

IEEE History Center

ISSUE 131, July 2026



Students light up with excitement as they make a glass jar glow like a light bulb—a spark of discovery powered by an IEEE REACH hands-on activity. See article page 5

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The newsletter reports on the activities of the IEEE History Center and on new resources and projects in electrical and computer history. It is published three times each year—once in hard copy (July) and twice electronically (March and November) by the IEEE History Center.

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Michael N. Geselowitz
Senior Director, IEEE History and Heritage

These are exciting times at the IEEE History Center. As mentioned in my last column, in the fourth quarter of 2025 the staff operation was relocated from the Corporate Activities department to the newly constituted Conferences, Events & Experiences department (CEE) in a move designed to enhance our ability to tell the story of IEEE, its members, their industries and the related technologies. This reorganization will make us

more efficient in making our substantial contributions to IEEE's strategic goal to expand public awareness of the significant role that engineering, science, and technology play across the globe. As you can see glancing through the exciting program updates in this issue, the efforts are bearing fruit.

Now, following up on that move, there has been a small reorganization within the History Center. My title has been changed from Senior Director, IEEE History Center, to Senior Director, IEEE History and Heritage. Daniel Mitchell has been promoted to Direc-

HOW CAN THE HISTORY CENTER HELP YOU?

A Handy Guide to Some of Our Programs and Contacts

Engineering & Technology History Wiki: https://ethw.org/Main_Page

List of dedicated IEEE Milestones: https://ethw.org/Milestones/List_of_Milestones

How to Propose an IEEE Milestone:

https://ieeemilestones.ethw.org/Milestone_Guidelines_and_How_to_Propose_a_Milestone

Milestone proposals in process: http://ieeemilestones.ethw.org/Milestones_Status_Report

Oral History Collection: https://ethw.org/Oral-History/List_of_all_Oral_Histories

REACH Program (free online materials for teaching the history of technology): <https://reach.ieee.org/>

History Events Calendar: <https://history.ieee.org/news-events/events/>

Support for scholars:

Fellowship in the History of Electrical and Computing Technologies:

<https://history.ieee.org/programs/fellowships-prizes/ieee-life-members-fellowship-in-electrical-history/>

Pugh Young Scholar in Residence:

<https://history.ieee.org/programs/fellowships-prizes/pugh-young-scholar-in-residence/>

Middleton History Prize (awarded to a book in the history of technology): <https://history.ieee.org/programs/fellowships-prizes/ieee-william-and-joyce-middleton-electrical-engineering-history-award/>

WAYS YOU CAN HELP HISTORY

As you read this newsletter, you will see the many success stories of the IEEE History Center and the ways it nurtures the heritage of the profession. As successful as the Center is, it relies on the support and contributions—financial, intellectual, and time and effort—of many people. We ask you to help further our work by:

Proposing an IEEE Milestone—Milestones recognize significant achievements in technology
ieeemilestones.org

Contributing a First-Hand History—Written and oral histories help us chronicle important innovators and innovations <http://ethw.org/create>

Authoring an article for the ETHW—The Engineering and Technology History Wiki (ETHW) is an authoritative collection of historical information about technology's contributions to society
ethw.org/create

Supporting the History Center's mission with a donation.

However you can help, it is always deeply appreciated.

NEWSLETTER SUBMISSION BOX

The IEEE History Center Newsletter welcomes submissions of letters to the editor, as well as articles for its **Reminiscences** and **Relic Hunting** departments. "Reminiscences" are accounts of history of a technology from the point of view of someone who worked in the technical area or was closely connected to someone who did. They may be narrated either in the first person or third person. "Relic Hunting" are accounts of finding or tracking down tangible pieces of electrical history in interesting or unsuspected places (in situ and still operating is of particular interest). Length: 500-1210 words. Submit to ieee-history@ieee.org. Articles and letters to the editor may be edited for style or length.

tor, Heritage Programs, and the two historians, Mary Ann Hellrigel and Alex Magoun will report to him. Daniel continues to report to me, as do Archival and Digital Content Manager Nathan Brewer, REACH Senior Program Manager Kelly McKenna, and Robert Colburn. In recognition of his years of service and expertise, Robert has been promoted to Manager, IEEE History Center. This arrangement will enable him more strongly support the IEEE History Committee, which provides strategic oversight for our activities and carries out important recognition programs, especially the IEEE Milestones Program (see Chair's Message on page 3). In that vein, I thrilled to note that we have just dedicated the 300th Milestone in the his-

tory of the program (see https://ethw.org/Milestones:Canadarm,_1981).

