





ETN
Global

20th Annual General Meeting and Workshop
“Accelerating turbomachinery pathways to net-zero”
19-21 March 2024, Leiden, The Netherlands

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HOST



EXHIBITORS

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A Caterpillar Company

Thomassen Energy

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Exhibition & Conference







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Agenda

TUESDAY 19 MARCH 2024 - Training

13:00 – 13:30	Registration of training attendees, <i>main entrance</i>
13:30 – 15:45	Parallel training courses*: Gas Turbine Materials: History and Current Application (André Mom, EM), room A1.24-Isaac Newton / Future Grid case study & Water in power and Hydrogen (Chris Dagnall, Timothy Illson & Ryan Wyvill), room B1.24A/B1.24B-Daniel Bernoulli
15:45 – 16:15	Coffee break, <i>canteen</i>
16:15 – 18:00	Parallel training courses*: Impact on material on use of alternative fuels (Joy Sumner, Cranfield University), room B1.24A/B1.24B-Daniel Bernoulli / Latest technology to reduce NOx emissions in OCGTs, using tempered air in a SCR system (Peter Rop & Leonel Goncalves Ferreira, NEM Energy), room A1.24-Isaac Newton
16:15 – 18:00	YEC training, B1.26-James Watt
16:15 – 18:00	Exhibitors to set-up their exhibition stands, <i>canteen</i>
18:15	Bus transports attendees from NEM Office to Golden Tulip & Tulip Inn Leiden Centre
18:30 – 23:00	ETN Working dinners (Supercritical CO ₂ , YEC, Project Board & Board)

*Training courses explained below:

Trainer(s)	Course name
 André Mom, President Emeritus, ETN; Assistant Professor, Delft Technical University	Gas Turbine Materials: History and Current Application This course offers a comprehensive overview of the history and modern application of materials in both stationery and aircraft gas turbines. It delves into critical aspects such as conditions within a gas turbine, thermal and mechanical loading, design philosophies, manufacturing processes, coatings, and the behaviour and life extension of materials and components under operational conditions. The course is enriched with practical examples of incidents and accidents, providing insights into the role of materials processing in real-life failure cases.
<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;">  Chris Dagnall, General Manager - Rotating Machinery Group DNV </div> <div style="width: 30%;">  Ryal Wyvill, Rotating Machinery Solutions Engineer DNV </div> <div style="width: 30%;">  Timothy Frank Illson Principal Specialist DNV </div> </div>	UK National Gas Future Grid – Chris Dagnall Water in energy and hydrogen production – Ryan Wyvill Materials and the impact of Hydrogen – Tim Illson (joining remotely) Energy transition outlook – Chris Dagnall This sessions aims to give an overview of the impact of hydrogen on assets surrounding rotating equipment, these will include the impact of availability of water not only in the production of hydrogen but also as consumed in the power generation industries, material impact and consideration for 100% hydrogen and also blended hydrogen, a case study of the UK future Grid project which is looking at the end to end impact of hydrogen on a national gas transmission system and then the DNV energy transition outlook with respect to decarbonisation.

Parallel courses @13:30 – 15:45

Trainer(s)

Course name



Dr Joy Sumner, Reader in Energy Materials and Head of Centre for Energy Engineering School of Water, Energy and Environment, Cranfield University

Impact on material on use of alternative fuels

This course will explore the intricate interplay between fuel, air specifications, and gas turbine components. Attendees will learn about degradation mechanisms, fuel compositions, and air filtration effects, understand how operational changes impact damage accumulation and will be presented with real-world examples offering practical insights. By the end, the participants will be equipped to address concerns around changing operating conditions effectively.



Peter Rop, Head of Product Development, NEM Energy



Leonel Ferreira, Project manager, NEM Energy

Latest technology to reduce NOx emissions in OCGTs, using tempered air in a SCR system

NEM Energy will engage with participants to discuss the challenges with regards to ongoing market trends such as the increased use of Open Cycle Gas Turbines (OCGT), the associated NOx emissions and the need to reduce those emissions. NEM will present on the latest technology of using tempered air in a SCR system to reduce NOx emissions in OCGTs.

