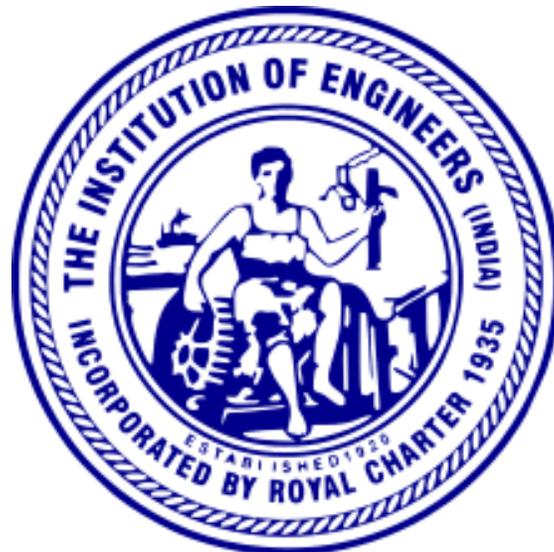


The Institution of Engineers (India)

Madurai Local Centre

**Er.T.M.Jambulingam Bhavan, No.1, Vivekananda Nagar,
120 Feet Road, Surveyor Colony, Madurai – 625 007**



Monthly Connect February-2022



The Institution of Engineers (India)

Madurai Local Centre

Monthly Connect February-2022

**Dr.N.SIVASUBRAMANIAN, FIE.,
CHAIRMAN**

**Dr.P.UDHAYAKUMAR, FIE.,
HON. SECRETARY**

Chairman's Desk



**Dr.N.SIVASUBRAMANIAN, FIE.,
Chairman**

With warm Greetings. It is heartening to note that IEI Madurai Local Centre has taken serious action in bringing out monthly newsletter of our centre regularly. I sincerely appeal to all members to support in bringing the newsletter without any break.

IEI Madurai centre needs to concentrate more on the membership development programme. Frequent joint activities with student members along with their faculty members are requested to be organised. I appeal to all the executive members and corporate members to participate in the programme actively and to contribute their valuable suggestions towards the betterment.

Our efforts are to have smooth interaction among academia and industries is gaining momentum to fulfil our long term vision. Shortly, IEI MLC is also planning for a National convention under IEI-Environmental Engineering Board. It is going to be a great event and dedicated team effort for the successful completion of the convention. The details will be finalised soon and circulated among the members. It is possible only with the support and sponsorship from concerned agencies.

I once again compliment and congratulate for the support and guidance provided by our team for proceeding to a greater height of our centre. With Best Wishes and Good Luck.

Secretary's Desk



**Dr. P.UDHAYAKUMAR, FIE.,
Hon. Secretary**

My greetings to you, all.

It is my great pleasure that IEI Madurai local centre is continuously releasing the monthly newsletter with the kind and dedicated support of our team members.

Programmes with the combined effort of student members and their faculty members are continuously encouraged and to be frequently conducted. With the earnest cooperation of executive members and corporate members, this should be made possible and fruitful.

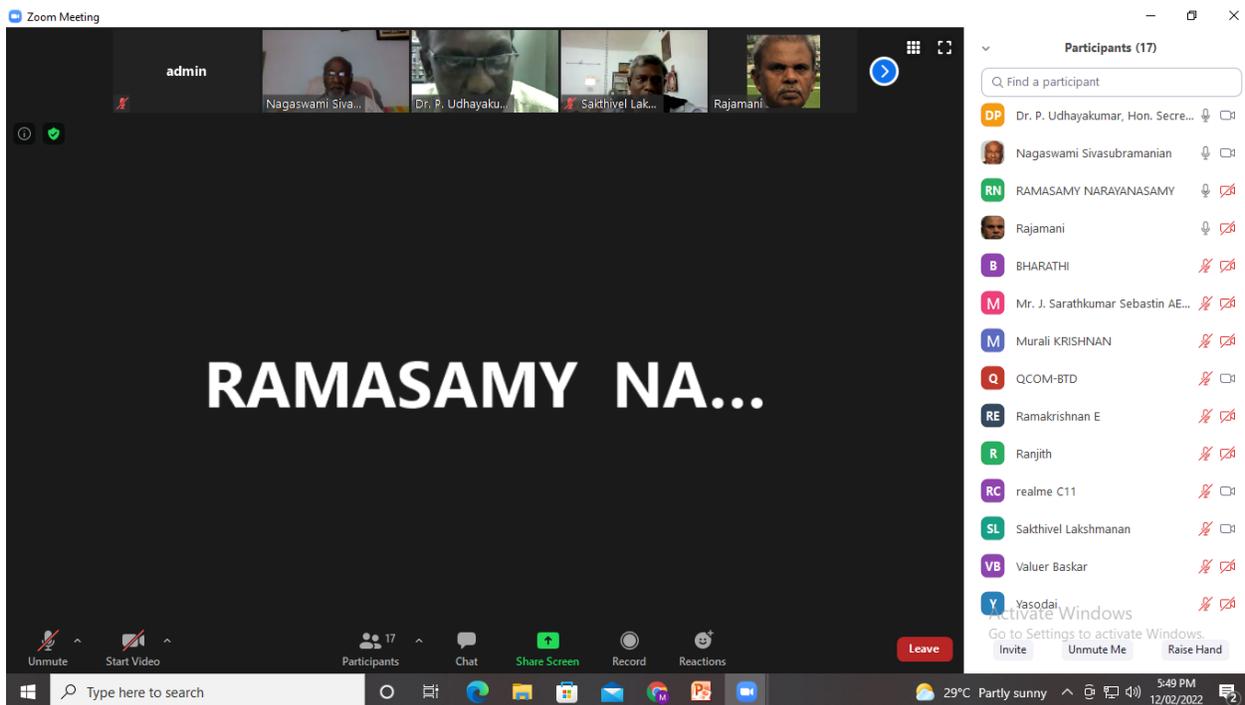
Our sincere efforts to develop a healthy relation between academic institutions and industries are bringing excellent results in making our dreams true.

