

WNU-THU WEEK 2021

世界核大学清华周 2021

The World Nuclear Industry Today

当今世界核工业

Online, 线上

12 – 16 July 2021

WNU-THU Week 2021 - China
WNU Short Course on “The World Nuclear Industry Today”
(Online)

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Overview

Introduction

The World Nuclear University is a global network committed to enhancing international education and leadership in the peaceful uses of nuclear energy and the applications of nuclear science and technology. The WNU founding supporters are the IAEA, OECD/NEA, WANO and World Nuclear Association.

The WNU short course is an opportunity for emerging and expanding nuclear nations to host in their own country a training programme delivered by the world's foremost experts in a cost-effective way. Since the first one in China in 2007, over 50 WNU short courses with about 7500 attendees have been held around the world. These courses have been held in Argentina, Brazil, China, Jordan, Kazakhstan, Indonesia, Malaysia, Mongolia, Singapore, South Africa, South Korea, Turkey and UAE. Local nuclear energy associations, universities or governmental institutions host and promote the events. In 2021, due to international travel restrictions, the short course will continue to take place online.

Objective

The WNU short course on “The World Nuclear Industry Today” is designed to enhance the knowledge of attendees about the status of nuclear energy in the world today and its likely development. The course also aims to inspire attendees to further their career in this exciting and expanding field. For the participants, the expected outcomes of the WNU short courses are:

- Improved knowledge and understanding about the role of nuclear technologies in the world today;
- Recognition of how local skills and experience fit into the global nuclear picture;
- Inspiration to develop an expansive vision of where the industry can go in the future;
- Networking with nuclear professionals in their countries and with international experts.

Participants

Target participants include Chinese university students and academia from science and engineering departments as well as legal, social and economic fields concerned with nuclear, environmental, energy and communication matters.

Faculty

Leading world experts will present overviews of a full range of nuclear-related topics in an accessible way. Local experts present national capabilities in the nuclear area. Lecturers are encouraged to focus on key points and draw out relevant issues for further discussion.

Methodology

The online WNU short course offers lectures with opportunities for question and answer sessions.

To read/watch before the course:

- a) [WNA Nuclear essentials](#)
- b) [UN Sustainable Development Goals](#)
- c) [WNA Nuclear Power Economics and Project Structuring 2017 Edition](#)
- d) [IAEA Country Nuclear Profiles](#)
- e) [IAEA Basics of Radiation and Radiation Emergencies](#)
- f) [IAEA Radioactive Waste - The Journey to Disposal](#)
- g) [IAEA Nuclear Communicator's Toolbox: Basics](#)

Topics

The course encompasses a range of up-to-date topics with the aim of offering essential knowledge, a global perspective and an exciting vision of the future. The curriculum is agreed with the host organization and typically covers energy demand and supply, technology, safety, project management and effective communications.

AGENDA

WNU Tsinghua Week 2021

WNU, THU

ONLINE: The World Nuclear Industry Today

12 – 16 July 2021

Start Time (Beijing)	End Time (Beijing)	Title	Presenter/Speaker	Org.	Start Time (London)	Start Time (Vienna, Paris)	Start Time (Toronto)
12 July, Monday							
Moderator: TONG Jiejuan							
13:00	13:05	Opening and welcome remarks	TONG Jiejuan	THU	6:00	7:00	1:00
13:05	13:20	Opening Remarks WNU	Sama Bilbao y Leon	WNU	6:05	7:05	1:05
13:20	13:30	Overview of the WNU	Isis Leslie	WNU	6:20	7:20	1:20
13:30	14:30	The future of nuclear energy globally	Francois Morin	WNA	6:30	7:30	1:30
14:30	15:30	Nuclear and the Sustainable Development Goals	King Lee	WNA	7:30	8:30	2:30

15:30	16:30	Energy supply and nuclear energy in China: current status and prospect	ZHOU Sheng	THU	8:30	9:30	3:30
16:30	17:00	Technical tour of the IAEA Siebersdorf	Reagan Aylmer	WNU	9:30	10:30	4:30
17:00	17:30	Free Q&A	TONG Jiejuan	WNU,THU	10:00	11:00	5:00
17:30	19:00	Break			10:30	11:30	5:30
Moderator: Isis Leslie							
19:00	21:00	Basic economics and nuclear project structuring	Milton Caplan	MC	12:00	13:00	7:00
21:00	21:30	Free Q&A			14:00	15:00	9:00
13 July, Tuesday							
Moderator: Isis Leslie							
13:00	14:00	The role for nuclear outside energy production	David Hess	WNA	6:00	7:00	1:00
14:00	15:00	Effective nuclear risk communications	John Lindburg	WNA	7:00	8:00	2:00
15:00	16:00	Nuclear communications and advocacy	Jonathan Cobb	WNA	8:00	9:00	3:00
16:00	17:00	The Fukushima accident	Abel Julio González	ARN	9:00	10:00	4:00
17:00	17:30	Free Q&A	TONG Jiejuan	WNU,THU	10:00	11:00	5:00
17:30	19:00	Break			10:30	11:30	5:30