Finally, related to the enhanced resources available to the History Center, I wanted to note that this is the last *IEEE History Center Newsletter* in its current form. Beginning in the fall we will be utilizing the new website launched last year (history.ieee.org) to deliver news of IEEE's historical activities in a more engaging and timely fashion. This delivery will be enhanced by resources and expertise from our CEE colleagues. Again, I would like to recognize and thank Robert Colburn for his many years editing the Newsletter.

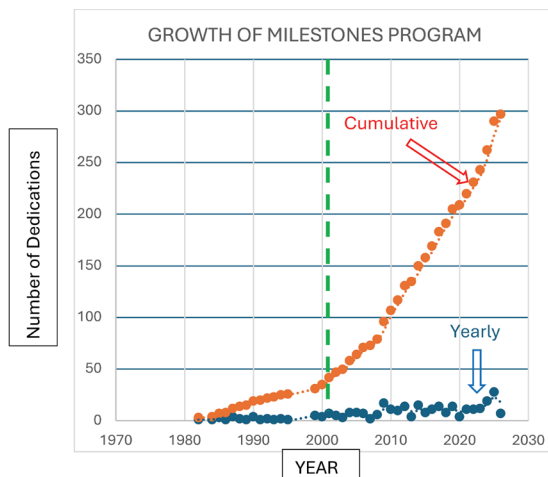
HISTORY COMMITTEE AND VOLUNTEER ACTIVITIES

IEEE HISTORY COMMITTEE CHAIR'S COLUMN

By John Vardalas

I am honored to be the 2026 Chair of the IEEE History Committee. Though I've served as a member of the History Committee on several occasions, it is from my current vantage point as Chair that I've gotten to appreciate the noteworthy efforts of the History Committee and History Center staff to advance IEEE strategic interests through history. In my first Newsletter entry as Chair, I want to highlight our successful IEEE Milestone program. In subsequent issues I will focus on the other history programs.

The graph below tells the tale of the Milestone program. In its first two decades, after its inauguration in 1983, the Milestone program had a slow start. Only one to four Milestones were being dedicated per year. In some years none were dedicated. It would take time for Sections, who were the prime drivers of Milestones, to appreciate the value of the program. Then around 2000, the program started to take off. The yearly submissions of proposals started to multiply.



In 2000, nearly twenty years into the program, a total of only thirty-five Milestones had been dedicated. But by the end

of this year, 2026, more than three hundred Milestones will have been dedicated. Sections have played, and will play, a central role in the success of the program. Through Milestones, IEEE members play an important role as IEEE historians. Each Milestone tells a story of an IEEE technical achievement that has benefited humanity. Dedicated members of the History Committee are also crucial to the success of the program. They've had to step up and meet the exploding workload of Milestone proposals that need to be carefully evaluated.

Success, however, has created serious challenges. The growth of the program will only increase. The History Committee and History Center staff are exploring ways to increase the efficiency of the program while maintaining its high standards. Although the section(s) in which the plaque(s) will be placed must sponsor the milestone proposal, any IEEE organizational unit can cosponsor (e.g. offer financial support) a milestone proposal. In the spirit of "One IEEE", TA has set up an Ad Hoc Subcommittee on Milestones, with participation from the History Committee, to explore ways to participate in the Milestone program, most significantly by assisting in finding reviewers for the milestone proposals.



