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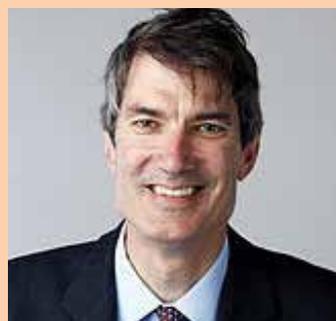
## CLASS OF 2019



Jesse Treu, Ph.D  
STELLAR ENERGY FOUNDATION



Jane Hotchkiss  
PEGASUS



Steven Cowley, Ph.D  
PPPL



Bernard Bigot, Ph.D  
ITER



Ahmed Diallo, Ph.D  
INFUSE



Bob Mumgaard, Ph.D  
CFS



Michl Binderbauer, Ph.D  
TAE



Christofer Mowry  
GENERAL FUSION



Nick Hawker, Ph.D  
FIRST LIGHT



Ian Baird  
MOTT MACDONALD



E. Michael Campbell, Ph.D  
LLE



Jonathon Carling  
TOKAMAK



David Kirtley, Ph.D  
HELION



F. Douglas Witherspoon, Ph.D  
HYPERJET



Derek Sutherland, Ph.D  
CT FUSION



Andrew Holland  
FIA

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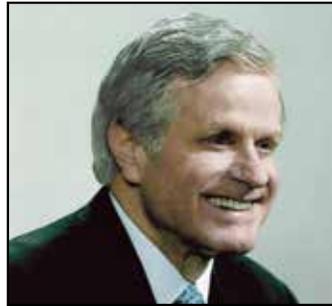
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Dick Flanagan  
flanagan@world-gen.com

Welcome to the Class of 2019!

*This is the Class of Climate Change. Fusion Energy has been thought of as the "HOLY GRAIL" of energy with infinite fuel, no carbon emissions and less and shorter-term radwaste compared to fission energy. Fusion Groups are focused on containing the plasma required to replicate the thermonuclear conditions of the sun, including magnetic confinement, inertial confinement and magnetized target fusion.*

*WORLD-GEN is pleased and proud to nominate the visionary fusion entrepreneurs into our 20th Class of the millenium starting with Jesse Treu who formed the Stellar*

*Energy Foundation to bring on fusion energy to make an impact on climate change.*

*Jane Hotchkiss co-founded Pegasus Fusion Strategies to share her experience in renewables as a consultant to fusion energy.*

*Steven Cowley is the Director of the Princeton Plasma Physics Laboratory (PPPL) devoted to developing solutions for fusion energy.*

*Bernard Bigot is Director-General of ITER, the first-of-a kind global collaboration of 35 countries to construct First Plasma in 2025.*

*Ahmed Diallo is deputy director of the DOE's INFUSE program so fusion companies can use the national labs.*

*Bob Mumgaard is CEO of Commonwealth Fusion Systems aimed at developing the world's first net energy gain fusion system with MIT.*

*Michl Binderbauer heads up TAE Technologies that christened "Norman", a 100 million dollar machine replacing the C-2U experiment.*

*Christofer Mowry is the CEO of General Fusion that is using an approach referred to as Magnetized Target Fusion (MTF).*

*Nick Hawker is the Co-Founder and CEO of First Light Fusion, Ltd., spun out from the University of Oxford.*

*Ian Baird is managing director of Mott MacDonald collaborating with First Light Fusion on a fusion reactor.*

*E. Michael Campbell is Director of Laboratory for Laser Energetics at the University of Rochester to support the NICF program.*

*Jonathan Carling is CEO of Tokamak Energy creating a way for a small modular fusion reactor to supply the National Grid.*

*David Kirtley is founder and CEO of Helion Energy developing a 50MW scale system using Magneto-Inertial Fusion power technology.*

*F. Douglas Witherspoon is CEO and Chief Scientist of HyperJet Fusion developing Plasma-Jet driven Magneto-Inertial Fusion.*

*Derek Sutherland is CEO of CT Fusion, a spin-off company from the University of Washington resulting from HIT-SI research projects.*

*Andrew Holland is executive director of the 19 member Fusion Industry Association based in Washington, DC.*

*World-Gen welcomes commentary. Please email [flanagan@world-gen.com](mailto:flanagan@world-gen.com)*