Moderator: TONG Jiejuan							
19:00	21:00	International system: radioprotection, security, safeguards	Abel Julio González	ARN	12:00	13:00	7:00
21:00	21:30	Free Q&A	TONG Jiejuan	WNU,THU	14:00	15:00	9:00
14 July, Wednesday							
Moderator: TONG Jiejuan							
13:00	14:30	Digital Transformation of Nuclear Energy System	ZHOU Sheng*	TONGYUAN	6:00	7:00	1:00
14:30	16:00	SMR's Position in China's Energy Development Strategy	ZHAO Chengkun	CNEA	7:30	8:30	2:30
16:00	17:30	Innovation of nuclear technology application	CONG Peng	THU	9:00	10:00	4:00
17:30	18:00	Break			10:30	11:30	5:30
18:00	20:00	HPR1000 project progress	CHEN Guocai	CNNP	11:00	12:00	6:00
15 July, Thursday							
Moderator: TONG Jiejuan							
13:00	15:00	Advanced Reactor Technologies in China: Generation IV reactors and HTR-PM	SUN Jun	THU	6:00	7:00	1:00
15:00	17:00	Nuclear Waste Management	LIU Xuegang	THU	8:00	9:00	3:00
17:00	17:30	Free Q&A		WNU,THU	10:00	11:00	5:00

17:30	19:00	Break			10:30	11:30	5:30
19:00	21:00	Homework time			12:00	13:00	7:00
16 July, Friday							
Moderator: Isis Leslie							
13:00	14:00	Recent global developments in nuclear technologies, including SMRs, Gen IV and non-power technologies	Ian Hore-Lacy	WNA	6:00	7:00	1:00
14:00	15:00	Developments in fusion technologies			7:00	8:00	2:00
15:00	16:00	Panel on international opportunities in the nuclear workforce	Pedro D, Li (Jerry) Li, Yuji Kumagai, Callum Thomas, Lena Andriolo	IAEA, WANO, OECD NEA, Thomas Thor	8:00	9:00	3:00
16:00	17:00	Closing	TONG Jiejuan	WNU, THU	9:00	10:00	4:00

Session Descriptions

Opening Remarks

欢迎词，童节娟与 Sama Bilbao y Leon

1. 清华大学核研院副院长童节娟教授致欢迎词

Welcome from Prof. TONG Jiejuan, Deputy Director of INET, Tsinghua University

2. 世界核协会总干事 Sama Bilbao y Leon 博士致欢迎词

Welcome from WNA Director General and intro to course/global nuclear perspective

Overview of the WNU, Isis Leslie

世界核大学介绍， Isis Leslie

世界核大学介绍：使命与目标

Overview of WNU: our mission and objectives for this programme

The future of nuclear energy globally, Francois Morin

世界核能发展展望， Francois Morin

1. 能源，历史的视角 Energy, an historical perspective

There is no development without energy. Fossil fuels have created development in Europe & US in the 19th century, and in China since the 90's

2. 煤炭，过去，现在，未来 Coal, before, now, in the future

Particularly coal, which represents still 70% of energy consumption in China, will continue to play a role in the world energy supply until final energy transition phase which will not occur before 2040.

3. 电力需求在增长 Electricity demand only grows

The development on one hand, the economic structure modifications in another hand both drive upwards electricity demand, in developing countries as well as in already developed countries.

4. 核的历史和作用 Nuclear history and place.

Nuclear energy is the consequence of astonishing discoveries made in early 20th century. The properties of uranium are unique and put it as a long-term fuel for generating electricity, but also heat, and probably more in the future.

5. 密度是关键 Density is the key

The advantage of Nuclear over other energy sources (Coal, gas, oil, water, wind, light) resides in its high density, enabling the delivery of more energy with less source and limiting the waste problem.

6. 技术，越来越多 Technologies, more and more

The diversity of technologies available, from PWR to FBR and further fusion reactors will address all problems (safety, waste) attributed to nuclear power. Foreseeable advances in nuclear technologies far outpace potential progress in other energy technologies.

7. 结果：或多或少还是需要核？ Consequence: more or less Nuclear?

In spite of its current modesty, nuclear energy is essential for societies that want to maintain their standard of living (the West in general) as well as for those that want to develop it.

8. 核领域的工作机会！更多更好的报酬 Jobs in Nuclear! More and better paid.

Nuclear industrial sector is a formidable opportunity for young scientists, engineers, technicians, for those who like hard physics and theory as well as for those motivated by design, materials, machines, AI and highly technological operation.

Nuclear and the Sustainable Development Goals, King Lee

核与可持续发展目标， King Lee

要实现可持续发展目标，清洁且经济的核能是至关重要的

Clean and affordable nuclear energy is crucial for achieving sustainable development goals, from eradicating poverty through to advancing health and education, facilitating industrial development and reducing greenhouse gas emissions.

The role of nuclear energy can play a central role for sustainable development with contributing to the 3 pillars of environmental, social and economic and sustainability.

Nuclear science and technology support countries to reach the 17 UN Sustainable Development Goals (SDGs)

Energy supply and nuclear energy in China: current status and prospect, ZHOU Sheng

中国能源供应与核能：现状和前景，周胜

1. 中国能源供应与核能：现状和前景 Energy supply and nuclear power in China: current status and future prospect
2. 全球气候变化与能源低碳转型 Global climate change and low carbon energy transitions
3. 中国能源需求和供应现状 Current status of energy demand and supply in China
4. 中国核能发展现状和前景 Current status and future trend of nuclear in China

Technical tour of the IAEA Siebersdorf, Reagan Aylmer

IAEA 核技术实验室在线技术参观， Reagan Aylmer

在线参观 IAEA 的核技术实验室

Participants will be led of a virtual tour of three of the IAEA Nuclear Applications laboratories. During this tour, participants will have an opportunity to virtually explore the IAEA's laboratories, which are located in Austria and Monaco, and learn more about the thematic areas of work they specialize in.

Basic economics and nuclear project structuring, Milton Caplan

经济性基础与核工程项目架构，Milton Caplan

核工程项目的经济性意义、成本核算架构、风险与成功之路。

Economics are fundamental to the success of the nuclear industry. Nuclear plants must provide economic and reliable electricity to the grid when compared to alternative modes of electricity generation.

