

Our Ref: SC210009

Your Ref:

Date: 06/10/2021

Dear Sirs/Madams,

**Contract Ref: SC210009**

**Contract Title: Specific environmental risks from repurposing oil and gas wells**

You are invited to quote for the above in accordance with the enclosed documents.

Instructions on what information we require you to provide is in Section 4 of the following Request for Quotation document. Before submitting your quote please check for updates and communications on the website.

Your response should be returned to the following email address by 13:00 on 29/10/2021.

Sian.loveless@environment-agency.gov.uk

If you have any queries, please do not hesitate to contact me.

Yours sincerely

Sian Loveless

Senior Scientist, Chief Scientist’s Group

E-mail: sian.loveless@environment-agency.gov.uk

Telephone: 07920 873025

**The Environment Agency**, Red Kite House, Howbery Business Park, Benson Lane, Crowmarsh Gifford, Wallingford, OX10 8BD

**Request for Quotation**

**Ref: SC210009**

**Title: Specific environmental risks from repurposing oil and gas wells**

**Section 1**

**Who is the Environment Agency?**

We are an Executive Non-departmental Public Body responsible to the Secretary of State for Environment, Food and Rural Affairs. Our principal aims are to protect and improve the environment, and to promote sustainable development.

Further information on our responsibilities, Corporate Plan and how we are structured can be found on our Website.

<https://www.gov.uk/government/organisations/environment-agency/about>

**What do we spend our money on?**

We are a major procurer of goods and services within the UK, spending circa £600M per annum, our major spend areas are:

* Flood and Coastal Risk Management (design, construction and maintenance)
* ICT and Telecommunications
* Vehicles and Plant
* Environmental Consultancy and Monitoring
* Temporary Staff and Contractors
* Facilities Management, Energy and Utilities
* Flood Management and Water Related Services

**What do we need from our suppliers?**

Suppliers are vital in supporting the delivery of our corporate plan. We aim to support the economy and society whilst delivering more environmental outcomes for every pound we spend. In many areas we are leading the way on environmental and technical developments. It is our role to ensure that suppliers clearly understand our corporate aims and objectives and know that we are committed to delivering the best value most sustainable solutions, taking into account the whole life cost of our procurement decisions. We promote diversity and equality and treat all of our suppliers fairly.

Our procurement strategy may be of interest to you as a potential supplier. It sets out our priorities and key commitments in a range of areas such as delivering our corporate plan, Government policy, supplier management and sustainable procurement:

<https://www.gov.uk/government/organisations/environment-agency/about/procurement#procurement-strategy>

**Government changes and collaboration**

Since 1 April 2013, the Environment Agency is no longer responsible for delivering the environmental priorities of Wales. This is now the remit of Natural Resources Wales (NRW).Further information can be found here:

<http://naturalresources.wales/splash?orig=/>

By bidding for this requirement, you may also be approached by other members of the Defra network, NRW or other government departments that are specifically named in the tender document.

**Further information**

For further information and to see our commitments to Diversity and Equality, please visit our website.

<https://www.gov.uk/government/organisations/environment-agency/about/procurement>

https://www.gov.uk/government/organisations/environment-agency/about/equality-and-diversity

Also, are you up to date on environmental legislation? See links below for further information.

Waste and Environmental Impact - <https://www.gov.uk/browse/business/waste-environment>

Environmental Regulations - <https://www.gov.uk/browse/business/waste-environment/environmental-regulations>’

**Section 2**

**The Customer**

**Summary**

This work is being commissioned by the Research team within the Chief Scientist’s Group. The work of the Environment Agency’s Chief Scientist’s Group is a key ingredient in the partnership between research, guidance and operations that enables the Environment Agency to protect and restore our environment. The team focuses on four main areas of activity:

* Setting the agenda, by providing the evidence for decisions;
* Maintaining scientific credibility, by ensuring that our programmes and projects are fit for purpose and executed according to international standards;
* Carrying out research, either by contracting it out to research organisations and consultancies or by doing it ourselves;
* Delivering information, advice, tools and techniques, by making appropriate products available.

