICS CENTRE | RIGA, LATVIA

Riga Photonics Centre (RPC) is a not-for-profit association registered in Riga, Latvia on 8 October 2015 to advance light sciences and technologies in Latvia and beyond. Members are largely individual scientists. RPC was registered as a research institution in Latvia in July 2020 with the aim of participating in government funded research and science policy projects for which this status is a requirement. The current focus of RPC work is science related to sustainable development.

RPC primary activities in 2022 revolved around planning, organizing and participating in sessions at science conferences addressing sustainable development.

Each session at each conference resulted in a broadened research and communication network and documented progress in advancing sustainable development with renewable energy development in Africa and peaceful uses of outer space with a focus on Space 2030 Agenda, which was approved by the UN General Assembly in October 2021. Three space sessions were organized as part of SSUNGA77:

- In partnership with ACES to address space-related threats to sustainable development.
- In partnership with Space Renaissance International – the positive impact of space exploration beyond Earth on sustainable development on Earth
- In partnership with the space sector of Latvia the implementation of Space2030 Agenda at a national level linking space-related research and commercial space development to UN Sustainable Development Goals.

Our efforts with sustainable energy development in Africa are focussed on access to electricity where an estimated 600 million people do not have access. This was the topic in the ANSOLE conference in February as well as the Science Summit at the UN General Assembly in September and the Science event at the U.S.-African Leaders' Summit December 12-16, 2022.

Russia's invasion of Ukraine on 24 February 2022 has disrupted global efforts to address climate change, pandemics, and other emerging threats. Research capacity in Ukraine has been heavily damaged and Russian science has been isolated from global research networks and the resulting militarization to defend against Russian aggression has resulted in increased spending on military research. This coupled with significant backsliding due to explosive increases in gas and oil prices raises serious concerns about the potential to meet climate change goals. Russia's war has become a global threat to humankind not even considering the nuclear weapons threats made by Russian leadership. RPC drove the creation of the SSUNGA77 session "Recovery of Ukraine's-science-and-innovation-after-the-fossil-fuel-war" to bring attention to this issue.

Multiple projects are emerging from planning and networking involved in organizing the sessions.

ANSOLE 11th annual conference

Riga Photonics Centre was invited in early January 2022 to participate in the conference planned for 4 February 2020. We contributed the theme “Electrify Africa 2030”. We also sponsored the participation of two researchers (Dr. Petro Smertenko and Dr. Vadim Naumov) from the Institute of Semiconductor Physics, National Academy of Sciences of Ukraine each of whom presented his research work on hybrid solar cells. Additionally, we invited Dr. Gunārs Bajars to present on Research and Development of Materials for Li-Ion Batteries and Hydrogen Energy at the Institute of Solid State Physics, University of Latvia. Other speakers in the conference were from universities across Africa as well as from Austria, Germany, Sweden, Finland, the UK, Iceland, Netherlands, and Indonesia presented their research work on renewable energy to address needs in Africa.’ The proceedings of the conference can be downloaded here.

In addition to his energy policy presentation “Electrify Africa 2030” Vidvuds Beldavs drafted the Declaration of the Conference which is included in this report due to its importance in opening subsequent opportunities to organize subsequent high level conferences - six sessions at the Science Summit at the UN General Assembly (SSUNGA77) which took place from September 13-30, 2022 and two sessions at the Science Event at the U.S. – Africa Leaders Summit.

Declaration of the Conference

Dedicated to the vision of Agenda 2063 “an integrated, prosperous and peaceful Africa, driven by its own citizens and representing a dynamic force in the international arena.”

We came together to discuss technical, economic and policy choices available to Africa to advance renewable energy research, innovation, financing, and implementation to meet Sustainable Development Goals (SDGs) for Africa.

Our shared understandings:

We understand that the 6th African Union - European Union Summit will take place from 17-18 February 2022 with sustainable development and renewable energy priority concerns.

SDG7 calls for “ensuring access to affordable, reliable, sustainable and modern energy for all” to be achieved by 2030 and this goal is incorporated in the plans of the African Union, the EU, the UN, World Bank, and other international organizations and partners.

We are very concerned that the COVID-19 crisis has negatively impacted plans to achieve universal access to electricity by 2030 and that current forecasts by the IEA show 600 million people without access to electricity by 2030 of which 560 million are forecast to be in Sub-Saharan Africa, with most of them in rural areas.

Rising climate-change linked threats increase the vulnerability of people without access to electricity while access to electricity enables further development steps. It is extremely important that the AU and EU Partnership address this issue, taking all feasible measures to assure access to electricity for all in Africa by 2030.

The Africa-EU partnership, together with other international partners, member states, academia, NGOs, and business have the knowledge and the capacity to achieve SDG7 despite current, real-world forecasts of likely failure.

Education, training and other human development are critically important to address the electricity access challenge. The costs of solar energy conversion and storage systems are forecast to continue to decline and financing is available for any feasible energy project across Africa. People are needed to define, finance, and develop small and medium-scale (SMS) energy projects, focusing on rural areas.

Large renewable energy projects are being implemented at an increasing tempo purely based on business feasibility. The greatest challenge and greatest opportunity is across vast rural regions of Sub-Saharan Africa without infrastructure. Boot-strapping solutions with mini-grids using solar, wind, hydro and biogas to provide power have been demonstrated. People need to be educated to boot-strap and develop Small and Medium Scale (SMS) micro-grids that can open opportunities for a widening array of job-creating businesses, especially for the African Youth. This will contribute to mitigating emigration/immigration issues.

While focussed on the near-term goal of universal access to electricity in Africa by 2030 we need to be mindful of what needs to be done to achieve Agenda 2063 goals. Motivation to achieve the near term 2030 goals will be strengthened by awareness of how this enables meeting the greater challenges that lie ahead.

