

CIGRE NGN Forum

31st August 2022

Room 352B, 11:00 – 14:00



cigre

For power system expertise

Host

Aditie Garg (US)

Speakers

Stefie Cray (DE)

Siva Kaviya, Trichy Siva Raman (UK)

Li Yang (BE)

Bogdan Leu (RO)

Harish Krishnappa (NE)

Ana Lovrenčić (SL)

Mike Heyeck

Arshad Mansoor

Agenda

Time	Description	Presenter(s)
11:00	Introduction to NGN Forum	Aditie (US)
11:15 – 11:20	NGN Overview	Stefie, NGN IEC Chair (DE)
11:20 – 12:00	NGN Presentation (5 min. each) + 15 min. Q&A	NGN UK NGN Belgium NGN Romania NGN Netherlands NGN Slovenia
	5 min. extra time	
12:05 – 12:25	Talk/Q&A Session with CIGRE Steering Committee Member	Mike Heyeck (CIGRE VP Finance)
	5 min. extra time	
12:30 – 1:00	Invited Speaker 15-20 min. speech 10 min. Q&A	Arshad Mansoor (CEO, EPRI)
	10 min. extra time	
1:10 – 1:40	NGN Speed Networking Breakout Session	NGN Volunteers



Sparkup Code



Access to the NGN online Q&A system

Direct link to group Q&A pages
<https://cigregrroups.org/x/uQs3Cg>



Space name: Spontaneous Contribution

Use your Laptop or Tablet with a standard HTML5 browser such as Chrome/Firefox/Safari/Edge.

Internet Explorer may cause difficulties.

Select "desktop view mode" if using a Smartphone.

- Existing KMS Group Users
 - Login as normal
 - Set the eye-icon <<Watch all content for this Space>>
- Guest Users
 - Username: ngn
 - Password: hertz
 - Access will be revoked by 2022-Oct-01

Forgot your Username/Password
UMS: <https://admin.cigregrroups.org/>



About our KMS:
<https://cigre.tiny.us/ycktd9w3>



Cigre's Next Generation Network (NGN)

A professional network for engineers studying or in the early stages of their career in the power industry



What is the NGN?

“the gateway for young professionals and students into Cigre”

- Facilitate involvement of young members in Cigre
- Personal and professional development for members
- Support the local National Committees and Regular Members

What is the NGN International Executive Committee (IEC)?

Official organisational body to coordinate and lead all international NGN activities throughout Cigre

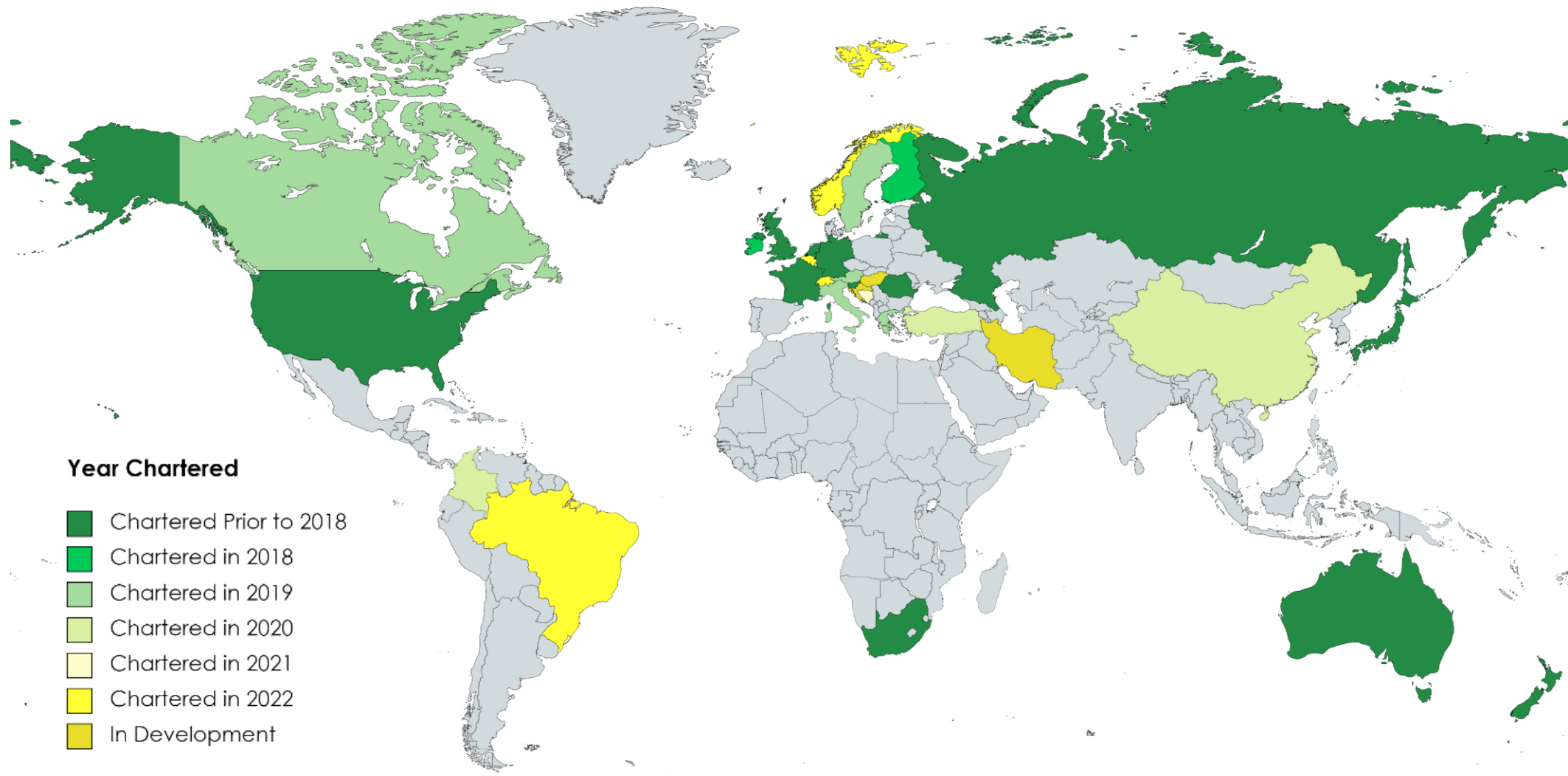
- Official contact between organizational bodies of Cigre and the national NGN groups.
- Support National Committees in set up of new NGN groups
- Chair has seat on Cigre Steering committee