## Contract Length

It is anticipated that this contract will be awarded to one supplier for a period of 4.5 months to end no later than 31/03/2022. Prices will remain fixed for the duration of the contract award period. We may at our sole discretion extend this contract to include related or further work. Any extension shall be agreed in advance of any work commencing and may be subject to further competition. Any amendment to contract prices for the extensions are to be by negotiation.

The Environment Agency Conditions of Contract for Research (Appendix C) shall apply to this contract.

This contract shall be managed on behalf of the Agency bySian Loveless, sian.loveless@environment-agency.gov.uk.

## Contact Details and Timeline

Sian Loveless, sian.loveless@environment-agency.gov.uk will be your contact for any questions linked to the content of the quote pack or the process. Please submit any questions by email and note that both the question and the response will be circulated to all tenderers.

Key elements of the process have been reviewed. Anticipated dates for planned activities are below:

|  |  |
| --- | --- |
| **Activity** | **Due Date** |
| Supplier responses for Request for Quote | 29/10/2021 13:00 |
| Evaluation of Request for Quote submissions | 05/11/2021 |
| Award of contract | 16/11/2021 |
| Project/Contract end date | 31/03/2022 |

It should be noted that these timescales and activities may be subject to change.

**Section 3**

## Evaluation Criteria

We will award this contract in line with the most economically advantageous tender (MEAT) as set out in the following award criteria:

* Price – 60%
* Quality – 40%

The following quality criteria are weighted in accordance with the importance and relevance attached to each one.

|  |  |
| --- | --- |
| Experience of well and reservoir engineering  | 20% |
| Understanding of the possible chemical and physical processes associated with well repurposing for a range of different uses, and possible environmental risks resulting from these | 20% |
| Understanding of relevant UK datasets and geology of England  | 10% |
| Project methodology (including project management oversight) | 25% |
| Ability to deliver a successful project to time and budget, including adequacy of staff resources (including for project management) | 25% |

The criteria listed above will be assessed on a 0 to 10 basis and will reflect the following judgements:

|  |  |
| --- | --- |
| **Rating of Response****The tenderer provides a response which in the opinion of the evaluators is:**  | **Score** |
| **Excellent:** Addresses all of the requirements and provides a response with relevant supporting information which does not contain any weaknesses, giving the Agency complete confidence that the requirements will be met. | 10 |
| **Very Good:** Addresses all of the requirements and provides a response with relevant supporting information, which contains very minor weaknesses, giving the Agency high confidence that the requirements will be met. | 8 |
| **Good:** Addresses all of the requirements and provides a response with relevant supporting information, which contains minor weaknesses, giving the Agency reasonable confidence that the requirements will be met.  | 6 |
| **Satisfactory:** Substantially addresses the requirements and provides a response with relevant supporting information which may contain moderate weaknesses, but gives the Agency some confidence that the requirements will be met.  | 4 |
| **Weak:** Partially addresses the requirements, or provides supporting information that is of limited relevance or contains significant weaknesses, and therefore gives the Agency low confidence that the requirements will be met. | 2 |
| **Nil:** No response or provides a response that gives the Agency no confidence that the requirements will be met.   | 0 |

**Section 4**

**Information to be returned**

**Please note, the following information requested must be provided. Incomplete tender submissions may be discounted.**

Please complete and return the following information:

* details of the personnel you are proposing to carry out the service, including CV’s of your key personnel;
* detail your recent experience of carrying out similar contracts or projects
* details of proposed methodology
* completed Pricing Schedule (Appendix A);
* completed Prior Rights Schedule (Appendix B);
* confirmation that terms and conditions are accepted (Appendix C. Please note that the terms cannot be amended later).

**Section 5**

**Specification**

# Background to the Requirement

Hydrocarbon wells that have not yet been fully decommissioned can be repurposed and used for the extraction of geothermal energy, storage of hydrogen, thermal or mechanical energy, or CO2. A recent study estimated that of the 2242 onshore hydrocarbon wells, almost 1/4 of these have the potential to be repurposed for geothermal purposes (Watson, Falcone, & Westaway, 2020).