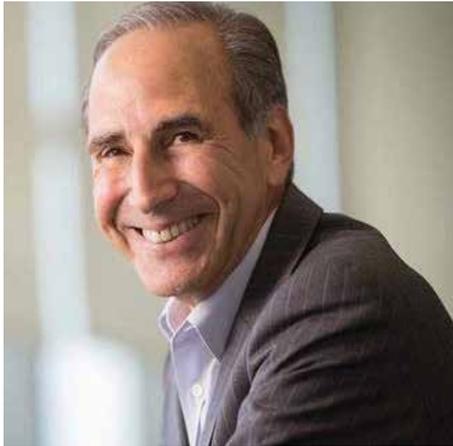
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## JESSE TREU

CHAIRMAN & CEO, STELLAR  
ENERGY FOUNDATION



In 2016, Jesse Treu co-founded the Stellar Energy Foundation dedicated to helping to bring fusion to the zero-carbon power portfolio soon enough to make an impact on climate change. Treu serves as Chairman and CEO of the Foundation.

In June in New York City, Jesse Treu welcomed fusion industry experts to a workshop to share innovative approaches and prepare a roadmap for pathways to a fusion economy. Panelists discussed: economies and costs from research to commercial and funding from public, private and philanthropic partnerships. To date, nearly a billion dollars has been raised by investments from Allen's Vulcan Capital, Venrock Ventures, Prenano, Mithril, Bill Gates Breakthrough Energy Ventures, Khosla Ventures and DOE among others.

He is a co-founder and partner of Domain Associates, LLC and is a leader in the field of venture capital focused on healthcare and biotech companies. He has served as a founder, president and chairman of numerous venture stage companies.

Treu received his BS in physics from Rensselaer Polytechnic Institute and his MA and Ph. D in Physics from Princeton University.

## JANE HOTCHKISS

CEO, PEGASUS  
FUSION STRATEGIES



Pegasus Fusion Strategies is a consulting firm co-founded by Jane Hotchkiss to bring fusion energy to the grid. Pegasus was formed to focus on the commercial fusion industry, a rapidly expanding environment of companies working toward creating consumable energy.

Our experience and capabilities are centered on providing commercial fusion companies a resource to move more quickly toward funding and operation; to be a conduit for those interested in fusion energy to stay abreast of the state of the industry and with the industry as a means to create a social license for the rapid deployment of fusion energy," Hotchkiss said.

"It is our mission to prepare the public space for fusion by providing research information and ideas to the many constituents vital to successful and efficient adoption of this critical conflict-free energy source. A number of projects are underway either for clients or pro bono in areas ranging from funding options to education of middle and high school students on the potential of fusion energy."

Jane Hotchkiss has spent nearly 30 years in the energy space, beginning in the late 80's at Skadden, Arps.

She holds a BA degree from Yale.

## STEVEN COWLEY

DIRECTOR, PRINCETON PLASMA  
PHYSICS LABORATORY



The Princeton Plasma Physics Laboratory (PPPL) is an innovative and discovery leader in plasma and fusion science and engineering. It is the only U.S. Department of Energy (DOE) national laboratory devoted to these areas, and it is the lead U.S. institution investigating the science of magnetic fusion energy.

PPPL is a partner in the U.S. contributions to the international ITER Project and hosts multi-institutional collaborations. Its flagship experiment is the National Spherical Torus Experiment-Upgrade. The Laboratory also hosts smaller experimental facilities used by multi-institutional research teams.

PPPL has two coupled missions. First, PPPL develops the scientific understanding of plasmas from nano to astrophysical scale and secondly develops the scientific knowledge to enable fusion to power the U.S. and the world.

The Laboratory is managed by Princeton University and funded by DOE's Office of Science.

Steven Cowley became the 7th Director of PPPL on July 1, 2018. He was previously chief executive officer of the United Kingdom Atomic Energy Authority (UKAEA) and was knighted by the Queen of England in June 2018 for his role in fusion science.

