FLYING THE SKIES TO WIRE THE SEAS

Should the Subsea Cable Industry Stop Traveling?

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Despite its oceanic roots, the subsea cable industry has long been dependent on the sky. Since the golden era of commercial and civil aviation in the 1960s and 70s, the industry has relied on air travel to develop cross-border partnerships and penetrate global markets. Before that, workers traveled around the world via ship to implement and operate submarine infrastructures. By the 2000s, travel had escalated to include dozens of global events and conferences each year.

Then, COVID-19 hit and the subsea workforce was grounded. As was true in many industries, companies developed new forms of remote collaboration at all levels of a project–from research to installation. Operators figured out how to run their networks without travel. Projects such as Dunant, Jupiter, JGA, NO-UK, EllaLink, and a myriad of regional cables were all carried to completion. These cable networks in turn strengthened the ability of people around the world to conduct work remotely—a change that is now the "new normal." As part of these changes to world tourism, work practices, and industry operations, global passenger traffic fell around 30% between 2019 and 2022 (International Civil Aviation Organization, 2022).

This transition generated substantial positive environmental effects. Air transportation makes up between 2-3% of global greenhouse gas emissions; roughly on par with the ICT sector overall. Cutting air travel makes a significant dent in the subsea network's carbon footprint. And by reducing other industries' reliance on air travel, subsea cables indirectly contribute to those industries' own ability to lessen their carbon footprint. At the same time, companies have saved a considerable amount of money in travel budgets. Concerns about oil prices following the Russian invasion of Ukraine have only intensified the question: should the industry continue to travel at pre-COVID levels? Or should we embrace the new normal, with all of its ecological and financial benefits? Or, will there be some intermediate compromise, which is accepted as effective and also efficient both from a business and environmental standpoint?

For this month's Sustainable Subsea column, brought to you by the SubOptic Foundation's Sustainable Subsea Networks research project, we tackle these questions. We interviewed leaders in the industry, surveyed research conducted on this topic, and tracked decisions being made at senior levels. Although remote work is here to stay—with all of its green dividends—we were consistently reminded that there is also an intractable "in-person" aspect critical to the subsea cable industry.

One of the reasons that a global transition to remote meetings could happen was precisely due to the smooth performance of the subsea network. In turn, the transition to remote operations went relatively

smoothly for the subsea industry because video conferencing connected an already close-knit community of individuals and companies, with well-established relationships that have been in place for many years. This community is global in scope, mission-oriented to connecting the world, accustomed to having to work across differences, and committed to serving clients. While the shift to remote went well because of subsea's community, such a community remains very difficult to develop and maintain without traditional in-person interactions. It turns out, for one of the very industries that enables remote work itself, travel paradoxically remains part of the social fabric that binds the network together.

SUBSEA ADAPTS TO THE "NEW NORMAL"

At the start of the COVID-19 pandemic, the subsea industry quickly adapted to remote work. Companies signed up for the premium versions of video platforms, and created novel internal policies and etiquette regarding remote work, meeting challenges to ongoing projects and commercial goals. Coordination meetings continued in online formats across all sectors of the subsea cable industry—from research to supply chain management. For many, travel and jet lag challenges were replaced by a need to balance time zones across oceans—meaning that very early or very late calls became a norm.

In many ways, what happened in the industry is indicative of a broader global trend. Research covering data traffic patterns shows that one year after the first lockdown in 2020, the aggregated data traffic volume had increased by around 40%. Applications for remote work that rely on video conferencing had increased

beyond 200% (Feldmann et al., 2021). The significance of these platforms has been documented in reports by international organizations, which emphasize the positive aspects of quick adaptation, recovery, and human resilience enabled by an increasingly digitized world (International Telecommunication Union, 2021).

This shift to remote work, however, is not entirely new or COVID-related. In space-related research and multi-stakeholder science consortia, for example, remote synchronous meetings have long taken place, though on a much smaller scale and with a specific niche of researchers in ultra-specialized topics. For instance, Nobel Prize-winning scientists Jennifer Doudna and Emmanuelle Charpentier conducted joint-research on gene technology for about nine years while living thousands of kilometers apart, using extensive email, Skype, and Dropbox to connect through the Atlantic (Krämer, 2021). Another ocean-spanning project, the Event Horizon Telescope (ETH), composed of a global network of radio telescopes in places as diverse as the Atacama Desert in Chile, the South Pole in Antarctica, Moune Kea in Hawaii, and Sierra Nevada in Spain, and which revealed the first image of a supermassive black hole in 2019, was made possible by daily exchanges of data and video between astronomers, engineers, and computer scientists (Murchikova, 2019). For these and other collaborations in science and technology, remote work has long been critical.