A great event National convention under IEI-Environmental Engineering Board is to be conducted with the support of team members.

I admire the continuous and active participation of all the team members for the betterment and growth of our centre. I welcome constructive suggestions from all of you.

I wish the editorial board, and everyone connected to this newsletter all the best in their effort. I wish all the success and Good Luck. Jai Hind.

EVENTS HELD DURING MONTH OF JANUARY 2022



10th EC Meeting held on 08.01.2022 at 6.00PM at through Online Meeting

Name of the Centre / Forum		MADURAI LOCAL CENTRE	
Title of the Webinar:		SUSTAINABLE LIFE	
Under the aegis of which Divisional Board:		Interdisciplinary Coordination Committee (ICC)	
Program Date:	23.01.2022	Program Time:	2.00 PM to 4.00 PM
Associate organization (if any):		KUMARI ARIVIAL PERAVAL YOUNG SCIENTIST 2021-2022	
No. of Participants logged in		90 Nos.	

Extract of Welcome address by Chairman, Host Centre:

Dr. N. Sivasubramanian, Chairman, IEI/ MLC welcomed the gathering. Er. L. Muthu, Former Deputy Director, ISRO Valiamala acted as a Moderator for this webinar. He introduced the following three Panel Members.

- 1) Er. V.V. Vikram, Deputy General Manager, Schneider Electric India Pvt. Ltd, Coimbatore
- 2) Dr. R.P. Dhanya, AP & Head, Department of Microbiology, Nooral Islam College of Arts and Science, Kumaracoil
- 3) Dr. A. Helen Sonia, HOD and Vice Principal, Department of Pharmaceutics, S.A. Raja Pharmacy College, Vadagankulam, Tirunelveli

Panellist No. 1

Name: Er.V.V.VIKRAM	
Designation: Dy. General Manager, Schneider Electric India Pvt. Ltd., Coimbatore	
Credential in Brief: A post graduate in mechanical engineering also hold a master's in business administration with 14 years of experience in design and development of low & medium voltage switchgear and switchboards	

Excerpts of deliberation:

WATER SUSTAINABILITY

Great cities are defined and illuminated by the water that surrounds or flows through them. Top cities understand and address their water in a sustainable manner. This means efficiently providing safe, reliable, and easily accessible water as well as reliable sanitation and waterways protected from pollution. Sustainability also means being resilient and adaptable to extreme weather events that may contribute to issues such as flooding and scarcity. The Arcadis Sustainable Cities Water Index assessed 50 global cities by the stewardship of their water across issues impacting their water resiliency, efficiency and quality to show which cities are best positioned to harness water for their long-term success.

Each of the 50 cities included in the index have distinctive water relationships that helped shape their urban character and define their commercial identity and competitiveness. The study highlights the importance of water as an urban asset critical to long-term success, economic development and overall sustainability. North American cities, threatened by both water scarcity and natural disasters, are among the most at risk in the developed world. As a result, no U.S. cities placed in the top 10 of the global rankings of water sustainability. Still, there's a lot to be learned from successes in the United States.