There are clear benefits to repurposing wells, including the cost savings that frequently hinder projects with low-economic returns such as geothermal energy, in addition to reducing environmental impacts from drilling new wells (e.g. waste, emissions, CO2, spillages). However, it is not yet clear what the potential environmental impacts might be from using these wells for purposes for which they weren’t originally intended. For this we need to build on our existing knowledge about the source-pathways-receptors of pollution from oil and gas wells and other technologies in order to understand the specific environmental risks from different fluids and operating regimes associated with repurposed wells. Possible concerns include;

* Reactivity of wellbore materials or geological fluid with the different proposed fluids (brines, air, CO2, H2)
* Damage from re-entering/re-drilling a well bore
* Mechanical stresses from cyclical loading or temperature changes on the wellbores and geological formations
* How many wells could be repurposed in England, and where?

This project will investigate the specific environmental risks from repurposing oil and gas wells to understand whether or not this is an acceptable in contrast to their immediate decommissioning. It will help us achieve our EA 2025 goals:

* Ensuring clean and plentiful water.
* Reducing the risks of harm from environmental hazards.
* Managing exposure to chemicals.
* Mitigating and adapting to climate change.

# Specific Objectives/Deliverables

1. Conduct initial scoping and discussions with the EA and other regulators to identify project methodology (e.g. targeted literature view/expert elicitation).
2. Prepare a brief (40 pages maximum) report in EA format that:
	1. Briefly **explains** how onshore oil and gas wells can be repurposed to extract or store non-hydrocarbon fluids in the subsurface.
	2. Summarises **requirements** for repurposing wells for different technologies (i.e. geothermal, thermal energy storage, hydrogen, compressed air energy storage and CO2 ,,,), including:
		1. decommissioning status (suspended through to fully decommissioned)
		2. well infrastructure, completion and age
		3. types of geological formation that can be used (e.g. reservoir properties/geochemistry/previous uses)
	3. Details the **potential sources and pathways** of contamination to groundwater that could result from repurposing wells for different fluids or gases based on thermal/chemical/mechanical interactions with casing and cement, and the sources and pathways within the geological formation. The project will focus on subsurface sources and pathways to groundwater, but will also address air or surface water quality where this is relevant.
	4. Identify important **knowledge gaps** and how these might be investigated further.
3. Deliver an **assessment** of the possible numbers and locations of hydrocarbon wells that could be repurposed for different applications (geothermal, H2, CAES, CO2) in England using objectives 1 and 2 and other available data.
4. **Present** findings from objectives 1 to 3 at a workshop for the EA steering group and other internal and external stakeholders.

Key requirements:

* The supplier will have experience of well and reservoir engineering and a good understanding of the physical and chemical processes associated with well repurposing for a range of different uses, and possible environmental impacts associated with these.
* A single point of contact will be provided by the supplier.
* Deliverables and timescales are outlined below.

### Timescales/Deadlines

|  |  |
| --- | --- |
| **Date** | **Activity and Deliverable** |
| 16 Nov 2021 | **Start-up meeting** with the contractor project team and the EA steering group:* Confirm possible uses of repurposed wells to include in the project
* Discuss possible well and formation requirements to consider and also potential sources and pathways of contamination
* Confirm methods, including relevant literature to review and expert elicitation interviews to conduct
* Outline expected structure of report and purpose
* Project deliverables and timings
 |
| 16 Nov 2021 to 31 Mar 2022  | Weekly meetings with project manager (and steering group as and when needed) to trouble shoot and keep up to date with policy and industry advances. There will be the possibility to cancel if not needed. |
| 15 Jan 2021 | **Progress meeting**, including;* Update on initial findings
* Early draft report, including structure, for comment
* Update on financial performance
* Plans for remainder of the project
 |
| 10 Feb 2022 | * **Draft report** to EA, EA steering group reviews report
 |
| 17 Feb 2022 | * EA provides **comments** back to project team.
 |
| 10 March 2022 | * Delivery of **final report** in EA format
* **Final project meeting**
 |
| 01 March – 31 March 2022 (communication and dissemination) | * **EA workshop, run by contractors** with EA steering group and other interested stakeholders to share findings and ask questions.
* Contractorto provide 1 hour seminar.
* Report publication and dissemination of results to EA and partner organisations.
 |

It is assumed all meetings will be virtual.

