

GO COMPETITION CHALLENGE 1: ADDITIONAL FAQ 2019/04/01

Questions and Answers:

- 1. We are concerned about the computing power available, especially as the competition progresses. Will ARPA-E expand the available hardware? Will ARPA-E add any new software or optimization packages?**

We plan to expand the hardware and software. We always welcome feedback. For the trial and final events, each team will have full use of the software and hardware described on <https://gocompetition.energy.gov/evaluation-platform>. For additional software or hardware needs, please submit a formal request with arpacomp@pnnl.gov. When submitting requests, please be aware that one of our objectives is to keep the competition hardware within a reasonable realm of the means of a typical ISO.

- 2. Is it possible to provide a data matrix in the form of MATPOWER for the 14 bus system?**

We will not likely provide any new data formats at this point in the competition, but if desired then please send a formal request to arpacomp@pnnl.gov. You can also check the forum to see if any other team has already prepared the data in this way and would be willing to share with the group.

- 3. Will ARPA-E make the admittance matrix available for each scenario?**

We do not plan to provide an admittance matrix.

- 4. Will ARPA-E provide a shift factor matrix for each scenario?**

We are considering this. If you are interested, we suggest you provide follow-on feedback.

- 5. We have noticed some data issues in the Original Dataset...**

We have corrected the non-convex generation cost curves present in several of the datasets, and we are aware that other issues remain in Original Dataset network #10. Future datasets have been corrected and will not contain non-convex generator cost curves or any of the problems associated with Original Dataset network #10. If you find additional problems with the datasets, please contact us at arpacomp@pnnl.gov. We will also ensure that trial 1 does not contain datasets with issues so that the scoring is not impacted by dataset errors.

- 6. We would like some feedback for our solutions. Can ARPA-E provide a globally optimal solution for the Original Dataset?**

We are not planning to release a globally optimal solution for the Original Dataset, but the leaderboards and trial events should provide feedback on the relative strength of your approach.

- 7. When will ARPA-E release the trial 1 datasets?**

Trial 1 datasets will be released soon after the trial 1 results are posted.

- 8. Can we run multiple algorithms in parallel on the different nodes, not just a parallelization of the same algorithm?**

Once we launch your code1, you are free to utilize the full extent of the hardware as best serves your program. Your submission.conf should specify the number of nodes your program will require.

- 9. We have submitted using the Original Dataset, but we are not on the leaderboard, is there a specific criteria that we are lacking?**

If you have submitted using the Original Dataset but are not on the leaderboard then there may have been an error with either your submission or the online platform. Please check with arpacomp@pnnl.gov so we can resolve the issue as quickly as possible.

10. Will the Original Dataset be available during the Trial 1 submission window?

Yes, you should be able to continue submitting with the Original Dataset throughout the competition. However, please be aware that we may have to temporarily suspend executing Original Dataset submissions during the evaluation periods for Trial 1.

11. If we submit early can we have additional submissions for Trial 1?

No, you will only get one submission for Trial 1.

12. Do we need to submit for all four divisions at once in Trial 1, or can we submit for each separately?

There is an input that defines what division is being scored. Your code should take that input. You submit one code1 that handles all four divisions, not separate codes.

13. Will the Trial 1 datasets resemble the Original Dataset?

At each stage of the competition, the datasets will grow in complexity (network size and contingencies) and grow in terms of the number of scenarios. Trial 1 will be close to the Original Datasets that are released but there will be more scenarios in Trial 1 and there will be some that are larger in size. Trial 2 will grow from Trial 1 and the Final Event will grow from Trial 2.

14. Will ARPA-E release newer versions of the Original Dataset to help us prepare for Trial 2 or the Final Event?

No additional cases will be released in the Original Dataset. However, following each Trial Event, the datasets from each trial will be released for algorithm development.

15. When does the clock start for sol1 in the Trial competition? How will time be measured?

The clock starts as soon as your code1 is launched. The time is measured as wall-clock time.

16. What quality should we expect of the incumbent solution (provided in the input files) for the Real-Time (10 min) divisions 1 and 3?

For divisions 1 and 3, the incumbent solutions should reflect an input that would be used in practice for an SCOPF application in real-time, with a short execution time limit. We anticipate that the majority of the incumbent solutions would be at least feasible across the base case and all contingencies (feasible without constraint relaxations). At best, the incumbent solution quality may reflect the quality of the last time period's solution provided to an operator when solving for the next operating point in real time. The incumbent solutions will be available in the input data files. You are free to choose a different starting point for your program if desired.

17. Do we need a code2 if our code1 produces both sol1 and sol2?

Yes, the evaluation code will look for code1 *and* code2 before starting either program and will produce a "scripts not found" error if either is missing. If necessary, your code2 can write the version of sol2 that your code1 created.

18. If our code1 prints out more files than just sol1 can our code2 use those files? Will they still be available in our "work directory" during the evaluation?

