



DE-FOA-0002504 – REMEDY

Questions can be sent to ARPA-E-CO@hq.doe.gov

FIRST DEADLINE FOR QUESTIONS: 5 PM ET, MAY 11, 2021
SECOND DEADLINE FOR QUESTIONS: TBD

QUESTIONS AND ANSWERS

PLEASE REFER TO THE GENERAL FAQs SECTION OF ARPA-E'S WEBSITE ([HTTP://ARPA-E.ENERGY.GOV/?Q=FAQ/GENERAL-QUESTIONS](http://arpa-e.energy.gov/?q=faq/general-questions)) FOR ANSWERS TO MANY GENERAL QUESTIONS ABOUT ARPA-E AND ARPA-E'S FUNDING OPPORTUNITY ANNOUNCEMENTS. ADDITIONAL QUESTIONS SPECIFIC TO THIS FOA ONLY ARE INCLUDED BELOW. PLEASE REVIEW ALL EXISTING GENERAL FAQs AND FOA-SPECIFIC QUESTIONS BEFORE SUBMITTING NEW QUESTIONS TO ARPA-E.

I. Concept Paper Phase Questions:

Q1. Can I speak or meet with the ARPA-E program director or other ARPA-E personnel about this funding opportunity announcement?

ANSWER: No. Upon the issuance of this Funding Opportunity Announcement (FOA), ARPA-E Program Directors and other ARPA-E personnel are prohibited from communicating (in writing or otherwise) with Applicants, or potential Applicants regarding the FOA. This "quiet period" remains in effect until ARPA-E's public announcement of its project selections. During the "quiet period," Applicants may submit questions regarding the FOA to ARPA-E-CO@hq.doe.gov with the FOA name and number in the subject line. Applicants may also submit questions regarding ARPA-E's online application portal, ARPA-E eXCHANGE, to ExchangeHelp@hq.doe.gov with the FOA name and number in the subject line. ARPA-E will not accept or respond to communications received by other means (e.g., fax, telephone, mail, hand delivery). E-mails sent to other e-mail addresses will be disregarded.

Q2. I submitted a Concept Paper to the ARPA-E OPEN 2021 funding opportunity that would be a good fit for the the DE-FOA-0002504 REMEDY funding Opportunity. Should I submit my Concept Paper to the REMEDY Funding Opportunity also?

ANSWER: Applicants who submitted REMEDY eligible Concept Papers to the OPEN 2021 FOA but would rather submit to either the REMEDY FOA or REMEDY SBIR/STTR FOA, should send a withdrawal request to ARPA-E-CO@hq.doe.gov including their OPEN 2021 Concept Paper Control Number. ARPA-E will then withdraw that Concept Paper and the Applicant can then submit a Concept Paper to the applicable REMEDY FOA instead.

Q3. Can foreign technologists apply? - I'm a British scientist.

ANSWER: See Section III.A (Eligible Applicants) of the FOA for information about the institutions and individuals that are eligible to apply to the FOA.

Q4. I submitted a concept note to the Open 2021 FOA on our Atmospheric methane oxidation project. It is designed to reduce atmospheric methane levels significantly. Shall I update and submit it again for this REMEDY FOA?

ANSWER: See Q2 above.

Q5. Is there a difference between DE-FOA-0002504 and DE-FOA-0002505, other than the latter being through the SBIR? (difference in terms of application content, etc.?)

ANSWER: No.

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Q6. These FOA's appear identical, apart from one apparently being administered as an ARPA-e award and the other being administered as a SBIR/STTR award.

Can you indicate what this distinction means in practice? All other technical narrative & administrative requirements appear the same.

ANSWER: The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are highly competitive programs that encourage domestic small businesses to engage in Federal Research/Research and Development (R/R&D) with the potential for commercialization. More information about SBIR/STTR awards can be found at <https://www.sbir.gov>.

Q7. Please clarify if landfill methane is a technical priority under this FOA.

The REMEDY FOA presentation from Director Lewnard in late 2020 referred to landfill methane more than once, but there don't seem to be any explicit references to landfill methane in the actual FOA.

ANSWER: The REMEDY FOA scope does not include landfill methane abatement.