Parallel courses @16:15 – 18:00

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WEDNESDAY 20 MARCH 2024 - Annual General Meeting	
08:00 – 11:00	Registration of attendees, coffee & expo, <i>main entrance</i>
08:30 – 10:30	ETN Board meeting (room A1.28-Thomas Newcomen), Project Board meeting (room B1.24A/B1.24B-Daniel Bernoulli) & YEC meeting (room B1.26-James Watt), Additive Manufacturing Working Group meeting (room A1.24-Isaac Newton)
11:00 – 12:30 <i>Atrium</i>	<p>Opening announcements, <i>Christer Björkqvist, ETN / Sebastiaan Ruijgrok, NEM Energy</i></p> <p>Welcome speech, <i>CEO, Alexander Wisse, NEM Energy</i></p> <p>President’s speech, <i>Pedro Lopez, ETN President / Uniper</i></p> <p>AGM opening and approval of last meeting’s minutes, <i>Pedro Lopez, ETN President / Uniper</i></p> <p>Achievements and Activity report 2023/24, <i>Christer Björkqvist, ETN</i></p> <p>Changes in ETN’s Articles of Association, <i>Christer Björkqvist, ETN</i></p> <p>Financial report, <i>Andy Williams, ETN Treasurer / Chromalloy</i></p> <p>ETN Board election, <i>Christer Björkqvist, ETN</i></p> <p>Closing of AGM, <i>Pedro Lopez, ETN President / Uniper</i></p> <p>Photo moment, <i>Sebastiaan Ruijgrok, NEM Energy</i></p>
12:30 – 14:00	Lunch & expo, <i>canteen</i>
14:00 – 15:45 <i>Atrium</i>	<p>Global market overview and GT sector needs - ETN White Paper, <i>Pedro Lopez, ETN President, Peter Jansohn, PSI</i></p> <p>ETN’s 2024 Technical Objectives and Roadmaps, <i>Rene Vijgen, ETN</i></p> <p>ETN Working Group objectives and initiatives 2024/2025</p> <ul style="list-style-type: none"> • Hydrogen WG: <i>Peter Kutne, DLR</i> <ul style="list-style-type: none"> ○ Hydrogen combustion task force ○ Hydrogen GT enclosure safety task force ○ CCS task force ○ Alternative fuels task force • Decentralised Energy Systems WG: <i>Peter Breuhaus</i> • Supercritical CO₂ WG: <i>Marco Ruggiero, Baker Hughes</i> • Air Filtration WG: <i>Olaf Brekke, Equinor</i> • Additive Manufacturing WG: <i>Ulli Klenk, Siemens Energy</i> • Component life assessment & extension, <i>Siavash Pahlavanyali, RINA</i> • Digital solutions and diagnostic (NEW)
15:45 – 16:15	Coffee break & expo, <i>Canteen</i>
16:15 – 17:30 <i>Atrium</i>	<p>ETN User Groups: status and outlook</p> <p>Young Engineers Committee, <i>Erika Rodriguez Aleman, City, University of London</i></p> <p>A Two-Decade Journey: Milestones and Vision Ahead, <i>Christer Björkqvist, ETN, André Mom & Bernard Quoix, ETN Emeritus</i></p> <p>Closing remarks, <i>Pedro Lopez, ETN President, Uniper / Christer Björkqvist, ETN</i></p>
18:00 – 22:30	Attendees will be transported from NEM directly to dinner event by busses at <i>the Woods restaurant</i> (Dinner event sponsored by NEM Energy) After dinner attendees will be transported by boats to Leiden city centre/close to hotels (boat trip co-sponsored by NEM Energy & teQ Services)

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THURSDAY 21 MARCH 2024 – Workshop

