NICE Future
Nuclear Innovation: Clean Energy Future

Tuesday, July 21, 2020

INFORM AND INSPIRE THE NEXT GENERATION, WEBINAR SERIES, PRESENTS:

Part I: U.S. Spotlight on K-12 Nuclear Science Curriculum Initiatives and STEM Engagement

CO-SPONSORS:

ANS

IYNC

C3E INTERNATIONAL
ADVANCING GENDER EQUALITY TOGETHER
AN INITIATIVE OF THE CLEAN ENERGY MINISTERIAL

Ministerial Vision and the NICE Future Initiative

- At the 9th Clean Energy Ministerial (CEM-May 2018, Copenhagen), ministers launched the Nuclear Innovation: Clean Energy Future (NICE Future) initiative, an international collaboration that envisions a world in which nuclear energy innovation and uses advance clean energy goals.
- A NICE Future initiative core mission is to inform, inspire, and build a diverse and inclusive workforce of the future.

Lead Countries

Participant Countries

Focus Areas

Exploring innovative applications for advanced nuclear systems both electric and non-electric.

Pooling experience on economics, including valuation, market structures, and ability to finance.

Engaging policy makers and stakeholders on energy choices for the future.

Communicating nuclear energy's roles in clean, integrated energy systems and developing the nuclear energy workforce of the future.

External Partners

International Energy Agency

OECD Nuclear Energy Agency

International Atomic Energy Agency

International Framework for Nuclear Energy Cooperation

Generation IV International Forum

ClearPath

Third Way

Energy for Humanity

Energy Options Network

Women in Nuclear Global

International Youth Nuclear Congress

Nuclear Industry Council

Nuclear Energy Institute

World Nuclear Association

American Nuclear Society

Electricite de France

For more information, visit **nice-future.org**.

Inform and Inspire the Next Generation Series—Part I: U.S. Spotlight on K-12 Nuclear Science Curriculum Initiatives and STEM Engagement

IAEA Capacity Building Support to Member States

21 July 2020

Lisa Berthelot
Stakeholder Involvement Officer
IAEA Division of Nuclear Power


People in Nuclear Power
Engaging with Stakeholders
Knowledge Management
Workforce Planning
Education and Training

Milestones in the Development of a National Infrastructure for Nuclear Power

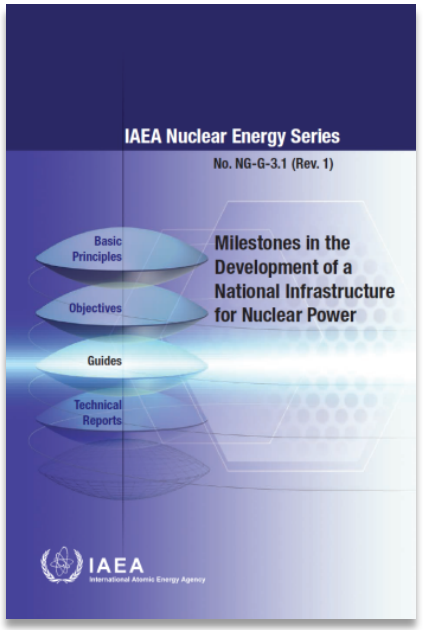
The IAEA has developed the

Milestones Approach **to assist Member States introducing a nuclear power programme or expanding an existing one**

The national nuclear infrastructure required to support the programme ranges from

'**softer**' areas, such as laws, institutions, regulations, international legal instruments, **human resources, and stakeholder involvement**

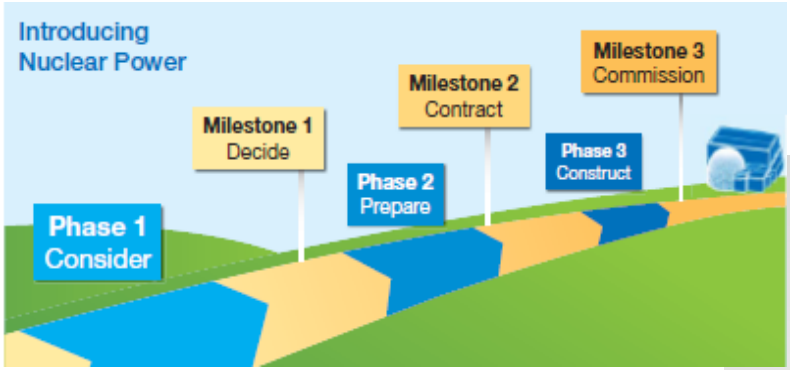
to the '**hard**' (or physical) aspects of infrastructure, such as the capacity and quality of the electricity grid, available sites, transport system and the local industrial base