Finally, we would like to point out that one of the most powerful synergies is when photovoltaics is partnered together with water treatment technologies for the provision of clean drinking water – breaking out of the water-energy nexus paradigm. The gains made above with regard to SDG6 can leverage further impacts on a much wider range of SDGs including clean water (SDG6), gender equality (SDG5), education (SDG4) and health (SDG3). We believe that small-scale and modular technologies (photovoltaics, energy storage, and membrane filtration modules) enable technologies that can reach the remote populations of Africa who otherwise may not see an electricity gridor water distribution pipes in their village in this lifetime.

We recommend these actions:

- The EU Commission should develop a Sustainable Development Action corps (SDA) that would train and send qualified EU citizen-volunteers and African ex-pats to work with communities in Sub-Saharan Africa to develop job-creating micro-grid systems to provide access to affordable reliable electricity and create small business opportunities for those served.

- The AU Commission and member states should support the SDA.

- The AU Commission working with member states and their higher Education systems Institutions (HEIs) and universities in the EU, with support from the EU Commission develop training programs to provide sufficient human resources to enable universal access to electricity across Africa by 2030.

- The EU-Commission in partnership with the AU Commission should develop an EU-AU Partnership R&D program drawing on elements of the Horizon Europe research program to build long term research capacity in Africa linked to Sustainable Development Goals and Agenda 2063 aspirational goals. To address the human development challenge MSCA Actions, particularly the MSCA Staff Exchange, can be adapted to address research priorities of interest to both the EU and the AU such as improving solar energy conversion and related technologies – including energy storage and water treatment – to address the need to more rapidly develop access to electricity in Africa. In addition, the budget for building capacity in higher education in Africa under the ERASMUS+ programme should be increased to ensure significant impact on SDG 5: good quality education for all.

- The EU Commission, in Partnership with the AU Commission, should encourage production of equipment in Africa for energy conversion, energy storage and water treatment technologies – including providing research and innovation support. Bearing mind that Sub-Saharan Africa is a major source of critical materials for alternative energy technologies this would be in the long-term interests of both the EU and the AU.

- The Africa-EU Summit should consider continuation of the AEEP Topics and Activities.

- Promote the production, in Africa, of energy conversion and energy storage equipment, considering that Africa is a major source of materials for alternative energy technologies.

- Review and Launch a Renewable Energy Cooperation Programme (RECP) to 2030 (RECP Strategy 2030)

- Within a RECP strategy 2030:

- Continue to promote and increase funding for Renewable Energy Research and Innovation in African Higher Education Institutions (HEIs) between and amongst African and EU Researchers.

- Encourage African member states to dedicate a reasonable share of their GDP to Renewable Energy Research and Innovation to build a long-term research capacity in Africa linked to the SDG and Agenda 2063.

- Create a Platform for African NGO involve in Renewable Energy Research and Innovation.

- Promote boot-strapping solutions: defining, developing, and financing Small and Medium Scale projects of Renewable Energies-powered mini grid for rural electrification in Africa, to expand opportunities for job-creating businesses, especially for African Youths, as a strategy to curb emigration of skilled people from the continent, long term research capacity in Africa linked to the SDGs and Agenda 2063.

ANSOLE will seek to review progress towards realization of goals and recommendations in this Declaration at subsequent conferences.

A2IOC 2022 Conference Participants

Science Summit at UNGA77
13-30 September 2022

SSUNGA77 Sessions convened by Riga Photonics Centre

Session Title *Pan-African initiative to build research and innovation capacity to achieve SDG7 for*

SSUNGA77 Sessions convened by Riga Photonics Centre

SSUNGA77 Sessions convened by Riga Photonics Centre

Africa

Date - September 21 • 2:00pm - 5:00pm

Session REF number/ Link

REF21101 https://ssunga77.sched.com/event/15tjg/ref-21101-pan-african-initiative-to-build-research-and-innovation-capacity-to-achieve-sdg7-for-africa

Keywords*

SDG7, SDG6, research capacity, renewable energy, solar energy, pan-African, universal access,

Abstract*

The session consisted of two segments whose purpose was to raise awareness of the urgency to build research and academic capacity in Africa, to enable sustainable development which is made possible by universal access to sustainable, reliable energy at an affordable price. The highest priority is in Sub-Saharan Africa with about 560 million people without access to electricity. The first segment presented the positions of researchers, academics, and religious community leaders from Africa's regions – North, South, East, West and Central. The needs of electricity access-deficit countries (such as Nigeria, DR Congo, Ethiopia, Mozambique, South Sudan, Cameroon, and Tanzania received particular attention. Also, emphasized was action to advance the role of women in research, teaching and professional work. Half of the speakers were women professors and professionals. There is an urgent need for electricity access deficit regions in Sub-Saharan Africa for community level energy solutions that provide electricity, pure water and clean and safe ways for cooking. Dr. Peter Schubert, Director of the Lugar Renewable Energy Center in Indiana, USA presented decentralized modular energy systems to produce green hydrogen and byproducts from local biomass.

Funding sources for capacity building in Africa were discussed starting with the Horizon Europe research program for which African states are eligible. The Need for capacity building in advanced energy research was addressed by Dr. Shaimaa Mohamed, Zewail City of Science and Technology while pastor Pastor Daniel Mbiwan addressed building community level capacity to implement sustainable energy solutions by engaging religious congregations and local civil communities.

Prof. Sarah Anyang Mbi Agbor, former AU Commissioner for Human Resources, Science and Technology, present her vision for a path to universal access to sustainable energy for all Africans. Prof. Daniel Ayuk Mbi Egbe, CEO of ANSOLE led the session and Vidvuds Beldavs, Chairman of the Riga Photonics Centre (ANSOLE Institutional member) overviewed the ANSOLE Energy Compact -: https://www.un.org/en/energycompacts/page/registry#AfricanNetworkforSolarEnergye.V.

The second segment discusses policies and international support for capacity building for SDG7 in Africa. This panel provided a trans-African approach with a global perspective to the issues and opportunities for human resource and research capacity building raised by ANSOLE members at universities in key countries in Africa.

