REQUEST FOR PROPOSALS

FOR

FURNISHING AND DELIVERY

OF

STEAM TURBINE GENERATOR 10 AND AUXILIARIES

FOR

THE CURATORS OF THE UNIVERSITY OF MISSOURI

ON BEHALF OF

UNIVERSITY OF MISSOURI – COLUMBIA CAMPUS

RFP # 22100

DUE DATE: MARCH 25, 2022

TIME: 1:00 PM, CT

THE CURATORS OF THE UNIVERSITY OF MISSOURI
Prepared by:
Teresa Vest, Associate Director
University of Missouri Procurement
2910 LeMone Industrial Blvd
Columbia, MO 65201

Date Issued: March 1, 2022

NOTICE TO RESPONDENTS

The University of Missouri requests proposals for the Furnishing and Delivery of Steam Turbine Generator 10 and auxiliaries, RFP #22100 which will be received by the undersigned at University of Missouri Procurement, until March 25, 2022 at 1:00 p.m. CT. The University assumes no responsibility for any supplier's on-time receipt at the designated location for proposal opening.

In the event a Respondent chooses to use the Word version of the RFP to aid in preparation of its response, the Respondent should only complete the response information. Any modification by the Respondent of the specifications provided will be ignored, and the original wording of the RFP shall be the prevailing document.

If you have any questions regarding the RFP, please send them to:
Teresa L. Vest, Associate Director
University of Missouri Procurement
vestt@umsystem.edu

All questions regarding the RFP must be received no later than March 8, 2022 at 1:00 pm. CT.

The University reserves the right to waive any informality in Request for Proposals and to reject any or all Request for Proposals.

THE CURATORS OF THE UNIVERSITY OF MISSOURI
Prepared by:
Teresa L. Vest, Associate Director
University of Missouri Procurement
2910 LeMone Industrial Blvd
Columbia, MO 65201

INDEX

UNIVERSITY OF MISSOURI
REQUEST FOR PROPOSAL (RFP)
GENERAL TERMS AND CONDITIONS & INSTRUCTIONS TO RESPONDENTS

General Terms and Conditions

1. Purpose: The purpose of these specifications is to require the furnishing of the highest quality equipment, supplies, material and/or service in accordance with the specifications. These documents, and any subsequent addenda, constitute the complete set of specification requirements and proposal response forms.

2. Governing Laws and Regulations: Any contract issued as a result of this RFP shall be construed according to the laws of the State of Missouri. Additionally, the supplier shall comply with all local, state, and federal laws and regulations related to the performance of the contract to the extent that the same may be applicable.

3. Taxes: The supplier shall assume and pay all taxes and contributions including, but not limited to, State, Federal and Municipal which are payable by virtue of the furnishing and delivery of item(s) specified herein. Materials and services furnished the University are not subject to either Federal Excise Taxes or Missouri Sales Tax.

4. Sovereign Immunity: The Curators of the University of Missouri, due to its status as a state entity and its entitlement to sovereign immunity, is unable to accept contract provisions, which require The Curators to indemnify another party (537.600, RSMo). Any indemnity language in proposed terms and conditions will be modified to conform to language that The Curators are able to accept.

5. Preference for Missouri Firms: In accordance with University policy, preference shall be given to Missouri products, materials, services, and firms when the goods or services to be provided are equally or better suited for the intended purpose. In assessing overall value, consideration will be given to the extent to which proximity or Missouri preference of the supplier provides potential advantages or reduction of risks. Firms are considered "Missouri firms" if they maintain a regular place of business in the State of Missouri.

6. Appropriation: The Curators of the University of Missouri is a public corporation and, as such, cannot create indebtedness in any one year (the fiscal year beginning July 1 to June 30) above what they can pay out of the annual income of said year as set forth in 172.250, RSMo. Therefore, if the University determines it has not received adequate appropriations, budget allocations or income to enable it to meet the terms of this contract, the University reserves the right to cancel this contract with 30 days' notice.

7. Equal Opportunity and Non-Discrimination: In connection with the furnishing of equipment, supplies, and/or services under the contract, the contractor and all subcontractors shall agree not to discriminate against any recipients of services, or employees or applicants for employment on the basis of race, color, religion, national origin, sex, age, disability, or veteran status. The contractor shall comply with federal laws, rules, and regulations applicable to subcontractors of government contracts including those relating to equal employment of minorities, women, persons with disabilities, and certain veterans. Contract clauses required by the United Sates Government in such circumstances are incorporated herein by reference.