Similarly, synchronous video platforms had been in use in the ICT and telecom industries since the early years of the Internet, though not as widely across the board as they are today. Even in the cable industry, teleconferencing has been present for decades. In Cable & Wireless in the mid 1990s, for example, employees utilized basic video conferencing to coordinate cable interests around the world. John Tibbles, an adviser to the SubOptic Foundation, recall-

ing this period, observed that one of the reasons it was so effective was "because we all worked for the same company, we all knew each other well." The teams connected were not simply British but encompassed locally-based staff in the Caribbean, Hong Kong and Japan, among other sites. And in the years before the pandemic, there had been evolutions for remote provisioning of equipment on the end of a cable—enabling local teams to get support from a remote technical team rather than always flying someone out to a site.

The accelerated uptake of video conferencing during the pandemic brought some major benefits to the subsea industry. People recognized that a contract could still get signed and a project delivered from scratch via platforms such as Zoom and Teams, despite their limitations. From a commercial standpoint, this revealed an enormous financial savings from cutting in-person travel.

Moreover, while many in the industry certainly enjoyed some aspects of a travel-intense career, others had found it challenging to balance with other commitments. Any given month, it was common for many industry workers to spend two to three weeks away from home. Even with the Cable & Wireless video conferencing technology, Tibbles noted that extensive travel was still the norm and being away from home was not always easy throughout one's career: "Looking back a good many of us would have been happy with some virtual substitute for the less important meetings, leaving for Singapore on a winter night leaving behind two small children."

Virtual interactions have indeed helped alleviate some of the health, family, and personal stresses involved with air travel, while also freeing up time for additional work. Elaine Stafford, a Managing Partner at DRG Undersea Consulting, said that while she enjoys traveling and meeting people face-to-face, she appreciates having the opportunity to be home more now. "I don't see a compelling need for all of the travel we had in the past, nor do I look forward to potentially returning to that paradigm," she says. "I think many of us can see the possibility of a more optimal and equally-effective balance between online meetings and face-to-face meetings for a reasonable portion of those get-togethers which historically de facto required hopping on a plane."

And, of course, remote work brings with it major potential environmental benefits. See Figure 1 for an estimate of the carbon emissions savings of a single consortium system. This hypothetical project—using partial videoconference substitution—avoided emissions roughly equivalent to 154 gasoline-powered passenger vehicles driven for one year, or 792,522 tons of coal burned. Aviation is a great place to cut emissions since, unlike network infrastructures, it cannot be decarbonized through a switch to greener electricity. Because of trade-offs in energy potential and weight in battery technologies, it is unlikely that electric aircraft will ever be viable for more than short-haul flights. Transoceanic travel requires the energy density of liquid fuels. Overwhelmingly, this means fossil fuels. Sustainable biofuels are currently uneconomic and marginal, making up less than 0.01% of the sector's use in 2018. It is also the case that sustainable fuels cannot be dramatically scaled up without significant land use conflicts. These environmental concerns are made all the more acute by the aviation sector's exclusion from the Paris Agreement, and by the continued annual growth of its carbon footprint (the early months of the pandemic excepted).

It's also the case that air travel emissions have a greater impact than terrestrial ones. Interactions between planes, jet fuel pollutants, and atmospheric conditions frequently lead to the formation of contrails and other meteorological phenomena that significantly increase the effects of global warming. While there is still scientific uncertainty on the precise conditions and impacts produced by a variety of aviation conditions, conservative estimates put the overall impact of these factors at 2 to 4 times the total amount of the sector's CO2 emissions. In other words, the problem is at least twice as bad as it first appears. Aviation, as a whole, looks to be stuck without legible and credible pathways out of its climate impacts. It will likely continue to be a climate problem long after other sectors have achieved their mitigation goals.