CHAIR: Stefie CRAY (DE)
VICE-CHAIR: Stan EROSHENKO (RU)
SECRETARY: Anthony GIACOMONI (US)



Current NGN Groups:

1. Australia
2. Austria
3. Belgium
4. Bosnia & Herzegovina
5. Brazil
6. Canada
7. China
8. Colombia
9. Croatia*
10. Denmark
11. Finland
12. France
13. Germany
14. Greece
15. Hungary*
16. Iran*
17. Ireland
18. Italy
19. Japan
20. Netherlands
21. New Zealand
22. Norway
23. Romania
24. Russia
25. Slovenia
26. South Africa
27. Sweden
28. Switzerland
29. Turkey
30. United Kingdom
31. United States



*In Development

NGN IEC Lead Positions for activities and initiatives

Special Announcement!

Organisation:

Chair: Stefie Cray

Vice Chair: Stanislav Eroshenko

Secretary: Anthony Giacconi

Technical & Organisational

Paris Session

Marketing & Comms (*MarCom*)

NGN Showcase

Study Committee Collaboration

Task Force:
„How can we speed up the Energy Transition?“

NGN Group Constitution (template for new groups)

International Task Force for Paris Co-ordination

Overall MarCom Lead

Website

Webinar Programme

Social Media (Linked In, Instagram)

Women's Network Rep

Lead*

Main point of contact and responsible for deliverables

US

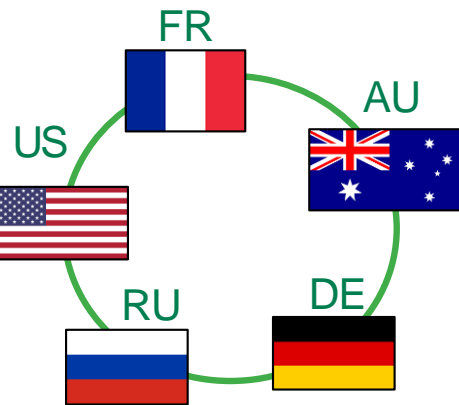


1 lead per SC (Anthony co-ordinating)

DE



IE



RU



UK



IR



IT



Support*

Active support in activity. Multiple groups can volunteer to support each activity

CN



SE



IE



JP



JP



*Lead and Support roles currently allocated per country and refer to the two official representatives of this country's NGN group, as listed on the KMS.

Incoming NGN Chair & Vice Chair: Paris 2022 - 2024

Congratulations to Phil and Anthony for being elected into the positions of Chair and Vice Chair!
We wish you all the best in your new roles 😊

CHAIR



Phil Coughlan (AU)

VICE-CHAIR



Anthony Giacomoni (US)

We are looking for a new Secretary for the NGN IEC!

SECRETARY



Could this be you??

We are looking for a new Secretary for the NGN IEC!

Role & Responsibilities

- Critical support to the NGN Chair and Vice Chair
- Organisation of bi-monthly NGN IEC meetings (virtual) including preparation of agenda together with Chair
- Support in Paris preparations and other events as required
- Key contact point between NGN IEC and Central Office
- Point of contact for NGN Chairs from the international groups
- Time commitment varies, typically a few hours per week for calls / organisation

SECRETARY



Could this be you??

Why take on the role?

- Build your international network & gain strong visibility amongst senior levels within Cigre
- Develop your organisational and leadership skills
- Work with a great team
- Gain a deep understanding of the inner workings of Cigre
- Make a difference to the future of Cigre and the NGN!

Prerequisites?

- We are looking for a motivated young professional to bring enthusiasm and new ideas to the team
- No prior experience needed, you are also here to learn!

14:00 : NGN IEC Meeting

Room 252A- 14:00 – 15:45

*Prior to Opening Ceremony.
Meeting is open to all NGN
Members to observe in person.*

10:00 : NGN Technical Tour

Nanterre - 10:00 – 12:00

*Visit RTE Voltage Facility
Meet 8:30 in Palais des Congrès
Only for registered persons*

16:00 : Career Speaker #1

NGN Booth - 16:00 – 17:00

*Stewart BELL, Executive General
Manager, Powerlink Queensland*

14:00 : NGN Poster Session

NGN Booth - 14:00 – 16:00

*Poster authors available during this
time with opportunity for Q&A.*

16:00 : Career Speaker #3

NGN Booth - 16:00 – 17:00

*Olivier GRABETTE, Senior Executive
Vice President,*

Sunday
28 August

Monday
29 August

Tuesday
30 August

Wednesday
31 August



Thursday
1 September

Friday
2 September

08:00 : NGN Activities Briefing

NGN Booth 8:00 – 8:30
*Information about all activities
during the week*

08:00 : NGN Showcase

Room 352B: 8-11 & 14-15

10 minutes presentations followed by Q&A

11:00 : NGN Forum

Room 352B 11:00 – 14:00

*Meet with NGN members from around the
world*

16:00 Career Speaker #2

NGN Booth - 16:00 – 17:00

*Pascal DALEIDEN, Country Managing
Director, Hitachi Energy Germany AG.*

Wednesday Social Event

18:30 : Drinks at the Freedom Pub
20:00 : Dinner at Ziti's Italian
*Dinner for registered persons only, drinks
open for all*