Conclusions *

Community-level implementation capacity building is key to achieving SDG7 in Sub-Saharan Africa. Here both religious communities (churches and mosques) as well as local governments and civil society organizations have a role.

Staff exchanges are a key capacity building activity between institutions and SMEs in different regions of Africa as well as with European, U.S., Canadian and other universities, and research centres. The Horizon Europe MSCA Staff Exchange call with an 8 March 2023 deadline is under development involving partners from Europe, the U.S., Northern Africa, South Africa, Nigeria, Cameroon, and Kenya, and other African partners.

The Energy Compact with the UN provides a sound framework to achieve ANSOLE's mission. Now early projects need to be funded to build momentum to sustain and accelerate development to 2030 and beyond. Funding is an extremely urgent matter.

Recommendations *

The reality that over 600 million people in Africa do not have access to electricity means that 600 million people are denied a pathway to development. This is the most urgent issue in African development.

ANSOLE needs to secure sustainable funding to implement its Energy Compact because it offers a highly promising approach to accelerating access to sustainable energy at an affordable cost which is key to achieving all other sustainable development goals. ANSOLE needs to grow funding year by year with a minimum target being 1 million euros in 2023, doubling in 2024 and doubling again in 2025 with incremental growth thereafter to 2030.

A funding plan needs to be developed before 31 December 2022 with the ANSOLE session at SSUNGA78 a workshop discussing the long term vision and strategic plan as well as success towards the Energy Compact milestones and lessons learned.

ANSOLE as a pan-African organization can accelerate development by building cooperation between Northern Africa and Sub-Sharan Africa through fellowships, summer schools, and staff exchanges. The African Union Commissioner for Education, Science, Innovation and Technology needs to be engaged in the process.

Ideally, 2 to 3 recommendations suggesting practically how you think UN bodies in general and the planned Summit of the Future in 2024 specifically can support your area of science and its contribution to the UN SDGs and the post-SDG process.

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SSUNGA77 Sessions convened by Riga Photonics Centre

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SSUNGA77 Sessions convened by Riga Photonics Centre

Name of Session: Global Space Concerns: Cosmic Hazard to Earth and Using Space to Meet UN 2030 Sustainable Development Goals (SDG)

Date – September 26, 9 AM to 12 EDT

Session ref / link https://ssunga77.sched.com/event/14WM8/ref-26168-recasting-the-space-agenda-convened-by-alliance-for-collaboration-in-the-exploration-of-space

Key Words: Solar Storms, Potentially Hazards Asteroids & Solar Storms, Orbital Space Debris, Space Traffic Management, Protecting the World's Power Grid, Space & the UN Sustainable Development Goals for 2030, "Compact Agreements" to Use Space Systems to Meet 2030 UN Sustainable Development Goals

Abstract An international panel that included two former Directors of the U.N. Office of Outer Space Affairs, the President of the International Space University, Representative of the European Space Agency, the President of the International Institute of Space Law, the President of Space Renaissance International and the Alliance for Collaboration in the Exploration of Space (ACES Worldwide) discussed threats to Earth represented by violent solar storms, asteroids and comets, and orbital space debris and the need for further global cooperation and action to combat these threats as well as more effective use of space systems to meet the UN 17 Sustainable Development Goals. Speakers regarding cosmic hazards suggested that there should be a global fund for installing "blocking capacitors at all the world's electrical power transformers to prevent a "Carrington Event" knowing out the world's electrical grid. There were also suggestions of ways to make the world more aware of cosmic hazards to encourage the world space agencies to undertake more collaborative research and cooperative programs to consider ways to protect against asteroids and comets, active deorbit of space debris, and discuss was forward toward international coordination and agreement on Space Traffic Management. In the second part of the discussion experts discussed the various ways to use space applications to use satellite tele-health and tele-education linked to terrestrial wireless systems to provide these services in rural and remote parts of the world. There should be initiative and "Compact Agreements" to get space systems and local governments to sign "Compact Agreements" to improve the chances of meeting U.N. Sustainable Development Goals for Health (Goal 3) and for Education (Goal 4). Other panelist explained the way to use remote sensing satellites, Hyperspectral sensors, weather and meteorological satellites, and positioning and navigation satellites to improve "smart agriculture (Reduce Hunger Goal 2), to preserve clean water (Goal 2), and support efforts to safe the environment on land, under water, and the atmosphere (Goals 13, 14, and 15).

Conclusions

1. Global cooperative action to create a fund to install "blocking capacitors" at unprotected electrical power transformers against a "Carrington Event" type Super Solar Storm and particularly violent Coronal Mass Ejections is urgently needed.

2. The Space Agencies of the World need more cooperative and integrated programs to protect Earth against all types of cosmic hazards. Priority needs to be given to Space Agencies working together to protect against orbital space debris, potentially hazardous asteroids and comets, and solar super storms that could do trillions of dollars of damage and wipe out electrical power supplies, vital pipe supply lines, global communications and the Internet, automated supervisory control systems and vital satellites.
3. Compact Agreements to incentivize the use of space systems to meet as many of the 17 SDGs as possible was strongly endorsed in these discussions.

Recommendations

1. General Assembly discussion of a global fund to protect the world's electrical power supply against a super solar storm (i.e. a CME) and especially to install blocking capacitors and heavy duty circuit breakers and a referral of this problem to the world's space agencies and the U.N. Office of Outer Space Affairs
2. General Assembly discussion of problem of possible dangers of comets and asteroids and orbital space debris. This would involve an invitation to the world's space agencies to come together and to propose a strengthen cooperative effort to address these concerns and to refer such an initiative to the U.N. Office of Outer Space Affairs to organize such an process to prioritize global planetary defense
3. Encourage the process to create a "Compact Agreement" initiative to strengthen the use of space applications to increase the global effort to achieve the Space 2030 Goals and specifically the U.N. 17 Sustainable Development Goals for 2030 where space systems can help accelerate progress.