8. Supplier Diversity Participation: The University of Missouri System is committed to and supports supplier diversity as an essential part of the University's mission and core values. To qualify as a Diverse Supplier, the company must be at least 51% owned and controlled by someone in one of the recognized groups (see below). These firms can be a sole proprietorship, partnership, joint venture or corporation. Diverse suppliers should be certified from a recognized certifying agency.

   The University of Missouri recognizes the following groups:
   - MBE (Minority Owned Business Enterprise)
   - African American
   - Asian American (including Pacific Asian and Subcontinent Asian)
   - Hispanic American
   - Native American

WBE (Women Owned Business Enterprise)
DVBE (Service-Disabled Veteran Owned Business Enterprise)
VBE (Veteran Owned Business Enterprise)
LGBT (Lesbian, Gay, Bisexual, Transgender)
DBE (Disadvantaged Business Enterprise)

9. Tier 2 Diverse Supplier Spending and Reporting: The University strongly encourages Supplier Diversity participation in all contracts for goods and services. Tier 2 spend is spend reported by primary (non-diverse) suppliers of the University of Missouri who subcontract work to or make purchases from a diverse supplier. Depending upon the contract, primary (non-diverse) suppliers may be asked to submit Tier 2 information with Women and Diverse Owned Companies. Suppliers have two options in reporting Tier 2 dollars depending on the terms on the contract: Direct and Indirect. Definitions and further explanation of these options is included in the Supplier Diversity Participation Form attached hereto.

10. Supplier Diversity Participation Form: If a respondent will be utilizing a diverse supplier as part of this contract, they must indicate their Supplier Diversity participation levels on the Supplier Diversity Participation Form included in this RFP (see Attachment A). The Respondent must describe what suppliers and/or how the Respondent will achieve the Supplier Diversity goals. Evaluation of proposals shall include the proposed level of Supplier Diversity participation. Proposals that do not meet the participation requirements for Supplier Diversity will not receive any of the points during proposal review.

    Suppliers will be responsible for reporting Tier 2 diverse supplier participation on an agreed upon timing (e.g. quarterly, annually) when business is awarded.

    The University may monitor the supplier's compliance in meeting the Supplier Diversity participation levels committed to in the awarded proposal. If the supplier's payments to participating diverse suppliers are less than the amount committed to in the contract, the University reserves the right to cancel the contract, suspend and/or debar the supplier from participating in future contracts.

11. Applicable Laws and Regulations: The University serves from time to time as a contractor for the United States government. Accordingly, the provider of goods and/or services shall comply with federal laws, rules and regulations applicable to subcontractors of government contracts including those relating to equal employment opportunity and affirmative action in the employment of minorities (Executive Order 11246), women (Executive Order 11375), persons with disabilities (29 USC 706 and Executive Order 11758), and certain veterans (38 USC 4212 formerly [2012]) contracting with business concerns with small disadvantaged business concerns (Publication L. 95-507). Contract clauses required by the Government in such circumstances are incorporated herein by reference.

12. Anti-Discrimination Against Israel Act: If this Contract involves the acquisition or disposal of services, supplies, information technology, or construction and has a total potential value of $100,000 or more, and if Supplier is a company with ten (10) or more employees, then Supplier certifies that it, and any company affiliated with it, does not boycott Israel and will not boycott Israel during the term of this Contract. In this paragraph, the terms "company" and "boycott Israel" shall have the meanings described in Section 34.600 of the Missouri Revised Statutes.

13. Applicable Digital Accessibility Laws and Regulations: The University affords equal opportunity to individuals with disabilities in its employment, services, programs and activities in accordance with federal and state laws, including Section 508 of the Rehabilitation Act, 36 C.F.R., Pt. 1194. This includes effective communication and access to electronic and information communication technology resources, and the University expects that all products will, to the greatest extent possible, provide equivalent ease of use for individuals with disabilities as for non-disabled individuals. The University of Missouri has adopted the Web Content Accessibility Guidelines (WCAG), as specified by the University of Missouri Digital Accessibility Policy.

    Supplier shall: (1) deliver all applicable services and products in reasonable compliance with University standards (Web Content Accessibility Guidelines 2.0, Level AA or above); (2) provide the University with an Accessibility

Conformance Report detailing the product's current accessibility according to WCAG standards using the latest version of the Voluntary Product Accessibility Template (VPAT); (3) if accessibility issues exist, provide a "roadmap" plan for remedying those deficiencies on a reasonable timeline to be approved by the University; (4) promptly respond to assist the University with resolving any accessibility complaints and requests for accommodation from users with disabilities resulting from supplier's failure to meet WCAG guidelines at no cost to the University; and (5) indemnify and hold the University harmless in the event of any claims arising from inaccessibility.