Now more than ever, cities, their waterscapes and water sources face challenges: water demand is rising, aquifers are being depleted and the threat of extreme weather is increasing. Aging infrastructure and funding issues continue to plague systems worldwide. On the other hand, increased use of automation and technology — key tools to achieve efficiency — are they vulnerable to disruption. Cities are responsible for protecting their citizens from pollutants, diseases and destructive storm surges that can be difficult to anticipate. Urbanization causes further demand for drinking water and sanitation, while increasing impermeable areas that can contribute to flooding. As a result, many cities are struggling and many more are vulnerable.

ENERGY SUSTAINABILITY

Sustainable energy is a form of energy that meets our today's demand of energy without putting them in danger of getting expired or depleted and can be used over and over again. Sustainable energy should be widely encouraged as it does not cause any harm to the environment and is available widely free of cost. All renewable energy sources like solar, wind, geothermal, hydropower and ocean energy are sustainable as they are stable and available in plenty. Sun will continue to provide sunlight till we all are here on earth, heat caused by the sun will continue to produce winds, the earth will continue to produce heat from inside and will not cool down anytime soon, movement of earth, sun and moon will not stop, and this will keep on producing tides.

The process of evaporation will cause water to evaporate that will fall down in the form of rain or ice which will go through rivers or streams and merge in the oceans and can be used to produce energy through hydropower. This clearly states that all these renewable energy sources are sustainable and will continue to provide energy to the coming generations.

There are many forms of sustainable energy sources that can be incorporated by countries to stop the use of fossil fuels. Sustainable energy does not include any sources that are derived from fossil fuels or waste products. This energy is replenishable and helps us to reduce greenhouse gas emissions and causes no damage to the environment. Fossil fuels are not considered as sustainable energy sources because they are limited, cause immense pollution by releasing harmful gases and are not available everywhere on earth. Fossil fuels normally include coal, oil and natural gas. Steps must be taken to reduce our dependency on fossil fuels as pose dangerous to the environment. Most of the counties have already started taking steps to make use of alternative energy sources. As of today, around 20% of the world's energy needs come from renewable energy sources. Hydropower is the most common form of alternative energy used around the world.

During ancient times, wood, timber and waste products were the only major energy sources. In short, biomass was the only way to get energy. When more technology was developed, fossil fuels like coal, oil and natural gas were discovered. Fossil fuels proved a boon to mankind as they were widely available and could be harnessed easily. When these fossil fuels were started using extensively by all the countries across the globe, they led to the degradation of the environment. Coal and oil are two of the major sources that produce a large amount of carbon dioxide in the air. This led to an increase in global warming.

Also, few countries have held on these valuable products, which led to the rise in the prices of these fuels. Now, with rising prices, increasing air pollution and the risk of getting expired soon forced scientists to look out for some alternative or renewable energy sources. The need of the hour was to look for resources that are available widely, cause no pollution and are replenishable. Sustainable Energy, at that time, came into the picture as it could meet our today's increasing demand for energy and also provide us with an option to make use of them in the future also.

Panellist No. 2

Name: Dr.R.P.Dhanya	
Designation: Assistant Professor and Head, Dept of Microbiology, NI College of Arts and Science, Kumaracoil.	
Credential in Brief: Working as Assistant Professor since 2004. Area of research- Diversity and molecular characterization of Potential estuarine actinomycetes. Serving as coordinator in Kumari Ariviyal Peravai since 2017.	

Excerpts of deliberation:

LIVELIHOOD SUSTAINABILITY

A livelihood is sustainable when it can cope with and recover from the stresses and shocks and maintain or enhance its capabilities and assets both now and in the future without undermining the natural resource base. The sustainable livelihoods approach is a way of thinking about the objectives, scope, and priorities for development activities. It is based on evolving thinking about the way the poor and vulnerable live their lives and the importance of policies and institutions. The objective of the Sustainable Livelihood Program is to reduce poverty and inequality by generating employment among poor households and by moving highly vulnerable households into sustainable livelihoods and toward economic stability. How do you create a sustainable livelihood?

- ✓ Promotion of Community Based Institutions. ...
- ✓ Capacity Building of Community Based Institutions. ...
- ✓ Sustainable Agriculture. ...
- ✓ Natural Resource Management. ...
- ✓ Employment Generation. ...
- ✓ Collective Marketing/ Enterprise Promotion. ...

Panellist No. 3

Name: Dr.A.Helen Sonia	
Designation: H.O.D., & Vice Principal Dept. of Pharmaceutics, S.A.Raja Pharmacy College, Vadakkangulam, Tirunelveli District	
Credential in Brief: Best poster award:2; Paper published:7 As resource person/invited speaker in seminars:24 Project guided:8; Teaching experience: 13 years, Scientist in institutional animal ethical committee, Area of research- Formulation Development and evaluation of proniosomes for anti-viral drugs.	