IEEE MILESTONE FOR PIONEERING MEDICAL INFORMATION
SYSTEM DEDICATED

By Brian Berg, IEEE History Committee

On Thursday, 14 May 2026, an IEEE Milestone for a Pioneering Medical Information System was dedicated at El Camino Hospital in Mountain View, CA, U.S.A. where the system was first installed.

Beginning in 1965, the MIS was a joint effort between ECH and Lockheed Missiles and Space Co. to computerize the strictly manual process by which doctors, nurses, and medical staff handled patient records. The MIS ran on an IBM mainframe computer with only 128KB of memory, and a light pen was used to make selections on a monitor's screen. Today's cellphones have over a million times as much memory as that mainframe computer.

The MIS first went live in 1972. Interestingly, nursing staff were initially much more enthusiastic than doctors about using this system. However, with increased efficiency and improved patient outcome, there was no looking back. Other hospitals began installing the system in 1973, and the systems now used throughout the world owe their success to the early work done by ECH and Lockheed.

The dedication event featured speakers from ECH, Lockheed, IEEE, and several government officials. At its conclusion, the words of the MIS bronze Milestone plaque were recited to the audience.

Officiating at the dedication event were Jill I. Gostin (2026



IEEE President-Elect) and Brian Berg (R6 History and Milestone Chair, who was History Committee Advocate for the Milestone). Its proposal was written by Rich Clewett and Tom Gardner. This was Region 6's 43rd Milestone, and the 27th for the IEEE Santa Clara Valley Section.

Further details are on the MIS Milestone webpage (https://ethw.org/Milestones:Pioneering_Medical_Information_System,_1965-1974). The plaque is being mounted in the lobby of ECH at 2500 Grant Rd, Mountain View, CA, U.S.A. where it can be seen during normal business hours. A duplicate plaque is now the 30th IEEE plaque on the front wall of the Computer History Museum.

CHARLI MULLER IS 2026-2027 IEEE LIFE MEMBERS FELLOW IN
ELECTRICAL HISTORY

The IEEE History Committee selected Charli Muller as the 2026 IEEE Life Members' Fellow in Electrical History.

Charli Muller is a scholar of the history and political economy of communication technology. In fall 2026 she will begin a Postdoctoral Fellowship in Space Ethics at Wesleyan University's

College of Science and Technology Studies. Her dissertation is on the history of wireless communication from geostationary satellites and radio to WiFi and low Earth orbit satellites. She follows 20th and 21st century debates over how to divvy up two internationally shared resources necessary for global wireless communication: orbital space for satellites and

electromagnetic spectrum. This postwar history of international telecommunication governance demonstrates how competing political economic ideas and anti-imperialist projects were expressed through technical regulation. The dissertation traces how political and legal concepts were debated in the UN's International Telecommunication Union by diplomats, engineers, and scholars seeking to rectify global economic inequalities. She has published on the history and political economy of communication technology in *tripleC*, *Handbook of Media and Communication Governance*, *Logic(s) Magazine*, *Monde(s) Histoire, Espaces, Relations*, and forthcoming in *Media and the Global Cold War*.

Her research is supported by fellowships and grants from the Linda Hall Library, Association for Computing Machinery History Committee, History and Political Economy Project, Hagley Library, Remarque Institute, and the Urban Democracy Lab.

IEEE-UNESCO STEM BOOTCAMP ON ELECTRICITY, SKYSCRAPERS AND ENGINEERING FOR SUSTAINABLE CITIES



IEEE South Africa Section volunteers who supported the Bootcamp

"Education is the most powerful weapon which you can use to change the world." — Nelson Mandela

Those words capture exactly why IEEE REACH exists. In a world where technology is evolving faster than ever, REACH equips educators with resources that show students why technology matters—not just how it works. Through the lens of history, students learn how technology emerges from real-world challenges and how innovations can influence culture, alter economies, and impact society and the environment. When students experience REACH they view STEM as a creative force for good, encouraging more students, especially girls, to envision themselves in STEM.

