ChatGPT and the Power Sector: What's Hype? What's Possible?

What Is It, What Does It Do, and Why Does It Matter?

You cannot have listened to or read the news over the past few months without learning about the anticipation for—and the anxiety over—ChatGPT. ChatGPT is a commercially available chatbot released on November 30, 2022 by OpenAI. It is based on an artificial intelligence (AI) large language model (LLM) called GPT-3.5. With the rapid pace at which these AI language models are improving, they have the potential to be a major disruptor, including in the energy sector.

ChatGPT and similar AI large language models speed information gathering by allowing a user to ask for and receive targeted information in a quick and fluent manner, leveraging the data lakes, systems, IT infrastructure, and staffing that many organizations currently use to connect and consolidate siloed information.

ChatGPT and other chatbots can be "trained" to write—mimicking a certain writing style—and can respond to questions.

As these tools are quickly refined and trained on more technical, germane data sets for the industry, their value will increase. Energy companies could use them to create operational efficiencies that could reduce overhead, operations, and maintenance costs as well as incorporate functions that provide a better customer experience. Companies will have options on which tool they implement for various uses, including considerations for data security and legal requirements.

These models offer impressive capabilities, but they still lack accuracy in industrial or scientific contexts and will need fine-tuning with industry-specific data sets [1].

How Are Other Industries Currently Using It? (or Not, and Why?)

Among software developers and data scientists, ChatGPT is a way to overcome "writer's block" and improve upon short code sections. Although the results are imperfect and still require a subject matter expert's (SME) technical review, they can significantly speed up the development process.

The big internet search engines are rapidly deploying versions of ChatGPT and similar AI language models to improve their functionality; Microsoft is embedding ChatGPT in its 365-software suite. A host of applications use OpenAI's solution in the background as a service via widgets. Some services use LLMs to enable "citizen developers"—people without coding experience—to create applications, such as HumanFirst.ai.

Industry and workplace policy over the use of these tools is evolving. Some companies have taken a conservative approach by limiting access to LLMs, especially those on external servers; others have created policies and playbooks around their use to ensure that users are aware of the existing legal, proprietary, and sensitive aspects of sending data into the cloud and outside of the control of their company.

As of this writing, an open letter has been issued by tech leaders to call for a six-month halt to the development of technologies beyond OpenAI's GPT-4 for evaluation of potential risks [2].

Although caution is necessary, many potential beneficial use cases are identified for the energy sector:

- **Programming support** to help data scientists and software developers with coding language translation, debugging, and creation.
- **Automation of recurring administrative tasks** such as call center routing and triage, writing emails and templates, human resource support, simple data analysis, and completing forms.
- **Text creation** such as generating marketing materials and creating brainstorming summaries.
- **Knowledge transfer and retention** to collate, combine, and summarize experiences and history.
- **Voice-to-text** with improved accuracy for dictation, speech-to-form for field workers, and automated translation to other languages.

What Should We Look Out For?

EPRI researchers surveyed internal staff and interviewed several industry and energy company stakeholders. A common observation was considerable enthusiasm for the potential efficiency these tools have to help automate, develop, communicate, and analyze data. On the other hand, there were several warnings around shortcomings and flaws, such as "hallucinations," lying by omission, data security, and intellectual property (IP) protection.

Although AI language models are available as software-as-a-service or downloadable on-premise installation in various forms and capabilities, all current versions of AI language models suffer from knowledge gaps and "hallucinations." A hallucination is created when ChatGPT, which is designed to create text in a conversational format, does so even when it lacks sufficient information and therefore creates fluent statements that are factually incorrect. These hallucinations are difficult to catch unless debunked by an expert. Hallucinations are also more likely to occur in scientific or other technical contexts in which the LLM lacks an adequate data set.

As part of an initial research project, EPRI staff ran 35 queries through ChatGPT and found only 10 to be correct with sufficient technical depth. All others were missing important context or contained inaccurate information.