Excerpts of deliberation:

ECOLOGICAL SUSTAINABILITY

Ecological sustainability includes everything that is connected with the Earth's ecosystems. Amongst other things, this includes the stability of climate systems, the quality of air, land and water, land use and soil erosion, biodiversity (diversity of both species and habitats), and ecosystem services (e.g. pollination and photosynthesis).

Ecological Sustainability improves the quality of our lives, protects our ecosystem and preserves natural resources for future generations. ... Going green and sustainable is not only beneficial for the company; it also maximizes the benefits from an environmental focus in the long-term. How do you achieve ecological sustainability?

- ✓ Save energy. By using less energy, you can help to reduce carbon emissions. ...
- ✓ Eat less meat. ...
- ✓ Use reusable alternatives.
- ✓ Use renewable energy. ...
- ✓ Recycle and reuse. ...
- ✓ Grow your own produce. ...
- ✓ Donate unused items.

CLIMATE SUSTAINABILITY

Current decade is critical for climate, people and nature. Climate change is one of the most challenging issues ever faced by humanity. If we don't act quickly to deeply transform our societies, future generations will be affected by irreversible impacts. "Sustainability" in conversations about climate change—as in a "sustainable economy," or a "sustainable energy system." In the context of climate change, this usually means changing our energy, transportation and other systems so that they don't contribute to warming the planet.

It is now universally recognized that human-induced climate change could have major adverse consequences for the world's ecosystems and societies. Climate change is caused by the emission of greenhouse gases, which trap long-wave radiation in the upper atmosphere and consequently raise atmospheric temperatures. This also produces other changes in the climate system. Carbon dioxide is the most important of these gases and its atmospheric concentration has increased exponentially since the beginning of the industrial revolution as a result of fossil fuel combustion and land-use change. In 1800, the atmospheric concentration of carbon dioxide was about 280 parts per million; today it is about 350 ppm and rising. Similar increases have been observed for other greenhouse gases such as methane and nitrous oxide.

Most 'solutions' to combating the effects of climate change usually focus on restricting emissions of greenhouse gases such as carbon dioxide. However, such policies intended to tackle climate change through restrictions on greenhouse gases are almost certainly not sustainable – they bear significant costs and have minimal impact on the climate and will most certainly bring about poverty, making it more difficult for the poor to adapt to climate change. Meanwhile, foreign aid to poorer countries targeted at technological adaptation is unlikely to do anything to prevent problems in the future and may even be counterproductive.

Indeed, attempting to control climate change through global regulation of emissions alone will not work or could be counterproductive. Sustainable development is the way forward and can only be led by government and come through the adoption of institutions which enable people to engage in activities that generate wealth and lead to technological progress and innovation.