Plenary session, Atrium

07:45	Busses transport attendees from Golden Tulip & Tulip Inn Leiden Centre, Schipholweg 3, to NEM Office	
08:30 – 08:45	Registrations, coffee & expo, <i>main entrance</i>	
08:45 – 09:00	Pathways & introduction to the four sessions, Chairs	
Parallel sessions		
09:00 – 10:00 Parallel sessions	Digital solutions and diagnostics, room B1.24A/B1.24B-Daniel Bernoulli <i>Chair: Ian Macafee, Oxsensis, Co-chair: Stefan Reh, DLR</i> <i>This session will cover the digitalisation of turbomachinery assets and the application of smart sensors and address the following questions:</i> <ul style="list-style-type: none"> The power of data in the GT Industry: how to get the most of it (Herwart Hönen, ETN Emeritus Member) AI revolution: challenges and opportunities (Yiguang Li, Reader, Cranfield University) Digitalisation: kick-off of the new ETN Global Working Group (Ian Macafee, Business Development Director, Oxsensis) 	More efficient and/or Innovative cycles, room Atrium <i>Chair: David Sánchez, University of Seville & Co-chair: Marco Ruggiero, Baker Hughes</i> <i>This session will cover innovative cycles such as sCO₂ solutions, operational flexibility, hybridisation solutions, air filtration, and address the following questions:</i> <ul style="list-style-type: none"> Enhanced performance and operational flexibility from the perspective of the users (Sigrid Gijbels, Thermal Fleet Manager, Engie) Enhanced performance and operational flexibility from the perspective of Oil & Gas companies (Dominique Orhon, Turbomachinery Specialist, TotalEnergies) R&D activities on air filtration (Stefano Rossin, Chief Engineering Office Leader, Baker Hughes)
	10:00 – 10:30	Coffee break & expo, <i>canteen</i>
10:30 – 11:30 Parallel sessions	Product circularity, room B1.24A/B1.24B-Daniel Bernoulli <i>Chair: Andy Williams, Chromalloy, Co-chair: Ulli Klenk, Siemens Energy</i> <i>This session will cover quality aspects of AM manufactured parts and the development of High temperature AM materials and address the following questions:</i> <ul style="list-style-type: none"> Innovations in High-Temperature Alloy Development for Additive Manufacturing: Current Trends and Prospects (Yogiraj Pardhi, Global Additive and Materials Expert, Sulzer) Laser-Powder Bed Fusion Machine Evaluation (Rene Vijgen, Senior Technical Manager, ETN Global) 	Low carbon solutions, room Atrium <i>Chair: Peter Kutne, DLR & Co-chair: Olaf Brekke, Equinor</i> <i>This session will cover alternative low carbon fuels, hydrogen combustion and GT CCS solutions, and address the following questions:</i> <ul style="list-style-type: none"> Full Hydrogen Retrofit Solutions for Existing Gas Turbine Heat and Power Plants (Franck Denicourt, Head of engineering, Thomassen Energy) Uniper's Power CCS Developments in the United Kingdom (Jon Runyon, Gas Turbine Combustion Engineer, Uniper)
	11:30 – 12:00	Coffee break & expo, <i>canteen</i>

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THURSDAY 21 MARCH 2024 – Workshop

12:00 – 13:00 Parallel sessions	<p>Product reliability and lifetime extension, room B1.24A/B1.24B-Daniel Bernoulli <i>Chair: Siavash Pahlavanyali, RINA, Co-chair: Annalisa Maragno, EthosEnergy</i></p> <p><i>This session will cover Product reliability, life assessment & extension, and address the following questions:</i></p> <ul style="list-style-type: none"> • On-site test methodology for gas turbine rotor assessment and lifetime extension (Dirk Kulawinski, Development Expert and Project Manager, Siemens Energy) • The status of TBC developments (Daniel Emil Mack, Team Leader "High Temperature Protective Coatings", Forschungszentrum Jülich) 	<p>Integrated energy system solutions, room Atrium <i>Chair: Peter Breuhaus, NORCE, Co-chair: Giuseppe Tilocca, ETN Global</i></p> <p><i>This session will explore integrated solutions for decentralised energy systems including storage and flexibility, and address the following questions:</i></p> <ul style="list-style-type: none"> • Integration of intermittent renewables • Change/adaptation of the demand • Integration of carbon free fuel and/or CCS
13:00 – 14:15	Lunch break & expo, <i>canteen</i>	
Plenary session, Atrium		
14:15 – 16:00	Report from the Chairs on takeaways/actions & closing remarks	
16:30	Bus transports 50 attendees from NEM Office to Leiden Train Station	
17:15	Bus transports 50 attendees from NEM Office to Leiden Train Station	
16:30 – 18:00	<p>ETN Hydrogen Working Group meeting, room A1.24-Isaac Newton</p> <p>ETN GT Life Assessment & Extension Group meeting, room A1.28-Thomas Newcomen</p> <p>ETN Air Filtration Working Group meeting, room B1.26-James Watt</p>	
18:00	Bus transports 50 attendees from NEM Office to Leiden Train Station	