Q8. On Page 26 of the REMEDY FOA, Table 3 VAM Baseline Parameters, it lists Baseline GHG emission from methane slip and methane combustion as 112,854 tonnes CO₂(e) per year, and Controlled GHG emission from methane slip and methane combustion of 12,916 tonnes CO₂(e) per year, with 99.5% methane reduction in the comments column.

I was not able to independently arrive at the same numbers through my calculations. Could you please explain the basis for those numbers, or direct me to a reference source that you used to determine those numbers?

On the same Table 3, you also show a methane concentration of 0.6%. Is it by volume, or by mass? Could you provide me with the basis for the 0.6%?

ANSWER: Table 3 Baseline GHG emissions should read 118,794 Tonnes/yr CO₂e (vs 112,854); controlled emissions should read 12,872 tonnes/yr CO₂e (vs 12,916), using standard conditions of 68 F/1 atm. Thank you for pointing out the error. Given the significant digits for the inputs, it is best to consider no more than 2 significant figures for any of the inputs in Tables 1-3

Methane concentration is by volume. There is a wide range in reported VAM methane concentration; please see reference 61.

Q9. Under topic area 2: "Reduction of methane emissions from Flares required for safe operation of oil and gas facilities"– Would ARPAAE consider projects that allow upgrading of natural gas to higher value products that can be used onsite at the remote locations or the main goal of this FOA is to improve combustion efficiency of NG flare gas to CO₂ to reduce GHG potential?

ANSWER: Please see FOA:

Section 5:

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Systems that propose to monetize methane must address the economics for marketing their product(s), and demonstrate a market that would use at least 1 billion cubic feet methane/yr.

Section D:

Oxidation of methane to CO₂ is sufficient. REMEDY metrics incorporate the value proposition for processes that propose to monetize methane by capturing it for use or converting it to higher-value products. However, REMEDY does not prioritize monetization of methane over oxidation. As noted previously, submissions based on monetizing methane must demonstrate an amenable market, addressing impact of site locations/remoteness, volume of saleable product(s), and net revenue after delivering product(s) to market.

Section 3, Submission Specifically Not Of Interest

Flare reduction programs focused on associated gas flaring due to lack of natural gas takeaway capacity.

Q10. Also - for the REMEDY program, what is meant by proposed effort; are we just describing the technology or will we need to plan a specific project?

ANSWER: ARPA-E will not pre-assess an applicant's proposal. Prospective applicants must review the technical requirements of the FOA and independently determine whether their proposed concept warrants a submission.

Q11. Are solutions that replace the flare step, i.e., remove the methane from the uncombusted flare gas, of interest to ARPA-E if they meet the other metrics put forth in the REMEDY FOA?

ANSWER: Yes

Q12. We are developing internal pipeline repair robots for gas and oil pipelines. CEOs of the largest gas/oil companies, such as Saudi Aramco, TOTAL, Shell, etc, have shown interest in using our robots when commercialized. Does it fit into your DE-FOA-0002504?

ANSWER: No. Repair robots are outside the scope of the REMEDY FOA

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Q13. I am trying to submit a proposal for the 99.5% DRE flare. On page 22 Figure 5 of the attached FOA, it cites reference 52, which is “Flaring Fact Sheets by Basins in US, National Energy Technology Laboratory (NETL), 2020.”

I searched for this reference and could not find it. Is there any way you could provide a PDF copy of this reference or provide a link to this reference?

Figure 5 of the attached FOA seems to be misleading. A flare, being an emergency and safety equipment, is often designed to handle a huge flow rate, for example 21 MMSCFD. It is not operated all the time at the max flow rate. Rather it is operated at the max rate only a small fraction of the time. During the majority of the time of the year, it is operated at a small fraction of the max flow rate (like 300 MSCFD, or 0.3 MMSCFD), or operated in a standby mode (hardly any gas sent to the flare). When averaging the flow rates sent to a flare over the entire year, the average flow rate may seem like a small number. A Quote from the FOA: “The smaller flares account for the majority of flared gas volume: 27% of total flared gas from the smallest flares, more than 50% from flares < 300,000 SCFD, and less than 5% from the largest flares.” Again calling them smaller flares may be misleading.

A flare, when pipeline takeaway capacity is available, can have a very small average flow rate. The same flare can be flaring significant amount of gas if the pipeline takeaway capacity is limited.

ANSWER: The NETL document has not been approved for public release.