This presentation will summarize the economics and structuring of nuclear projects, both currently operating plants and new build. The presentation will address:

- Electricity and its importance to modern life
- Understanding the cost structure of nuclear plants
- A path forward to project success
- Summary and discussion points

The material will be based on a number of key project studies by the IEA and NEA. There has been a considerable amount of new information on nuclear economics issued over the last year. The global focus on climate change including the push for net zero emissions by 2050 is also having an important impact.

Following the presentation, the students should have a basic understanding of how economics are assessed for a nuclear project, the key risks associated with these projects and basic approaches to overcoming them.

The role for nuclear outside energy production, David Hess

核能在非能源生产领域的应用，David Hess

工艺热 heat

氢 hydrogen

海水淡化 desalination

同位素生产 radioisotope production

Effective nuclear risk communications, John Lindburg

有效的核风险沟通, John Lindburg

核风险沟通艺术、风险感知基本原理、影响核风险认知的因素

The art of effective nuclear risk communications

Fundamental principles of risk perception, including the psychology and neurocognitive science underpinning it

Mental shortcuts, heuristics, and biases

What drives nuclear risk perception:

Trust

Facts/knowledge

Emotions/imagery

Gender

Risk communication “Do’s and don’ts”

Nuclear communications and advocacy, Jonathan Cobb

核沟通与宣传, Jonathan Cobb

核沟通与宣传

The different kinds of nuclear advocacy and communication

What people expect from nuclear communicators.

When to agree, when to argue.

When, and when not, to talk about safety.

Media interview experiences

The Fukushima accident, Abel Julio González

福岛核事故, Abel Julio González

1. 以前的核事故 (Previous nuclear accidents)
 - 三哩岛事故 (Three Mile Island accident)
 - 切尔诺贝利事故 (The Chernobyl accident)
 - 放射性释放 (Radioactive discharges)
 - 国际切尔诺贝利项目：经验教训 (Proyecto internacional de Chernobyl: lecciones aprendidas)
 - 清理者 ('Liquidators')
 - 公众照射 (Public exposure)
 - 甲状腺癌 (Thyroid cancers)
 - 心理后果 (Psychological consequences)
2. 福岛第一核电站事故
(The Fukushima Daiichi Nuclear Power Plant Accident)
 - 地震, 传输线路倒塌, 海啸, 洪水, 事故 (Earthquake, Collapse of lines, Tsunami, Inundation, Accident)
 - 应急准备和响应 (Emergency preparedness and response)
 - 紧急防护行动和保护公众的其他响应行动 (Urgent protective actions and relocation)
 - 辐射后果 (Radiological consequences)
 - 环境中的放射性 (Radioactivity in the environment)
 - 公众照射限制 (Restriction of public exposure)
 - 公众照射 (Public exposure)
 - 职业照射 (Occupational exposure)

- 健康效应 (Health effects)
 - 心理后果 (Psychological consequences)
 - 事故后恢复 (Post-accident recovery)
3. 附件 (Annex): 福岛: 事故及其评价 - 教训 (Fukushima: The accident and its assessment - Lessons)

International system: radioprotection, security, safeguards, Abel Julio González

国际体系：辐射防护、核安保、核保障，Abel Julio González

1. 前言(preface): 国际体系 (International system)
 - 联合国原子辐射影响科学委员会 (UNSCEAR)
 - 国际辐射防护委员会 (ICRP)
 - 国际原子能机构 (IAEA)
2. 辐射 (radiation)
 - 辐射防护中使用的量 (Quantities used in rad. protection)
 - 辐射源 (Sources of radiation exposure)
 - 辐射健康效应 (Radiation health effects)
3. 辐射防护 (Radioprotection)
 - 辐射防护体系 (The System of Radiation Protection)
 - 照射情况类型 (Types of exposure situations)
 - 辐射防护原则 (The principles of radiological protection)
 - 照射的分类 (Categories of exposure)
4. 安全 (Safety)
 - 政府间的义务 (Inter-governmental obligations): 公约 (Conventions)
 - 安全标准 (safety standards)
 - 安全基本原则 (Safety fundamentals)
 - 安全要求 (Safety requirements)

- 安全导则 (Safety guides)
 - 保障标准实施的措施 (Provisions for the application of the standards)
5. 安保 (Security)
- 核安保 (Nuclear security)
 - 联合国公约 (United Nations Conventions)
 - 放射源安全和保安行为准则
(Code of Conduct on the Safety and Security of Radioactive Sources)
 - 放射源的进口和出口导则
(Guidance on the Import and Export of Radioactive Sources)
 - 弃用放射源管理导则
(Guidance on the Management of Disused Radioactive Sources)
 - 脏弹:“放射性物质散布装置”
(Dirty bomb:“radiological dispersal device”)
 - 核安保丛书 (Nuclear security series)
 - 安全和安保之间的接口 (Interfaces between safety and security)
6. 保障监督 (Safeguards)
- 国际原子能机构规约 (Statute of the International Atomic Energy Agency)
 - 国际原子能机构保障监督制度 (Safeguards of the International Atomic Energy Agency)
 - 核材料转用 (Diversion of nuclear material)
 - 特种可裂变材料 (Special fissionable material)
 - 保障协定 (Safeguards agreement)
 - 核问题 (Nuclear weapons issues):
 - 不扩散核武器条约 (Nuclear Non-Proliferation Treaty)
 - 全面禁止核试验条约 (Comprehensive Test Ban Treaty)
 - 裁军谈判会议 (Conference on Disarmament)
7. 附件 (Annex): 最新消息 (Latest news)
- 由发电而产生的辐射照射
(Radiation exposure due to the generation of electricity)