### Skills of Personnel Required

# Technical expertise in, and experience of, well/reservoir engineering

# Understanding of physical and chemical processes that might impact well or formation integrity due to repurposing of hydrocarbon wells.

# Understanding of UK datasets and geological settings in England.

# Experience of conducting literature reviews and conducting expert elicitation interviews or similar methods

# Excellent communication skills (written, pictorial and verbal).

# Ability to work collaboratively and share knowledge.

**Section 6**

**Contract Management**

This contract shall be managed on behalf of the Agency bySian Loveless, sian.loveless@environment-agency.gov.uk

The contractor is required to maintain close liaison with the Environment Agency's Project Manager.

During the course of the project, the contractor will provide the Environment Agency’s Project Manager with a monthly updates regarding:

* progress and difficulties encountered with the project
* any proposed changes to the manner in which the project is run
* time spent on the project
* details of the financial spend during the previous month.

Weekly meetings will be scheduled as an opportunity to trouble-shoot any potential project issues or answer any questions.

An Environment Agency project steering group will be set up to act as the technical quality review panel for the work and outputs. It is likely that key outputs will be subject to external peer review. The project advisory group will review the draft report produced by the contractor, prior to acceptance. You should ensure that sufficient time is allowed within the project to consult with the project steering group in directing the project. Approximately 2 weeks is likely to be required for the group to review a final draft document.

The contractor should allow enough time for project meetings to discuss progress and agree future scope. There will be three full project meetings, all of which will be virtual and 2-3 hours; one at the start-up of the project, a progress meeting to discuss an early draft report (which should be made available at least one working week prior to the meeting) and a final project meeting. Other project meetings and any other discussions needed will be conducted where necessary.

We will raise purchase orders to cover the cost of the services and will issue to the awarded supplier following contract award.

Before the invoice is issued, a fee note must be emailed in advance to the contract manager for approval. All invoices must quote the purchase order number in order to be processed. A file copy invoice must be provided to the contract manager, on request. The timescale for payment of invoices will be up to 30 days after we have received a valid invoice.

It is proposed that full payment be made on acceptance of the final report. Alternative programmes of work and payment schedules will be considered.

**Section 7**

**Sustainability Considerations**

We are committed to continually improving our sustainability performance. The Environment Agency has set itself tough objectives as a clear commitment and contribution to sustainable development throughout England. The Agency recognises that this can only be achieved through commitment from all sectors of society and it is intent on raising awareness amongst industry and commerce.

Contractors must adopt a sound proactive environmental approach, designed to minimise harm to the environment.

Environmental criteria should be considered as part of your tender submission with credit given for innovation. Factors to be considered could include areas such as:

* + - Paper use: All documents and reports prepared by consultants and contractors are produced wherever possible on recycled paper containing at least 100% post consumer waste and printed double sided.
		- Travel: use of public transport, reduce face to face meetings by using email and videoconferencing. Meetings to be held in locations to minimise travel and close to public transport links.
		- Packaging: should be kept to a minimum. Re-use and disposal issues must be considered.
		- Efficient Energy and Water Use.
		- Disposal of Waste: Whilst on site the contractor is responsible for the disposal of their own waste and can only use client facilities with express permission from the on site facilities officer.
		- Whilst on site, contractors should comply with the local environmental policy statement which will be made available to you in advance or on arrival.

**Diversity and Equal Opportunities**

We are committed to promoting equality and diversity in all we do and valuing the diversity of our workforce, customers and communities.  As a public body, we publish regular information about what our equality objectives are and how we’re meeting them.

<https://www.gov.uk/government/organisations/environment-agency/about/equality-and-diversity>

**Health and Safety**

Contractors will be responsible for making sure all required health and safety aspects including risk assessments are undertaken and required management measures are in place to protect worker exposure. This includes management of all partners, consortium members and subcontractors.