For these reasons, a growing movement of climate advocates have singled out air travel as a uniquely important site of personal and collective climate action. From Greta Thunberg's famous transatlantic boat travel, to No Fly Cli Sci and the Flying Less Movement in academia more broadly, concerned groups have aspired to reduce air travel in professional and advocacy contexts long before the COVID-19 pandemic. Among the many positive effects of remote work, cutting in-person travel generates a significant carbon reduction for the industry.

THE LIMITS OF REMOTE WORK AND THE ENDURING SOCIAL FABRIC OF THE SUBSEA INDUSTRY

Things are not so simple, however. Not everyone agrees that remote

work is all that efficient. Synchronous video and audio do not necessarily mean effective use of time. Rajesh Kheny, Lead in Global Program Management - Submarine Cable at Meta, contends that a face-to-face straight week of meetings can be very productive compared to a series of video conference calls. Being "locked in a room somehow forces outcomes," he says. The level of persuasion in corporate decisions, as well as in sealing deals or deciding on operations or long-term views for a project, takes a different shape when people are together. In other words, the achievement of goals are heavily dependent on social dynamics; and disrupting social dynamics can disrupt project goals. On a similar note, "if everyone is in the same room for one or two days, knowing that we shouldn't part ways until the issue is resolved, focused discussions drive towards a conclusion much more effectively," said Paul Gabla, VP Sales & Marketing of Alcatel Submarine Networks.

Ills can not only limit participants' attention span but also make everyone feel tired—though it is debatable that attending meetings with jetlag has a similar effect. Beyond the cable industry, studies have shown how home office practices are actually making employees work longer hours than before, and sometimes make it difficult for employees to deal with work-life boundaries and their mental health (American Psychiatric Association, 2021).

While such limitations to remote work might be true in all business contexts, the subsea cable industry is uniquely dependent on in-person work. In this relatively small world, people work together across fields ranging from engineering, to marine science, to marketing. They coordinate across national contexts, speak different languages and are immersed in different cultures. They work together, even with competitors, to try to connect people around the world. Launching a cable project requires working across all of these differences—and having smooth and effective communication amongst a project team.

As a result, an essential part of the industry is knowing one another. This mutual understanding—a social fabric of the cable industry—has been solidified over decades as people work on different projects together. Stafford notes: "I think if our industry had not had such close relationships pre-established, progress during COVID would have been far more difficult." From meetings with stakeholders to attending global conferences to share knowledge, international travel has been the foundation for this community. As described by one industry consultant, "social interactions are very

Figure 1. Carbon Emissions Savings Calculator

	Planning & Development	JBA & Procurement	Construction	Total
Period (Months)	18	18	36	72
Meeting Frequency (btwn mtgs)	1.5	1.5	1.5	4.5
Number of Meetings	12	12	24	48
Avg # of Participants Traveling/Mtg	12	18	15	45
Avg # of Participants Traveling/Project	144	216	360	720
% of Meetings Possible via Zoom	80%	90%	30%	
# of Individual Trips Saved w/Zoom	115.2	194.4	108	417.6
Average Distance Traveled per Individual Trip (km)*	4000	4000	4000	
Total Air Travel Distance Avoided (km)	460800	777600	432000	1670400
Carbon Savings per Project (kg CO2e) Δ	197600	333450	185250	716301

NOTES

~ Estimates assume a large-scale consortium system.

* Average air travel distance is assumed to be a mid-length international flight. 4,000km was selected as a fair estimate—roughly the distance between Los Angeles and Honolulu. Please alter project travel distances for a more accurate assessment.

Δ Conversion factors are taken from the 2021 UK Government's GHG Conversion factors, inclusive of radiative forcing and presuming business class travel.

important to the putting-the-project-together stage and pushing the terms and details of its execution over time and across geographies." We found when speaking to people that in-person connections at times fostered a sense of loyalty to a cable project even above the company an individual worked for, which in turn would actually facilitate a company's long-term success. Long-standing relationships could present opportunities to join new consortia contracts or expand overall commercial operations. At the end of the day, says Kristian Nielsen, Quality & Fulfillment Director at WFN Strategies, "it's still an in-person industry."

Remote work has been particularly successful for the industry because it rests on pre-formed in-person connections, but it is also particularly challenging, since informal relationships cannot develop over the phone or video conference in the same way. Gabla, for example, points out that business relationships in the industry rely heavily on social relationships. "It's all the untold feelings and non-verbal cues that one misses totally over the phone, partially over video-based platforms," he says.