- 辐射对健康影响的归因，及推断风险
(Attributing health effects to radiation exposure and inferring risks)
- 维也纳核安全宣言(The Vienna Declaration on Nuclear Safety)
- 关于氡的最新消息 (Latest news on radon)

*Digital Transformation of Nuclear Energy System, ZHOU Sheng**

核能系统数字化转型，周胜

- 1 数字化技术变革与装备数字化 Digital transformation and equipment digitalization
 - 1.1. Background of digitalization and system engineering transformation
 - 1.2. Development history of equipment digital transformation
 - 1.3. Global example of equipment digitization and systems engineering
 - 1.4. Equipment digital transformation features and elements
- 2 装备数字化关键技术 Equipment digital transformation key technology
 - 2.1. Digital Twin
 - 2.2. Technical Framework of Equipment Digital Twin
 - 2.3. Key Technologies of Equipment Digitization
- 3 数字化平台工具体系 Digital platform tool system
 - 3.1. Digital system design and simulation verification platform
 - 3.2. Overview of major project applications
- 4 核能 MBSE 数字化工程体系探索 Exploration of nuclear energy MBSE
 - 4.1. Nuclear energy MBSE
 - 4.2. Design of gas-cooled micro-reactor
 - 4.3. Unified Modeling and Simulation of PWR

SMR's Position in China's Energy Development Strategy, ZHAO Chengkun

模块化小堆在我国能源发展中的战略地位，赵成昆

- 本报告主要从以下几个部分来介绍：小堆发展的总体背景、国外小堆发展现状、国内小堆发展现状、我国小堆发展面临的挑战和建议。

This lecture consists of the following parts: the general background of SMRs development, status quo of SMRs overseas and at home, challenges faced by SMRs in China, and suggestions for the development of SMRs in China.

- 本报告是结合我国当前“双碳”目标中核能的战略地位，特别是小型模块化反应堆在拓展核能发电和非电力应用方面的前景，分析国内外小堆开发的最新进展，研究形成的综合成果。

This report is a summary of the research on SMRs frontiers both in China and across the world. The research investigated the strategic role of nuclear energy in China's "dual-carbon" goals (carbon neutrality and emission peak), especially the employment prospects of SMRs in nuclear power generation and non-electric applications.

Innovation of nuclear technology application, CONG Peng

核以致用 唯有创新——核技术应用的新进展, 丛鹏

- 我国应用核技术在工业、农业、医药、环境等领域有着广泛的应用，在辐照材料性能改善、辐射加工、辐射基设备、公共卫生、公共安全、环境保护等多个领域正逐步形成产业规模。

Application of Nuclear Science and Technology in China has widespread applications in industry, agriculture, medicine, environment etc. and is developing into industry scale in a variety of areas including material performance improvement by irradiation, radiation processing, radiation-based equipment, public health, public security and environment protection.

- 数字辐射成像领域取得了许多新进展，拓宽了应用领域，为许多应用场景做了创造性的工作。本报告将详细阐述这些方面。

Many new progresses have been made in the field of digital radiation imaging, which broadens the application field and makes creative work for many application scenarios. This report will elaborate on these aspects.

HPR1000 project progress, CHEN Guocai

华龙一号项目建设, 陈国才

1. 研发历程 Roadmap of HPR1000 R&D
2. 华龙一号主要技术指标 Main technical Parameters of HPR1000
3. 华龙一号示范工程建设情况 Progress of HPR1000 Demonstration Project
 - 1) 总体概况 overview
 - 2) 项目组织管理 management mode
 - 3) 项目四大控制情况 project control (safety, quality, schedule, cost)
4. 管理创新实践 Management Innovation of HPR1000 Project
5. 未来展望 Prospect of HPR1000 Project
 - 1) 设计优化与改进 Design optimization and improvement
 - 2) 工程管理能力持续提升 Improvement of project management ability

*Advanced Reactor Technologies in China: Generation IV reactors and HTR-PM,
SUN Jun*

中国先进反应堆技术：四代堆及高温堆示范工程，孙俊

1. 四代堆 Generation IV Reactors
 - 1) 历史 History
 - 2) 四代堆核能系统国际论坛 GIF
 - 3) 钠冷快堆 SFR
 - 4) 铅冷快堆 LFR
 - 5) 熔盐堆 MSR
 - 6) 超临界水堆 SCWR
 - 7) 超高温堆 VHTR
 - 8) 气冷快堆 GFR
2. 高温堆示范工程 HTR-PM
 - 1) 中国高温堆发展 History in China
 - 2) 示范工程进展 HTR-PM progress
 - 3) 关键技术创新 Key technology innovation
 - 4) 固有安全性 Inherent safety

5) 未来发展方向 Future plans

Nuclear Waste Management, LIU Xuegang

核废物管理，刘学刚

1. 核废物/放射性废物的定义 The definition of nuclear/ radioactive waste
2. 核废物的来源 Where they come from
3. 核废物的分类 Category of radioactive waste
4. 核废物的管理 How to handle the waste
5. 核废物管理技术介绍 Introduction of the technologies to treat nuclear waste
6. 总结与讨论 Summary and discussion

Recent global developments in nuclear technologies, including SMRs, GenIV and non-power technologies, Ian Hore-Lacy