This became explicitly evident during the IEEE-UNESCO STEM Bootcamp on Electricity, Skyscrapers and Engineering for Sustainable Cities held at the University of Pretoria, in South Africa, on February 11-12, 2026. The event was organized to mark the International Day of Women and Girls in STEM (11 February) and held in collaboration with South Africa's Department of Science, Technology and Innovation (DSTI), and Department of Basic Education (DBE). Nearly three hundred people participated, including more than two hundred students—primarily 11th grade girls from rural communities—

forty educators and administrators, with assistance from twenty IEEE volunteers. Others from the University of Pretoria, from UNESCO, as well as mentors from outside organizations also attended.

The day before the Bootcamp, more than one hundred South African educators joined a virtual workshop on using IEEE REACH resources to spark student engagement. The two-day in person program then immersed students and teachers in REACH lessons, hands on activities, and engineering concepts designed to inspire interest in electrical fields, engineering, and the built environment. IEEE volunteers and other mentors shared personal stories that made engineering feel real and attainable.

As rapid urbanization and technological change reshape societies and labor markets, foundational knowledge in electricity, structural engineering, and urban infrastructure is essential for sustainable development. Yet many young learners still face barriers to entering STEM—because of persistent stereotypes, limited access to resources and exposure to meaningful STEM learning.

Peter Wells, Head of Education for UNESCO in Southern Africa, stated, "UNESCO is committed to ensuring that every young person—especially girls—has access to quality STEM

UNESCO is committed to ensuring that every young person has access to quality STEM education.

education, due to science, technology, and innovation are not optional for the future we are building; they are essential. Too many girls continue to be excluded from STEM pathways because of persistent gender stereotypes, unequal access to resources, and limited opportunities to engage with science in meaningful ways. Hands-on STEM initiatives, such as this Bootcamp, respond directly to this challenge. Through partnerships with institutions such as IEEE, government, and universities, UNESCO is working to create inclusive STEM ecosystems that open doors for girls, strengthen education systems, and ensure that innovation reflects the talents, perspectives, and potential of all."

During the bootcamp, the energy in the room was unmistakable—and the impact was immediate. Students left inspired, sharing reflections such as:

"The Bootcamp broadened my view of what I can achieve. It showed me that I can overcome obstacles in life and sparked my interest in STEM."

"I didn't know about STEM before I came here. During the two days, I learned about STEM and engineering careers, and it

showed me how exciting STEM can be!"

And a standout: "I think we young girls have the power to take up space in STEM, and with the motivation we got from this event, we can do it!"



With support from IEEE Humanitarian Technologies—and many thanks to both the IEEE volunteers who committed their time and the donors who sustain IEEE REACH—this event became possible. We are truly grateful for everyone who made it happen. Here is a link to an energetic, short video that highlights the event. <https://www.youtube.com/watch?v=DZ8bx2uPS5w>

A WORLD OF CONNECTION: IEEE GLOBAL MUSEUM AND THE 150TH ANNIVERSARY OF BELL'S TELEPHONE PATENT

2026 marks the 150th anniversary of Alexander Graham Bell's groundbreaking telephone patent that opened an era of two-way voice communication. On 5 March 2026, IEEE—through the IEEE History Center and IEEE Conferences, Events and Experiences (CEE)—collaborated with the United States Patent and Trademark Office (USPTO) on an educational and celebratory program. It featured a panel discussion moderated by IEEE President-Elect Jill Gostin, "From Bell to Broadband," on the legacy of Bell's invention, and a second, forward-looking one on how intellectual property protection continues to foster innovation in communications and emerging technologies.

The panels were followed by personal reflections on Bell's achievements from Sara Grosvenor, Bell's great-granddaughter, and Vint Cerf, Google's Chief Internet Evangelist and 2023 IEEE Medal of Honor winner. Cerf, whose

pioneering work in internet communications protocols relied on the physical infrastructure provided by the commercial telephone network, spoke movingly about how he felt a personal connection to Bell because they both married deaf women.