When installation, configuration, integration, updates, or maintenance are provided, the supplier must ensure these processes are completed in a way that does not reduce the original level of WCAG conformance. If at any point after procurement it is determined that accessibility improvements need to be made in order to comply with the WCAG standards, the supplier agrees to work with the University to remedy the non-compliance by submitting a roadmap detailing a plan for improvement on a reasonable timeline. Resolution of reported accessibility issue(s) that may arise should be addressed as high priority, and failure to make satisfactory progress towards compliance with WCAG, as agreed to in the roadmap, shall constitute a breach of contract and be grounds for termination or non-renewal of the agreement.

14. Applicable Health Related Laws and Regulations: If these specifications or any resulting contract involves health care services or products, the Supplier agrees to maintain, and will further assure such compliance by its employees or subcontractors, the confidential nature of all information which may come to Supplier with regard to patients of the University. All services provided pursuant to this contract shall be provided in accordance with all applicable federal and state laws including The Health Insurance Portability and Accountability Act of 1996, Public Law 104-191, sections 261-264 (the Administrative Simplification sections) and the regulations promulgated pursuant thereto and regulations of the Joint Commission on Accreditation of Healthcare Organization and The Centers for Medicare & Medicaid Services (CMS).

    Respondents understand and agree that the Curators of the University of Missouri, in the operation of MU Health Care, is regulated under federal or state laws with regard to contracting with suppliers. The Respondent represents that it is not currently excluded or threatened with exclusion from participating in any federal or state funded health care program, including Medicare and Medicaid. Respondent agrees to notify the University of any imposed exclusions or sanctions covered by this representation.

    The University will regularly check the "List of Excluded Individuals/Entities" (LEIE), maintained by the Office of Inspector General, United States Department of Health and Human Services ("OIG") to determine if any Respondents have been excluded from participation in federal health care programs, as that term is defined in 42 U.S.C. §1320a-7b(f). The University reserves the sole right to reject any respondents who are excluded by the OIG, who have been debarred by the federal government, or who have otherwise committed any act that could furnish a basis for such exclusion or debarment.

15. Inventions, Patents, and Copyrights: The Contractor shall pay for all royalties, license fees, patent or invention rights, or copyrights and defend all suits or claims for infringements of any patent or invention right or copyrights involved in the items furnished hereunder. The Contractor shall defend, protect, and hold harmless the University its officers, agents, servants and employees against all suits of law or in equity resulting from patent and or copyright infringement concerning the contractor's performance or products produced under the terms of the contract.

16. Copyrights for any item developed for the University shall be the property of the University and inure to its benefit and the Contractor shall execute such documents as the University may require for the perfection thereof.

17. Contractor Gifts: The contractor shall refrain in offering any offers of gifts to the University, and all University of Missouri employee's, in accordance with University of Missouri Policy #26301, Suppliers.

<u>Instructions to Respondents</u>

1. Request for Proposal (RFP) Document: Respondents are expected to examine the complete RFP document and all attachments including drawings, specifications, and instructions. Failure to do so is at Respondents' risk. It is the

Respondents' responsibility to ask questions, request changes or clarifications, or otherwise advise the University if any language, specifications or requirements of the RFP appear to be ambiguous, contradictory, and/or arbitrary, or appear to inadvertently restrict or limit the requirements stated in the RFP to a single source.

Any and all communications from Respondents regarding specifications, requirements, competitive Request for Proposal process, etc., should be directed to the University buyer of record referenced in this RFP. It is the responsibility of the person or organization communicating the request to ensure that it is received.

The RFP document and any attachments constitute the complete set of specifications and Request for Proposal response forms. No verbal or written information that is obtained other than through this RFP or its addenda shall be binding on the University. No employee of the University is authorized to interpret any portion of this RFP or give information as to the requirements of the RFP in addition to that contained in or amended to this written RFP document. In case of any doubt or difference of opinion as to the true intent of the RFP, the decision of the University's Chief Procurement Officer shall be final and binding on all parties.

2. Preparation of Request for Proposals: All Request for Proposals must be submitted in the format and number of copies as specified in the detailed specifications and must be delivered electronically with the following in the subject line: Request for Proposal #22100 for Steam Turbine Generator, and delivered to Teresa Vest at vestt@umsystem.edu. Respondents shall allow sufficient time for electronic submission to pass through University of Missouri security protocols.