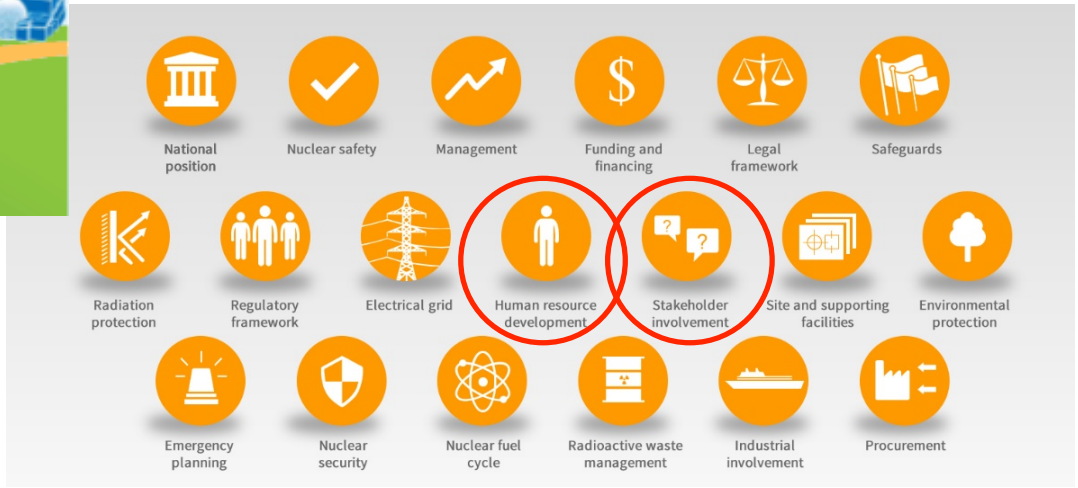
IAEA Milestones Approach cont.

❸ **Phases (Consider – Prepare – Construct)**

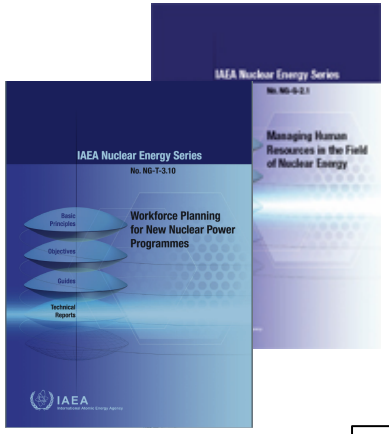
❸ **Milestones (Decide – Contract – Commission and Operate)**



