

Best Practices for Writing and Editing Technical Reports

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Scientific articles are complex documents, typically with multiple authors collaborating, revising, and improving the manuscript even before it goes to a journal, where it receives multiple additional rounds of review and revision. It can be a long and involved process, and much has been written about the best practices for navigating that journey. Technical reports as company deliverables are no different, and it behooves companies and journals to determine and implement the best practices for writing, editing, and publishing them. In fact, researchers, journal editors, technical editors, and consultants can learn from each other to apply best practices to writing and editing scientific articles and technical reports.

At our Tetra Tech office in Boston, we work mostly in energy project permitting, where technical reports often are written to inform government agencies how different renewable energy projects could affect the environment. Our technical reports can range in size from 4 or 5 pages, as in a Wetlands and Waters of the United States Survey, to the more formidable offshore wind construction and operations plan (COP). COPs are monster documents that include thousands of pages of text and many different elements to compile—body text, data tables, maps, images, citations and sources, and appendices—to name several. It takes dedication to organization, teamwork, diligence, and best practices to conquer the monster and meet deadlines. Editors and project managers must work on 2 levels simultaneously, the micro and macro levels, to ensure clarity and consistency and keep in mind that the overall goal is to make this complex document as straightforward and coherent as possible.

COPs for Offshore Wind Farms

With the recent record-breaking heat waves and Vineyard Wind laying foundations for the first full scale offshore wind farm in the United States, now more than ever, there is a focus on

climate change and the means to scale it back.¹ There are about 29 Bureau of Ocean Energy Management (BOEM) Lease Areas for offshore wind farms in active development for the Atlantic Outer Continental Shelf and 6 for the Pacific Outer Continental Shelf.² Although it may be obvious that the engineering design process to build these wind farms is daunting, it is lesser known that the permitting process is daunting as well.

For offshore wind, COPs include physical and environmental surveys of the proposed facility sites (located in the federal waters off the coasts of the United States along the Outer Continental Shelf), project-specific information on how the proposed offshore wind farm is to be constructed, and environmental resource information, including how the offshore wind farm will impact the environment and to what degree. The purpose of a COP is to assist the lead federal agency, BOEM, in complying with the National Environmental Policy Act (NEPA) process (i.e., the process by which a federal agency will comply with NEPA). The COP is submitted to BOEM, a government agency that manages the development of America's offshore energy and mineral resources, and the one that ultimately determines if the wind farm will be built or not.³

Creation and Planning of COPs

Offshore wind farm developers contract out the writing of COPs to companies like Tetra Tech; we have the subject matter expert (SME) knowledge and the science know-how with respect to writing the sections. Therefore, a COP has multiple authors, in other words, many different SMEs who write the different sections and appendices and are knowledgeable in the different areas of science that apply. The purpose is reiterated for every section—to inform BOEM of the parameters and impacts of the offshore wind farm and ensure compliance with NEPA, as well as make recommendations regarding mitigation.

Planning also involves knowing the audience. Is the report for public reading or is it geared toward peers in industry, or both? There are several audiences for the COP, each important at different phases of development. The client is the company we are writing the report *with* or *for*; these are the offshore wind developers and are the first audience to review and evaluate the document. The second audience includes the federal agencies (BOEM and many others in

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support of BOEM) that process the document and ultimately make the decision as to whether the project is approved, rejected, or additional analyses need to be made, based on the NEPA process. The general public is the third audience to review the COP; BOEM publishes the COP on its website and to do so, mandates that the entire COP be fully accessible to all readers (see Style Guides and Templates).^{4,5}

Writing Is a Process

At the “micro” level, the crux of technical reports is the writing itself. Good writing is a process that involves several steps, including planning, establishing the purpose of the document, researching, gathering and presenting data, managing citations, reviewing, and revising. These steps translate to the following report elements:

- An introduction with a statement of purpose (thesis);
- Body paragraphs that include background information, research, analysis, and/or data to support the thesis/purpose (evidence);
- Correct grammar and diction, proper punctuation, and adherence to style;
- Organized, tabulated data and formatted visuals (GIS maps, photos, graphs);
- A list of reputable and industry-vetted sources; and
- A conclusion that summarizes important points, data, and recommendations.

This could be the structure of any technical report, whether it be how a wind farm impacts the environment or how a cancer treatment targets cancer cells; the elements of the scientific argument and its process/steps are the same.

Style Guides and Templates

Consistency makes for a professional document, and to ensure consistency, a comprehensive style guide and a sound compilation of templates should be created in the planning phase of writing the COP. Style guides are guidelines on how sections or appendices should be written with respect to structure, format, and terminology and may be internally created or provided by the client. Templates, either provided by a client or internally designed, have style (e.g., particular font type, type size, etc.) built into them and standardize the COP sections with minimal effort on the writer’s part. They are also created with accessibility in mind (i.e., they abide by Section 508 of the Rehabilitation Act⁶) and therefore ensure that the COP sections and appendices are capable of being read by a screen reader to assist the visually impaired.

