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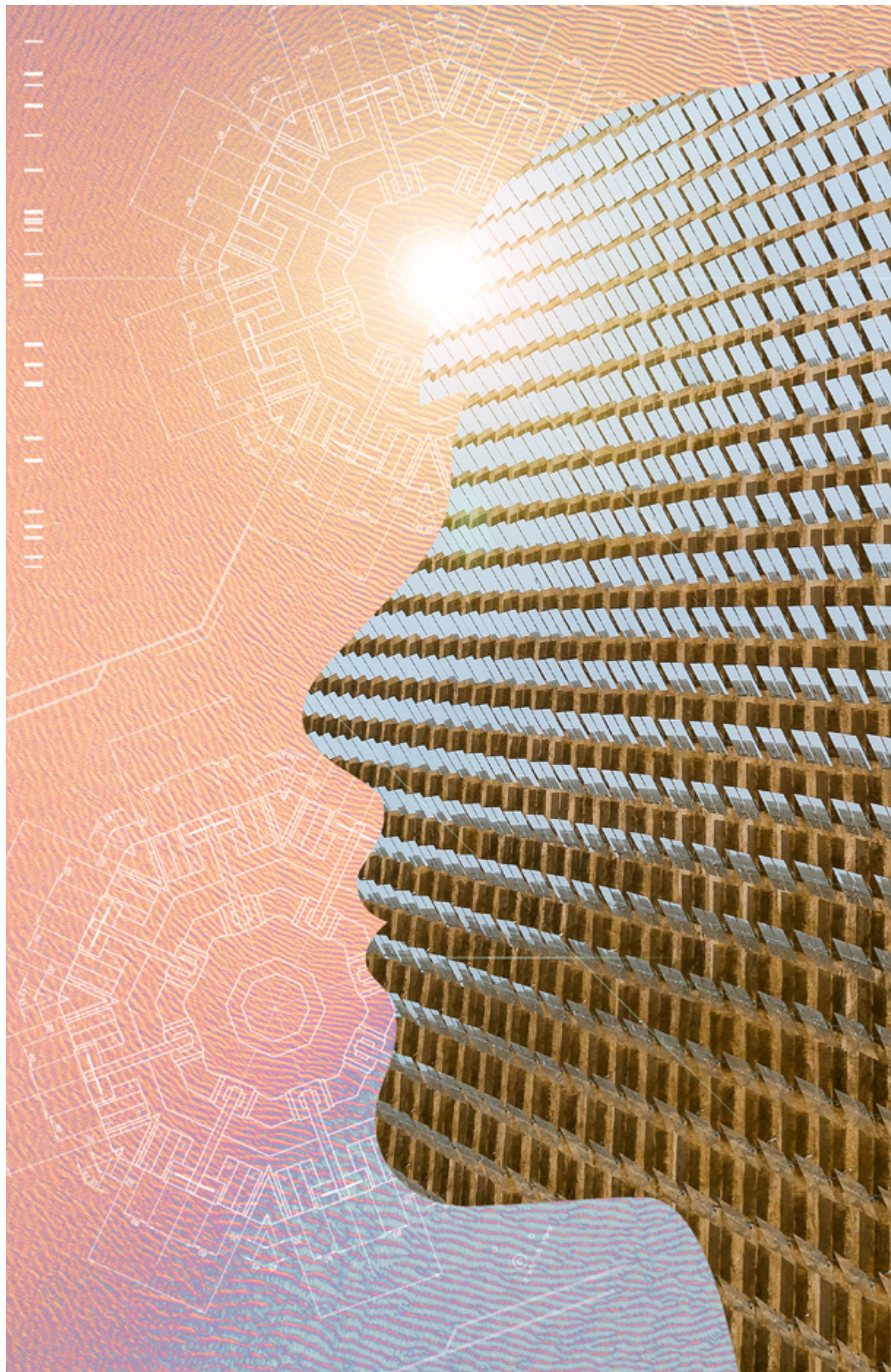
GREEN  
WARSBACKGROUND /  
ENERGY + POWER

With the move from natural resources such as wind and animal power to coal, and then to oil-fuelled factories and transportation, shifts in energy sources have always been transformative for the economy, society, and warfare. What powers the world, and who uses and controls it, has both reshaped the dominant technologies of the day and reordered the most valuable regions of the world. It has also literally changed the climate of our globe.