At the reception afterwards, the IEEE Global Museum debuted two interactive touchscreen exhibits about Bell's inventive life, along with a short quiz. These featured a rich selection of photographs, letters and documents curated with help from the Library of Congress and AT&T archives. "The Telephonic Bell" charted Bell's invention of the telephone and

its commercialization, from his family's personal and professional connections to the teaching of deaf people, through the development of long-distance telephony during the 1880s and 1890s.

"The Unknown Bell" shared lesser-known episodes across his wide-ranging inventive interests

"The Unknown Bell" shared lesser-known episodes across his wide-ranging inventive interests. An early pioneer of flight, in the 1900s Bell experimented with varied forms of multicellular tetrahedral kite designed to carry a pilot.

The exhibits and quiz will be launched online on the IEEE History website in anticipation of the United States' 250th anniversary on 4 July 2026, alongside video interviews with event speakers and panelists on the nature and significance of Bell's inventive life.



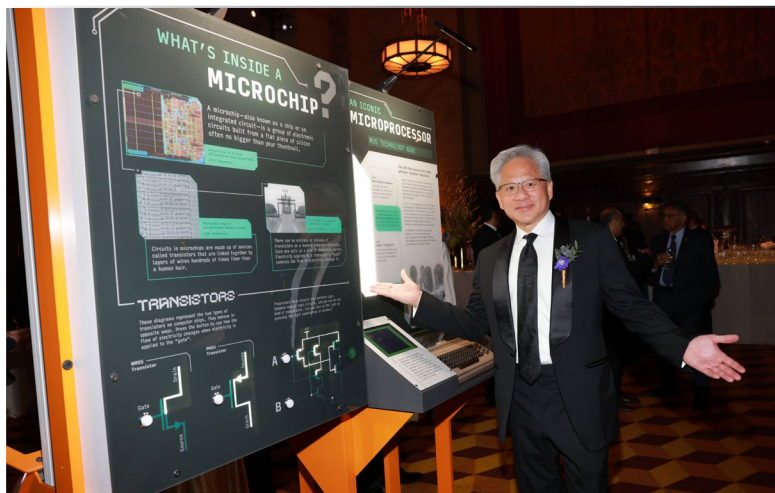
Replica of Bell's patent and telephone transmitter on show at the UPSTO's 150th anniversary event

MICROCHIPS THAT SHOOK THE WORLD ON SHOW AT THE IEEE AWARDS CEREMONY

The pre-dinner drinks reception at this year's IEEE Awards Ceremony featured more than fine refreshments and conversation. Guests were treated to an exclusive viewing of *Microchips That Shook the World*, an interactive traveling "Exhibit-in-a-Box" from the IEEE Global Museum.

Serving as docents, the exhibit's co-curators—Daniel Jon Mitchell, Senior Historian at the IEEE History Center, and Stephen Cass of *IEEE Spectrum*—guided attendees through the history of foundational microchips across categories including image sensing, memory, interfacing, and core processing.

The display provided a thematic bridge to the evening's highest honors, which recognized NVIDIA co-founders Jensen Huang and Chris Malachowsky for their pioneering work in GPU architecture, accelerated computing, and the advancement of artificial intelligence. By prompting guests to reflect on how far chipmaking has come since the 1970s and 80s, *Microchips that Shook the World* highlighted the legacy of innovation underpinning Huang and Malachowsky's remarkable achievements.



2026 IEEE Medal of Honor awardee and NVidia CEO Jensen Huang kicks loose at the IEEE Global Museum Microchips that Shook the World exhibit.

NEW FIRST-HAND HISTORIES

The Engineering and Technology History Wiki (ETHW) is one of the largest websites dedicated to the history of technology. One of the components of the website is the First-Hand History section, which allows engineers to submit their memoirs and recollections of their technical careers. These stories help explain not only what technologies were built, but how and why they were developed, which provides valuable insight into the historical development of technology that cannot always be gleaned from reviewing patents and other primary documentation.