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SSUNGA77 Sessions convened by Riga Photonics Centre

TITLE: Space Science, Technology and Sustainable Civilian Development

Ref no / Link: 26182 https://ssunga77.sched.com/event/178CC/ref-26182-space-science-technology-and-sustainable-civilian-development

ABSTRACT-

The Session had 9 speakers who all emphasized the immediate need for training students and young off-world explorers; support for analog training; and the urgent need for cooperation in sharing data/lessons learned with all the nations on earth.

Vid Beldavs, Latvia, and Adriano Autino, SRI, discussed how to make the 2030 Space Agenda and the SDGs actionable. One idea is to work with national/regional space agencies to develop Space Compacts that will lead to coordinated protocols and goals. Specific challenges of Civilian space development includes human health; protection against cosmic radiation, gravity forces, green environments and use of water, and others that are being tested on earth now.

Pascale Ehrenfreund (ISU, COSPAR) discussed ISS and Tiangong China Space Station , and future plans for Space Tourism for orbital, suborbital and lunar missions; Artemis mission is a good start for a long-term presence on the moon. Space exploration is seen as expensive, space challenges inspire our youth and the development/implementation of technologies that can achieve the SDGs. International cooperation is needed even more now.

Henk Rogers (US), described initiatives in exploration and climate change mitigation, and the development of analogue HI-SEAs base in Hawaii

Agata Kolodziecjzyk (PL), described the Analog Astronaut Training Facility where many crew isolation campaigns, as well as physical and mental training were conducted

Kiran Gautam (UK/IN), space biologist , described her lresearch, and experience in EMMPOL

Ioana Roxana Perrier (FR), described the opportunities for training young professionals to astronautics through collective and individual projects, and analog campaigns

Serena Crotti (IT) , space designer described her research on space architecture and design of habitats experiments for astronauts training

Armin Wedler (DE), reported technical developments in planetary robotics with recent ROBEX and ARCHES campaigns in Etna, and benefits to society

The moderator, Bernard Foing (SRI & LUNEX EuroMoonMars), summarized, then presented a vision of sustainable life on the moon and mars, pointing to a roadmap to get there (robots, humans), operate, communicate, move and survive. He discussed the ILEWG EuroMoonMars programme with space science data analysis, instruments development, earth testing of space technology (2003-2022), pointing to field work in Utah, HI-SEAs Hawaii, AATC Poland, Atacama desert in Chile, and Iceland, with Lab and field research in geology and astrobiology, instruments demos, and habitas. He

described EuroSpaceHub initiative to develop astronautics, social innovation and entrepreneurship aspects.

Conclusions-

Technologies developed for space exploration have demonstrated major benefits for sustainable development on Earth and are necessary for sustainable human presence in outer space.

- Analog experiments here on Earth prepare and practice for testing technologies, living and working in earth orbit, on the moon, and directly pertinent to SDGs.

- Space agriculture methods applied on Earth can assure food security under conditions anticipated as climate change impacts grow in severity and frequency – heat storms, extreme weather, droughts and advancing deserts, rising seas.

- Circular economy pioneered in space and applied to life on spaceship Earth

- Human-robot partnership pioneered for space exploration has numerous applications on Earth and can accelerate applications of sustainable development in areas such as Sub-Saharan Africa where more than 600 million people - half the population does not have access to electricity at this time.

Recommendations

The Moon for all Mankind concept breaking emerging barriers among space power blocs. Exploring the Moon Treaty as providing a pathway towards internationally accepted rules for use of lunar resources as well as an international Moon-Earth space traffic authority

It is extremely important to engage all people, particularly emerging and isolated countries and communities in space exploration activities to build awareness that humanity has a sustainable, long-term future that is not limited to the Earth. Opportunities need to be created where young people from all countries could participate together in space data analysis, simulations and future exploration projects.

References: Links

Space2030 Agenda - https://www.unoosa.org/res/oosadoc/data/resolutions/2021/general_assembly_76th_session/ares763_html/A_RES_76_3_E.pdf

All session presentations -

• Vidvuds Beldavs- Energy Compacts - Implementation of Space Agenda 2030 - https://youtu.be/XQVHVkn3CiM?t=758

• Henk Rogers - The Hawaii - Space Exploration Analog and Simulation (Hi-SEAS) - https://youtu.be/XQVHVkn3CiM?t=1152

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• Adriano V. Autino - How to make the 2030 SDGs sustainable - https://youtu.be/XQVHVkn3CiM?t=1781

• Kiran Gautam - Space science technology and sustainable civilian development - https://youtu.be/XQVHVkn3CiM?t=2481

• Pascale Ehrenfreund - Space exploration, an international endeavour - https://youtu.be/XQVHVkn3CiM?t=2955

• Agata Kptpdziejczyk - Analog missions for sustainable civilian development - https://youtu.be/XQVHVkn3CiM?t=3572

• Armin Wedler - AI-powered vehicles for humanitarian help deployment - https://youtu.be/XQVHVkn3CiM?t=4405

• Ioana-Roxana Perrier - Training the future space sceintists, engingineers and explorers - https://youtu.be/XQVHVkn3CiM?t=5461

• Serena Crotti - Space on Earth - Design of a trasnportable base for Space mission simulations on Earth - https://youtu.be/XQVHVkn3CiM?t=6333

• Adrian Guzman - ISRU Technologies and Disciplines - https://youtu.be/XQVHVkn3CiM?t=7307

• Bernard Foing - Space4All Researchers, Astronauts and Entrepreneurs - https://youtu.be/XQVHVkn3CiM?t=8738

SSUNGA77 Sessions convened by Riga Photonics Centre

Session Title *

"Prospects for Latvian space science and technology to fulfil UN Space2030 Agenda"

Date - September 28 • 9:00am - 11:00am

Session REF number / link

REF28234 https://ssunga77.sched.com/event/15tkd/ref-28234-prospects-for-latvian-space-science-and-technology-to-fulfill-un-space-agenda-2030