⓳ **Infrastructure Issues**

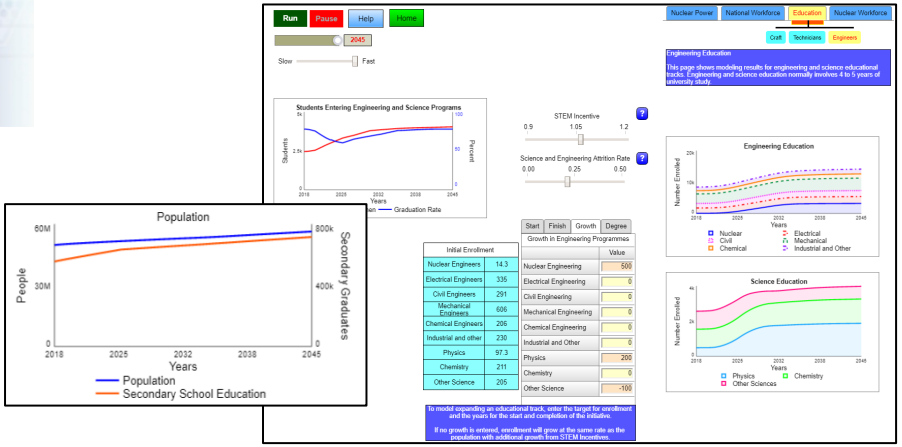


IAEA approach to HR Development



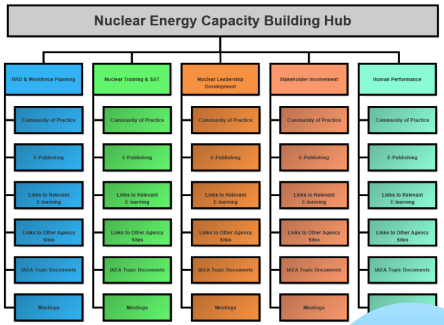
IAEA guides on HRD

IAEA Guidance on Human Resource Development includes a modelling tool to perform a holistic analysis of the education systems and workforce needed to support nuclear power



Snapshot from NPHR modelling tool

An HRD Strategy should include elements for K-12 education and STEM programmes that prepare the nuclear workforce



Nuclear Energy Capacity Building Hub

Publications

Training Course

Technical Meetings

Workshops

Expert Missions

Webinars

Nuclear Communicator's Toolbox

E-learning

Scientific Visits

IAEA Capacity Building Support

Thank you!

C3E International Ambassador Program

For Women who Want to Be a Part of the Clean Energy Future

@C3E_Intl_Energy
#Equalby30

Technology Collaboration Programme by IEA

C3E INTERNATIONAL
ADVANCING GENDER EQUALITY TOGETHER
AN INITIATIVE OF THE CLEAN ENERGY MINISTERIAL

Welcome and Introductions

Clean Energy Education and Empowerment (C3E) International is a multilateral initiative **working towards greater gender diversity in clean energy professions**, recognizing that the transition to a clean energy future will only succeed if we harness all possible talent.

C3E Chair: Annette Hollas, Canada

C3E Vice-Chair: Suzanne Jaworowski, USA

Natural Resources Canada | Ressources naturelles Canada

Canada

@C3E_Intl_Energy

Technology Collaboration Programme by IEA

Workstreams

- Data Collection
- Ambassadors and Mentorship
- Awards and Recognition
- Communications
- Equal by 30

C3E INTERNATIONAL
ADVANCING GENDER EQUALITY TOGETHER
AN INITIATIVE OF THE CLEAN ENERGY MINISTERIAL

Developing the Next Generation of Women Leaders

Awareness:
Role Models
Ambassadors

Education:
Scholarships
Mentors

Experience:
Internships
Fellowships

Ambassadors Cohort 2020-2022

AUSTRIA

Christine Materazzi-Wagner
Director of Electricity, E-Control

Elisabeth Spitzenberger
Head of Technical Management, Energie AG Oberösterreich

Cornelia Daniel
Owner, Dachgold/ Tausendundein Dach

Theresia Vogel
Director, Climate and Energy Fund

CHILE

Annika Schuttler
Project Leader, Energy and Sustainability, Chilean-German Chamber of Commerce

Carolina Isabel Gómez Agurto
Professional of the Environmental and Climate Change Division, Ministry of Energy

Loreto Rivera Torteroglio
Stakeholders Manager, RWE Renewables Chile

Monserrat García Herrera
Environmental Engineer, Ministry of Energy Chile

María Susana Muñoz Espinoza
Head of Corporate Affairs & Communications, Pacific Hydro Chile

USA

Lisa Murkowski
Senator from Alaska
Chairman of the Senate Energy and Natural Resources Committee
Chairman of the Interior and Environment Subcommittee

Danielle Merfeld
Vice President and Chief Technology Officer, GE Renewable Energy

Dr. Sara Pozzi
Professor of Nuclear Engineering and Radiological Sciences and a Professor of Physics, University of Michigan
Director, Diversity, Equity, and Inclusion, College of Engineering

CHINA

Bai Yu
Associate Professor, Deputy Director of Science and Technology Division, Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences (GIEC, CAS)

Fang Xiaoju
Director of PR and Branding, Envision Energy

Wang Mu
Deputy Director of International Cooperation, Dept. of Chinese Wind Energy Association (CWEA)