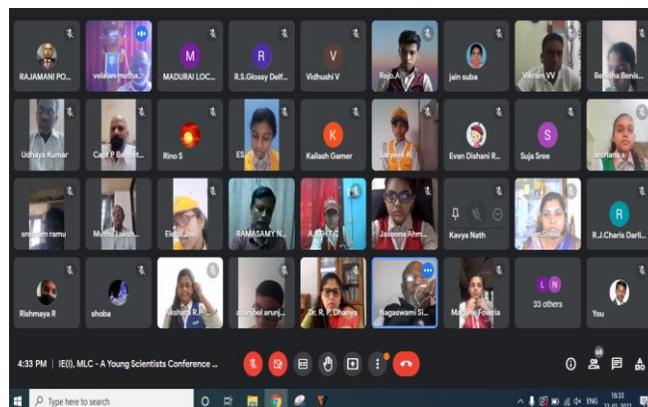
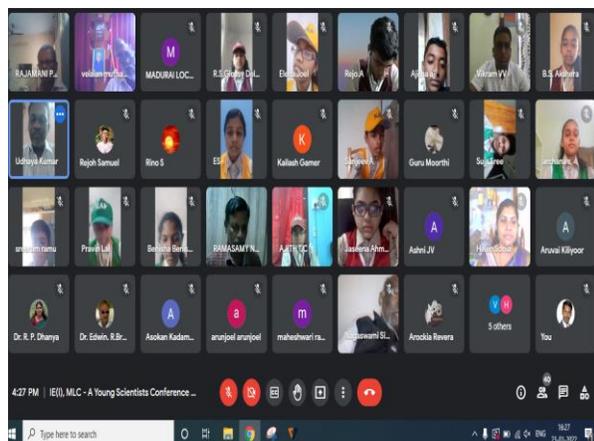
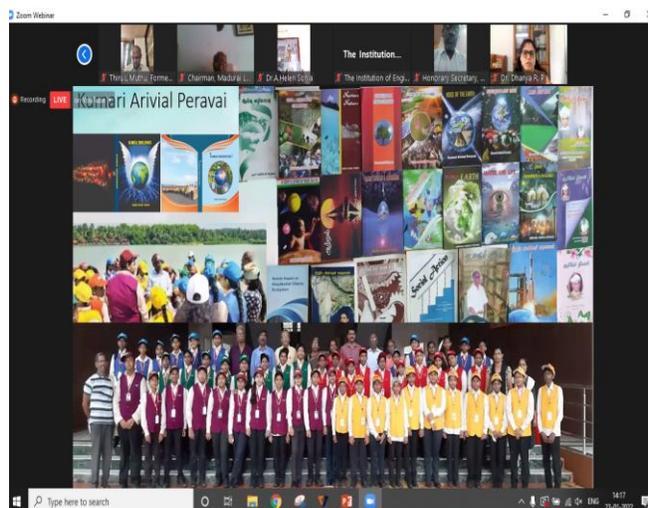
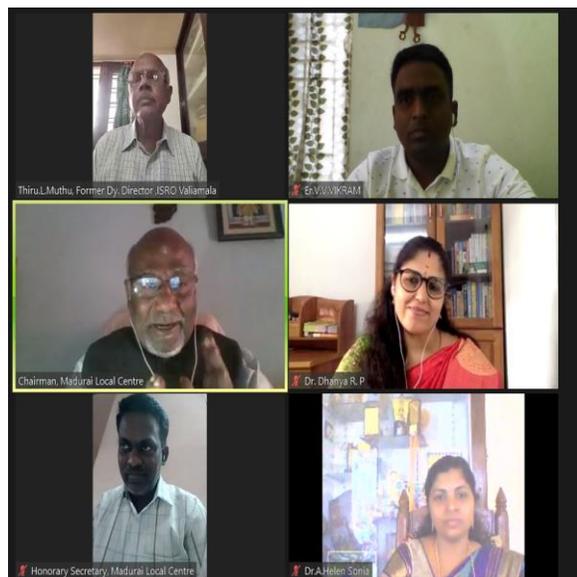
Comments of Moderator and Recommendation:

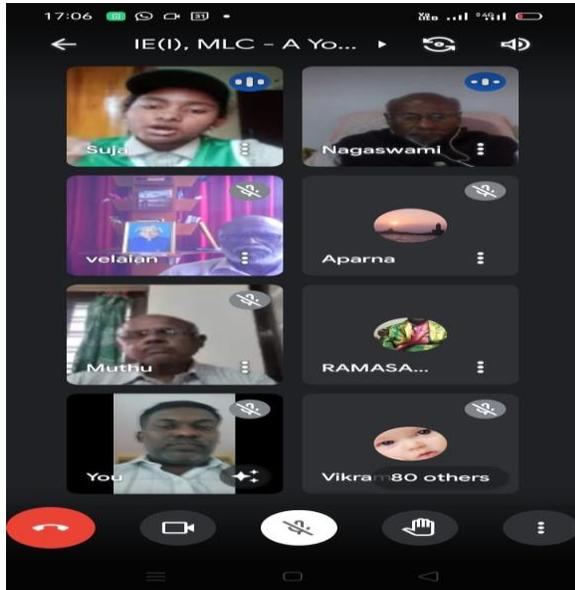
Er. L. Muthu, Moderator summarized all the statistical data and elaborate studies delivered by the three Panel members. He recommended to give first priority to Water Sustainability which is need of this hour

Extract of Vote of Thanks by Honorary Secretary, Host Centre:

Mr. Kingshuk Sen, Assistant Director (Technical), IEI HQ, provided all technical support and guidance for the smooth conduct of Webinar. Dr. P. Udhayakumar, Hon. Secretary, IEI/MLC delivered Vote of thanks.

Name of Centre :		Madurai Local Centre	
Title of Activity:		One Day Conference on “SUSTAINABLE LIFE”	
Date:	23.01.2022	Venue:	Through Online Google Meet at 4.30 PM To 6.30 PM






The Institution of Engineers (India)
Madurai Local Centre
 &
KUMARI ARIVIAL PERAVAI YOUNG SCIENTIST 2021-2022
 Cordially invite you for a Young Scientists Conference on 23rd January, 2022
 at 4.30 P.M through Google Meet on the Topic:
“SUSTAINABLE LIFE”