Keywords*

Space2030 Agenda, sustainable development, astronomy, astrophysics, radio telescope, satellite laser-ranging, Latvia, ESA, national space strategy, COPUOS, space education

Abstract*

This session sought to frame a strategic vision for Latvia to implement Space2030 Agenda at a national level. Angelina Bekasova presented Latvia's space strategy and the dynamism of the commercial space sector in Latvia developing innovative technologies with global market potential.. Latvia has three observatories of significance to European space sciences: Baldone Astrophysical Observatory led by Dr. Ilgmars Eglītis, Ventspils Radio Astronomy Centre led by Dr. Aleksejs Klokovs, and the Geodynamics Observatory in Rīga, led by Dr. Kalvis Salmiņs. Pauls Irbiņš presented the extraordinary Cesis Space Education Center that will draw visitors from across the Baltic Sea Region that shows a commitment to space in Latvia's future. Dr. Arnolds Ubelis introduced the space research capabilities of the FOTONIKA-LV science platform that now includes the new Space Photonics ERA Chair at the University of Latvia led by prof. Bernard Foing to develop a European center of excellence in space sciences that draws upon all of Latvia's space science capabilities to join international research projects and networks for pathbreaking new research and to address threats such as space debris, asteroid impact and space weather extremes. Roberts Kancans spoke as a diaspora researcher working for Honeybee Robotics in the U.S. on exciting NASA planetary research and exploration projects to Saturn's moon Titan and beyond.

Vidvuds Beldavs reviewed Space2030 Agenda and saw a role for Latvia to implement the UN program for sustainable development through space research and commercial development through a new instrument called a Space Compact modelled on UN Energy Compacts where organizations can commit to a plan with defined milestones to achieve universal access to sustainable energy by 2030. Space Compacts would document commitments by a state, international organization, company, NGO, or local government to drive sustainable development goals through space science or commercial space development.

Conclusions *

SSUNGA77 Sessions convened by Riga Photonics Centre

Latvia has the opportunity to emerge as a space leader based on its significant space research infrastructure with the laser ranging station and geophysical observatory, the astrophysics observatory, and the Ventspils International Radioastronomy Centre, as well as advanced photonics research laboratories, materials sciences and emerging space technology manufacturing sector. Latvia stands out with its entrepreneur-friendly business environment – best in OECD. The strong interest in space is evidenced by the Space Education Center at Cesis modelled on the International Space Station, as well as the Star Space Amateur Astronomy Centre, and the Ventspils Science Centre.

Luxembourg with a much smaller population has gained the reputation as the world centre for asteroid mining and space resources use. Latvia has comparable potential, given commitment to a national strategy to achieve such goal.

Recommendations *

The Space Photonics Era Chair needs to become a research centre that draws on all space science capacity in Latvia to drive pathbreaking research with global significance.

Latvia needs to identify the topics in which it wants to achieve world recognition and then engage all organisations and people with influence to achieve this goal.

Latvia, as a member state of the UN Committee on Peaceful Uses of Outer Space (COPUOS) can take a leading role in the development of Space Compacts in partnership with UNOOSA offering a headquarters location for Space Compacts coordination.

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Passcode: 40qe%H40

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UN Energy Compact -:
https://www.un.org/en/energycompacts/page/registry#AfricanNetworkforSolarEnergye.V.

SSUNGA77 Sessions convened by Riga Photonics Centre

Session Title *

""Managing use of peatlands in Latvia to meet UN sustainable development goals and achieve carbon neutrality by 2050""

Date: October 4 • 6:00am - 8:00am

Session REF number REF30058

Session link - https://ssunga77.sched.com/event/19Xyw/ref-30058-managing-use-of-peatlands-in-latvia-to-meet-un-sustainable-development-goals-and-achieve-carbon-neutrality-by-2050

Keywords*

peatland, sustainable development, biodiversity, peat extraction, recultivation, greenhouse gas, carbon trade, greenhouse gas inventory, rural development

Abstract*

Peatlands cover about 11.2% of the land area of Latvia with significant biodiversity. Peat is also an important economic resource of Latvia generating about 220 million euros in exports principally in the form of peat used for horticulture in Germany, Netherlands, UK, and other countries. Degraded peatland resulting from removal of top layers of peat can become a significant emitter of greenhouse gasses (GHG). Latvia is developing a model for sustainable use of peatlands that minimizes GHG emissions while preserving biodiversity and fostering economic development in rural areas that need to create meaningful work.In 2019 Latvia concluded the project "Sustainable and Responsible Management and Re-use of Degraded Peatlands in Latvia'' (LIFE14 CCM/ LV/001103, LIFE REstore) presenting the scientific evidence for sustainable use of peatlands. This session will update developments since the project was completed 31 August 2019 affirming the continuing relevance of the research conducted in Latvia on peatlands. The issue is very important for Latvia due to the position advanced by advocates of peatland restoration that oppose the economic use of peatlands. https://www.bbc.com/news/uk-59195535. Models used by the IPPC to estimate GHG emissions assume that extracted peat is used as a fuel and burned rather than as a soil substrate in horticulture which can reduce GHG emissions. Analysis shows that soil substrates from alternatives to peat generate more GHGs. Extraction, packaging and shipping of peat from rural areas in Latvia creates much needed meaningful work and thereby contributes to meeting UN SDGs. Arguments for banning use of peat for agriculture need to also consider that substitutes for peat may result in greater global GHC emissions than well-managed use of peatlands coupled with both restoration of degraded peatlands and investment to grow cranberries and other health promoting crops. Peat for horticulture is a significant export of Latvia. Sustainable economic use of degraded peatlands is possible further contributing to sustainable development of rural regions in Latvia that have seen significant reduction in their population and the quality of education, health and other services for

the people that remain in regions with declining economic activity. Latvia can offer a model for sustainable use of peatlands that can be adapted to similar regions in other parts of the world.