CIGRE NGN Presentations

CIGRE UK NGN



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For power system expertise

Siva Kaviya, Trichy Siva Raman
United Kingdom



Biography – Siva Kaviya, Trichy Siva Raman



- **Currently: Junior Software Engineer, IPSA, TNEI, Manchester ,UK (July 2021 – Present)**
- **Masters: Intelligent Electrical Power Grids(IEPG), TU Delft ,Netherlands (August 2018 – Dec 2020)**



Expertise:

- Developing software tools in the realms of power system in the domains of data integration, energy integration, analysis modules and scripting
- Other areas of expertise include smart grids, IOT based communication for power systems, demand side congestion management



Introduction – The Team



Zhou Yue



Jianing Li



Jiajie Luo



Qinghua Han



Angeliki Loukatou



Melike Ayaz



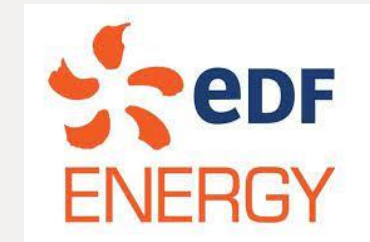
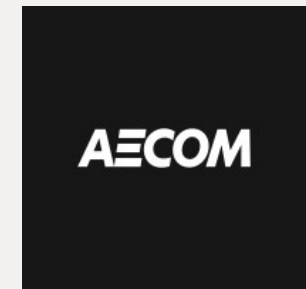
Margi Shah



Max McFarlane



Jesus Valdivieso



Introduction – The Team



Jingyi Wan



Asimina Frosinou



Anita Aliu



Qiteng Hong



Stefan Borozan



Siva Kaviya, Trichy Siva Raman



Ying Xue



Victor Timmers



Maria-Irina Oancea



Overview of CIGRE UK NGN

UK NGN started – 2007

NGN UK Members:

- Active Student Participation (112)
- Individual Participation (78)
- Total NGN Members until June 2022 – 190

CIGRE UK NGN 2022 YM Showcase 24th Jan 2022

- 3 Winners nominated for NGN Paris Showcase

Nominees - Dr Angeliki Loukatou, Dr Ying Li and Mr. Christian Pößniker



Online Technical Webinars in 2021/2022

1. 21st July 2022, The Changing Electricity Market : UK & AU perspectives in collaboration with CIGRE AUS NGN
2. 1st July 2022, Innovation and Creativity Event
3. 05th May 2022, Clean Technologies & Energy Storage, CIGRE UK NGN in collaboration with CIGRE Romania NGN
4. 01st February 2022, Offshore Wind Development towards a Net Zero World, CIGRE UK NGN in collaboration with CIGRE France NGN
5. 27th January 2022, Cutting Edge Technology towards Net Zero World, CIGRE UK NGN in collaboration with CIGRE AUS NGN.
6. 3rd December 2021, Grid Forming Technologies for the Net Zero Power Network , CIGRE UK NGN in collaboration with CIGRE B4 Study Committee
7. 26th October 2021, Women In Energy, Diversity Inclusion Event, CIGRE UK NGN in collaboration with Italy
8. 12th October 2021, Opportunities and Challenges for HVDC and Power Electronics in the UK, in collaboration with CIGRE B4 Study Committee
9. 9th June 2021, Net Zero in the UK and China – Challenges and Opportunities, in collaboration with CIGRE NGN China
10. 29th March 2021, Impact of COVID on Electrical Power Systems, in collaboration with CIGRE NGN Netherlands



Mentoring Scheme

- 7 Mentors & 14 Mentees – started in 2021
- Reiterate the scheme again to find more mentors and mentees in September

Upcoming Events

- Manchester HV Lab Site Visit (19th September)
- Collaborative Event with CIGRE B4 (under planning)

- LinkedIn page - <https://www.linkedin.com/company/cigre-uk/>
- Twitter - <https://twitter.com/cigreukngn>
- Newsletter subscription - <https://cigre.org.uk/ngn/>

CIGRE NGN Presentations

CIGRE Belgium NGN



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Li Yang
Belgium



The Belgian NGN at a Glance

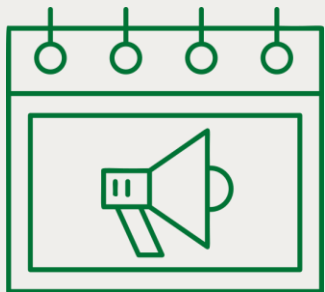


Launched end March 2022!