   To receive consideration, Request for Proposals must be received, prior to the Proposal due date and time stated in this RFP. It is the respondent's full responsibility for the actual delivery of Proposals

   Unless otherwise specifically stated in the RFP, all specifications and requirements constitute minimum requirements. All Requests for Proposals must meet or exceed the stated specifications or requirements. All equipment and supplies offered must be new, of current production, and available for marketing by the manufacturer unless the RFP clearly specifies that used, reconditioned, or remanufactured equipment and supplies may be offered. Unless specifically stated and allowed in the Detailed Specifications and Special Conditions, all pricing submitted in response to this RFP is firm and fixed.

   Whenever the name of a manufacturer, trade name, brand name, or model and catalog numbers followed by the words "or equal" or "approved equal" are used in the specifications, it is for the purpose of item identification and to establish standards of quality, style, and features. Proposals on equivalent items of the same quality are invited. However, to receive consideration, such equivalent proposals must be accompanied by sufficient descriptive literature and/or specifications to clearly identify the item and provide for competitive evaluation. The University will be the sole judge of equality and suitability. Whenever the name of a manufacturer is mentioned in the specifications and the words "or equal" do not follow, it shall be deemed that the words "or equal" follow unless the context specifies "no substitution." Unless noted on the Request for Proposal form, it will be deemed that the article furnished is that designated by the specifications. The University reserves the right to return, at contractor's expense, all items that are furnished which are not acceptable as equals to items specified and contractor agrees to replace such items with satisfactory items at the original proposal price.

   Time will be of the essence for any orders placed as a result of this RFP. The University reserves the right to cancel any orders, or part thereof, without obligation if delivery is not made in accordance with the schedule specified by the respondents Proposal and accepted by the University. Unless otherwise specified in the Detailed Specifications and Special Conditions, all proposals shall include all packing, handling, and shipping charges FOB destination, freight prepaid and allowed.

3. Submission of Proposals: Respondent shall furnish information required by the solicitation in the form requested. The University reserves the right to reject proposals with incomplete information or which are presented on a different form. All proposals shall be signed, in the appropriate location, by a duly authorized representative of the Respondent's organization. Signature on the proposal certifies that the Respondent has read and fully understands all RFP specifications, plans, and terms and conditions.

By submitting a proposal, the Respondent agrees to provide the specified equipment, supplies and/or services in the RFP, at the prices quoted, pursuant to all requirements and specifications contained therein. Furthermore, the Respondent certifies that: (1) the proposal is genuine and is not made in the interest of or on behalf of any undisclosed person, firm, or corporation, and is not submitted in conformity with any agreement or rules of any group, association, or corporation; (2) the Respondent has not directly or indirectly induced or solicited any other Respondent to submit a false or sham proposal; (3) the Respondent has not solicited or induced any person, firm, or corporation to refrain from responding; (4) the Respondent has not sought by collusion or otherwise to obtain any advantage over any other Respondent or over the University.

Modifications or erasures made before proposal submission must be initialed in ink by the person signing the proposal. Proposals, once submitted, may be modified in writing prior to the exact date and time set for the RFP closing. Any such modifications shall be prepared on company letterhead, signed by a duly authorized representative, and state the new document supersedes or modifies the prior proposal. The modification must be submitted marked "Proposal Modification" and clearly identifying the RFP title, RFP number and closing date and time. Proposals may not be modified after the RFP closing date and time. Telephone and facsimile modifications are not permitted.

Proposals may be withdrawn in writing, on company letterhead, signed by a duly authorized representative and received at the designated location prior to the date and time set for RFP closing. Proposals may be withdrawn in person before the RFP closing upon presentation of proper identification. Proposals may not be withdrawn for a period of sixty (60) days after the scheduled closing time for the receipt of proposals.

All proposals, information, and materials received by the University in connection with an RFP response shall be deemed open records pursuant to 610.021 RSMo. If a Respondent believes any of the information contained in the Respondent's response is exempt from 610.021 RSMo, the Respondent's response must specifically identify the material which is deemed to be exempt and cite the legal authority for the exemption; otherwise, the University will treat all materials received as open records. The University shall make the final determination as to what materials are or are not exempt

4. Evaluation and Award: Any clerical errors, apparent on its face, may be corrected by the Buyer before contract award. Upon discovering an apparent clerical error, the Buyer shall contact the Respondent and request clarification of the intended proposal. The correction shall be incorporated in the notice of award. The University reserves the right to request clarification of any portion of the Respondent's response in order to verify the intent. The Respondent is cautioned, however, that its response may be subject to acceptance or rejection without further clarification.