**IEM2020:**

## Sustainability Objectives

As the Environment Agency, our overarching aim is to protect and improve the environment for people and wildlife. Over the last 10 years we have achieved significant reductions in our environmental impacts that occur through our everyday operations. This included a 40% reduction in our carbon emissions and a 37% reduction in the number of miles we travel. This year we have launched our new Internal Environmental Management strategy to take us through to 2020, building on these successes and widening our ambition.

**Supply chain**

Our 2020 approach will have a very strong emphasis on the indirect impacts of our supply chain.

Our supply chain accounts for over 70% of our total environmental impacts.

Working with our supply chain we want to be world class in the area of environmental management. The environmental impacts of our work and that delivered by and through our supply chain must be reduced; environmental risks must be effectively managed and opportunities for enhancements investigated.

As an organisation, our environmental management system (EMS) is accredited to ISO14001 and EMAS standards. Our procurement activities form part of this system; driving environmental performance improvements across the value chain.

## Section 8

### Additional Information

### Copyright and confidentiality

Unless otherwise indicated, the copyright in all of the documentation belongs to the Environment Agency, and the documentation is to be returned to us with your tender. The contents of the documentation must be held in confidence by you and not disclosed to any third party other than is strictly necessary for the purposes of submitting your quote. You must also ensure that a similar obligation of confidentiality is placed upon any third party to whom you may need to disclose any of the documentation for the purposes of the tender.

### Accuracy of documentation

You should check all documentation; should any part be found to be missing or unclear you should immediately contact us at the address given in the covering letter. No liability will be accepted by the Environment Agency for any omission or errors in the documentation which could have been identified by you.

### Amendments to documentation

Prior to the date for return of tenders, we may clarify, amend or add to the documentation. A copy of each instruction will be issued to every Tenderer and shall form part of the documentation. No amendment shall be made to the documentation unless it is the subject of an instruction. The Tenderer shall promptly acknowledge receipt of such instructions.

### Alternative Offers

Alternative offers may be considered if they constitute a fully priced alternative and are submitted in addition to a quotation complying with the requirements of the Invitation to Quote Documents. If, for any reason you wish to submit an alternative offer without a fully compliant tender please contact us in accordance with the details in the covering letter.

## Continuity of personnel

The Contractor shall employ sufficient staff to ensure that the Services are provided at all times and in all respects to the Project Standard. It shall be the duty of the Contractor to ensure that a sufficient reserve of staff is available to ensure project delivery in the event of staff holidays, sickness or voluntary absence

The Environment Agency will be notified immediately of any changes to personnel associated with the project. The Contractor will ensure that every effort is made to replace outgoing staff with personnel of equal calibre and expertise. All new members of staff undertaking work for the Project will need to be agreed by the Environment Agency prior to commencement.

At all times, the Contractor shall only employ in the execution and superintendence of the Contract persons who are suitable and appropriately skilled and experienced.

## Intellectual property rights

All results, including material and tools produced, developed or paid for under this contract shall be the property of the Environment Agency.

## References

The Environment Agency may request recent and relevant references prior to the award of the project.

**Contract award**

This Request for Quote is issued in good faith but we reserve the right not to award any or all of this work.

### DATA PROTECTION ACT ADDENDUM TO SPECIFICATION

## Protection of personal data

In order to comply with the Data Protection Act 1998 the Contractor must agree to the following:

* You must only process the personal data in strict accordance with instructions from the Environment Agency.
* You must ensure that all the personal data that we disclose to you or you collect on our behalf under this agreement are kept confidential.
* You must take reasonable steps to ensure the reliability of employees who have access to personal data.
* Only employees who may be required to assist in meeting the obligations under this agreement may have access to the personal data.
* Any disclosure of personal data must be made in confidence and extend only so far as that which is specifically necessary for the purposes of this agreement.
* You must ensure that there are appropriate security measures in place to safeguard against any unauthorised access or unlawful processing or accidental loss, destruction or damage or disclosure of the personal data.
* On termination of this agreement, for whatever reason, the personal data must be returned to us promptly and safely, together with all copies in your possession or control.