Especially for negotiations in advancing subsea cable projects, there are common situations in which video and audio do not capture the nuances of the moment, particularly when there are different socio-cultural practices and diverging commercial strategies or visions involved, let alone vastly different timezones. "When we do a virtual meeting," Mohamed Eldahshory, Director of Global Projects and Submarine Cable Development at Telecom Egypt observes, "we face a lot of misunderstandings." The potential for miscommunication can

be heightened the more cultures or different stakeholders there are at the table. Some people might know each other—some might not. "In our industry, there is lobbying that needs to happen inside the consortium,"one interviewee describes, "Bilateral meetings need to take place." Video conferencing sets limits on the way the conversation can take shape and affect who may or may not dominate the direction of the meeting. Another interviewee describes how one project he was working on "almost went completely off the rails" due to miscommunication via Zoom. This is not only a problem of different languages. As one of our interviewees summed up: we must remember that "English is many languages, not just one."

A striking example of a project that brings together a wide range of companies and cultures is SEA-ME-WE 6, which links all the way from Southeast Asia to Western Europe via the Middle East. This project was delayed during COVID-19, in part due to the inability for the consortium's many members to meet in-person. Video conferencing solidified gaps in cultural and linguistic communication, and coupled with time zone differences, solutions to the regular challenges of cable planning were much more difficult to find. Eldahshory, who was involved in the cable's construction, offers his take: "four virtual meetings equate to one physical meeting." Another interviewee volunteered a different formula: the chance of success of a remote meeting is inversely related to the number of cultural, ethnic, and linguistic differences between parties.

To sum up, the reality is that there are aspects of a cable system planning and implementation are difficult to maintain in a travel-free way of collaborating, and this is particularly intense when no community exists—or when community and connections need to be formed across geographies and cultures. Given these constraints in building community and the expectations around the delivery of a project, it is likely that face-to-face

meetings will likely never go away in their entirety—and to do so would be to shift some of the unique practices at the heart of the cable industry. Moreover, the amount of miles traveled in cable planning is a tiny fraction of the airmiles saved by the projects that are developed.

IN CONCLUSION: IT DEPENDS

In our many interviews, we found that—specifically for the cable industry—the decision whether to travel or not is highly dependent on context. In short, it depends on what stage of the process the project is at; the particular people in the room; and the degree to which people already know each other and the social fabric is in place. "The inherent need to meet face-to-face will likely never go away in its entirety," Rajesh Kheny tells us, "it will just be prudent to think through and replan with the question: if we managed somewhat successfully remotely, can we continue to manage that way since it helps those who don't like traveling and those who like a decent work-life balance to manage effectively and indirectly result in cost savings as a benefit."

For example, from a management standpoint, it is likely that a late-stage project-related remote meeting might not have a terribly negative impact on delivering a cable system. However, that is not the case necessarily for other parts of a cable project entailing teams in marine, CLS, and network installations, who often heavily rely upon on-site visits and meeting with stakeholders at the early stages of a project. Our interviewees noted that cables with a single purchaser might be more likely to be more successful via remote work, in part because of the shared corporate culture and limited need for discussion, than meetings with many parties across nations. Getting new business, our study participants reiterated, was one of the more difficult things to achieve via video conference.

To an extent, more effective management practices around "new normal" work practices also depends on age group. "Young people are preferring the ease of flexibility that comes with video calls while the older generation much prefers the advantages that come with face-to-face interactions," says Felix Seda, General Manager for NJFX. The younger generation is more accustomed to using break out rooms for discussions and chatbox for opinion sharing or informal responses to what's being discussed live. For the veterans of the industry, community has been formed more actively in-person, over a set of drinks or on the golf course. And yet, as another industry member points out, "in an era where we need to infuse 'new blood' into our industry, in-person meetings have a sort of On-the -Job-Training benefits for new industry entrants as trainees." When it comes down to it, the medium doesn't alone determine success, solve a problem, create a problem, or create a community—people do. Be it face-to-face or via video conferencing platforms, many of our industry interviewees pointed out, humans tend to bring their habits and energy from one medium to another.

For those that would like to calculate the emissions saved by a transition to remote meetings, visit our website for a copy of our Carbon Emissions Savings Calculator.

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