SteerCo – interim-**4 members**

Events 2022-**3+**

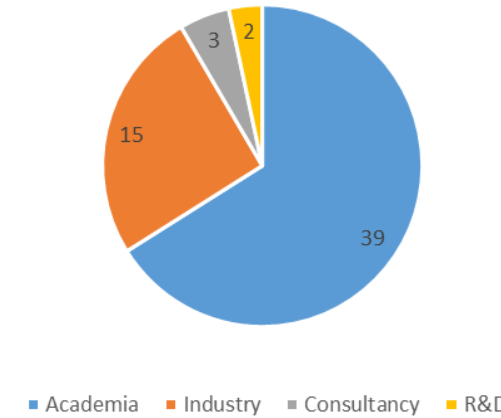


Membership **65**

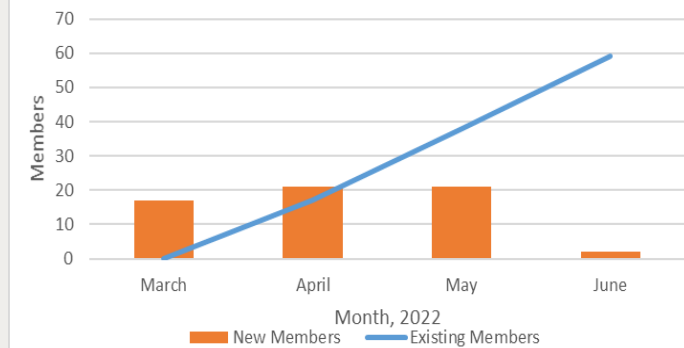


Students – **39**
Cigré YM – **26**

NGN BE Membership Breakdown by Sector



BE NGN Members by Month



Acting Steering Committee



Acting Chair
Li Yang



Acting Event Lead &
Treasurer
Geraint Chaffey



Acting Technical Lead and
Academic Liaison Officer
Adedotun Agbemuko

Acting Co-Chair
Willem Leterme



Highlights from First Event-Presentation Competition



Progress and Outlook



- Administrative preliminaries to initial set up
- First events to gather interests
- Set up of interim ex. committee and draft constitution
- Recruitment drive for first members
- Proposals for initial event calendar
- Registration of members
- First events
- Recruitment drive for first members
- Proposals for initial event calendar
- Registration of members
- First events
- More events to foster collaboration
- Industrial visits
- Proposals for participation in elected committee
- Voting
- First year with elected ex. committee

CIGRE NGN Presentations

CIGRE Romania NGN



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For power system expertise

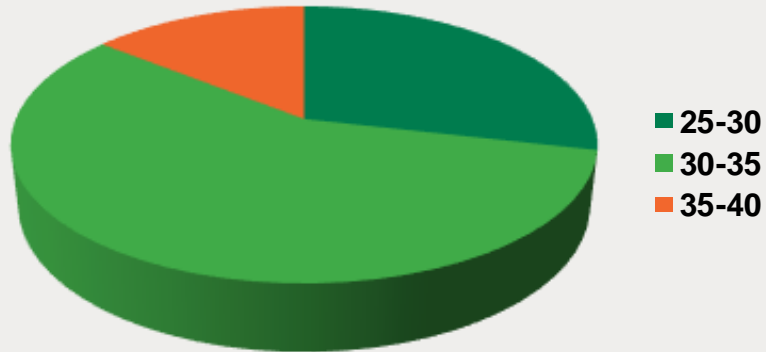
Bogdan Leu
Romania



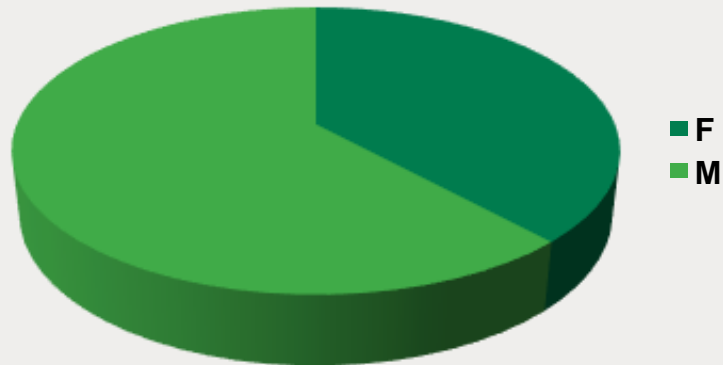
Introduction

25 members, where:

NGN Romania Members Age



NGN Romania Members Gender Balance



NGN Romania has been founded in 2015 at the initiative of our former Chair, Mihai Marcolț after attending the CIGRE Paris NGN Booth.



New Steering Committee starting with May 2022

Chairman:

Bogdan Leu

Power systems expert
CNTEE Transelectrica SA
bogan.leu@transelectrica.ro



Vice-Chairman:

Teodor Diaconu

Cabinet Adviser for Secretary of State
Ministry of Energy, Romania
diaconuteodor@gmail.com



Secretary:

Anamaria Iamandi

Principal Engineer
CNTEE Transelectrica SA
anamaria.iamandi@transelectrica.ro



2021-2022 Highlights

EVENT 1 :

CMDM 2021 – CIGRE Romania Conference on Condition Monitoring, Diagnosis and Maintenance (6th edition)

NGN Romania's members shared their vision regarding power systems challenges in the context of energy transition



Joint webinar organized by
CIGRE NGN United Kingdom and NGN Romania
Clean Technologies and Energy Storage

Thursday, 5th May, 2022

CIGRE Next Generation Network

The Next Generation Network (NGN) seeks to facilitate a successful transition into the power systems industry for **early career professionals and students** by providing technical resources and networking opportunities for personal and technical development.

CIGRE NGN UK and CIGRE NGN Romania would like to invite to a webinar where four top speakers will present current research activities regarding the contribution of clean technologies and energy storage on modern power networks.