# APPENDIX A - PRICING SCHEDULE

ALL COSTS QUOTED MUST BE EXCLUSIVE OF VAT

All costs must be quoted on this schedule. Any costs not detailed will not be paid.

Please detail your task costs in the table below.

|  |
| --- |
| **Cost Proposal (To be completed by Supplier)** |
| **Tasks** | **Hourly Rate** | **No of Hours** | **Cost** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Total Staff Costs  |  |
| **Expenses (please detail type, i.e. travel etc)** |  |
| **Discounts applied (please detail)** |  |
| **Total Overall Cost**  |  |

**Other costs**

Please state any other costs that will need to be taken into consideration.

|  |  |
| --- | --- |
| **DESCRIPTION** | **COST** £ |
| **1. Other costs (please detail)** |  |
| **2. Other costs (please detail)** |  |
| **3. Other costs (please detail)** |  |
| **TOTAL**  |  |

**Discounts, rebates and reductions**

Please detail below any discounts, rebates and other reductions you are prepared to offer and the basis of those incentives

|  |  |
| --- | --- |
| **DESCRIPTION** | **AMOUNT**£ |
|  |  |
|  |  |
|  |  |
| **TOTAL**  |  |

**Total Overall Cost**

Please detail the total fixed cost for the project

|  |  |
| --- | --- |
| **ITEM** | **TOTAL AMOUNT**£ |
| **Staff Costs** |  |
| **Other Costs** |  |
| **Discounts/reductions** |  |
| **TOTAL Overall Cost** |  |

The following limits will be applicable to all claims for travel and subsistence under this contract:

1. Travel by rail: standard class should be used at all times
2. Travel by car: 45 pence/mile

Hotel bookings should be made through the Environment Agency’s corporate travel contract. Details of this contract are available from the Corporate Contracting Team.

When making reservations you should state that you are a contractor working on Environment Agency business.

Hotel charges must not exceed a maximum limit per night bed and breakfast (VAT included) of: £140 in London; £100 in Bristol; £90 in Warrington; £85 in Reading; £75 in Aberdeen, Birmingham, Belfast, Cardiff, Coventry, Edinburgh, Glasgow, Harlow, Leeds, Manchester, Middlesbrough, Newcastle, Oxford, Portsmouth, Sheffield and York; and £70 in all other destinations. Please note that these hotel ceiling rates are subject to change throughout the life of the contract.

Expenditure on dinner during an overnight stay must not exceed a maximum limit of £25, including a drink.

Receipts for all rail travel, hotel and food expenses will be required as proof of expenditure and will be reimbursed at cost. No profit or additional cost shall be applied by the contractor to such personal expenses.

**APPENDIX B - PRIOR RIGHTS SCHEDULE**

Details of Prior Rights held by the Parties (To be updated as Rights are introduced during the period of the Contract)

Prior Rights owned or lawfully used by a Party, whether under licence or otherwise, which it introduces to the Project for the purposes of fulfilling its obligations under the Contract.

Held by the Environment Agency

|  |  |  |
| --- | --- | --- |
| **Name and description of Prior Rights** | **Extent of proposed use in the Project**  | **Proprietary owner of the Prior Rights** |
|  |  |  |
|  |  |  |
|  |  |  |

Held by the Contractor

|  |  |  |
| --- | --- | --- |
| **Name and description of Prior Rights** | **Extent of proposed use in the Project**  | **Proprietary owner of the Prior Rights** |
|  |  |  |
|  |  |  |
|  |  |  |

**Explanation of Contractor's Prior Rights**
All Intellectual Property Rights owned by or lawfully used by the Contractor, whether under licence or otherwise before the date of this Contract. It can also mean any invention and know how or other intellectual property (whether or not patentable) owned by one of the parties prior to the commencement of the Project, or devised or discovered by one of them only in the course of other projects during the Project period and not arising directly from the Project.

**APPENDIX C – ACCEPTANCE OF TERMS AND CONDITIONS**

I/We accept in full the terms and conditions named in Section 2 and appended to this Request for Quote document.

Company \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name

Signature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Print Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Position \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_