Panelists			Moderator
			
Er. V.V. Vikram Dy. General Manager, Schneider Electric India Pvt. Ltd., Coimbatore	Dr. R.P. Dhanya Assistant Professor and Head, Dept. of Microbiology, NI College of Arts and Science, Kumaracoil.	Dr. A. Helen Sonia H.O.D., & Vice Principal Dept. of Pharmaceutics, S.A. Raja Pharmacy College, Vadakkangulam	Er. L. Muthu Former Dy. Director, ISRO Valiamala
Dr. N. Sivasubramanian, FIE., Chairman, IEI/MLC	Dr. P. Udhayakumar, FIE., Hon. Secretary, IEI/MLC	Speakers & YOUNG STUDENTS SCIENTISTS	
		Mullanchery M. Velaian Organizer, KAP	

Google Meet: <https://meet.google.com/ayw-hqaa-tyu>

Young Scientist Conference on SUSTAINABLE LIFE

The Institution of Engineers (India), Madurai Local Centre in association with Kumari Arivial Peravai organized a Young Scientist Conference on SUSTAINABLE LIFE through online mode held on 23.01.2022 at 4.30pm to 6.30 pm. through Google Meet. Total No. of Participants: 94

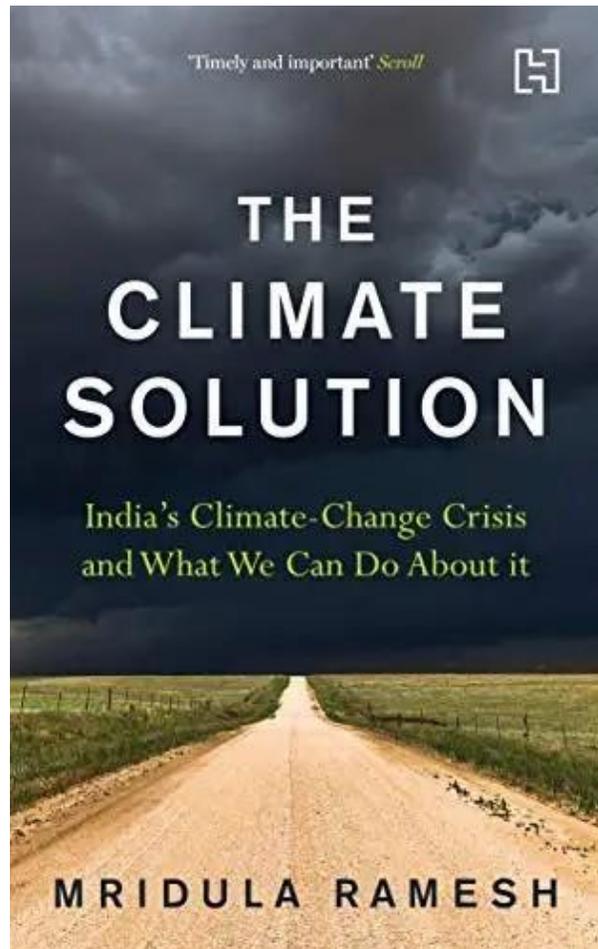
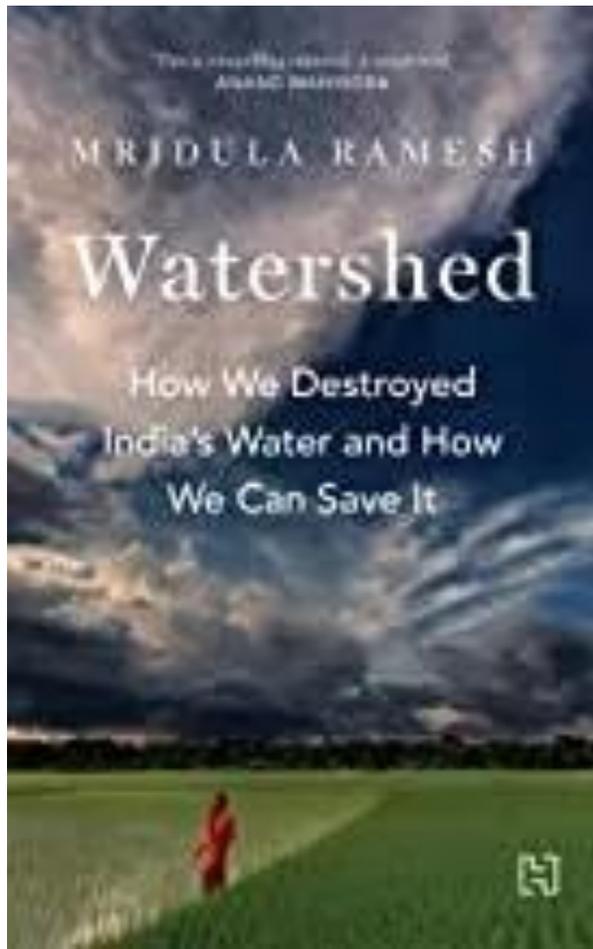
Dr. N. Sivasubramanian, Chairman, The Institution of Engineers (India), Madurai Local Centre delivered the welcome address and also highlighted the importance of 17 Sustainable Development Goals. Mullancherry M. Velayan, Organizer, Kumari Arivial Peravai presided over the Conference. Er.V.V. Vikram, Deputy General Manager, Schneider Electric India Pvt Ltd, Coimbatore, Dr. R.P. Dhanya, AP & Head / Department of Microbiology, NI College of Arts and Sciences, Kumaracoil, Dr. A. Helensonia, HOD and Vice Principal, Department of Pharmaceutics, SA Raja Pharmacy College, Vadakkankulam, Tirunelveli was act as panellist members. Er. L. Muthu, Former Deputy Director, Indian Space Research Organization, moderated the conference.