To clarify Figure 5: The data in this chart is based on frequency distributions showing the number of flares vs the actual amount of gas flared. It is not a graph of the number of flares vs their maximum capacity. By “smaller” flares, we mean flares that have an annual throughput that is smaller compared to flares that have a higher annual throughput. “Small” and “large” are not intended to relate to the physical size or maximum capacity of the flare.

We recognize that flares can have highly variable flow rates. The LCA/LCCA spreadsheet for flares notes the maximum capacity and specifies an annual average capacity that is 50% of the maximum.

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Q14. I have three questions related to the solicitation: Funding Opportunity Number: DE-FOA-0002504

- 1) The REMEDY solicitation focuses on reducing methane emissions from flare stacks at well pad sites. We are envisioning a system which would eliminate this flaring of methane that cannot be monetized. Would such a system be in the scope of this solicitation? Gas fractionation plants and refineries also have flare stacks. Would addressing these flares be part of the REMEDY solicitation?
- 2) The solicitation states: ‘Applicants may submit more than one application to this FOA, provided that each application is scientifically distinct.’

We consider two approaches for different types of flaring, one for off-shore petroleum production and one for on-shore production (such as Permian and Williston Basins). The approaches are very different processes incorporating different technology. There are commonalities between the two methods. We are wondering how to assess if the approaches are to be considered scientifically distinct or sufficiently related?

- 3) Proposal states interest in finding ways to monetize gas. However the submission also specifically states submissions that are not of interest include: ‘flare reduction programs focused on associated gas flaring due to lack of natural gas takeaway capacity’. It seems that these are contradictory statements. There is substantial flaring of flared gas not because of distance to market or level of impurities. The capacity of existing systems is not the problem but rather the economic viability to transport flared gas to market.

Would a proposal to eliminate gas flaring by transferring the gas and converting it to monetized products be within the scope of the solicitation?

ANSWER: ARPA-E will not pre-assess an applicant’s proposal. Prospective applicants must review the technical requirements of the FOA and independently determine whether their proposed concept warrants a submission. ARPA-E will not pre-assess whether an application is scientifically distinct.

Q15. I just realized there are two FOAs that seem very similar, except for a few details.

Is there a document that describes the differences between the two FOAs?

Can we submit applications under both?

Will Concept Papers for each FOA be reviewed by separate technical groups, or will the same group review both Concept Paper submissions?

Will any sort of preference be given to one FOA over the other?

ANSWER: One of the FOAs is for SBIR/STTR awards. Please see the above answer for more information on the program.

Small businesses that qualify as a “Small Business Concern”, as defined in the SBA’s “Guide to SBIR/STTR Program Eligibility” (http://sbir.gov/sites/default/files/elig_size_compliance_guide.pdf) may apply to only one of the two ARPA-E REMEDY FOAs: DE-FOA-0002505 (SBIR/STTR) or DE-FOA-0002504. Small businesses that qualify as “Small Business Concerns” are strongly encouraged to

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apply under the former (SBIR/STTR FOA). To determine eligibility as a “Small Business Concern” under DE-FOA-0002505 (SBIR/STTR), please review the eligibility requirements in Sections III.A – III.D of that FOA.

With respect to the individuals that will be reviewing submissions to the FOA, see Section V.B.2 (ARPA-E Reviewers) of the FOA for more information. The same individuals may or may not review for both FOAs.

No preference is given to either FOA.

Q16. Our project involves combining new drone technology with methane sensors and magnetometers to determine the location of lost abandoned and orphaned wells, and then plugging the wells to permanently cut off the release of methane and other harmful gasses into the atmosphere. Would this type of project qualify to be funded under the DE-FOA-0002504 grant?

ANSWER: ARPA-E will not pre-assess an Applicant’s proposal. Prospective Applicants must review the technical requirements of the FOA and independently determine whether their proposed concept warrants a submission.

Q17. We are working with oil producers in Oklahoma and west Texas to partner with power pools to stop the practice of flaring. By using that methane to power generators to generate power into the power pools is this something that will fall into these grant guidelines ?

ANSWER: ARPA-E will not pre-assess an Applicant’s proposal. Prospective Applicants must review the technical requirements of the FOA and independently determine whether their proposed concept warrants a submission.

Q18. I was made aware of this challenge by our US partner, Drexel University.