New First-Hand Histories posted on the ETHW include "Early Work on Time Difference of Arrival (TDOA) Localization for Communications EW at Defence R&D Canada" by Robert J. Inkol, who details how Defence Research Establishment Ottawa developed, tested, and ultimately failed to operationalize an early TDOA radio-localization system for communications electronic warfare, while still generating technical lessons and later research/commercial spinoffs.

Additionally, A. Michael Noll, Professor Emeritus of Communication at the Annenberg School for Communication at the University of Southern California, who spent nearly fifteen years performing basic research at Bell Labs in Murray Hill, New Jersey, starting there in 1961, submitted eight First-Hand Histories:

"Raster Scanned Display" - An account of a project at Bell Labs in the 1960s converting a Honeywell DDP-224 (upgraded from a DEC DDP-124) from flickery vector CRT output to a software-driven raster scan display with a frame buffer

"Pitch Determination" - Adapting Bogert and Tukey's "cepstrum" idea, spotted in seismic research and championed by Manfred Schroeder, into short-time speech pitch detection

"The Fourth Dimension" - An account of a computer-animated film of a rotating four-dimensional hypercube

"Community Activism" - On community affairs in Newark, New Jersey and Noll's attempts to present them as case studies to Bell Labs

"Growing up in Newark" - Observations of the changing city of Newark, New Jersey since 1939

"Classical Music Critic" - Recollections of Noll's criticism of classical music

"Reader at the Huntington" - An account of reading the John R. Pierce papers at the Huntington Library

"Environmental Pollution" - On analyzing data related to pollution around Los Angeles International Airport

In addition to these First-Hand Histories, two were submitted by Hiroyuki Ono, former employee of IBM Fujisawa:

"Origin of the Two-Stage Servo Track Writing Architecture (ESPER and ESPER-2)" - Detailing how the ESPER (Economical Servo Pattern Embedder) and ESPER-2 systems introduced a two-stage hard-disk servo track-writing architecture, using a master servo reference created in the first stage to enable more precise writing in the second.

"RoHS Compliance in HDD: Practical Standardization" - An account of how IBM/HGST helped standardize practical RoHS compliance methods, solving supplier, materials, and reliability challenges before formal testing standards existed.

Do you have a story to tell? No matter how big or small, we would be delighted to add your memoirs to our collection. To read these First-Hand Histories, or to submit your own, visit <http://ethw.org/fhh>

THINGS TO SEE AND DO

Riverside Museum, Glasgow, Scotland. People traveling to Glasgow for the 2026 IEEE Sections Congress should consider stopping at the Riverside Museum on the River Clyde to see the transportation exhibits. <https://www.glasgowlife.org.uk/museums/venues/riverside-museum>

Hunterian Museum, Glasgow University, Gilmorehill Campus, Hillhead St., Glasgow 55.873071, 4.288856 Contains scientific instruments used by James Watt, Joseph Lister, and Lord Kelvin <http://www.gla.ac.uk/hunterian/collections/> The IEEE Milestone plaque for the Standardisation of the Ohm is in the Hunterian Museum.

IEEE History Center staff have compiled a self-guided technical tour of southern Scotland https://ethw.org/Technical_Tour_-_Scotland

Museum of Extinct Media, Tokyo, Japan: <https://extinct-media-museum.blog.jp/otemachi/> The Extinct Media Museum is a private museum that exhibits media and media equipment that have died out or are dying out. The museum's collection and exhibits include video cameras, photo cameras, typewriters, personal computers, recording media, music players, cell phones, PDAs, and mobile terminals with keyboards.

International Computable 90 Conference, co-hosted by The National Museum of Computing (TNMOC) and the London Mathematical Society (LMS) at Bletchley Park, September (16–18 Sept 2026). The conference marks the 90th anniversary of Alan Turing's seminal 1936 paper, *On Computable Numbers*. In addition to the main academic tracks, we are also hosting a major public evening lecture on Thursday, 17th September by Professor Avi Wigderson (IAS Princeton, Abel Prize & ACM Turing Award winner) titled "*Reading Alan Turing*."