## BERNARD BIGOT

DIRECTOR-GENERAL  
INTERNATIONAL  
THERMONUCLEAR  
EXPERIMENTAL REACTOR (ITER)



ITER is designed to demonstrate the scientific and technological feasibility of fusion power and is the world's largest experimental fusion facility. ITER is a first of a kind of global collaboration of 35 countries. Europe is contributing almost half of the costs of its construction, while the other six members to this joint international venture (China, India, Japan, the Republic of Korea, the Russian Federation and the USA) are contributing equally to the rest. The ITER project is under construction in Saint-Paul-lez-Durance, in the south of France. The construction strategy is to achieve First Plasma by 2025, with full fusion power by 2035. Over 600 US companies, laboratories and universities are ITER participants.

The ITER Council just offered a second five-year term to Dr. Bernard Bigot as Director-General of ITER. The Council believes in the continuity of the project leadership under Dr. Bigot. Prior to his appointment at ITER Dr. Bigot completed two terms as Chairman and CEO of the French Alternative Energies and Atomic Energy Commission, CEA. From 2003 to

2009, Bernard Bigot served as France's High commissioner for atomic energy. Bernard Bigot was trained at the Ecole normale supérieure de Saint-Cloud and holds an agrégation (highest-level teaching diploma in France) in physical science and a PhD in chemistry.

## AHMED DIALLO

DEPUTY DIRECTOR, INFUSE



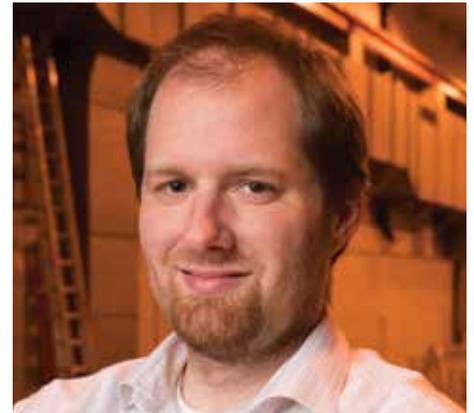
The US Department of Energy launched a program to encourage private-public partnerships to speed the development of fusion energy with PPPL physicist Ahmed Diallo serving as deputy director.

The program is called the Innovation Network for Fusion Energy (INFUSE). It's an initiative of the Office of Fusion Energy Sciences (FES) within DOE's Office of Science and will facilitate collaborations between industry and the DOE national laboratory complex. "Industry will tap the core competencies of national labs to enable new or advanced fusion technologies toward realization," Diallo said. "We will maintain the submission website, and organize and conduct merit reviews." FES will make the award decisions and will usher through the Cooperative Research and Development Agreement (CRADA) for each partnership.

Diallo is a graduate of the University of Iowa with a PhD in Physics, receiving his undergraduate degree from the University of Montana.

## BOB MUMGAARD

CEO, COMMONWEALTH  
FUSION SYSTEMS



In June, Commonwealth Fusion Systems, a startup commercializing fusion energy company, raised \$115 million and closed its Series A round.

CFS is collaborating with MIT's Plasma Science and Fusion Center to develop the world's first net energy gain fusion system, called SPARC.

CFS will produce first-of-its-kind high temperature superconductor magnets to build smaller and lower-cost fusion power plants. CFS will use these magnets to build SPARC by 2025 and demonstrate net energy gain from fusion for the first time in history. SPARC will pave the way for the first commercially viable fusion power plant called ARC, which will produce fusion power onto the grid.

CFS announced a \$50 million investment from Italian Energy Company, ENI. "Today is a very important day for us," said ENI CEO Claudio Descalzi at the signing. "Thanks to this agreement, Eni takes a significant step forward toward the development of alternative energy sources with an ever-lower environmental impact. Fusion is the true energy source of the future."

Mumgaard received his Ph.D at MIT. Advances in superconducting magnets have put fusion energy potentially within reach, offering the prospect of a safe, carbon-free energy future," says MIT President L. Rafael Reif.

## MICHL BINDERBAUER

CEO, TAE TECHNOLOGIES



TAE Technologies was founded in 1998 to develop and distribute safe, cost-effective commercial fusion energy with the cleanest environmental profile. With over \$800 million in private capital, TAE Technologies is now on the cusp of delivering a transformational energy source capable of sustaining the planet for centuries.

TAE announced an evolution in machine performance. “This achievement further validates the robustness of TAE’s underlying science and unique pathway,” Michl Binderbauer said. The \$100 million machine has been christened “Norman” in honor of physicist Norman Rostoker, the late founder of TAE. TAE’s research team is aiming for a hydrogen-boron fusion reaction, which is cleaner than the typical deuterium-tritium reaction and will require building a successor to Norman. TAE’s approach to fusion involves shooting “smoke rings” of high-energy plasma at each other within a magnetic confinement chamber, with neutral beams directed into the chamber to improve plasma stability.