The session was rescheduled twice to accommodate the schedules of all participants

Conclusions *

A consensus position was not achieved between the multiple research organizations in Latvia involved in research on peat and biodiversity and wildlife protection as well as environmental protection agencies, representatives of the Ministry of Environmental Protection and Regional Development, and the Ministry of Agriculture and the two trade organizations representing firms involved in peat extraction. However, based on the numerous discussions involved in developing the session it appears that a "Latvia model" of careful management of the extraction and use of peat for use as a substrate in horticulture can have positive results in reducing GHG emissions and strengthening biodiversity in Latvia. Managed use of peatlands can be particularly effective in reducing GHG emissions and strengthening the biodiversity of Latvia when well-managed peat extraction is coupled with restoration and recultivation of degraded peatlands that comprise about 22 000 hectares, a legacy of Soviet agricultural practices before 1990.

A session at SSUNGA78 addressing the topic addressed in the SSUNGA77 Latvia peatlands session could successfully present an approach that would be based on sound research that creates jobs in Latvia through exports of peat as well as horticultural products produced in Latvia using peat substrates while meeting the expectations of biodiversity advocates.

Recommendations *

Research is called for in the following areas:

- Impact of use of peat as a horticultural substrate on plant growth and CO2 uptake by plants so grown.

- Potential for GHG emissions reduction through restoration or recultivation of the degraded peatlands legacy of Soviet agricultural practices. Can this be used in carbon-trading schemes to pay for degraded peatland restoration?

- Use of peat with other biomass as a feedstock for decentralized green hydrogen production.

The peat community in Latvia (research, peat extraction businesses, rural area governments, environmental regulators, and biodiversity and nature advocates) should pursue development of a Latvia model of best practices for managed use of peatlands. Managed use of peatlands in Latvia with 11.2% of its sparsely populated territory classified as peatland can be done while reducing GHG emissions, strengthening biodiversity and contributing to vitally important sustainable rural development.

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SSUNGA77 Sessions convened by Riga Photonics Centre

Session Title *

“Recovery-of-ukraines-science-and-innovation-after-the-fossil-fuel-war“

Session REF number

REF30561

Session link - https://ssunga77.sched.com/event/1A9Gj/ref-30561-recovery-of-ukraines-science-and-innovation-after-the-fossil-fuel-war

Keywords*

Russia's war in Ukraine, Science at risk, Antifragility, Sustainable Development Goals: SDG4 Quality Education, SDG7 Affordable and Clean Energy, SDG8 Decent Work and Economic Growth, SDG9 Industry, Innovation and Infrastructure, SDG11 Sustainable Cities and Communities, SDG13 Climate Action, SDG16 Peace, Justice and Strong Institutions and SDG17 Partnerships for the Goals

Abstract*

Russia’s war against Ukraine fundamentally violates the UN Charter, accelerates climate change and massively degrades global progress towards sustainable development in energy, food security and global poverty. The estimated 200,000 dead or disabled soldiers do not include the estimated 50,000 civilian casualties. There is extensive destruction of civilian infrastructure and far-reaching damage to the total environment of Ukraine with thousands of hectares mined and poisoned with toxic wastes. Compounding this is that the highly skilled specialists needed to address the global crises caused by Russia’s war fighting for survival rather than to address climate change and its consequences. Russia’s significant capabilities in science and technologies are increasingly isolated as needed international cooperation has been hampered.

Svitlana Krakovska, who chaired the session, speaks of the fossil fuel war. Ukraine is committed to the Paris Climate Accord. It has an active program to fulfil Agenda 2030 goals internally and contribute to the global effort through Ukraine’s research and advanced technology development.

Russia’s war has resulted in significant damage to research facilities in Ukraine. There are multiple examples of theft and destruction of research instruments by Russian occupying forces. About 30% of Ukraine s weather stations have been destroyed diminishing capabilities to monitor the impact of the war on the environment as well as to significantly reduce the quality of weather forecasts across much of Ukraine.

Now young scientists in Ukraine have been mobilized to fight the invaders. After Russia stops its war and withdraws its forces, Ukraine will face the challenge of reopening research labs and retaining vitally needed scientists for research programs in Ukraine and with international partners.

Ukraine is committed to climate change and UN Agenda 2030. It is seeking international partners to help renew facilities and capabilities damaged by the war as well as to make its contribution to meeting global challenges.

SSUNGA77 Sessions convened by Riga Photonics Centre

Speakers included a broad range views from Ukrainian scientists, member of parliament,

Svitlana Krakovska, climate scientist

Garry Sotnik – associate professor Stanford,

Bohdan Oryshkevich Shape the Scienc

Olga Polotska, Executive Director National Research Foundation of Ukraine

Oleksandr Berezko, President, Eurodoc

Yulia Bezvershenko, Visiting Scholar, Stanford, former Director General of Science and Innovation of the Ministry of Education and Sciece

Yuriy Khalavka, Instructor Chernivtsi National University

Yulia Ovchynnykova, Member of Parliament

Kyrylo Bezkorovayny, Co-Founder Kunsht, science popularization

Okeksandr Diachuk, Leading Researcher at Institute for Economics and Forecasting

Svitlana Grynchuk Vice Minister, Ministry of Ecology and Natural Resources of Ukraine

Vidvuds Beldavs, Convenor

Conclusions *

- Damage to Ukraine's research infrastructure has been extensive with over 2000 schools destroyed, 4 universities destroyed, and continues. Irreplaceable facilities, research in progress

- Loss of human capacity in the sciences includes loss of life, career interruptions, blackouts and power outages make much of experimental science difficult or impossible.

- Anti-fragility and resilience in performing science in wartime are top priorities to enable research to proceed .