   The University reserves the right to make an award to the responsive and responsible Respondent whose product or service meets the terms, conditions, and specifications of the RFP and whose proposal is considered to best serve the University's interest. In determining responsiveness and the responsibility of the Respondent, the following shall be considered when applicable: the ability, capacity, and skill of the respondent to perform as required; whether the respondent can perform promptly, or within the time specified without delay or interference; the character, integrity, reputation, judgment, experience and efficiency of the respondent; the quality of past performance by the Respondent; the previous and existing compliance by the Respondent with related laws and regulations; the sufficiency of the Respondent's financial resources; the availability, quality and adaptability of the Respondents equipment, supplies and/or services to the required use; the ability of the respondent to provide future maintenance, service and parts.

   The University has established formal protest procedures. For more information about these procedures, contact the Buyer of Record.

   In case of any doubt or difference of opinion as to the items and/or services to be furnished hereunder, the decision of the Assistant Vice President Management Services, UM System shall be final and binding upon all parties.

The University reserves the right to accept or reject any or all proposals and to waive any technicality or informality.

5. Contract Award and Assignment: The successful Respondent(s) shall enter into a contract prepared by the University. The Contract Documents shall include the Advertisement for Request for Proposals, Specifications and Addenda, Exhibits, Request for Proposal Form, Form of Contract, Statement of Work, Letter of Award, University Purchase Order, and Form of Performance Bond, if required.

   The contract to be awarded and any amount to be paid thereunder shall not be transferred, sublet, or assigned without the prior approval of the University.

6. Contract Termination for Cause: In the event the Contractor violates any provisions of the contract, the University may serve written notice upon Contractor and Surety setting forth the violations and demanding compliance with the contract. Unless within ten (10) days after serving such notice, such violations shall cease and satisfactory arrangements for correction be made, the University may terminate the contract by serving written notice upon the Contractor; but the liability of Contractor and Surety for such violation; and for any and all damages resulting there from, as well as from such termination, shall not be affected by any such termination.

7. Contract Termination for Convenience: The University reserves the right, in its best interest as determined by the University, to cancel the contract by given written notice to the Contractor thirty (30) days prior to the effective date of such cancellation.

8. Warranty and Acceptance: The Contractor expressly warrants that all equipment, supplies, and/or services provided shall: (1) conform to each and every specification, drawing, sample or other description which was furnished or adopted by the University, (2) be fit and sufficient for the purpose expressed in the RFP, (3) be merchantable, (4) be of good materials and workmanship, (5) be free from defect. Such warranty shall survive delivery and shall not be deemed waived either by reason of the University's acceptance of or payment for such equipment, supplies, and/or services.

   No equipment, supplies, and/or services received by the University pursuant to a contract shall be deemed accepted until the University has had a reasonable opportunity to inspect said equipment, supplies and/or services. All equipment, supplies, and/or services which do not comply with specifications and/or requirements or which are otherwise unacceptable or defective may be rejected. In addition, all equipment, supplies, and/or services which are discovered to be defective or which do not conform to any warranty of the Contractor upon inspection (or at any later time if the defects contained were not reasonably ascertainable upon the initial inspection) may be rejected.

9. Payment: Preferred settlement method is through the use of Electronic Accounts Payable solutions. Payment terms associated with these forms of payment will be issued as net 30 after the date of invoice. Payment terms associated with settlement by check will be net 30 days. Cash discounts for prompt payment may be offered but they will not be considered in determination of award unless specifically stated in the Detailed Specifications and Special Conditions. The University may withhold payment or make such deductions as may be necessary to protect the University from loss or damage on account of defective work, claims, damages, or to pay for repair or correction of equipment or supplies furnished hereunder. Payment may not be made until satisfactory delivery and acceptance by the University and receipt of correct invoice have occurred.

   For consulting services and/or contract labor services performed for MU Health Care, the hourly rate and the number of hours worked must be included in the agreement and/or on the invoice submitted. Payment may not occur unless this information has been provided.

   The University encourages suppliers to opt into its Single-Use Account (SUA) credit card program for payment of invoices. The SUA is an electronic, credit card-based payment solution that acts like a check. It provides a single 16-digit virtual account number for each payment. Similar to a check, the credit limit on each SUA is set to the specific payment amount. Payment terms for Suppliers who participate in the SUA program are Net 0 as opposed to the standard Net 30 terms.