Dr. Binderbauer is an expert in reactor kinetics, equilibrium, and stability of advanced beam-driven Field-Reversed Configurations and aneutronic fusion systems. He holds a Ph.D from UC Irvine.

## CHRISTOFER MOWRY

CEO, GENERAL FUSION



General Fusion was founded in 2002 with a goal to transform the world’s energy supply by developing the fastest, most practical and cost-competitive path to commercial fusion power. The company has now grown to a team of more than 70 at its world-class laboratories in Burnaby, just outside Vancouver, BC.

General Fusion has been recognized globally for its work in clean energy technology and is a member of the Cleantech Global 100, as well as the recipient of numerous Canadian and international cleantech awards.

General Fusion is using an approach referred to as Magnetized Target Fusion and will be constructing a full-scale prototype system. General Fusion power plants will also be modular.

General Fusion recently commissioned the world’s largest plasma injector used to shoot super heated gas into a compression chamber for ignition.

Christopher Mowry has more than 30 years of global executive leadership experience in the energy and infrastructure sectors. He holds a BS degree from Swarthmore College and a Masters degree from Drexel University.

## NICK HAWKER

CEO, FIRST LIGHT FUSION



“Fusion Energy doesn’t just need to be scientifically feasible; it needs to be commercially viable,” Hawker said. Mott MacDonald is one of the world’s leading power consultancies with a wealth of experience in energy generation and in fusion in particular; given their involvement with ITER. “The work we are doing is an important step forward towards making fusion energy a reality”. Identifying the engineering challenges of our unique and radically new technology is a fundamental milestone towards the vision of a commercially viable fusion power plant.

First Light Fusion Ltd was spun out from the University of Oxford in July 2011, First Light aims to deliver a detailed reactor design in the 2020’s. The firm’s inertial confinement approach creates extreme temperatures and pressures required for fusion by compressing a target using a projectile traveling at massive speed.

First Light Fusion directly employs a team of engineers, and physicists, as well as collaborating closely with academic organizations, including the University at Oxford, Warwick University, UCL and Imperial College, London.

Nick Hawker is the co-founder and CEO of First Light. Nick’s research into fusion began in 2007 as part of his masters thesis.

## IAN BAIRD

MANAGING DIRECTOR  
MOTT MACDONALD NUCLEAR  
DIVISION



The Mott MacDonald Group is a consultancy with headquarters in the United Kingdom, employing 16,000 in 150 countries and is one of the world's largest employee-owned companies.

Ian Baird was appointed as general manager for Mott MacDonald's Nuclear Division in May. "Fusion energy is one of the great engineering and scientific challenges. We are excited to be working with First Light to help bring this vital technology towards commercialization. We are impressed by their new approach, pragmatic collaborative culture and the scientific rigor. We expect a number of engineering hurdles, as we are dealing with a technology that has never been developed before, but the promise of clean and limitless energy is becoming a reality, and we are proud to be part of this journey," Baird said.

Ian is a chartered civil engineer with 35 years of experience specializing in power and nuclear sectors. He has worked as a designer, manager and director on engineering, procurement and construction of multi-disciplinary projects.

## E. MICHAEL CAMPBELL

DIRECTOR  
LABORATORY FOR LASER  
ENERGETICS



The Laboratory for Laser Energetics (LLE) is a unique national resource for research and education in science and technology and a major asset of the University of Rochester. The university has a history of innovation that provides a singular environment for LLE within a technologically sophisticated scientific community, resulting in substantial regional economic impact. Established in 1970 as a center for the investigation of the interaction of intense radiation with matter, LLE has a five-fold mission: (1) to conduct laser fusion implosion experiments in support of the National Inertial Confinement Fusion (ICF) program; (2) to develop new laser and materials technologies; (3) to provide education in electro-optics, high-power lasers, high-energy-density physics, plasma physics, and nuclear fusion technology; (4) to conduct research and development in advanced technology related to high-energy-density physics; and (5) to operate the National Laser Users' Facility (NLUF).