Date and Time: 5th May 2022, 11:00 – 13:00 (BST)

Platform: CIGRE WebEx

Agenda: 11:00 – 11:10 (BST) Introduction of CIGRE NGN Romania & UK
11:10 – 11:30 Speech I by Mihai Sandulescu
11:30 – 11:50 Speech II by Dipti Singh Chakravorty
11:50 – 12:10 Speech III by Petru Ruset
12:10 – 12:30 Speech IV by Angeliki Loukaki
12:30 – 13:00 Round table discussion

Registration: <https://www.eventbrite.co.uk/c/clean-technologies-and-energy-storage-ngn-uk-ngn-romania-collaborative-tickets-318437433937>

Join Us NGN Romania Signup: Please contact Bogdan Leu at bogdan.leu@cigre.ro
NGN UK Signup: <https://www.eventbrite.co.uk/c/clean-technologies-and-energy-storage-ngn-uk-ngn-romania-collaborative-tickets-318437433937>
For inquiries please contact Yue Zhou at zhouyue@cigre-uk.org

Speech I – Hydrogen storage as an energy bridge between seasons
The presentation describes a typical case study of renewable energy production during year seasons, providing a view regarding the need for inter-season storage. Hydrogen and CH4 are seen as the main candidates for such season-bridges. The presentation develops the subject and gives possible solutions for a combination of short- and long-term storage, by considering main storage technologies in combination with hydrogenated solutions.

Dr. Mihai Sandulescu received his M.Sc. degree in electrical engineering and Ph.D. in smart systems for power networks, from the Polytechnic Institute of Bucharest. Mihai worked at the Energy Research and Metering Institute KIMENERG Bucharest in various positions. Mihai has various activities in the electrical energy sector, including with companies such as Land&Sky for metering systems and Siemens for Power Supervision and Distribution. Mihai is currently Associate Professor in University POLITEHNICA of Bucharest, Department of Electrical Power Systems.

Speech II – Advanced tools for future systems
Introduction to an advanced planning and developed for the Electricity System Operator in Great Britain the tool is designed to enable probabilistic planning for boundary capability assessment using cutting-edge techniques, combining traditional power systems quality analysis with statistical and machine learning methods such as efficient sampling techniques, non-linear dimensionality reduction, neural reduction for dynamic equivalents and reinforcement learning.

Dr. Dipti Singh Chakravorty is a Principal Consultant, and he leads the Networks and Innovations team in E.ON, Manchester. He is an electrical engineer with over 20 years of experience in the power industry. He is involved in several innovations projects in the UK as a technical lead working closely with National Grid Electricity System Operator and several Distributors Network Operators.

Speech III – Climate neutral technologies for clean energy
The presentation will describe Siemens Energy's contribution to the energy transition through its projects that are implemented both in Romania and other countries in the region. By using products with low global warming potential, there will be a change in the upcoming years in how the modernizing projects of electrical substations, power lines and production units will look like and their impact on the environment.

Dr. Petru Ruset has more than 20 years of experience in the energy companies in Romania. He is currently the Managing Director of Siemens Energy and has joined Siemens in 2007 as Head of company's divisions related to the energy field. Between 1999 and 2007 he worked for the transport and distribution of electricity company REE, Transenercia and SMART, holding coordination and management positions.

Speech IV – Long-duration energy storage projects
The presentation will describe three different long-duration energy storage projects. UK is involved in. Specifically, focus will be given on lithium-based batteries co-located with renewable flow batteries and renewable sources, adiabatic compressed-air energy storage utilizing EDF's gas storage facilities and hydrogen stored in dual-phase cryogenic tanks, combined with fuel cells.

Dr. Angeliki Loukaki is a senior research engineer at EDF Energy UK R&D. She specializes in optimal valuation of energy storage co-located with renewables and long-term electricity price forecasting. She also helps the Wholesale Market Operations team regarding workflow automation of their forecasting tools. Previously she has worked at Energy Systems Catalyst and the University of Manchester.

EVENT 2 :

Clean Technologies and Energy Storage

Joint webinar organized by CIGRE NGN UK and Ro

Speakers from UK and Ro presented the contribution of clean technologies and energy storage on modern power networks

EVENT 3 :



WORKSHOP
"CIGRE, primul 100 de ani și rolul liniilor în tranziția energetică"

Date: 3 August, 2022
Locație: Centrul CAAPRIK, UPS – Sala conferințe, Etaj I
Organizator: CIGRE Next Generation Network Romania

AGENDĂ		
17:00-17:10	Opening Speech & Host	Bogdan Leu – Chairman, CIGRE Romania NGN
17:10-17:20	Mini CIGRE & CIGRE Romania	Ciprian Dăscălescu – Chairman, CIGRE Romania
17:20-18:00	How CIGRE is Promoting Energetică	Representative of major Companies Energetică din România
18:00-18:10	CIGRE Post-Session	Mihai Moroniș – Secretary, CIGRE Romania
18:10-18:20	CIGRE Study Committee	Lădu Constantin – SC M Working Group Member
18:20-18:30	Mini CIGRE HIGH CIGRE Romania NGN	Teodor Dăscălescu – Vice-Chairman, CIGRE Romania NGN
18:30-18:40	Call to action – membrii CIGRE Romania NGN & "next professionals"	Ana-Maria Văduva – Secretary, CIGRE Romania NGN
18:40-19:00	Q & A	



Workshop – "CIGRE, the first 100 years and the role of young professionals in the energy transition"

UPCOMING EVENTS :

RSEEC 2022 (6th edition) where NGN Romania will organize:

- The 3rd edition of the Next Generation Network Contest - Scientific paper contest for Bachelor, Master and PHD Students;
- NGN workshop on "S-E European Power Systems Challenges in the Green Energy Transition Context".