10. Accounting Practices: The Contractor shall maintain, during the term of the contract, all books of account, reports, and records in accordance with generally accepted accounting practices and standard for records directly related to this contract. The Contractor agrees to make available to the University, during normal business hours, all book of account, reports and records relating to this contract for the duration of the contract and retain them for a minimum period of one (1) year beyond the last day of the contract term.

11. Debarment and Suspension Certification: The Contractor certifies to the best of its knowledge and belief that it and its principals are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency in accordance with Executive Order 12549 (2/18/86).

12. Cooperative Purchasing: The intended coverage of this RFP, and any Agreement resulting from this solicitation, shall be for the use by all faculty, staff, students, departments, locations, and affiliates of the University of Missouri, including MU Health Care.

    The University of Missouri System seeks to make the terms and prices of this contract available to other higher education institutions and public entities in the State of Missouri. Extension of the terms and prices to any or all other Missouri higher education institutions and public entities is at the discretion of respondents and shall not be considered in the award of this contract. The contractor shall further understand and agree that participation by other higher education institutions and public entities is discretionary on the part of these institutions, and the University of Missouri System bears no financial responsibility for any payments due the contractor by such entities, nor will the University be responsible for contract administration for other institutions.

UNIVERSITY OF MISSOURI
DETAILED SPECIFICATIONS AND SPECIAL CONDITIONS

I. OBJECTIVE

The Curators of the University of Missouri, a public organization, propose to contract on behalf of University of Missouri-Columbia (hereinafter referred to as "University") with an organization (hereinafter referred to as "Supplier"), to provide Steam Turbine Generator 10 and Auxiliaries as described herein.

II. BACKGROUND UNIVERSITY INFORMATION

The University of Missouri has provided teaching, research and service to Missouri since 1839. It was the first publicly supported institution of higher education established in the Louisiana Purchase territory. Today, the University of Missouri is one of the nation's largest higher education institutions with more than 73,000 students, 24,000 faculty and staff on four campuses, an extension program withactivities in every county of the state, comprehensive distance learning services and an extensive health care network.

III. BACKGROUND POWER PLANT & PROJECT INFORMATION

The existing power plant provides electric power and heating steam to the Columbia Campus. This is achieved with multiple boilers and generator sets within the plant, which are operated in varying combinations to meet the University's heat and power demands. The new Steam Turbine will receive driving steam from the existing 900 psi system, and exhaust steam to the 60 psi campus heating steam system. The varying types of boilers that feed the 900 psi steam system results in a range of steam conditions. The design of the existing campus heating steam system requires exhaust steam conditions within a set range. The new Steam Turbine must be capable of operating given the variable inlet steam conditions from the 900 psi system while maintaining exhaust steam conditions within the requirements of the campus heating steam system.

IV. CONTRACT PERIOD

The contract period shall be from the date of award through completion of the warranty period.

The Curators of the University of Missouri is a public corporation and, as such, cannot create an indebtedness in any one year (the fiscal year beginning July 1 to June 30) above what they can pay out of the annual income of said year as set forth in Section 172.250 RS MO. Therefore, if the University determines it has not received adequate appropriations, budget allocations or income to enable it to meet the terms of this contract, the University reserves the right to cancel this contract with thirty (30)days' notice.

V. SCOPE OF PROPOSAL INCLUDES

A. Design, furnish, and deliver one (1) steam turbine generator package. Package shall include:

1. Base mounted backpressure steam turbine.
2. Synchronous 13,800-volt, 1800 RPM electric generator with brushless exciter and PMG.
3. Lubrication/control oil system for the turbine, generator, and gear box units. Oil system should be mounted on separate skid base to be installed in the basement of the Power Plant, just below

the steam turbine. An oil system integral to the STG base may be provided if a remote system cannot fit within the available space in the basement, provided it fits within the available space on the turbine deck as described in Part 1 below.

4. Common steel base for mounting of the turbine and gear box. Generator may be mounted on a separate skid.

5. Neutral grounding reactor to be installed outdoors by installation Contractor.

6. Turbine Generator Control Panel - Provide a control panel with a programmable logic controller (PLC), Electronic Governor, HMI, Vibration Monitoring Rack (if supplied), Analog Rotary Sync-scope, Sync Check Relay, and all other necessary components for complete monitoring, control, and operation of the turbine generator package.

    i. Unless specified otherwise, Protective relays will be furnished and installed remotely by the installing Contractor. Steam turbine generator supplier shall provide protective relay settings.