Young scientist Ms. R.A. Abarna compered the event. Young scientists Ms. M.S. Anushree and Ms. S. Archana presented on Ecological Sustainability, Young scientists Ms. S. Jaseena and Ms. M. Magline Fouzia presented on Water Sustainability, Young scientists Mr.B.H. Harinandanar and Ms. A. Anjana Varsha presented on Energy Sustainability, Young scientists Ms. S. Rino and Ms. R.P. Akshara presented on Livelihood Sustainability and Young scientists Ms. P. Elena Joel and Mr. A. Sanjeev presented on Climate Sustainability.

Kumari Arivial Peravai Coordinators Mr. Sunilkumar, Mr. Johnrabhikumar and Mr. Johnson participated. e-participation Certificate was given to all the Participants.

Prof. Dr. P. Udhayakumar, Hon. Secretary, The Institution of Engineers (India), Madurai Centre delivered vote of thanks.

Two New Books added in our Library at IEI / MLC



Latest News:

First 3D Printed House at IIT Madras

The 600 square feet single-story house has been constructed using indigenous concrete 3D printing technology and in collaboration with Habitat for Humanity's Terwilliger Center for Innovation in Shelter. Using this technology, a house can be built in five days

Finance Minister Nirmala Sitharaman on April 27, 2021 inaugurated India's first 3D printed house at the Indian Institute of Technology (IIT) Madras campus. The house has been constructed by Tvasta Manufacturing Solutions, a startup founded by IIT Madras alumni, which is a part of the new incubator of the Ministry of Housing and Urban Affairs (MoHUA) established at IIT Madras.

Tvasta Manufacturing Solutions, a deep tech startup founded by three alumni of IIT Madras in 2016, has created history by constructing India's first 3D-printed house. Constructed on campus with a built-up area of about 600 square feet, this single-storey home consists of a single bedroom, hall and a kitchen.

Tvasta's 'Concrete 3D Printing' is an automated manufacturing method for constructing three-dimensional real-life structures at all realizable scales. The technique utilizes a concrete 3D Printer which accepts a computerized three-dimensional design file from the user and fabricates a 3D structure in a layer-by-layer manner by extruding a specialized type of concrete specifically designed for the purpose.

The 'Concrete 3D Printing' technology employed has multiple advantages:

- ✓ Potentially reduces overall construction cost significantly
- ✓ Order of magnitude difference in overall construction time
- ✓ Brings down the related carbon footprint
- ✓ Increases productivity of labour involved
- ✓ Offers raw material flexibility/utilization of eco-friendly materials

3D Printing technology is built to bring digital technological advantages to the realm of construction. The focus is to make the process available to all sections of the construction industry, including affordable housing and large-scale infrastructure building. The reduction in overall time required for construction involves an order of magnitude change. What would require months to build can be built in days. Currently, the capability is to print the superstructure of a house that would require 4 to 5 months to build conventionally in about

5 days. The technology has also been designed in such a way that it is sustainable and green. The material used contains industrial waste and recycled material. This reduces the overall carbon footprint of the structure during construction.

But the technology goes beyond that. The houses built using 3D Printing are customised for geographical and climatic conditions that exist in an area. As a result, any additional heating or cooling requirements—mostly cooling in India—are very minimal for the structure. This will ensure that the energy consumption of any structure that is built will be very minimal.



Inside India's First 3D Printed House at IIT Madras Campus.

How does 3D Printing reduce construction cost and save time?

The cost reduction is achieved by increasing the productivity of workers who are involved in the construction process. A structure that would take months to build can be done in a matter of a few days; this contributes to tremendous savings on the time and cost of capital. There is also a saving on the amount of material used as 3D Printing reduces wastage and the total amount of material required to build a structure. The saving on time is primarily brought in by the employment of robotics and automation technologies.