- Arguments that science is above politics and that Russian scientists should not be isolated as has been done with exclusion from CERN, ESA projects and other international initiatives ignore the widespread destruction of science presently underway in Ukraine. Action is needed now to to stop the war against Ukrainian science and the catastrophic impact on the global economy and energy and food security in many developing countries.

- Outreach and research and innovation partnerships with developing countries in Africa and elsewhere may broaden funding opportunities for Ukrainian scientists while boosting Ukraine's visibility in countries that have tended to have a pro-Russia policy.

- Ukraine in partnership with the U.S. has the potential to emerge as a sustainable development leader working with leading universities in the U.S. as well as Canada, the UK and Europe.

-

Recommendations *

Work to keep Russian science isolated to maintain pressure for Russia to stop the war that continues destruction of Ukraine and the critically important research and innovation capacity Ukraine needs for its future development.

Need a program to welcome Russian scientists that denounce Russia's war against Ukraine to help them to further their research work.

Advance open-science and reforms in Ukrainian science to thrive in a radically changed environment.

Publicize and encourage Ukrainian researchers to take advantage of EU, US, UK, UN and other programs to aid Ukrainian science and support ongoing science activities by Ukrainian scientists.

Develop a Ukraine Energy Compact with the UN and encourage energy compact development by firms, regions, and NGOs.

- Ukraine become a sustainable energy leader in Europe

- Replace centralized, fossil fuel-based energy infrastructure with resilient, decentralized energy systems including smart micro-grids and green hydrogen.

- Form partnerships with Sub-Saharan African countries helping to strengthen their R&D capacity and accelerating measures open energy access to communities in Africa while also strengthening research Ukraine and advancing decentralized energy solutions.

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Experts are speculating over Russia's next move. They may want to check Ukraine's weather forecast

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Politico 02.25.2022

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Russia's invasion of Ukraine is a fossil fuel war, climate scientist says

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A war running on fossil fuels

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Ukrainian Climate Scientist Says Fossil Fuels Enabled Russian War in Ukraine

Democracy Now! 11.18.2022

www.democracynow.org/2022/11/18/ukrainian_scientist_svitlana_kravoska_cop27

"Fossil Fuels Fund Dictatorships": Ukrainian Climate Activist Suspended from COP27 over Russia Protest

Svitlana Romanko

www.democracynow.org/2022/11/18/cop27_ukrainians_accuses_russia_fossil_fuel

Ukraine is finding new allies in a Russian tourist hotspot

CNN 11.18.2022

www.cnn.com/2022/11/18/europe/climate-ukraine-russia-war-cop27-egypt-intl/index.html

Riga Photonics Centre participation in COP27

We were invited to participate in one of Ukraine's sessions at COP27 in appreciation for the work to organize the Ukraine science session at SSUNGA77. I participated with a presentation addressing topic of accelerating science-based green transition in Ukraine as a model for post-conflict and post-disaster recovery. My primary focus was on the benefits of decentralized microgrids for energy resilience with a recommendation that Ukraine pursue an Energy Compact where decentralized microgrids receive emphasis.
My overriding point, however, was Russia's war of aggression against Ukraine has severely damaged Ukraine's science capacity through destruction of many research facilities and the mobilization of many scientists to defend their country. The negative impact of this has been amplified multi-fold through disruption of many international scientific networks as well as the isolation of much of Russian science. This has weakened international science capacity to address climate change and other cascading global crises. Progress to address climate change has been set back by years due to Russia's war which has become the greatest impediment to international cooperation to address climate change. The negative global impact of Russia's aggression is vastly more than the destruction and suffering it is causing the people of Ukraine.

Title: Accelerating science-based green transition in Ukraine as a model for post-conflict and post-disaster recovery

Place: Ukrainian Pavilion (hybrid format with online streaming)

Date/time: 11/11 14:00-16:00 (UTC+2)

Links - https://cop27ukraine.org.ua/program/#day11

https://www.youtube.com/watch?v=-QubX4bu4Iw&t=437s

Short description:

Ukraine is facing tremendous challenges in resisting Russia's invasion and will require enormous efforts to restore destroyed infrastructure, cities and economy. Ukraine's post-war recovery should consider the findings of the IPCC's 6th Assessment Report, which calls for immediate and deep emissions reductions across all sectors and a rapid decline in our reliance on fossil fuels. IPCC report provides science-based grounds for available measures to accelerate reductions of GHGs emissions and decarbonization of the economy due to the introduction of climate technologies in various sectors, adoption of climate policies at national and sub-national levels, behaviour changes, redirection of financial flows and refocusing international cooperation. Post-war recovery of Ukraine built on the findings of the IPCC report could create a model for post-conflict and post-disaster recovery in other regions of the world, including countries most affected by climate change and facing significant climate hazard risks, particularly in the Global South.

Riga Photonics Centre participation in COP27
Goal: to highlight the most relevant findings of the IPCC report to apply for green recovery of Ukraine and to bring the international community's attention to the possibility of utilising this experience for planning post-conflict and post-disaster recovery in other regions.

Moderator:

Svitlana Krakovska, Ukrainian Hydrometeorological Institute, national expert of APENA3 and INSURE (Ukraine)

Panelists:

1) Svitlana Grynchuk, Deputy Minister of environmental protection and natural resources of Ukraine for European integration (TBC) (Ukraine)

2) LA WGII/ WGIII IPCC (TBC)

3) Vidvuds (Vid) Beldavs, Chairman of the Board of Riga Photonics Centre advancing light sciences and technologies for Latvia; futurist.