We are a Norwegian company working directly with the above-mentioned challenge and we are wondering if it’s possible for a Norwegian entity to participate on this challenge.

Preferably together with our US partner!

ANSWER: For eligibility information for foreign entities, please refer to FOA Section III.A.3.

Q19. I see that the baseline data for the lean burn engines in the Excel Table for LCA parameters is different than the data in Page 25 of the FOA (Table 1). I see in the FAQs there was some discrepancy for another set of data for Table 3 - which set of data should we assume takes precedence?

ANSWER:

Table 1 in the FOA on page 25 gives the Baseline Parameters. Applicants need to fill out the Excel Table spreadsheet for the performance parameters of their proposed technology, using the baseline parameters. The Excel spreadsheet will then calculate the results for their proposed technology. The results calculated by the spreadsheet may vary from the values in Table 1, depending on the

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performance parameters the Applicants use. ARPA-E does not assume all Applicants will have the same performance parameters shown in the Excel spreadsheet.

Q20. Greetings DOE,

1. Earlier, in response to your DE-FOA-0002459, I submitted a concept paper for an engine operating on natural gas for use in compression in the natural gas pipelines. While the scope of the aims of this new project would be different, the science would be essentially the same as that of DE-FOA-0002459. Thus, were I to respond to DE-FOA-0002504 would I have to cancel my pending DE-FOA-0002459 submission?

2. If the answer to my question 1. is NO: would I also be able to respond to DE-FOA-0002505 with a scaled up (far more extensive) project proposal (Concept Paper)?

ANSWER: 1. So long as the concept paper submitted to the REMEDY FOA (DE-FOA-0002504) is scientifically distinct from the concept paper submitted to the OPEN 2021 FOA (DE-FOA-0002459), then you would not need to cancel your OPEN 2021 FOA submission in order to submit to the REMEDY FOA. If the concept paper is not scientifically distinct, please refer to question 2, above.

2. ARPA-E will not pre-assess an Applicant's proposal. Prospective Applicants must review the technical requirements of the FOA and independently determine whether their proposed concept warrants a submission.

Q21. In reviewing the solicitation, we noticed that it references Section I.C.5 throughout the document, however we cannot locate this section. Please advise if this is a typo and should be Section I.B.5. Thank you.

Example:

Address the general and specific techno-economic issues in Section I.C.5 relevant for the system and methane sources.

ANSWER:

The reference to Section I.C.5 is incorrect. The general techno-economic issues are in Section I.B.5, starting on page 12. There are also specific techno-economic issues for each of the three sources, in Section I.B.5.A Lean Burn Engines; Section 1.B.5.B Flare; and Section 1.B.5.C VAM.

Q22. If a small business team qualifies for the cost share grace period under Funding Opportunity No. DE-FOA-0002504 (REMEDY Methane Emissions Abatement Program), and the project proceeds to completion over two years, is the cost share for the first twelve months of the project deferred in the first year but still due later? Or, does the grace period mean that cost share for the first twelve months is forgiven and never become due and payable after the grace period?

ANSWER: Small businesses (as defined in the FOA) – or consortia of small businesses – may provide 0% cost share from the outset of the project through the first 12 months of the project (the project "Cost Share Grace Period"). If the project is continued beyond the Cost Share Grace Period,



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then at least 10% of the Total Project Cost (including the costs incurred during the Cost Share Grace Period) will be required as cost share over the remaining period of performance.

Q23. We are preparing a concept paper in response to DE-FOA-0002504.

In the FOA announcement, it says: “The Concept Paper must not exceed 7 pages in length including graphics, figures, and/or tables (except the required Gantt Chart and the optional LCA and LCCA spreadsheets)”

On the last page of the online Concept Paper template instructions (<https://arpa-e-foa.energy.gov/FileContent.aspx?FileID=83cbdade-86d9-4464-84f9-ea3e03376074>), it says: “Concept Papers shall not exceed four (4) pages in length including graphics, figures, and/or tables. If applicants exceed the maximum page length, ARPA-E will review only the authorized number of pages and disregard any additional pages.”

Can you please advise as to whether the 4- or 7-page length limit is applicable here?

ANSWER: The Concept Paper must not exceed seven (7) pages in length including graphics, figures, and/or tables (except the required Gantt Chart and the optional LCA and LCCA spreadsheets, provided in the FOA, which will not count as part of the 7 pages.