At the very same moment a movement towards a net-zero world of carbon dioxide emissions is growing, there have been major developments in possible new technologies to empower our world. These include 'green' hydrogen, alternatives to the internal combustion engine—in the form of solid-state batteries that could even be 3D printed into novel and useful shapes—fuel cells and supercapacitors, energy harvesting devices, and even biological sources, such as microbial fuel cells.

The key is not just the technology itself, but developments in new materials, structures, and markets to make them economically viable. Likewise there are important potential shifts in how that energy is collected, stored, and transmitted. These include new energy-management systems of ever-smarter power grids and microgrids, and even new approaches like SWIPT (Simultaneous Wireless Information and Power Transfer) that transmit power via far-field electromagnetic radiation.

The shift from fossil fuels to renewable energy will entail a significant shift in not just supply, but the entire design economy of energy. It will require new equipment, machinery, and vehicles (at sea, on land, and in air and space), as well as new markets; perhaps treating packets of energy in a similar way to data packets moving across the internet. In this way, it will likely drive significant local and geopolitical shifts and turmoil, akin to the benefits of and battles over oil in the last century.



Obituary

## ‘Green Wars’ Shadow Warrior Dead at 39 Years Old

Colleen Bell was emblematic of the change of the last decades

Oct 30, 2040



**‘The right person at the right time, that she was.’**

That is how a former British Army staff sergeant described retired Major Colleen Bell, OBE, killed yesterday in an e-bike accident in Dorset.

Though Bell was many things—a pioneering unconventional warrior, a noted author, and a thinker—she ultimately left her mark as an icon of the new-energy age.

Born in Bovington, she began her military career after graduating from Jesus College, Oxford. It was while reading Geography that she first connected to the issues that would shape her career, and she, in turn, would employ to shape her own life. After Super Typhoon Lupita left a swath of devastation from Hanoi to Hong Kong and Taiwan, killing millions and ultimately leading to the Global Zero Accords, Bell undertook a summer internship with an international relief organization. She soon found herself working in a refugee camp in the storm-ravaged Central Business District of Hong Kong.



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In her bestselling memoir/manifesto, *The Change of Power*, Bell wrote that she found it ‘freeing to be focused on a singular mission to help others help themselves, to the exclusion of everything else—even one’s own wellbeing.’ She also witnessed there the first large-scale experimental use of the now widespread SWIPT (Simultaneous Wireless Information and Power Transfer) technology. With much of the local power infrastructure destroyed, an ad-hoc network of solar energy collectors and beamed electromagnetic radiation carried electricity the final miles to the refugee camp. It was during her time in the camp, Bell wrote, that she had her first taste of the ‘inherent relationship between energy, power, and violence.’ She wrote of seeing her first mass grave, describing it as a symptom of the exacerbating impact that extreme weather would have on the sorts of simmering civil conflicts that she would later be immersed in as a soldier.

Returning to university, Bell was transformed. She remained an active member of the Oxford Union and rowed for her college. Yet, to her pursuits, she added organising coalitions among the student population to pressure the university to commit to ethical sourcing of the rare earth minerals used in its solar power and hydrogen fuel-cell systems. She succeeded after a 5,000-strong march drew students from across the region, the sight of which caused one displeased New College tutor to quip, ‘It’s like a medieval siege.’