Caution is called for when supplying AI tools with sensitive information, and users should be particularly cautious when using and fine-tuning company data on conversational AI tools hosted outside of the user's organization. This is particularly important when sending personally identifiable information, critical energy infrastructure information, for official use only information, intellectual property, copyrighted materials, or other sensitive data. Many of these concerns can be addressed with an LLM running locally or in a user-controlled environment.

It's possible that utilities and the energy industry can run LLMs that may not be as broad as ChatGPT but are accurate enough within a narrower subject domain to be run on energy company hardware.

These considerations do not constitute legal advice; users should consult their respective legal teams.

What Is the Value Proposition and Next Steps?

LLMs offer the promise of productivity in streamlining data gathering and routine service delivery. Internally, this can augment staff efficiency by reducing the technical burden of searching for information in disparate locations. Externally, there is the potential for an energy company to provide a smoother customer service experience.

EPRI will be leading research into the value of AI language models in three areas:

1. **Conducting a review of the wide range of AI language models**
   Each model will be evaluated based on its specific skill set (for example, foreign language translation, scientific knowledge) as well the hardware and software requirements to deploy.

2. **Generating industry-specific use cases**
   As previously noted, AI language models can offer programming support, task automation, text creation, knowledge transfer and retention, and voice-to-text. A possible industry-specific example of voice-to-text would be for field workers to dictate their work in the field, then have their voice recording consolidated and transcribed into work order forms. This will relieve the field worker of the need to carry additional tablets or phones and reduce data entry errors.

3. **Launching feasibility studies**
   The combination of efforts in tasks one and two will pair models with appropriate needs. These will be reviewed for legal and information security due diligence, then deployed on internal EPRI IT infrastructure as a proof of concept.

For more information, please contact
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References

1. https://www.deepmind.com/blog/language-modelling-at-scale-gopher-ethical-considerations-and-retrieval
2. https://www.wired.com/story/chatgpt-pause-ai-experiments-open-letter/

Appendix: How Did It Work for Us?

Figure 1 demonstrates one such example in which ChatGPT was asked about its capabilities. Item 2 in the figure is an over-generalized statement about sensitive data and does not address the nuances of export control. Item 3 is not fully correct; version GPT-3 and up are not available to train on-premise, nor do they do federated learning. This example illustrates that ChatGPT and other AI language models do not access any objective facts—they are probability-based models that choose the most likely word to follow based on the words that precede.

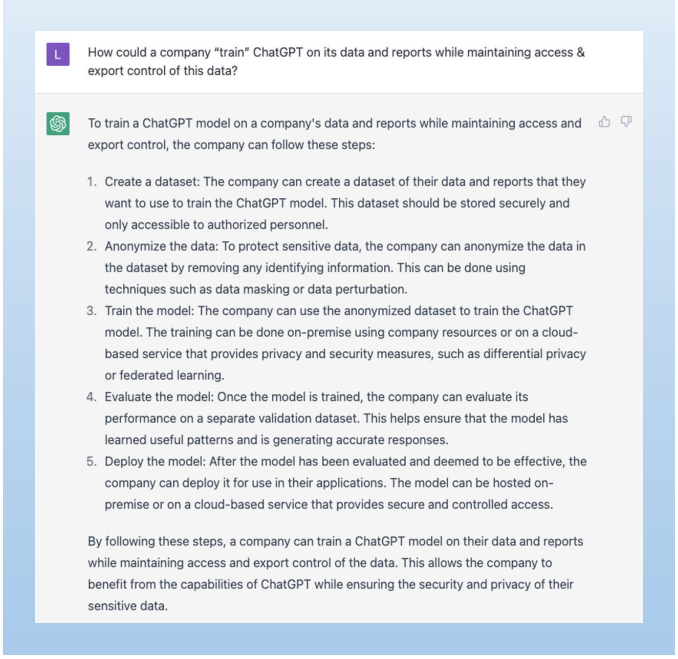

Figure 1: An example ChatGPT query

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