小型堆、第四代核反应堆与非电力技术等核能技术在全球的最新进展

Developments in fusion technologies

核聚变技术的发展

Lecturers' Biographies

Sama Bilbao y León



Sama Bilbao y León became the Director General of World Nuclear Association in October 2020. Previously, and since June 2018, she was Head of the Division of Nuclear Technology Development and Economics at the OECD Nuclear Energy Agency. In her role at the NEA, she led a team of analysts responsible for providing Member Countries with authoritative studies in the intersection of technology, innovation and economics in support of their energy policy decision-making. Since January 2020, she was also Head of the Technical Secretariat for the Generation IV International Forum (GIF). From 2011, she was the Director of Nuclear Engineering Programs and Associate Professor at the Department of Mechanical and Nuclear Engineering at Virginia Commonwealth University (VCU). She was one of the key individuals involved in the creation and development of this thriving new Nuclear Engineering program. Sama was responsible for the academic and research aspects of the new VCU nuclear engineering program, including student and faculty recruitment, curriculum development, accreditation, funding, research collaborations, industrial partnerships, marketing, outreach, etc. She also taught undergraduate and graduate courses in areas such as thermal-hydraulics, heat transfer, multi-phase flow, nuclear reactor design, energy and environmental policy, economics of electricity production, etc. At VCU, she led an active research group including post-doctoral research associates, PhD, MS and undergraduate students, and was the principal investigator in several research and development, as well as educational grants, totalling about \$4M. At her departure from VCU in May 2018, Sama was also a member of the Institute of Nuclear Power Operations (INPO) National Accreditation Board, and the Chairman of the Board of the Virginia Nuclear Energy Consortium (VNEC). From 2008, Sama was the Technical Head of the International Atomic Energy Agency (IAEA) Water Cooled Reactors Technology Development Unit and she was responsible for IAEA activities in support of the development and near term deployment of advanced water cooled reactors and their associated fuels. From February 2001 until March 2008, Sama was a Nuclear Safety Analysis Engineer at Dominion Energy, where she worked on the development and licensing of new methodologies in core thermal-hydraulics and nuclear safety analysis in support of Dominion's nuclear power stations. Sama is one of the seven founders of the North American Young Generation in Nuclear (NA-YGN), and served as Public Information Chair since its creation in 1999 until May 2005. Sama is also an active member of the American Nuclear Society (ANS) since 1995, both nationally and locally (VCU student section and Virginia local section). Her dedication to spreading the good news about nuclear earned her the ANS 2002 Public Communications Award. In 2007 she received

the NA-YGN Founder Award, the highest award given to an NA-YGN member, which rewards leadership, vision and dedication. In 2007, and again in 2010, Sama was elected to the national Board of Directors of the American Nuclear Society. In 2011, she received the ANS Mary Jane Oestmann Women's Achievement Award. In 2014 she received an ANS Presidential Citation for her continuous dedication to ANS. In 2018 she was presented with the W. Reed Johnson Award for Extraordinary Contributions to the Virginia Section of the ANS. Sama is also a member of SNE, ASME, ASEE, SWE and WiN. Sama, who is originally from Spain, holds a bachelor's degree in Mechanical Engineering and a master's degree in Energy Technologies from the Polytechnic University of Madrid; a master's degree and a PhD in Nuclear Engineering and Engineering Physics from the University of Wisconsin – Madison; and an MBA from Averett University.

Isis Leslie (Co-Chairperson)



Isis Leslie has joined the World Nuclear University as Programme Lead on a six month basis, having previously worked as Programme Coordinator for the WNU SI until 2015 and as Staff Director for the Security and Sustainable Used Fuel Working Groups. She has since been working on international Security and Non-Proliferation programmes with ORNL, WINS, the IAEA and other organizations as a contractor to Tetra Tech.

童节娟 TONG Jiejuan (Co-Chairperson)



清华大学核能与新能源技术研究院 副院长
清华大学核安全与环境领域 教授

Deputy Director, Institute of Nuclear and New Energy
Technology, Tsinghua University
Professor in Nuclear Safety and Environment, Tsinghua
University

Francois Morin



François Morin is senior engineer, graduate of the Ecole Centrale de Paris (ECP) and worked several years as process engineer in Framatome (now AREVA), in charge of accident evaluation and post-Chernobyl studies. In the 90's he worked within French Atomic Energy Commission and managed technology transfers into China in the field of Nuclear Medicine.

He then has been working in various fields and countries, Eastern Europe, Asia, Africa, focused on big projects structuring & financing involving international cooperation. He is currently living in China. He is Director Asia at the World Nuclear Association

François MORIN, 现任世界核能协会中国区总监。他是一名高级工程师，毕业于巴黎中央理工学院 (ECP)，并在法马通（如今为阿海珐）公司担任过多年工艺工程师，负责事故评估及切尔诺贝利事后研究。九十年代期间，他在法国原子能委员会工作，负责面向中国的技术转让问题 (包括在核医学方面)。

后来他辗转于各个领域和多个国家进行工作，比如东欧、亚洲、非洲，专注于涉及国际合作的大型项目结构与融资。他目前居住在中国。他是世界和协会亚洲区主任

King Lee



King Lee is the Director Harmony Programme at World Nuclear Association leading the Harmony Programme, the nuclear industry's vision for the future of electricity. In this role Mr Lee head a team promoting nuclear energy by working with the nuclear community to engage with key policy makers and stakeholders on the important role of nuclear energy as part of the clean energy future.

Mr Lee led strategic cooperation with key international institutions, such as United Nations Economic Commission for Europe (UNECE), Association of Southeast Asian Nations (ASEAN), Clean Energy Ministerial and World Energy Council, on development of nuclear power.

Previously, Mr Lee was Head of Nuclear Development at Lloyd's Register, where he led strategic business development and provided technical and commercial oversight of major nuclear projects in UK, China, Korea and UAE. This includes advice to government and industry leaders on regulatory and safety issues concerning the

challenges for the nuclear industries. He has also been involved a range of power and energy projects with considerable experience on risk and assurance management.