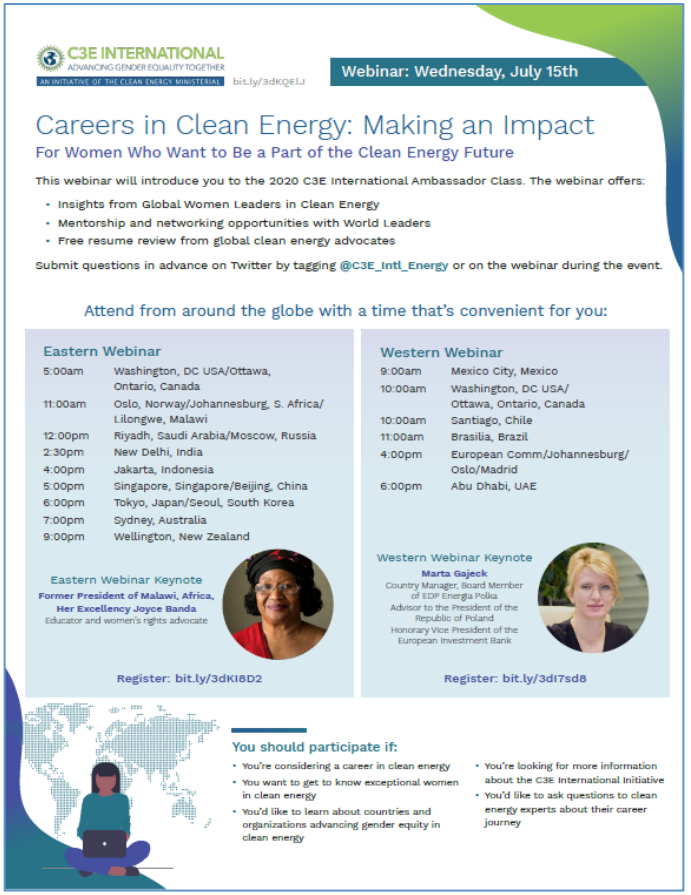
Zheng Yali
Deputy Director of Automotive Industry Research Department, China Society of Automotive Engineers

Lyu Fang
Senior Engineer & Secretary-General, Electrical Engineering Institute, Chinese Academy of Science;

C3E INTERNATIONAL AMBASSADORS GLOBAL WEBINAR

Careers in Clean Energy:
Making an Impact

- Networking/Mentorship
- Scholarships/Internships
- Resume Review



Prominent Speakers

Her Excellency, Dr. Joyce Banda
Former President of the
Republic of Malawi, Africa.
An entrepreneur, activist,
politician, and
philanthropist.

Marta Gajecka
Advisor to Polish President Duda
Vice President PGE Energia
Honorary VP, European Investment Bank

Technology Collaboration Programme
by iea

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C3E International Ambassador Panels

Loreto Rivera Torteroglio
Stakeholders Manager, RWE Renewables Chile
@Lola1981

Danielle Merfeld
Vice President and Chief Technology Officer, GE Renewable Energy
@DWMerfeld

Bai Yu
Associate Professor, Deputy Director of Science and Technology Division, Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences (GIEC, CAS)

Fang Xiaoju
Director of PR and Branding, Envision Energy

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How to Follow C3E

@C3E_Intl_Energy
#Equalby30

CleanEnergyMinisterial/initiative-clean-energy-ministerial/clean-energy-education-and-empowerment-c3e

NAVIGATING™ NUCLEAR

Energizing Our World

Janice Lindegard

Program Specialist

07/21/2020

What is Navigating Nuclear?

- K-12 nuclear energy and science curriculum
- Fact-based
- Lessons, STEM projects, careers
- Virtual Field Trips
- Free, globally available
- navigatingnuclear.com

Our Goal

- **Clarify common misconceptions** surrounding nuclear science and explore its current and future role in technological applications
- **Build understanding** of and create value for nuclear science and technology
- **Inspire future careers** in the nuclear field – and the pursuit of higher education to achieve this goal

How did we get to Navigating Nuclear?