CIGRE Regional South-East European Conference RSEEC 2022 (6th edition)
Innovation for efficient and effective management, solutions for power systems of the future!

cigre Romania

18th - 20th October, "Gheorghe Asachi" Technical University | Iași | Romania | 2022

In cooperation with EPE 2022 (12th International Conference and Exposition on Electrical and Power Engineering, Iași, 2022)

⚡ NEXT GENERATION NETWORK CONTEST ⚡

PREMII IN VALOARE DE 10.000 LEI

COMPETIȚIE DE LUCRĂRI ȘTIINȚIFICE PENTRU STUDENȚI, MASTERANZI ȘI DOCTORANZI

AFLĂ MAI MULTE 

[HTTPS://RSEEC2022.ORG/COMPETITION/](https://rseec2022.org/competition/)



What is next?

Our goal is:

- To extend our international collaboration with other NGNs;
- To increase the diversity of members;
- To support early-career professionals by organizing technical and social activities;
- To develop partnerships with other energy organizations.



bogdan.leu@transelectrica.ro

CIGRE NGN Presentations

CIGRE Netherlands NGN



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Harish Krishnappa
The Netherlands



Overview



Next Generation
Network

Founded
2014

Our mission


















The Next Generation Network (Young CIGRE) supports young professionals in career development and introduction to CIGRE, regardless of their current job in the energy sector.

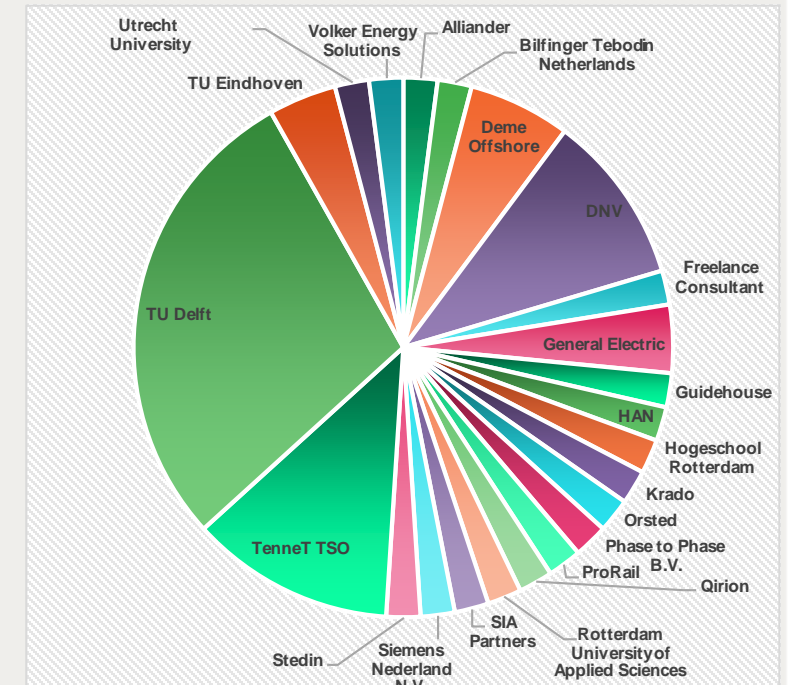
Our objectives

- To encourage active membership of CIGRE NGN both for the benefit of NGN members and the NGN group. → **NGN presentations (TUs)**
- To support/promote activities, such as technical visits, tutorials, and meetings for the CIGRE NGN. → **Teamday events**
- To organize appropriate CIGRE NGN networking events → **Matchmaking**
- To improve communication between CIGRE and NGN members → **NGN IEC + DB meeting**

Overview



<p>Chair</p>  <p>Harish Krishnappa</p> 	<p>Vice-Chair</p>  <p>Sanjay Ganeshan</p> 	<p>Secretary</p>  <p>Lakshna Kalpoe</p> 	<p>TU Eindhoven ambassador & board member</p>  <p>Tiago Elias Castelo de Oliveira</p> 	<p>TU Delft ambassador & Board member</p>  <p>Aleksandar Boričić</p> 
<p>Board members</p>  <p>Michalis Poikilidis</p>	 <p>Luis Hurtado</p> 	 <p>Massimiliano Longhin</p> 	 <p>Ioan Juravle</p>	 <p>Next Generation Network</p>



- 9 Board members (7 young professionals + 2 student ambassadors)
- 119 NGN subscribers (49 Individual CIGRE members)
- As of January 2022, no more collective membership for NGN members.
- 23 companies NL

Main activities



Teamday event
(Dive into the wind saga)
Borselle beta platform visit



Presentations at Universities
Networking event



Joint webinar event
(Webinar series)

Discussion about developments and investments driven and motivated by the global pandemic.



Teamday event
(Dive into the wind saga)
Offshore wind Symposium



Matchmaking event
(Signature annual event)
Networking event



CIGRE Session events
(bi-annual event)

Free-ticket presentations & NGN showcase

CIGRE NGN Presentations

CIGRE Slovenia NGN



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Ana Lovrenčič
Slovenia



NGN Slovenia

- Established in October 2014
- 35 young members
- Students and young engineers up to 33 years old
- Aim: to provide the ability to network with experts and possible employers, gain new experience and practical knowledge.



Benefits for young members:

- Participation on the national and international CIGRE conferences (participation, presenting a paper, voluntary work)
- Access to archive of papers, publications and brochures of NC Slovenia ,
- Participation on workshops and technical visits organized by NC Slovenia and NGN Slovenia.
- Attracting new members:
 - Every year presentations of NGN Slovenia for students on both universities in Slovenia (Ljubljana and Maribor)
 - Invited lectures for students organized by NGN Slovenia



Activities 2021/2022

- Part of CIGRE International Executive Committee (IEC) NGN
- **Slovenian National CIGRE conference 2021:**
 - possibility of free registration,
 - voluntary work in organizing committee
 - Young members competition for the best paper
- **Annual Bedjanič award 2021:**
 - respectable student's award for best doctoral and master theses,
 - up to year 2021, all together have been granted 300 awards.
- **International Symposium Ljubljana 2021:**
 - on the 100th anniversary of the first CIGRE conference
 - NGN members had the possibility of free participation and volunteering in the LOC
- **SEERC Vienna 2022:**
 - Paid registration for NGN Slovenia members
 - Cooperation with NGN Austria on NGN booth and NGN panel





THANK YOU FOR YOUR ATTENTION!