Mr Lee was the Vice-Chair of the Energy Institute Process Safety Committee. He is a member of the Nuclear Energy Agency (NEA) Nuclear Innovation 2050 Advisory Panel and Clean Energy Ministerial (CEM) Flexible Nuclear Campaign Working Group. Mr Lee is the Chair of UNECE Nuclear Fuel Working Group and Vice Chair of UNECE Group of Experts on Cleaner Electricity Systems.

周胜 ZHOU Sheng



周胜博士是清华大学核能与新能源技术研究院副研究员，他的研究方向主要为能源模型与能源政策、核能政策、全球气候变化和碳市场。他主持和参与了一系列研究工作，包括：全球背景下的中国能源消费与 CO₂ 排放，全球碳市场发展趋势及其对中国的影响，中国工业部门 CO₂ 排放路线图，工业部门能源消费和 CO₂ 排放峰值，非化石能源在中国温室气体减排目标中的作用，核能在中国能源供应中的地位和作用，中国核能发展的机遇和挑战等。

He is an associate professor at Institute of Nuclear and New Energy Technology of Tsinghua University in China. His research focuses on energy model and energy policy, nuclear policy, hydrogen energy policy, climate change and carbon market in China. He worked on China energy and CO₂ emission under a global perspective, global carbon market trend and its impact on China, the roadmap of China industry CO₂ emission, peak of industry energy consumption and CO₂ emission. He also worked on non fossil energy role under national target of emission reduction, nuclear role under energy supply in China, opportunities and challenges of nuclear energy development in China, hydrogen role in China energy system transition.

Reagan Aylmer



Ms Reagan Aylmer is an Associate Partnerships and Implementation Officer for the International Atomic Energy Agency (IAEA) in Vienna, Austria, where she works on strategic communication for the Department of Nuclear Sciences and Applications' laboratories. Originally from Chicago, Illinois in the United States, Reagan attended university at Trinity College (BSc) and the Diplomatic Academy of Vienna (Master's of Advanced International Studies).

Milton Caplan



With more than 40 years in the nuclear industry, Milt Caplan specializes in advising governments and utilities on how to increase confidence and reduce risk for large energy projects with a focus on managing projects for success. Of the many projects in his career, he is currently providing independent oversight of the Darlington Refurbishment Program to the Ontario Minister of Energy, Northern Development and Mines. Milt was also a senior member of the Economics and Finance working group for the Canadian SMR Roadmap issued in 2018 and continues to provide strategic advice to stakeholders on SMR development and deployment.

Milt is the chair of the World Nuclear Association (WNA) Economics Working Group, teaches nuclear economics and nuclear plant structuring and financing for the World Nuclear University (WNU), and is the author of a pro-nuclear blog addressing issues of interest to the industry.

David Hess



David Hess is a Policy Analyst at the World Nuclear Association and part of the Harmony Programme where he works to help the nuclear industry meet the challenge of providing 25% of global electricity by 2050. One part science communicator, one part industry analyst and one part evidence-based policy advocate, David's main focus areas include nuclear technology, economics, climate change, sustainable development and now (increasingly) space exploration

John Lindburg



John C.H. Lindberg FRSA is a recognised expert on nuclear and radiological risk communication, currently researching the cognitive and psychological foundations of radiophobias at King's College London and Imperial College. John is also public affairs manager at the World Nuclear Association, and has previously worked as an adviser to think tanks, politicians and the UK Government on energy, regulation, and foreign affairs.

Jonathan Cobb



Dr Jonathan Cobb is the Senior Communication Manager at World Nuclear Association.

Dr Cobb is leading the Association's contribution to the upcoming COP26 climate change meeting in Glasgow. He is the lead author of the World Nuclear Performance Report, an annual publication providing information on trends in nuclear construction and generation as well as spotlight case studies from around the world. He is programme manager of World Nuclear Association's Annual Symposium, the global nuclear industry's premier conference.

Dr Cobb responds to press enquiries and has spoken on behalf of the association on television and radio, including appearances on Al Jazeera, BBC World, CGTN, Channel NewsAsia, France 24, Sky News, TRT Newsmakers, Voice of Islam (UK Radio).

Dr Cobb studied chemistry at the University of Liverpool, before joining British Nuclear Fuels at its Sellafield plant. He then worked at BNFL's Marketing and Corporate Strategy Departments, before joining World Nuclear Association in 2004.

Abel Julio González



Mr. Abel Julio González is Academician at the Argentine Academies of Environmental Sciences and of the Sea, Senior Adviser of the Argentine Nuclear Regulatory Authority, member of the Commission of Safety Standards of the International Atomic Energy Agency (IAEA) and member of the Argentine delegation to IAEA's General Conference and Board of Governors.

After his graduation at the University of Buenos Aires, Mr. González worked for many years for the regulatory branch of the Argentine Atomic Energy Commission (CNEA) and became CNEA Director. In the 1980s, he moved to the IAEA as Director of the Division of Radiation Transport and Waste Safety, where he led many environmental radiological evaluations, such as those in the Bikini Atoll in the Marshall Islands, the Mururoa and Fangataufa Atolls in the French Polynesia and the Semipalatinsk area in Kazakhstan, as well as in many radiation accidents appraisals including the international assessment of the Chernobyl accident.

Already in 1976, Mr. González became member of ICRP Committee 4, in 2000 he was appointed to the ICRP Main Commission, which he was vice-chairing from 2009 to 2013. Mr. González has also been the Vice-President of the International Radiation Protection Association (IRPA) and the President of IRPA's 12th International Congress in 2008.

He has been honoured with several international awards including the Morgan Award twice in 2000 and 2003, the Sievert Prize in 2004, the Lauriston S. Taylor Lecturer Award in 2005 and the Marie Curie Prize in 2008.

Mr. González participated in UNSCEAR since 1968, first as delegate from Argentina and then representing the IAEA between 1985 and 2005. He has been representative of Argentina since the fifty-fourth session in 2006.