Bell’s father was a well-known financial journalist and viz commentator, and her mother was a commodities trader who split her time between New York and London. Years of accompanying her mother on far-flung business research trips, and rock climbing and mountain biking abroad with her father, left Bell with a keen eye for international economics and an insatiable appetite to be out in the world’s more exciting corners. Bell would credit, though, reading her grandfather’s Gulf War diaries as shaping her decision after university to ‘enter the coming fray’ and join the British



Army. ‘It was the last thing anybody expected Coll to do,’ her mother said. ‘Which is why she did it. If I’d said, “At least become an officer,” I’m sure she would have joined as a private soldier, just to spite me.’

At mid-2020s Sandhurst, Bell stood out immediately, regularly challenging her senior officer instructors to focus more on the strategic and tactical aspects that would come from the new technologies and economics of a world in transition. ‘Strategy from the Steam Age is nothing more than hot air,’ she wrote on her feed at the time, which later became the basis of an influential military journal article that won her renown while still a cadet. ‘Marie [von Clausewitz] must be rolling in her grave that we remain unwilling to see the profound power changes that surround us.’

As would be a repeated pattern, the young Bell was controversial, but prescient. Her TED-X talk went viral and even garnered her an invitation to brief the Defence Minister. In it, she connected the disruptive implications of new energy technologies like hydrogen and solid-state batteries with the opening skirmishes within the post-petroleum societies in the Middle East and West Africa, as regimes struggled with the imminent loss of their main sources of revenue. The roughly drawn frontlines of the scramble for rare earths in the Asia Pacific would follow soon after. The ensuing period of global conflict that came to be called the ‘Green Wars’ seems inevitable in hindsight, but at the time a military instructor condescended to Bell she was ‘too distractable.’

Bell would leave the public eye after graduation, joining 2 Rifles as a lieutenant. Her first trial by fire was in the Middle East during the turmoil of the late 2020s, when the oil- and natural gas-based political economies of the old regimes proved unsustainable in the new energy order. Into this chaos, Bell deployed as part of the support mission to the ‘free zone’ that built up around the massive solar farms being established in newly



independent territories. She led small-unit patrols protecting these new sites in the region's emerging clean energy network, which had become a lifeline for more moderate tribes fleeing the regional disorder. Bell quickly proved her mettle at both soldiering and languages. By her fifth month, she no longer needed an interpreter for Arabic, which won her the trust of the local fighters.

It was here that Bell also developed the concept for what would later become her iconic look. The desert heat, worsened by accelerating global warming, was brutal and overwhelmed the air con in her unit's armoured vehicles. Bell shaved her head, except for a thin ponytail that she kept in a braid. Confident in her practical approach, she wrote a memo on the need for better kit that combined traditional local desert wear with the fast-cooling properties of the high-tech racing suits worn by Olympic swimmers that mimicked snakeskin. This fusion of form would later be adopted as standard for a warmer world, but at the time was rejected as too unsoldierly.

Bell's studied but seemingly cavalier approach to tradition did not sit well with her superiors, and they let her know that she was pushing the 'unconventional' in unconventional warfare too far. It was then that she nearly left government service, but the opportunities offered by the re-established Special Operations Executive caught her attention.

Whereas the original World War II organization had been formed to 'set Europe ablaze,' the newly formed SOE's mandate was to wage unconventional warfare in a world already ablaze, both literally and figuratively. Its environment of innovation and bottom-up experimentation is where Bell went from officer to legend.

The SOE was part of the not-so-hidden conflict between the old and new energy powers that raged around the world over the next decades,



expressing itself in everything from civil wars to coups to gambits for new resources, and even votes in the UN on upcoming carbon capture treaties. Much of Bell's early role remains classified, but what is known indicates she quickly established the trust of both her SOE superiors and local forces wherever she went.