Dr. Campbell is an internationally known expert in inertial fusion, high-energy-density physics and high power lasers.

## JONATHON CARLING

CEO, TOKAMAK ENERGY



Tokamak Energy is creating a way for a small modular fusion reactor. What distinguishes Tokamak Energy from the ITER project is the shape of its planned fusion reactor. Both ventures are looking at magnetic confinement fusion. Tokamak Energy believes that a spherical tokamak much smaller than its ITER counterpart will be able to provide enough heat from the fusion reactor to generate electricity very economically.

Two factors will enable Tokamak Energy to reach its goal quickly. One is the smaller scale of the machines. The other is private sector funding. To date, the company has raised more than 22m euros and is embarking on a new funding round.

Tokamak Energy first used REBCO magnets on ST40's predecessor, which for ease of construction uses copper in its magnets. They are a relatively new technology and the company must develop both the magnets and the supply chain to build them. With this in mind, Tokamak has formed a partnership with Atkins. Carling hopes to have industrial level heat production in 2025, getting electricity on the grid by 2030.

Jonathan Carling trained as a mechanical engineer at City University of London in the mid-1980s. He was Rolls-Royce's chief operating officer for civil large engines before joining Tokamak Energy.

## DAVID KIRTLEY

FOUNDER & CEO  
HELION ENERGY



Helion Energy aims to revolutionize the energy market with its breakthrough technology for low cost, carbon-free electricity. Helion's scientifically validated technology allows for the affordable development and rapid deployment of practical commercial fusion energy. "Fusion is what powers our sun and environment. Other renewables, like wind and solar, indirectly harness the fusion energy of the sun. At Helion, we directly create fusion energy and Helium 3 to generate clean electricity, Kirtley said.

The technology and engineering required for net-production fusion finally exists. By combining our years of experience in fusion, newly available electronics technologies, and a revolutionary design using cutting-edge physics, Helion maintains it is making a generator 1,000 times smaller, over 50 times cheaper, and realizable 10 times faster than other approaches.

"We are a proven team of American entrepreneurs and scientists who are making fusion happen right now. The Helion team has designed and built award-winning technology and fusion prototypes many experts in the field consider the most promising approach.

He has academic degrees from the University of Michigan.

## F. DOUGLAS WITHERSPOON

CEO, HYPERJET FUSION



HyperJet Fusion Corporation was established in May of 2017, following a merger with HyperV Technologies Corp. of Chantilly, VA. Fusion is the ultimate form of green baseload power that uses a fuel with near-zero cost (deuterium from sea water and lithium, a common mineral) and minimal environmental impact.

The fusion approach that Hyper Jet Fusion is developing has been known as Plasma-Jet driven Magneto-Inertial Fusion (PJMIF) at the Los Alamos National Laboratory. The HyperJet Fusion open geometry and moderate reactor size allow for convenient and relatively low-cost diagnostic access. In contrast to other magneto-inertial fusion approaches, the driver is located with sufficient standoff distance from the pulsed fusion explosion and thus avoids any hardware destruction. These features allow HyperJet Fusion experiments to be conducted at low cost with high shot rates, enabling rapid resolution of technical issues (rapid learning) and thus rapid R&D development.

Dr. Witherspoon received his undergraduate degree at Indiana University and his Ph.D in Physics from the University of Wisconsin.

## DEREK SUTHERLAND

CO-FOUNDER AND CEO  
CT FUSION



CT Fusion is dedicated to the development of fusion energy, motivated by promising results from the HIT-SI Research Project with the University of Washington.

The dynamak is a variation of the most popular type of research fusion machine, the tokamak. The University of Washington's dynamak is a refinement of a subtype of tokamak called a spheromak. The most important difference is that the spheromak does away with most of the tokamak's expensive superconducting magnetic coils. Instead, a spheromak uses the electric currents flowing through the plasma itself to generate the magnetic fields needed to both stabilize and confine the plasma.

With its patented plasma current-drive technology, Imposed-Dynamo Current Drive (IDCD), cost-effective fusion power plants become possible as is realized with this dynamak reactor concept. CT Fusion seeks to build new prototype devices to demonstrate that IDCD scales to reactor-relevant plasma configurations.

Sutherland is a graduate of MIT with a BS in Nuclear Engineering and Physics and is presently a PhD candidate at the University of Washington.