"Your contributions to the **IEEE History Center Fund** preserve the heritage of the profession and its contributions to humanity.

We invite you to find out more about the Center and its programs at <https://history.ieee.org> and more about the Engineering & Technology History Wiki www.ethw.org "

Please consider adding a gift with your membership renewal.

NYE, DAVID E., *THE GREAT ENERGY TRANSITION: AMERICA FROM 1876 TO 1929*, MIT PRESS, 2026

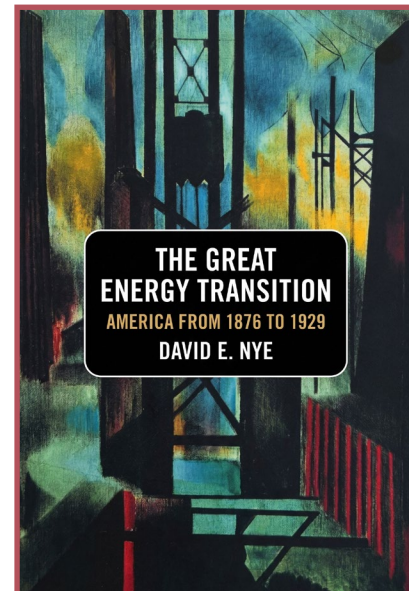
David Nye has a distinguished reputation as a historian of technology and its relations to social and cultural change, particularly the electrical technologies and power sources of the late 19th and early 20th centuries. Perhaps best known for expanding and popularizing the concept of “technological sublime,” here, his thirteenth book, Nye reframes the two generations of the Gilded Age and the Progressive Era in the United States through the lens of energy infrastructure. He argues that what historians have traditionally separated into separate sociopolitical periods were bound inextricably into a singular and massive shift from animal muscle, wood, and coal to oil, gas, and electricity.

Nye’s primary thesis is that this infrastructure shift occurred with such velocity that contemporary Americans lacked the vocabulary to comprehend what the author calls the “lifeworld” of human experience. Before terms like “technology” were adopted beyond some institutes of higher education, people experienced the last quarter of the 1800s as a chaotic, “kaleidoscopic” whirlwind. The book’s three sections - Transition, Reactions, and Momentum - reflect in ten chapters Thomas Hughes’s phases of systems development: invention, trials, expansion, momentum, and maturity. Nye expertly maps how the evolution of the new energy systems restructured in turn the daily lives of millions. Echoing his past explorations of technology and the environment, automation, and urbanization, we see how the American landscape changed alongside social norms, driving the rises in urbanization, living standards, and lifespans.

His most compelling insight arises from explaining how this transition seeded modern cultural polarization. Nye details how the rapid adoption of oil and electricity accelerated sharp social divisions, deepened racial segregation, fed the scale and scope of corporatism, and generated a lingering resistance to science. If oil and hydroelectric power represent the vanguard of all that is modern, we continue to experience the discontent with modernity’s unexpected consequences around the world. Yet Nye balances this dark undercurrent by describing the stabilizing forces that emerged outside of politics to hold the United States together, including mass media events, national parks, and shared consumer culture.

Nye draws as ever on profuse primary, artistic, and literary sources to support his arguments, aided by their availability online. Even if one disagrees with his interpretation, the rich array of examples and his accessible narrative keep one engaged. By demonstrating that energy and other technological choices are never politically neutral, *The Great Energy Transition* serves as a useful mirror for our own current transition to green energy – or, to two generations of personal computing, which shows no sign of decelerating. It is a timely read for anyone seeking to understand how the grids and paths of our past continue to influence the social divides of our present; a tribute to Nye’s peers in the history of technology; and a stimulus to future historians to explore, with equal skill and brio, his argument as applied to other nations’ energetic transitions to modernity.

Available from MIT Press, Cambridge, MA, USA, 1-617-253-5249, <https://mitpress.mit.edu/9780262052122/the-great-energy-transition/>, US\$45, paperback ISBN 9780262052122, 344 pp.



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