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Session & speakers

Digital solutions and diagnostics

Chair: Ian Macafee, Oxsensis, Co-chair: Stefan Reh, DLR



**The power of data in the GT Industry:
how to get the most of it**

Herwart Hönen, ETN Emeritus Member



AI revolution: challenges and opportunities

Yiguang Li, Reader, Cranfield University



Digitalisation: kick-off of the new ETN Global Working Group

Ian Macafee, Business Development Director, Oxsensis

Session & speakers

More efficient and/or Innovative cycles

Chair: David Sánchez, University of Seville & Co-chair: Marco Ruggiero, Baker Hughes



Enhanced performance and operational flexibility from the perspective of the users

Sigrid Gijbels, Thermal Fleet Manager, Engie



Enhanced performance and operational flexibility from the perspective of Oil & Gas companies

Dominique Orhon, Turbomachinery Specialist, TotalEnergies



R&D activities on air filtration

Stefano Rossin, Chief Engineering Office Leader, Baker Hughes

09:00 – 10:00: Parallel sessions

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Session & speakers

Product circularity

Chair: Andy Williams, Chromalloy, Co-chair: Ulli Klenk, Siemens Energy



Innovations in High-Temperature Alloy Development for Additive Manufacturing: Current Trends and Prospects

Yogiraj Pardhi, Global Additive and Materials Expert, Sulzer



Laser-Powder Bed Fusion Machine Evaluation

Rene Vijgen, Senior Technical Manager, ETN Global

Session & speakers

Low carbon solutions

Chair: Peter Kutne, DLR & Co-chair: Olaf Brekke, Equinor



Full Hydrogen Retrofit Solutions for Existing Gas Turbine Heat and Power Plants

Franck Denicourt, Head of engineering, Thomassen Energy



Uniper's Power CCS Developments in the United Kingdom

Jon Runyon, Gas Turbine Combustion Engineer, Uniper

10:30 – 11:30: Parallel sessions

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Session & speakers

Product reliability and lifetime extension

Chair: Siavash Pahlavanyali, RINA, Co-chair: Annalisa Maragno, EthosEnergy



On-site test methodology for gas turbine rotor assessment and lifetime extension

Dirk Kulawinski, Development Expert and Project Manager, Siemens Energy



The status of TBC developments

Daniel Emil Mack, Team Leader "High Temperature Protective Coatings", Forschungszentrum Jülich

Session

Integrated energy system solutions

Chair: Peter Breuhaus, NORCE, Co-chair: Giuseppe Tilocca, ETN Global

This session will explore integrated solutions for decentralised energy systems including storage and flexibility, and address the following questions:

- **Integration of intermittent renewables**
- **Change/adaptation of the demand**
- **Integration of carbon free fuel and/or CCS**

12:00 – 13:00: Parallel sessions

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Registration

Registration will take place at the main entrance of NEM Energy:

- **19 March 13:00-13:30 (for those attending courses)**
- **20 March 08:00-11:00**
- **21 March 08:00-08:45 (late commers)**

Event venue

NEM Energy
Stadhouderslaan 900
2382 Zoeterwoude
The Netherlands

Dinner venue

[Woods restaurant](#), Haagweg 81, 2321 AA Leiden, the Netherlands

Contact

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Transportation

NEM Energy office is located as follows:

- 15 mins from Leiden Central train station by taxi or 20 mins by bus nr 7 (tickets can be bought on the bus using a credit card – do not forget to tap in and out)
- Leiden local taxi numbers: Taxi Brouwer +31 71 3611000 or Taxi Centrale Holands-Midden: +31 648388855

Bus number 7- Busstop name: Meerburg (NEM head office)

Time table bus 7			
From Leiden - name busstop is Meerburg			
hour	minutes	minutes	
6	34		
7	4	34	
8	7	37	
9	7	35	
10	6		
11	6		
12	6		
13	6		
14	3		
15	3		
16	3	33	
17	3	33	
18	3		

Time table bus 7			
From Meerburg to Leiden Central			
hour	minutes	minutes	
6	45		
7	15	46	
8	19	49	
9	18	46	
10	17		
11	17		
12	17		
13	17		
14	14		
15	14		
16	14	44	
17	14	44	
18	14		

Note: There is a bus every hour plus in de morning and afternoon peak 2 times per hour.

- 30-40mins from Amsterdam Schiphol Airport by taxi (you can find taxis just outside the airport)
- Trains run from Amsterdam Schiphol Airport to Leiden central train station every 10 mins – it is a 20mins train ride.

Map