B. Manufacturers' Field Services

C. Spare Parts

D. Factory Test

E. Operator Training

F. Warranty

G. References
1. American Gear Manufacturers Association (AGMA)
2. American National Standards Institute (ANSI)
3. American Petroleum Institute (API)
4. American Society of Mechanical Engineers (ASME)
5. American Society for Testing and Materials (ASTM)
6. Expansion Joint Manufacturers Association (EJMA)
7. Heat Exchange Institute (HEI)
8. National Electrical Manufacturers Associations (NEMA)
9. Tubular Exchanger Manufacturers Association (TEMA)
10. International Electrotechnical Commission (IEC)

VI. TECHNICAL SPECIFICATIONS:

PART 1 – GENERAL

A. EQUIPMENT PROCUREMENT

1. The purpose of this solicitation is to obtain competitive bidding for the best value for The University of Missouri - Columbia, (MU) in association with procuring a nominal 7-9 MW steam turbine generator package complete with all ancillary equipment and components. The basis of award will be the best value of the complete project within budgetary and schedule

constraints.

2. The steam turbine generator package consists of a backpressure steam turbine, Totally Enclosed Water Air-Cooled (TEWAC) generator, lube/control oil system, gland steam system (if required), control system, any special tools, auxiliaries, and accessories as required. The steam turbine generator package will be installed by others inside the existing Power Plant located in Columbia, Missouri. The steam turbine generator will be directly purchased by MU.

3. Sheets A-005 and A-006 in Exhibit A are included in this package demonstrating the location in the MU Power Plant for the steam turbine installation. Note that the existing steam turbine and associated equipment will be removed by others. This new steam turbine will be installed in the same general area, by others, utilizing the existing foundation to the greatest extend possible. Exhibit sheet A-007 includes details of the existing turbine foundation to be utilized.

    a. Major dimensions for all indoor equipment shall allow the equipment to enter the building through a temporary opening at the existing building door location. The existing door will be removed back to the frame by others for entrance of the major equipment. The existing door frame is approximately 11'-9" high, and 8'-0" wide. The width of this opening may be further expanded to a maximum width of 12'-0" if required to install major equipment. Removal and reinstallation of the doorway will be by others.

    b. All equipment to be located in the basement shall also be capable of entering the basement through existing floor hatches or through the openings in the turbine foundation once the existing turbine has been removed. The largest floor hatch is 9-feet x 5-feet. The largest opening in the turbine foundation is 10-feet x 6-feet. See Exhibit sheet A-006 for further clarification. The equipment shall be capable of being lowered through the floor, by others, to the basement.

    c. The existing turbine hall has an existing 10-Ton overhead crane with a maximum hook height of 16-feet. The service area of the crane is indicated on Exhibit A-006. It is intended that the existing crane will be utilized to service the new equipment. Bidders shall provide heaviest required lift for major and minor service. All equipment service activities requiring a crane must be possible with the existing crane, considering both its capacity limit and service area.

    d. Steam turbine, gear box, and generator base mounting shall be supported by the existing turbine foundation in the existing turbine hall. Base mounting shall fit within the 27'-9" x 11'-6" new STG equipment area as shown on exhibit A-006. Foundation modification design if necessary is by others.

    e. All equipment sound enclosures or coverings shall fit within the turbine hall without interfering with existing equipment, access areas, or structures. In addition, all pull spaces and access/maintenance areas required around the new equipment shall not be obstructed by the existing building envelope or other existing equipment or structures.

4. The equipment and ancillary devices will be received at the MU Power Plant, 314 Elm Street, Columbia MO 65211. The unit will be received by the installing Contractor and the Owner's representative. The installing Contractor will be the successful bidder of the cogeneration system design package and will be assigned the selected steam turbine and auxiliaries at that time. The manufacturer's representative shall be at the site during all equipment deliveries and

assist in the supervision of the equipment off-loading, rigging, and storage. The manufacturer shall provide all interconnecting piping and devices between the manufacturer's skidded equipment. See Exhibits for Owner interface points. See PART 3 EXECUTION for manufacturer's responsibilities during delivery, field services, training, and spare parts.

   a. Wiring between equipment not located on the same skid shall be supplied and installed by others.

5. The steam turbine generator will be operated as a cogeneration unit. The generator will operate isochronously or in parallel with the utility and existing steam and combustion turbine generators. Nominal operating generator voltage is 13,800 volts, 60Hz, AC.

6. An allowance shall be included for attendance by two of the Owner's representatives to witness the factory testing and inspection of the turbine and generator. We understand that these may be tested at two different sites.