Concept
Nuclear energy education every US school

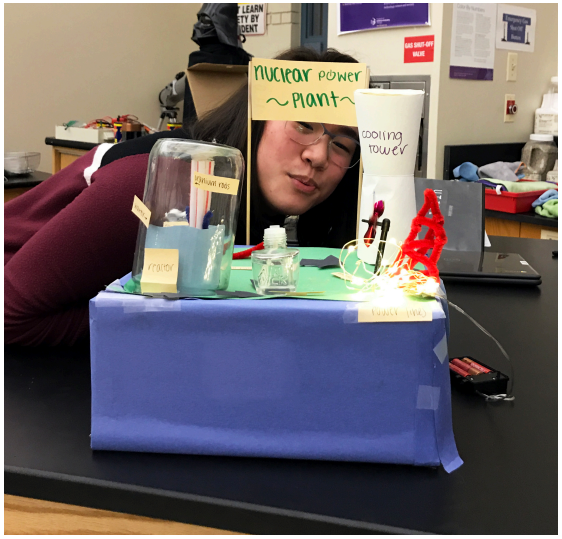
Challenge
US education system

Solution
Partner with curriculum specialists

About Discovery Education

- 35 million students served by 2.8 million educators
- Over 150 million pieces of content delivered annually
- Over 2.2 million unique monthly visitors to the digital educational platform
- Largest educator network of its kind.

Results



1,171,850 students reached

Keys to success

- Commitment
- Leadership
- Partnership

Commitment

Mary Lou Dunzik-Gougar

President, American Nuclear Society

Associate Dean College of Science & Engineering,
Idaho State University

Teacher Workshops

AGENDA

Detecting Radiation in Our Radioactive World

Saturday, October 28, 2017
Washington Marriott Wardman Park - Washington, DC
Room: Lincoln 6

7:30 AM	Attendee Check-in Begins	
8:00	Welcome and Introductions	Janice Lindegard Mary Lou Dunzik-Gougar
8:05	Introduction to Radiation **Activity: Isotope Discovery Kit**	Candace Davison Dunzik-Gougar
9:15	Topic: Alpha and Beta Decay **Demonstration: Alpha and Beta Decay** **Activity: Half-Life of M&Ms**	Davison
10:00	Break **Activity: Mini-Rutherford**	
10:15	Topic: Nuclear Power/Electricity Generation **Demonstration**	Davison
11:00	Topic: Fuel Cycle/Waste Managaement	Dunzik-Gougar
11:45	Lunch	
12:15 PM	Brief History of Particle Physics	Eric Loewen
12:45	Applications of Nuclear Science and Technology **Activity: Applications Cards**	Davison
1:30	Topic: Making Atoms Visible **Demonstration: Cloud Chamber** **Activity: Cloud Chamber Kits**	Jeffrey Chapman
2:15	Break	
2:30	**Demonstration: Radioactive vs Irradiated Salt**	Dunzik-Gougar
2:45	Topic: Radon **Activity: Radon Vacuum**	Davison
3:45	Topic: Detecting Radiation with Geiger Counters **Activity: Care, feeding, and use of Geiger Counters**	Dunzik-Gougar
4:30	Raffle and evaluations	Lindegard

ANS Center for Nuclear Science and Technology Information

U.S. DEPARTMENT OF ENERGY
Office of NUCLEAR ENERGY

NAVIGATING NUCLEAR
Energizing Our World

Leadership

Eric Loewen

SME Team Lead

Former ANS President

Support of four ANS Presidents

- Bob Coward
- John Kelly
- Marilyn Kray
- Mary Lou Dunzik-Gougar

Partnership

- Discovery Education
- Department of Energy, Office of Nuclear Energy
- Palo Verde Generating Station
- Idaho National Laboratory
- ANS membership
- Additional ANS donors

July 21, 2020

Jennifer Jackson
Manager, K-12 Education Programs

Inspiring the Next Generation

Through K-12 STEM Education & Outreach

Idaho National Laboratory

Idaho National Laboratory's K-12 Education Programs

Our Mission:

Lay a Strong STEM Foundation for All Students

~Early
~Informal
~Curriculum
~Equitable Access

Build a STEM Prepared Workforce

~Integrated
~Soft Skills
~Scholars
~Gen Z

Meet Increased Demand

+26% Growth
+100,000 jobs

Meet Our Team

JENNIFER JACKSON
K-12 STEM Program Manager

ANGELA GOOD

BRENDA GREENHALGH

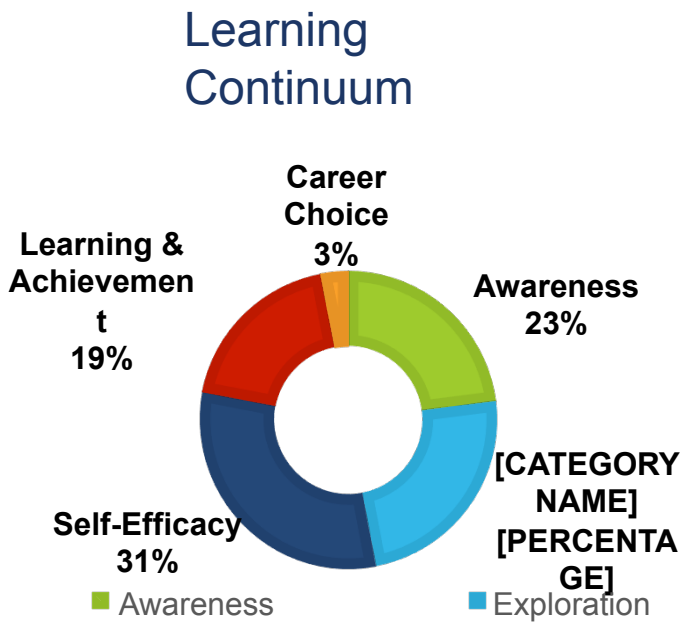
LESLIE WRIGHT

IDAHO NATIONAL LABORATORY

Idaho's STEM jobs pay well: Double the median wage of non-STEM jobs

STEM Self-Efficacy

We believe that students must see themselves as scientists, technicians, engineers, and mathematicians by engaging in experiential learning and by solving real world problems.



IDAHO NATIONAL LABORATORY

IF YOU CAN SEE IT, YOU CAN BE IT!

We empower INL employees to become STEM role models, mentors and ambassadors:

- STEM Ambassador handbook and training
- INL mission aligned activities and projects
- “How-to” videos and guides
- Event coordination, materials, and support