Yes, anything your code1 produces will be available for code2 to read, though code2 will not be able to make updates to sol1 after the time limit.

19. What does the term "Network Model" signify in Infile1, Infile2, etc.?

This differentiates between instances of the problem with similar topologies that represent different physical power grids. Each network model has multiple scenarios which reflect small topology changes (i.e., generation or transmission element availability) or operating conditions (i.e., load profiles, unit commitments). Refer to the scoring document at <https://gocompetition.energy.gov/challenges/challenge-1/scoring> for a detailed description of dataset terminology.

20. Can a bus have both a fixed and a controllable shunt?

Yes, it is possible – there is nothing in the formulation which expressly excludes this.

21. How do we model controllable one-step shunts?

All controllable shunts in this competition are modeled with continuous variables, your model may/must dynamically choose the susceptance (b) across the defined full range of operation as it finds a solution.

22. Is there a risk of radial line outages or islanding with any of the contingencies?

There should be no islanding in any of the contingencies.

23. We are concerned about very small violation amounts leading to very large penalties on the final results.

All small violations can be pushed into the slack variables that are contained in the formulation; the formulation, given the relaxations, is feasible, which should allow for teams to correct their violations in such a way to grab small violations through slacks. With that said, there is an issue with the precision of voltage and we are considering changes that will correct this issue appropriately. We do not anticipate such a change to cause a disruption in algorithmic approaches. We expect an announcement on any such potential change to come asap. Note that this is also related to questions 24-25.

24. Should the voltage in the output file be exact?

This question is, in part, related to questions 23 and 25. Your output files should conform to the guidelines posted on the website. Your results will be directly fed into the evaluation code. You are encouraged to download the evaluation code and to use it for your own testing purposes. We advise that you have consistent precision for your answers to avoid any issues with numerical accuracy and/or infeasibility. We anticipate a release of further information regarding the required precision of your answers very soon.

25. The hard constraint on voltage makes it difficult to find a feasible solution, why is this not bounded with a penalty as a soft constraint?

This is related to questions 23-24. As stated in the response to question 23, it is possible to translate a minor error in a hard constraint to a soft constraint such that the slack variables, which are defined, are used to gain feasibility. With that said, again we anticipate at least a modification to the evaluation procedure relative to the required precision that is required for voltage and potentially other sensitive hard constraints and variables.

26. The time limit seems very small to handle all of the contingencies, we are not sure how to write sol2 within the time limit.

Only code1's creation of sol1 is timed. Any changes to sol1 after the time limit will be discarded. Your code2 may begin or continue to run after the time limit to complete sol2. There is no posted time limit for sol2 (beyond what can be considered reasonable).

27. Does ARPA-E have any direction or tips on how to select important contingencies or how to speed up the solution of the problem?

Unfortunately, we have no plans to share any tips or strategy to teams for this competition at this time. We encourage you to find novel solutions to balance the time and accuracy concerns for this problem.

28. Are reactive power penalties based on absolute MVA or a percentage?

These penalties are calculated from the absolute MVA mismatch.

29. Can we add new team members after Trial 1?

You are allowed to add new team members at any time until the Final Event. New team members should be added using the Team Change Form on the team leader's account page.

30. Should we include startup costs and unit commitment in our model?

Unit commitments are not considered in the Challenge 1 formulation.

31. How many networks, cases, contingencies will there be in Trial 1, 2, and the Final Event? What size and which percentage for each?

We will update the website shortly with new information on the problem makeup for Trial 1, 2, and the Final Event.

32. How do we submit for Trial 1?

Please submit for Trial 1 using your GitHub account. You can practice with the Original Datasets – Trial 1 will use the same process. However, unlike Trial 1, you can re-submit with the Original Datasets as many times as necessary to perfect the submission process. *Each team can only submit one time for Trial 1.*

33. Is there a standard code for generating solution 2?

For now each team must generate their own sol2 file. This should be done via Code 2.

34. We would prefer to use an alternate method than described in the formulation (i.e. we would like to model contingency response with a single slack bus rather than with generator participation factors). Is this allowed?

Ultimately each team is allowed to determine and execute their own preferred approach to this problem; however, *your results will be evaluated according to the formulation described in this competition.* If your team believes that you have a better, or a more efficient, approach than the official formulation, you are free to develop such an approach. However, any deviations from the official formulation produced by your approach will result in penalties (on soft constraint violations) or infeasibilities (on hard constraint violations). APRA-E recommends familiarity with the official formulation and evaluation procedure so you understand your final score.

35. Will APRA-E release identification data for network models used in the competition?

The network models used in Challenge 1 will include network names (i.e., "Network 3") which identify networks that share base topologies. Competitors can expect a combination of previously encountered networks as well as new networks in Trial 1, Trial 2, and the Final Event.