When a consortium of private military contractors (PMCs) funded by an oil firm sought to tip the balance of power during the Nigerian civil war, Bell was part of the covert force that deployed in response. Using newly introduced fuel-cell-powered motorcycles and energy harvesting systems to 'live off the land' on multi-month overland missions, Bell finally found the autonomy she had long sought. Identifying the vulnerability of an adversary still reliant on traditional energy transportation networks, the SOE team that she led exacted tens of billions of dollars' worth of losses from the PMCs' sponsoring firm. Her small unit drove down both the firm's share price and carbon output, ultimately leading the corporate board to conclude it was more profitable to throw its weight behind the emerging energy packet market.

Bell readily advanced the SOE's mantra of being the pathfinder for a new way of warfare, more suited to a world in which all the rules of economics, politics, and warfare had been rubbished. A prototypical example was her sabotage of the Baku power hub during the Azeri ghost war, tricking the regime's AI management system into a surge that shorted out a key node in the area's air-defence network. Yet, she was careful to balance technical acumen with a human understanding. While many in Western militaries remained focused on weapons with ever-greater precision or information warfare algorithms that promised to change an entire nation's bellicosity to docility at the push of a button, Bell sought to be as close as possible to the people who were most vulnerable to the changes altering the world around them.



The actual issue at hand, she would later argue in her book, was not the predations of greedy dictators or displacement by increasingly dangerous weather events. It was the need to show respect and deference to those rightfully asserting their place in a world being reordered after more than a century of fossil-fuel paradigms. ‘The most important weapon we have in unconventional warfare is actually listening to what our partners are saying,’ she wrote in her journal after her second deployment to West Africa.

This attitude, and a willingness to always lead from the front, won Bell immense loyalty among those who served with her. ‘I would follow her to the ends of the Earth,’ described Staff Sergeant Gerald Hightower, who served with Bell on multiple deployments. ‘In fact, I did.’

While Bell’s tactics were becoming renowned inside military circles, the deployment to Indonesia made her a global icon. Bell’s unit formed part of the advance force sent in ahead of the United Nations mission to ensure an unfettered supply of rare earth minerals necessary for the new generation of batteries crucial to meeting the UN’s decarbonising global mandate. A coup in Indonesia, discreetly backed by a Chinese tech firm, jeopardized the entire global gambit to reach a net-zero world. The world’s leading nations—and their respective de-carbonization industries—could not tolerate such a stranglehold on even a sliver of the world’s new energy sources.

However, the intervention had echoes of a past era’s colonialism. Recognising the need to reshape the narrative, a reporter was embedded in Bell’s detachment. Critics would later accuse Bell of glory-hunting, but the record shows that she objected to the assignment in multiple strident memos to her superiors.



As they conducted a weeks-long campaign of reconnaissance and sabotage, Bell’s commandos engaged in a game of cat-and-mouse with numerically superior regime forces, all the while beaming out live augmented-reality vizfeed of their exploits in yet another operational innovation. The striking Bell, replete in her ponytail and attire, had the look of a super-heroine come to life. She built up a legion of online fans from afar. Recognising the potential, UN information operations began to highlight the exploits of the ‘The Guerrilla Gaia.’ Her attack on the regime’s Jakarta drone maintenance facility, which disabled their operations right before the invasion, came in seventh in global live views that year, just behind the semi-finals of the World Cup.

The invasion succeeded, in no small part due to the efforts of Bell’s force. But the global attention that her role garnered did not sit well. ‘The theatre of it all sickens me,’ she messaged a friend at the time. It would be her last deployment with SOE.

Bell spent the remainder of her career lecturing at Sandhurst. It might have been a tepid finish, but she discreetly used the time to write what many consider the definitive work of the era.

A mix of geopolitical and economic history, environmental manifesto, and personal reflection, *The Change of Power* masterfully wove hard-earned lessons of service with insights of those she served alongside from cultures around the world. ‘A cogent and inspiring tale for our time,’ noted the *Financial Times*. It was an instant bestseller and translated into 18 languages.

Bell was reportedly working on a second book, when she died after an e-bike crash while riding with friends. Her story had been told, but there was apparently much more to tell.