131 Employee STEM Ambassadors*

43 Employee STEM Ambassador Events*

INL STEM AMBASSADORS

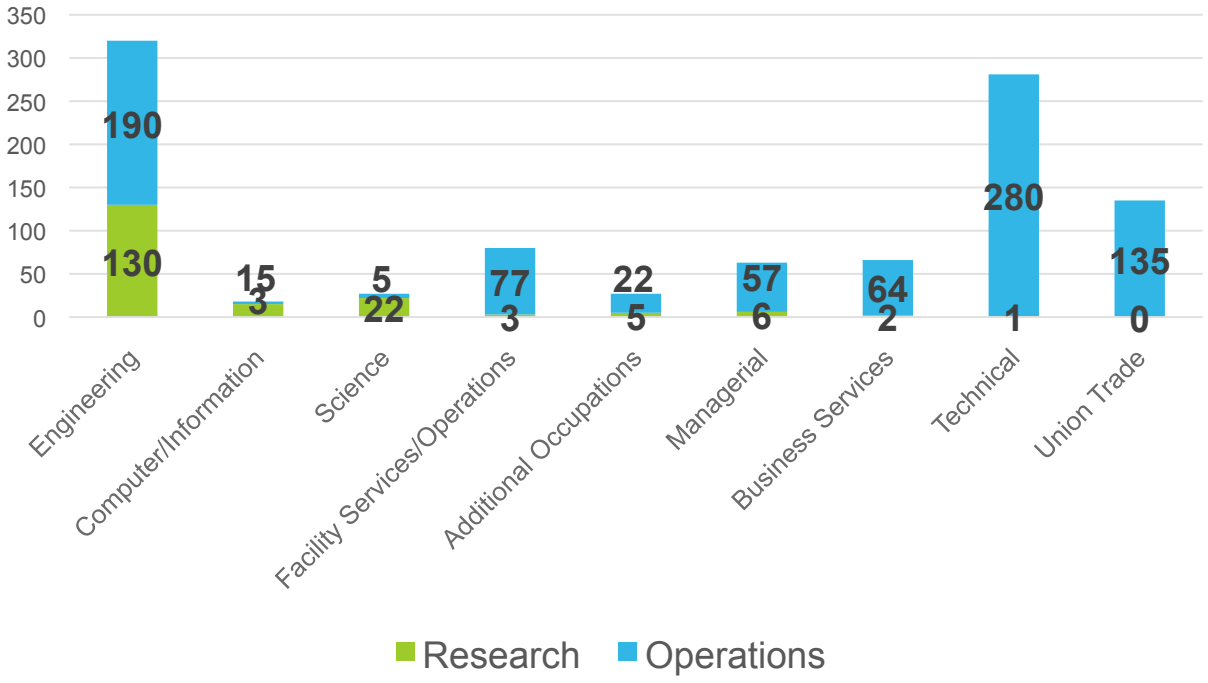
*FY 2019

Family Nuclear Science Night 2019

IDAHO NATIONAL LABORATORY

Projected Hires by Work Discipline

Research vs. Operations Focused Occupations



Embrace Your Future!
CTE Pathways to Success

IDAHO NATIONAL LABORATORY

STEM Education Ecosystem

- **Department of Energy-STEM Rising Initiative:** Science, Technology, Engineering and Mathematics are the essential building blocks to accomplishing the U.S. Department of Energy's mission. STEM Rising is the initiative to inspire, educate, and spark an upwards trajectory to lifelong success in STEM.

- **Battelle Education and Community of Practice:** to make the world better by commercializing technology, giving back to our communities, and supporting science, technology, engineering and mathematics (STEM) education.

- **Idaho STEM Action Center:** Connecting STEM education and industry to ensure Idaho's long-term economic prosperity by engineering innovative STEM opportunities for educators, students, communities and industry to build a competitive Idaho workforce and economy.

U.S. DEPARTMENT OF ENERGY | Office of NUCLEAR ENERGY

Clean. Reliable. Nuclear.

Inform and Inspire the Next Generation—U.S. Spotlight on K-12 Curriculum Development and STEM Engagement

July 21, 2020

Melinda Higgins
NE Tribal STEM Advisor
CNI/Office of Nuclear Energy

NE STEM Goals and Objectives

GOAL: The Office of Nuclear Energy works to engage youth and communities in nuclear energy education. The focus is on improving access to STEM education and workforce development opportunities, as well as increasing site-specific engagement. NE also collaborates with all three DOE Tribal Working Groups to increase STEM opportunities for youth and the workforce in Indian Country.

OBJECTIVES:

- Tribal STEM Engagement
- Internships and Work-based training
- Fellowships/scholarships
- Course-based training
- Curriculum development
- Outreach and communication

Supporting STEM Education in Tribal Communities
Project Team @TribalSTEM

Partners

- Shoshone-Bannock Tribes (co-lead)
- Battelle
- Arizona Science Center
- North Carolina School of Science and Mathematics (UNC system)
- Brockport Research Institute
- Stemnovations (Alaska)

474 views | Nov 26, 2019, 05:50pm

Traditional Knowledge From The Land, For The Land: STEM Opens Doors For Native American Students

Talia Milgrom-Elcott Contributor ⓘ
Education
I focus on collaborative problem-solving in K-12 STEM education.

Now more than ever, it's crucial to harness the full potential of STEM to tackle climate change, address public health challenges and advance technology. And there's a growing recognition that we won't be up to the task if we don't ensure all students have access to foundational math training, authentic STEM learning and high-level, career-relevant STEM courses. Right now, students of color and low-income students are too often shut out of these learning opportunities – too often because the courses and other opportunities are never made available to them.

That's especially true when it comes to Native American students, who use STEM skills in everyday life but too often don't have access to the formal STEM education and training that would open doors to careers in those fields.

Native Americans have been using STEM skills on Tribal lands for generations. Tribal youth are resourceful, creative and resilient. Now, those who have gone on to study and work in STEM fields are returning home to their reservations to help meet the challenge head-on.