*周胜 ZHOU Sheng**



周胜，苏州同元软控信息技术有限公司，核能领域专家。

周胜 2006 年由哈工程核学院本科毕业后进入清华大学核研院硕博连读，开展聚变裂变混合堆、高温气冷堆研发。2011 年博士毕业后一直从事反应堆工程设计与研发，负责了中广核研究院堆工中心各个重大项目及多个专业方向的研究工作，包含中广核在运在建机组、华龙一号、小型海洋堆、集团尖峰计划等科研项目。2017 年 4 月调入华龙国际，担任华龙一号工程项目联合设计、华龙一号 2020 科研与标准初步设计项目堆工所负责人，负责所内联合设计项目管理、进度管理及跨专业管理工作。作为堆芯方向主任设计师，承担核设计、热工水力、燃料、辐射屏蔽、核环保、安全分析等专业工作。

2020 年底进入苏州同元软控，主管 Modelica 多领域统一建模仿真技术在核能行业深入应用以及国际合作推广，负责公司核能行业经营、技术及市场战略制定，并结合核能行业特性，开展核能行业 MBSE 应用研究。

Dr. ZHOU Sheng, nuclear energy field application expert from Suzhou Tongyuan Software & Control Technology Co., Ltd.

Bachelor of engineering from Harbin Engineering University in 2006, Ph.D. from Institute of Nuclear and New Energy Technology(INET) of Tsinghua University in 2011. During Ph.D., he carried out some basic research of fusion fission hybrid reactor and high temperature gas-cooled reactor. After graduation, he has been engaged in reactor engineering design and research for 10 years. He has been responsible for the research work of various major projects and multiple professional directions of the reactor engineering center of China General Nuclear Power Research Institute, including operation and under construction CPR1000, HPR1000, small ocean reactor ACPR50S, and other group Research projects. He was transferred to Hualong International in April 2017 and served as section head, and department project manager of the HPR1000 joint design and the HPR 2020 design.

At the end of 2020, he entered Suzhou Tongyuan Software & Control, in charge of the in-depth application of Modelica multi-field unified modeling and simulation technology in the nuclear energy industry and the promotion of international cooperation, responsible for the company's nuclear energy industry operation, technology and market strategy formulation, and carried out the nuclear energy industry MBSE application research.

赵成昆 ZHAO Chengkun



赵成昆, 现任中国核能行业协会专家委员会常务副主任, 他曾任国家核安全局局长、中国核能行业协会副理事长。在此之前, 曾任核工业部第一研究设计院工程师、广东大亚湾核电站工程部总体处处长、分部经理、核工业一院设计部副主任、中国核动力研究设计院副总工程师兼秦山二期 60 万压核电站总设计师、中国核动力研究设计院副院长、院长, 国家环保总局核安全与辐射环境管理司司长、国家核安全局常务副局长。1966 年毕业于上海交通大学工程物理系船舶反应堆工程专业, 美国哥伦比亚大学工学院应用物理和核反应堆工程系核安全防护与计量学专业访问学者, 研究员级高级工程师。

Mr. ZHAO Chengkun, a senior engineer of professor level, is currently the Executive Deputy Director of the Expert Committee of the China Nuclear Energy Association (CNEA). Before that, he was the Director General of the National Nuclear Safety Administration (NNSA), and Vice Chairman of China Nuclear Energy Association (CNEA). Previously, he successively served as the Deputy Director General of Nuclear Power Institute of China (NPIC), Deputy Chief Engineer of NPIC, Chief Design Engineer of Qinshan Phase-II NPP, Director General of NPIC, and Executive Deputy Director General of NNSA. He graduated from the Department of Nuclear Engineering, Shanghai Jiaotong University in 1966. He ever worked as a visiting scholar in the Department of Applied Physics & Nuclear Engineering, Columbia University.

丛鹏 CONG Peng



丛鹏博士现为清华大学研究员, 博士生导师, 清华大学核能与新能源技术研究院应用核技术研究室主任。他的研究方向包括: 数字辐射成像系统设计、研发, 数字信息获取、处理、分析。包括大型客体/高精度 CT 系统图像重建原理及算法、GPU 加速计算, 三维显示, 三维图像处理及量化分析; 机器学习; 反向工程; 新型安检系统研发等。丛老师在国内外期刊发表论文 30 余篇, 拥有国内外发明专利 10 项, 软件著作权 4 项。

Dr. Cong is a professor and doctoral advisor of Tsinghua University. He is also the director of the Applied Nuclear Technology Laboratory of INET, Tsinghua University. His research fields include: Design, research and development of digital radiation imaging system; Acquisition, processing and analysis of digital information; The principle and algorithm of image reconstruction of large

object / high precision CT system, GPU accelerated calculation, 3D display, 3D image processing and quantitative analysis; Machine learning; Reverse engineering; Research and development of new security inspection system, etc.. As an advisor of 5 master students and 1 PhD student, he has published more than 30 papers and obtained 10 invention patents and 4 software copyrights.