NGN Slovenia



NGN Slovenia

Talk and Q&A Session



Mike Heyeck
CIGRE VP Finance



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Brand vision

World's benchmark for energy transition, technological advancement and more

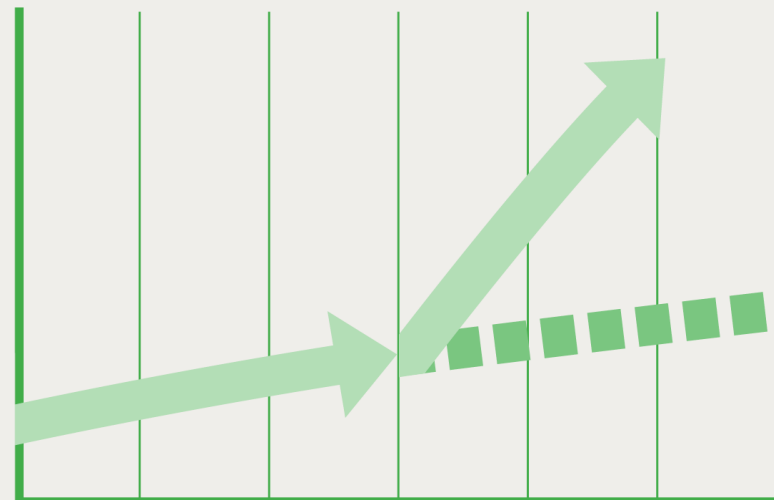
One place for end to end (E2E) power system expertise



Vision for growth 2023 and beyond

Key Goals

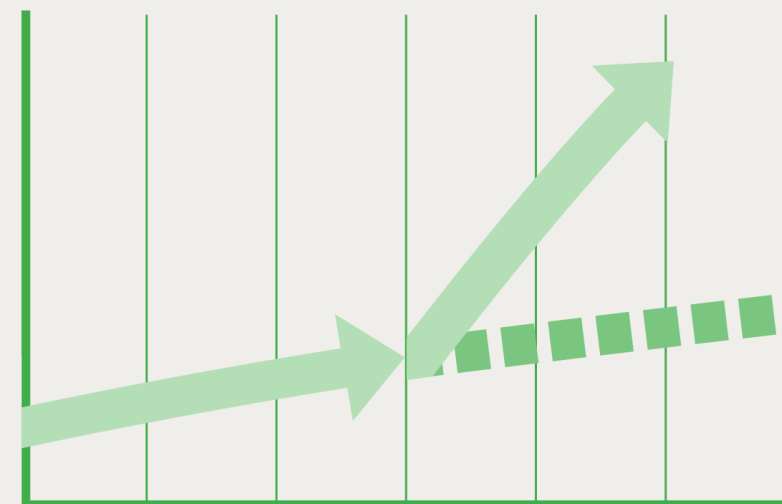
- Growth in membership 7-10% annually
- Long term 50,000 eqv Members
- Improved member experience to enhance retention
 - all new **e-cigre.org**
- Increased e-product sponsorships and advertisements to offset member costs