Talia Martin serves as the Tribal Department of Energy Director at Shoshone-Bannock Tribes in Idaho. Growing up, Martin loved reading and science, but didn't see opportunities to work as a scientist in her community, although those skills were desperately needed. While pursuing her master's in chemistry, Martin was often the

Navigating Nuclear STEM Resources

High School Resources:

- Digital Lesson Plans
- STEM Project Starters
- Virtual Field Trip of Idaho National Laboratory

Middle School Resources:

- Digital Lesson Plans
- STEM Project Starters
- Career Profiles

DOE has partnered with American Nuclear Society (ANS) and Discovery Education (DE) to support High School Resources (2019-2020) and *Elementary School Resources (2020-2021)*

Federal Alignment: Federal STEM Strategic Plan (2018-2023)

Goals of Plan

- Work towards a STEM-literate society
- Prepare for STEM workforce of the future
- Promote diversity and inclusion in STEM

DOE Implementation Strategy

Global Collaborative STEM Opportunities

Making Mosquitoes SIT!

How can radiation solve problems and benefit humans?

In this lesson, students will be introduced to how radiation, such as gamma radiation, can be used to help solve problems by examining the quest to eradicate Aedes mosquitoes using the Sterile Insect Technique: (SIT).

Download STEM Project Starter

NAVIGATING NUCLEAR
Energizing Our World

Project Starters

Topic

Making Mosquitoes SIT!

OBJECTIVES

Students will:

- Investigate types of radiation and understand how radiation can be used to solve problems and benefit humans.
- Gather evidence such as facts and statistics concerning deadly global diseases that use mosquitoes as vectors.
- Create a health campaign to inform the public of the use of mosquito sterilization as a sustainable technique to help combat the deadly diseases that they spread.

Overview

In this lesson, students will participate in an interactive survey to determine what their misconceptions may be about the risks and sources of radiation they are exposed to in their daily lives. They will next be introduced to how radiation, such as gamma radiation, can be used to help solve problems by examining the quest to eradicate Aedes mosquitoes, which are vectors for deadly diseases around the world. They will participate in a jigsaw, where students share information with each other about the mosquito's unique role in the transmission of pathogens such as dengue, malaria, and the Zika virus. Students will review various ways that humans have tried to control and eliminate mosquitoes that carry these diseases, and why there is a current need for alternative methods. Next, students will be introduced to the Sterile Insect Technique: (SIT). In SIT, male insects are sterilized in a laboratory through the use of gamma radiation to disrupt DNA, and are then released to mate. Mating is unsuccessful, which results in a sustainable decrease in insect pest populations over time in the areas where SIT has been used. Students will form groups and be asked to create a campaign to help garner funding and support for the use of SIT to combat mosquitoes and the deadly diseases they spread in an assigned country. They will introduce the specific problem in their country that is related to disease transmission by mosquitoes using research and statistics. They will also create an interactive 3-D model, animation, or video that explains how SIT uses gamma radiation for sterilization and describes the advantages of SIT over other control methods.

Grade Band

9–12

Nuclear Technique Helps Fight Mosquito-borne Illnesses

14 November 2019

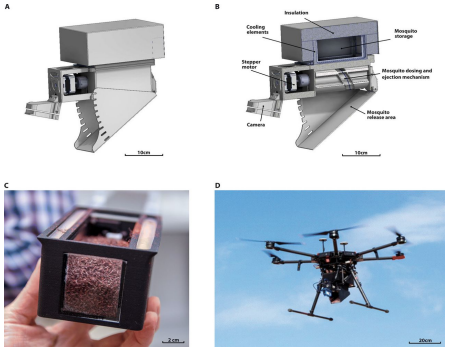
23

How you can use IAEA Videos →

Related Resources

- Insect pest control
- Sterile insect technique
- Exploring Genetic, Molecular, Mechanical and Behavioural Methods of Sex Separation in Mosquitoes
- Preventing Procreation: The IAEA's Research for Mosquito Control
- World-Wide Directory of SIT Facilities (DIR-SIT)

Future Iterations



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