陈国才 CHEN Guocai



陈国才，清华大学在读工程博士生。现任中核国电漳州能源有限公司党委书记、董事长，兼任福建省科协常委，中国核能行业协会专家委员会专家，福建省电力协会副会长，正高级工程师。从事核电工作二十余年，先后参与国家“九五”重点工程秦山三期重水堆核电站（加拿大 CANDU6）、浙江三门核电站（美国 AP1000 首台机组）、福清核电站等工程建设，机组调试，生产运营。全面主持并领导中国三代核电自主知识产权“华龙一号”示范工程建设。曾荣获 2015-2017 年度中国十大核科技进步奖，福建省第十届紫金科技创新奖，福建省第十八届优秀企业家等荣誉。

Mr. Chen Guocai, an engineering doctoral student at Tsinghua University. He is the chairman of CNNC Guodian Zhangzhou Energy Co., Ltd., member of the Standing Committee of Fujian Province Association for science and technology, expert of the expert committee of China Nuclear Energy Industry Association, Vice President of Fujian Province Electric Power Association. He is also a senior engineer of professor level. He has been engaged in nuclear power for more than 20 years. He has successively participated in the construction, commissioning, production and operation of Qinshan Phase III heavy water reactor nuclear power plant (CANDU6, Canada), Zhejiang Sanmen Nuclear Power plant (the first unit of the U.S. AP1000) and Fuqing nuclear power plant. He presided over and led the construction of China's "HPR1000" demonstration project, which uses generation III technology and has independent intellectual property. He has won the 2015-2017 China top ten Nuclear Science and Technology Progress Award, the 10th Zijin Science and Technology Innovation Award of Fujian Province, and the 18th Outstanding Entrepreneur of Fujian Province.

孙俊 SUN Jun



孙俊是清华大学副教授，核研院反应堆物理、热工与系统模拟研究室主任，2016年起担任四代堆核能系统教育培训工作组中方代表。研究领域包括反应堆热工水力学、核电模拟机、空间堆以及国际合作等。

Mr. Jun Sun is the Associate Professor in the Institute of Nuclear and New Energy Technology (INET), Tsinghua University. He is also the Division Head of Reactor Physics, Thermal Hydraulics, and System Simulation of INET. Started from 2016, he is assigned as the Representative of China in the Education and Training Working Group, Generation IV International Forum (GIF). His research interests include reactor thermal hydraulics, nuclear reactor simulators, space nuclear reactor designs and international cooperation.

刘学刚 LIU Xuegang



刘学刚博士是清华大学核能与新能源技术研究院研究员、博士生导师。在清华大学主讲“核燃料循环战略”和“核化学工程”两门研究生课程。主要从事核化学化工、核燃料循环和放射性废物处理等领域的研究工作。同时负责核退役方面的科研、工程项目的管理工作。主要研究内容和兴趣领域包括：乏燃料后处理、放射性废物处理处置、核退役技术、核燃料循环战略和政策等。

Dr. LIU Xuegang, a research professor, is now working in the Institute of Nuclear and New Energy Technology (INET), Tsinghua University. He has taught two graduate courses, i.e., “nuclear fuel cycle strategy” and “nuclear chemical engineering”. His work focuses on nuclear chemical engineering, fuel cycle, radioactive nuclides separation technologies and so on. Meanwhile, he is also responsible for the management on research and engineering projects of nuclear decommissioning. The areas of his research and interest include nuclear reprocessing, radioactive waste management, decommissioning technology, nuclear fuel cycle strategy and policy.

Ian Hore-Lacy

Pedro DIEGUEZ PORRAS

Li (Jerry) Li



Since March 2021, Mr. Li has been working as the Performance Analysis Senior Advisor in WANO London Office, assisting the performance analysis programme by screening WANO event reports, analysing performance data and participating in international workshops and seminars. This work supports the development of high-quality operating experience products for WANO members and promptly provides insights into industry trends. During July 2006 to March 2021, he worked in Sanmen Nuclear Power Co., Ltd. He was successively an operator trainee, Senior Operator, Shift Supervisor, and Shift Manager.

As a shift manager, he was responsible for the safe and reliable operation of the plant. He joined the very first group of shift managers in Sanmen. He had participated and led most AP1000 start-up activities, also with full experiences in plant commissioning and operation. Sanmen unit 1 has been put on commercial operation since 2018 without any unplanned trip during the start-up phase, and for the year of 2019, it was the best performance unit in China, and shift manager would be the critical person who led the operation team to success.

Yuji Kumagai



Dr. Yuji Kumagai is currently the senior nuclear safety specialist at the Nuclear Energy Agency (NEA) of the Organization for Economic Co-operation and Development (OECD). He has around 20 years' experience in nuclear industries, academic and international organizations in both technical assessment and project management roles. Within this experience, he has spent 12 year of nuclear career abroad in France, UK, USA, Italy, and Austria. Before the

current role, he was the senior nuclear advisor for nuclear safety and operation activities at the Horizon Nuclear Power in the UK. In addition, he was the nuclear safety researcher at the Electric Power Research Institute (EPRI) in the USA. Prior to his international appointment, he was senior engineer for nuclear safety field at both the Fukushima Daiichi nuclear power station and Tokyo head office in the Tokyo Electric Power Company (TEPCO). Yuji earned a PhD degree in nuclear engineering and a master degree in management of technology from Tokyo Institute of Technology.

Callum Thomas



Callum is the founder and CEO of Thomas Thor Associates, a recruitment, executive search and HR consulting organisation dedicated exclusively to the global nuclear industry and with offices across Europe, North America and the Middle East. He supports governments, regulators, operators, engineering companies, equipment manufacturers and research organisations in building and sustaining a competent nuclear workforce. His expertise is in attracting, recruiting and retaining the workforce required to build, operate, maintain and decommission nuclear facilities. Having worked in the nuclear industry across more than 30 countries, Callum has a global perspective on human resources and capacity building within nuclear. He is passionate about achieving inclusion and diversity in the global nuclear workforce and is co-founder of Diversity & Inclusion in UK Nuclear.

Callum also works as a consultant for the IAEA in the areas of Human Resource Development and Knowledge Management and sits on the UK's Next Generation Nuclear Industry Council. He has been involved in initiatives for member states with existing nuclear power infrastructure as well as member states developing new nuclear power programmes.



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