Communication with the GIS Team, Illustrators, and/or Graphic Designers

Planning also involves knowing which maps and figures are needed and how these will be input into the report.

Figures should be in the format dictated by the style guide and/or template (with respect to dimensions and caption style), have comprehensive legends (if they are maps) with all internal text legible, and include alternative text that describe the elements of the map to a person with visual impairment. If many maps or illustrations are to be input, these should be filed in an appendix or a map book, so as not to overwhelm the text.

Sources and References

For authors in the research phase, keeping track of sources is key—easily done with a spreadsheet or software like Mendeley—and abiding by style guide formatting for in-text citations and reference entries is imperative. Every in-text citation listed in the body of the report should refer by author’s last name to the entry in the reference or bibliography list at the back of the report. Sources used should be *reputable* (written by authors with credibility and vetted by industry professionals), *current* (published within the last 5 years), and based on *industry standards*.

The Scientific Argument

Technical reports like COPs are written to provide information and to prove scientific claims being made. For instance, sections of a COP report the existing conditions of the physical resources, like water quality, air quality, ocean currents, geology, etc., as well as any impacts to these resources during the construction and operations stages of wind farm development. Particular sections of the COP make scientific claims; for instance, the in-air acoustic analysis section may stipulate a claim that a developer will comply with all noise regulations regarding construction noise. The section reports local and state noise regulations and performs an analysis with data for evidence that shows how regulatory values will not be exceeded, or if they are exceeded, how the noise will be mitigated. Data is presented in a table style already formatted in a template and should have units specified in the style guide or other agency-related guidelines. Key data values should be discussed and highlighted in the text in conclusive paragraphs and compared with standard values as a courtesy to the reader.

Managing Review of Technical Reports

A comprehensive review system is implemented once a draft is written. The first step in the review process is self-revision for authors. This entails turning on that internal editor and consulting the relevant style guide and dictionary for perfecting the text. The author implements a quick check for errors regarding syntax, diction, punctuation, mechanics, style, structure, and grammar. Although this is ultimately the job of an editor, it is important for the author (SME) to conduct this check as well; the role of self-editor brings a different

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perspective piece for the author—the reader’s perspective—and oftentimes, additional key thoughts arise to be included in revision. A good practice for report authors is to read the text aloud—errors can often be heard when not seen—and consult a writing resource like the writing lab at Purdue OWL.⁷

Subsequent steps in the review process include having a technical reviewer (peer reviewer)—a designated science or technical discipline lead—check for the accuracy of the analysis. Once this is done, the document can go to an editor for an editorial review and then finally to a project manager or senior editor for document quality control. COP sections can then flow to the client for review and may come back to the internal review cycle with comments that need to be addressed.

The Importance of Trackers

The COP document and its compilation of sections and appendices (as stated, COPs are often thousands of pages) needs to be presented to the reader as straight-forwardly as possible. This is the challenge at hand, juggling the many sections and appendices, and one that editors, SMEs, and project managers must work as a team to achieve. The editor and project manager work on the “macro” level and determine how to achieve coherence and consistency of the document as a whole; this entails not only having a well-written style guide particular to the COP and comprehensive templates to ensure that the style of the document and its formatting are the same (these are primarily the editor’s tasks), but also tracking the flow of each document through the writing and review processes (this is primarily the job of the project manager) with a comprehensive spreadsheet tracker. The tracker should be constructed with one axis for the sections and appendices, and the other axis mimicking the flow of the document from SME to technical reviewer, to

editor, to project manager, to client. The tracker should be constructed in such a way that the whereabouts and status of any section or appendix is known at any point in time. Trackers can also include separate tabs for global edits or edits that are carried through the entire document from section to section.

Conclusion

The key to best practices in writing technical reports is to know your process and the staff available, and to recognize that the act of writing itself is a collective process with key players. Only then will the optimum outcome of a well-written, well-researched technical report or COP be most attainable.

References and Links

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2. <https://www.boem.gov/renewable-energy/lease-and-grant-information>
3. The Code of Federal Regulations section that describes this process is at <https://www.ecfr.gov/current/title-30/chapter-V/subchapter-B/part-585>, section 585.626. For information on BOEM, see their fact sheet at https://www.boem.gov/sites/default/files/documents/newsroom/fact-sheets/About_BOEM_3_23.pdf.
4. Examples of COPs available at <https://www.boem.gov/renewable-energy/state-activities/empire-wind-construction-and-operations-plan>. Empire Wind is an offshore wind farm planned for the federal waters off the southern coast of Long Island, NY.
5. <https://boem.gov/renewable-energy/state-activities/kitty-hawk-north-wind-construction-and-operations-plan-commercial>. Kitty Hawk North Wind is an offshore wind farm planned for the federal waters off the coast of VA and NC.
6. <https://www.justice.gov/crt/section-508-home-page-0#:~:text=Section%20508%20of%20the%20Rehabilitation,disabilities%20C%20unless%20certain%20exceptions%20apply>
7. https://owl.purdue.edu/owl/general_writing/