Vision for growth 2023 and beyond

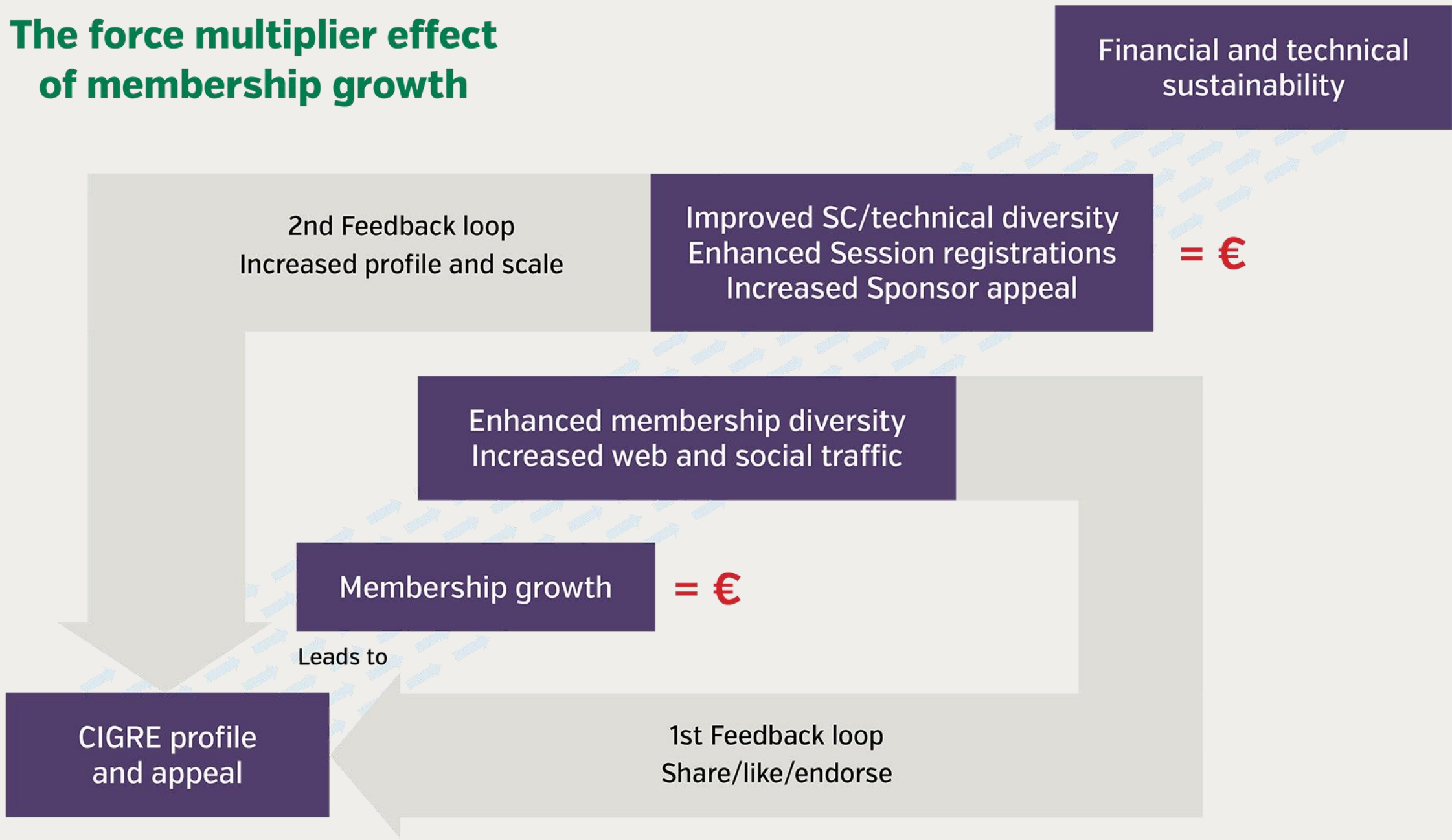
Growth with three guiding principles

1. New markets for innovation and new players
2. Global penetration with new members growing worldwide
 - Asia and Africa key
3. Membership diversity with students, NGN and WIE growing for our future



CIGRE's 2nd century...

The force multiplier effect of membership growth



Financial and technical sustainability

2nd Feedback loop
Increased profile and scale

Improved SC/technical diversity
Enhanced Session registrations
Increased Sponsor appeal

= €

Enhanced membership diversity
Increased web and social traffic

Membership growth = €

Leads to

CIGRE profile and appeal

1st Feedback loop
Share/like/endorse

2023+ growth marketing strategy



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MEMBERSHIP GROWTH MARKETING STRATEGY 2023+ MENU OF ACTIVITIES



Q&A



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NGN Invited Speech



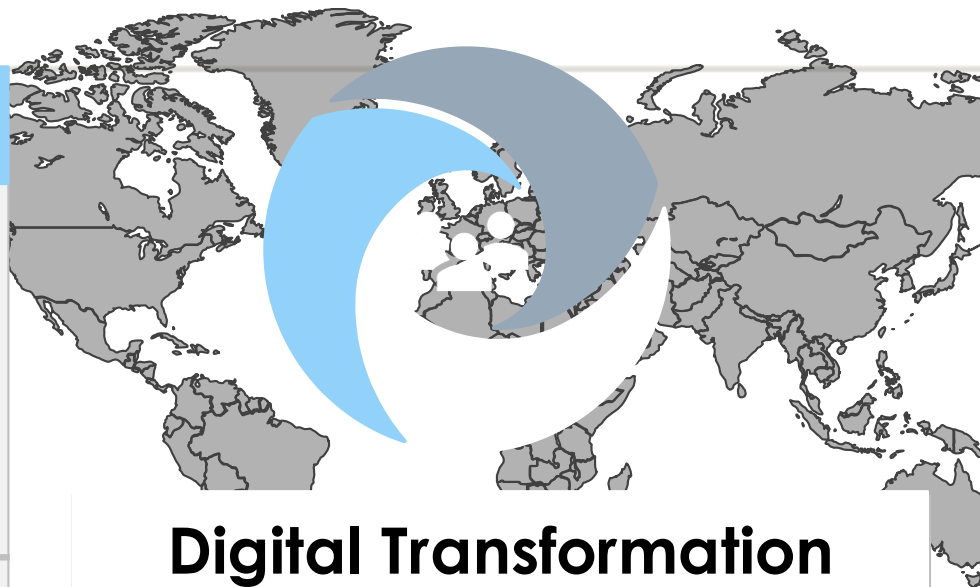
Arshad Mansoor
CEO, EPRI



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Reimagining the Future Energy System



Digital Transformation

- Drive affordability of a clean and resilient energy system through digital transformation
- Power system modernization: pervasive sensors, monitoring, advanced analytics using AI
 - Upgraded and expanded communications infrastructure and control systems

Decarbonization

Accelerate economy-wide, low-carbon solutions

- Electric sector decarbonization
- Transmission and grid flexibility: storage, demand, EVs
- Efficient electrification

Achieve a net-zero clean energy system

- Ubiquitous clean electricity: renewables, advanced nuclear, CCUS
- Negative-emission technologies
- Low-carbon resources: hydrogen and related, low-carbon fuels, biofuels, and biogas

Resiliency

Mitigate climate impacts and cyber/physical risks

- System and asset hardening
- Improved response
- Faster recovery
- Cybersecurity

Future proof energy system design basis

- Resilient power system design
- Advanced asset design and strategic undergrounding
- Smart integration of energy carriers

Making Energy More

Clean

Affordable

Reliable

~10-15 years

~15-30 years

~10-15 years

~15-30 years

Q&A



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NGN Speed Networking Breakout Session



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