4) Mykola Shlapak, Climate change and environmental consultant, LA WGIII IPCC (Ukraine)

5) Nataliia Pustilnuk, WWF Ukraine, Project INSURE: movIng Nature baSed climate solutions into Ukraine’s Reform agEnda

6) BridgeUkraine.org

7) Naftogas (TBC)

Title of session: "Meeting the challenge of universal access to electricity in Sub-Saharan Africa"

Session link: https://scienceusafricaleaders.sched.com/event/1FBlb/15050-meeting-the-challenge-of-universal-access-to-electricity-in-sub-saharan-africa

Keywords: sustainable energy, SDG7, renewable energy, solar energy, Sub-Saharan Africa,

Abstract:

"For the first time in decades, the number of people without access to electricity is set to increase in 2022" IEA presentation at COP27

> *There is no pathway to net-zero without first achieving universal electricity access. Not only is it a moral imperative, but renewables often provide the most cost-effective option for connecting consumers…*

Climate change poses high threats to Sub-Saharan Africa even in the near term. There are more than 600 million people without access to electricity in Africa. Access makes possible clean water, education, and modern healthcare essential for resilient communities facing rising threats. Far more needs to be done than the planned 35 million new connections by 2030in the U.S. Energy Compact – . https://www.un.org/en/energycompacts/page/registry#UnitedStatesofAmerica

The IEA forecasts that the electricity access deficit in Africa will still be 600 million people by 2030. Can a partnership of the U.S., EU and other democracies with Africa forge an Energy Compact to close the electricity access gap by 2030?

Meeting the challenge centers on building capacity in Sub-Saharan Africa for energy research to develop and adapt energy technologies that meet needs of local communities and to train specialists to plan, secure financing, and manage implementation.

Conclusion

Prof. Daniel Ayuk Mbi Igbe, CEO ANSOLE - Opening remarks.5 minutes.

Dr. Gianluca Tonolo, Energy Access forecasting specialist, International Energy Agency. 15 minutes. Overview of electricity access dynamics in Africa.

Dr. Raul Alfaro Pelico, Director, Global South, RMI, Overview of Africa Minigrids program and potential for scaling and innovative expansion. 15 minutes.

Dr. Peter Schubert, Director Richard Lugar Center for Renewable Energy, Biomass to energy pilot project with Northwest University of South Africa and potential for scaling. 10 minutes

Dr. Stephan Peter, Ernst-Abbe-Hochschule Jena

Vidvuds Beldavs, Chairman Riga Photonics Center, Concept for a top-level U.S. led partnership of democracies with the African Union to drive an Energy Compact to close the electricity access gap in Africa by 2030. 10 minutes. Link to presentation.

Discussion – Moderated by Raul Alfaro Pelico 30 minutes.

Expected outcomes

ANSOLE working with US, EU and African partners serve as pilot for an Energy Compact to build capacity for universal access to reliable, affordable and sustainable energy in Africa by 2030. Formation of an international advisory committee with representatives from international partners to oversee progress.

Exploration of the potential for a US-AU-EU Energy Compact to close the electricity access gap by 2030.

- Workshop in Riga, Latvia tentatively April 13-14, 2023
- ANSOLE Energy Compact session at SSUNGA78 – ½ day, September 20, 2023, New York

Title of Session:

Africa is huge over 1.4 billion are spread over an area of 30,370,000 km2. By 2050 the population will exceed 2 billion people from highly diverse cultures with over 2,000 native languages. Brain drain has severely impacted the continent amplifying the challenge of development and meeting basic needs as climate change, pandemics and now Russia's war disrupts supply chains and drives uncertainties across economic systems. The situation facing healthcare in Nigeria is illustrative of the cascading crises facing the continent:

"In 2015, there were only 34,000 doctors serving about 180 million people. This year, the number has gone down to 24,000, according to the Nigerian Medical Association, NMA. Meanwhile, the Worldometer estimates that Nigeria's population has climbed to over 211 million. "

Source: https://www.vanguardngr.com/2022/11/curbing-health-sector-brain-drain/

These challenges can only met with use of space technologies and advanced ICT to enable telehealth, computer augmented education, and sophisticated tools for life management delivered via apps available via smart mobile devices pervasive across the Continent..

This session will address satellite technologies, today and future, serving Africa. In the spirit of the US-Africa Summit, the speakers have worked, in collaboration with international organizations, using satellites for real-time disaster relief; telemedicine; tele-education; and low-cost broadband services in remote regions of Africa. Each speaker will address what works and what space technologies are still needed on an urgent basis.

Chair: Dr. Scott Madry, Professor and expert in Earth Observation/Remote Sensing Satellites, will provide an overview of satellites in use, and planned for, disaster management in Africa including his own experiences working with the Red Cross in Africa.

Temidayo Oniosun, Managing Director of Space in Africa (Nigeria) He will provide an overview of Space in Africa's programs and satellites planned for Africa.

Peter Martinez, Director of Secure World Foundation (South Africa) He will discuss Secure World Foundation's work in Africa.

Dr. Kris Lehnhardt, Element Scientist for Exploration Medical Capability at NASA Johnson Space Center plans to discuss his tele-medicine efforts in Africa, with emphasis on what space technologies are needed urgently to improve medical services in Africa.

INVITED:

Angie Mar, Director of International Programs, Geeks w/o Frontiers-N50 project services. She will discuss services already available in African nations, particularly tele-education and broadband. She will also explain plans for deployment of Portable Connectivity Centers in the most remote areas.

Ruth Kelly, Senior Advisor to OneWeb, will provide an overview of their plans to provide low-cost broadband services: when and where in Africa.

Vidvuds Beldavs, Chairman Riga Photonics Centre, provide an overview of cooperation between ACES, a Washington, DC based NGO and the African Union Commission and other partners to

develop space compacts linking activities in space to UN Sustainable Development Goals. Here is the link to the presentation.

Armin Weder, Head of Robotics at DLR, to discuss the status of work in Africa deploying satellite-driven AI robots in remote areas with the World Food Program in the Autonomous Humanitarian Emergency Aid Devices (AHEAD) project.

Expected Outcomes

Demonstrate advance technology amplified approaches that can meet needs and advance sustainable development goals to rapidly growing populations facing unprecedented cascading crises.

Highlight opportunities for engaging European and other democracies in partnership with the U.S. through application of space and advanced ICT technologies to enable and empower countries in Africa to advance sustainable development under cascading crises.