Construction is one industry where precision automation has still not taken root, unlike the automotive industry. Through the actions of a 3D Printer that can receive instructions to build a large-scale structure in the form of a 3D Virtual file, a large-scale structure can be built without formwork or molds in a very short period through layer by layer manufacturing.



Outside India's First 3D Printed House at IIT Madras Campus.



Printing Process

Advanced Battery technologies for Electric application to power clean energy

Dr.N.Sivasubramanian, FIE

The battery technology is marching towards a rapid growth for clean powered electric applications. In the international scenario, there are four types of battery are in use: lead acid, Lithium –ion, nickel-metal hydride and Vanadium ion battery. While lead acid and Lithium –ion batteries are abundantly in use, several other technologies like Vanadium redox, metal-air, metal-ion and liquid metal batteries are being explored. The factors concerning clean battery technology are energy density (charge per unit area), cost, safety(health impacts, flammability and explosiveness) and sustainability.

The limitations of using Lithium –ion battery are like expensive, availability of lithium ore rarely and moderate energy density to the order of 100-265 Wh per kg. Advances in high energy material technology have resulted Sodium-ion batteries as a potential candidate. Sodium is available in abundance compared to lithium and safer too, but it has low energy density of 140 Wh per kg.. But sodium –ion battery also uses organic electrolytes that are flammable.

There is an attractive development happening and being realised in the battery technology for electric vehicles namely Aluminium-air batteries since Aluminium ore is available in India adequately .Similarly, research on multi ion based metal technology for energy storage devises are also coming up in big way. Vanadium redox flow batteries, a type of electrochemical cell battery where energy is generated through the pumping of dissolved vanadium.

As the technology of manufacturing and development of special materials are racing up to meet high energy storage devises at affordable cost, and with less hazardous nature are on the anvil for sustainable future eliminating carbon emission.

A comparison chart of different configured batteries is given in the chart below.

Courtesy: Down to Earth Feb22 issue

POWER PLAY

The myriad energy applications may require different battery types, resulting in a technology mix in the market

Lithium-ion

Both cathode and anode contain lithium. When the battery is charging, the cathode releases lithium ions to the anode. The reverse happens during discharge

SUSTAINABILITY
Lithium is only found in a few regions and requires mining



Sodium-ion*

While the battery is charging, sodium atoms in the cathode release electrons towards the anode, which has hard carbons. The reverse happens during discharge

SUSTAINABILITY
Sodium is found globally, mined from seabeds or soda ash



Aluminium-air#

The batteries use the oxidation of aluminum at the anode and reduction of oxygen at the cathode to generate electrical currents. These batteries cannot be recharged

SUSTAINABILITY
Aluminium is extracted from bauxite found in many regions



Multi-ion#

Parallel flow of positive and negative ions from the anode to the cathode, and vice versa, generate electricity during discharge. Reactions are reversed while charging

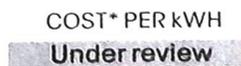
SUSTAINABILITY
Raw materials used vary across regions



Liquid-metal#

The liquid metal-calcium alloy cathode and antimony anode are separated by a calcium chloride electrolyte. The setup is heated to 500°C, calcium ions travel and generate power

SUSTAINABILITY
Raw materials used vary across regions



Vanadium redox flow#

Both cathode and anode have vanadium dissolved in water. The solutions are pumped into a fuel cell stack, where vanadium changes oxidation state during charge/discharge

SUSTAINABILITY
Vanadium is naturally found in 65 minerals in several regions



Note: *Costs estimated in relation to current costs of lithium-ion batteries * information on sodium-ion batteries from Faradion, aluminium-air from Phinergy, multi-ion from Gegadyne Energy, liquid-metal from Ambri and vanadium redox flow from Invinity
Sources: Company websites, scientific studies, expert comments

Forth Coming Events:

1. A Technical Lecture Meeting on “Madurai Smart City” is scheduled on 03.02.2022 at 6.00pm through online mode.
2. 11th EC Committee Meeting is scheduled on 12.02.2022 at 6.00pm through online mode.
3. A Technical Lecture Meeting on “Sustainable Energy Storage Devices for Electric Utilities” is scheduled on 12.02.2022 at 6.00pm through online mode.
4. A Technical Lecture Meeting on “The United Nations decade of ocean science – Role of Engineers” towards National Science Day Celebration is scheduled on 28.02.2022 at 11.00am through online mode.
5. A Technical Lecture Meeting towards World Engineering Day is scheduled on 04.03.2022 at IEI / MLC, 6.30pm
6. A Technical Lecture Meetings towards World Water Day is scheduled on 22.03.2022 at IEI / MLC, 6.30pm.



EDITOR:

**Dr.P.UDHAYAKUMAR, F.I.E.,
HON. SECRETARY**

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