7. A performance test will be conducted in general accordance with ASME PTC 6 after complete installation.

8. Proposal information: Furnish complete detailed information with proposal describing equipment including:

   a. Firm, net price with itemized pricing as specified above.

   b. Delivery time of all materials, including shop drawing for approval in number of weeks from date of contract award. Shop drawings shall be adequate for final design of structural, electrical, and mechanical systems to support the operation of the steam turbine generator.

   c. Delivery time of equipment, in number of weeks from date of submittal approval, including manufacturer's handling of drawings.

   d. Equipment size, general description, type and number of turbine stages, configuration, total weight and weight of individual components. Shipping, operating and flooded weights shall be provided. Maximum lift weight for equipment service, including major and minor overhauls shall be included.

   e. Preliminary sketches showing arrangement and overall dimensions of equipment, operating and flooded weights shall be provided.

   f. Power generation curves for steam flow from minimum throttle to 100%

   g. System schematics showing mechanical and electrical components and auxiliaries (P&IDs and electrical 1-line).

   h. Equipment cooling water requirements.

   i. Exhaust steam temperature before and after attemperator, if required.

   j. Equipment data sheets, including electrical characteristics of all equipment, and expected generator sub-transient reactance rating.

k. Recommended maintenance schedules showing major and minor overhaul intervals, durations, and descriptions.

l. Return copy of Desirable Criteria section with all fill-in information completed.

m. Earliest date of delivery from notice to proceed in weeks

n. A complete list of any exceptions to the specifications

o. All proposal documents are to be submitted in English units. If any documents are native to metric, English must also be provided.

B. SUBMITTALS

1. Shop Drawings: Shop drawings shall be submitted within eight (8) weeks of a mutually acceptable purchase order between the supplier and the Owner. The drawings shall include the following:

a. P&ID's of steam, lubrication oil, and cooling water systems.

b. Customer piping connections list: At a minimum, the list shall include the size, schedule, type, and material of each connection, and provide the process requirements, and design data at each connection point (e.g. minimum, normal, and maximum values for pressure, flow, temperature, etc.)

c. Insulation cover map: This map shall provide location and details for all removable insulation covers (thermal and acoustic) for use during removal and reinstallation of insulation covers.

d. Forces, weights, and moments for foundation design.

e. Dimensioned skid and equipment drawings with mounting details.

f. Electrical one-line diagram: diagram shall show generator and all electrical equipment provided including voltage regulators, exciter, instrument transformers, metering, and protective relaying.

g. Three-line diagrams: diagrams shall include all components shown in the above mentioned one-line diagram as well as terminal block connections for equipment provided by others such as protective relaying.

h. Wiring Diagrams: Detailed wiring for power and control connections. Differentiate between factory-installed and field-installed wiring.

i. Instrument List.

j. Instrument Datasheets.

k. I/O List.

l. Datalink I/O List(s).

m. Control schematics.

n. Conduit block diagram.

o. Cable and raceway schedule.

p. Allowable moments and forces for all piping connections.

q. Generator reactive capability curve, steady state, transient, and sub-transient reactances and negative sequence capability.

r. Thermal damage curve for generator.

s. Protective relay data sheets. Supplier shall provide protective relay settings. After installation Contractor has installed relays and input settings, supplier shall verify that settings have been input correctly and approve prior to start-up.

t. Human Machine Interface (HMI) graphics.

u. Electrical insulation ratings and materials for generator and exciter windings.

v. Provide electrical rotation and phasing.

w. Voltage regulator datasheets and instruction books.

x. Datasheets for current transformers.

y. IRIS PD bus coupler datasheets.

z. Flux probe datasheets.

i. PLC and Governor datasheets.

2. Operating Manuals: Five (5) hard copy sets and one (1) electronic set of Operating Manuals shall be submitted within four (4) weeks of equipment delivery. Each manual shall include:

a. General information.

b. Spare Parts List.

c. Operating Instructions.

d. Maintenance Requirements.

e. As Fabricated Drawings.

f. Equipment Arrangement Drawings.

g. P&IDs.

h. Instrument datasheets.

i. Control Valve Datasheets.

j. Field Wiring Diagrams.

k. Product Data for all major components.

l. Warranty Information.

3. Datasheets:

    a. Neutral Grounding Reactor

    b. MV Capacitors if applicable

    c. MV Arrestors if applicable

    d. Protective Relays

    e. Lockout Relays

    f. Synchronizer

C. PREPARATION FOR SHIPMENT

1. All piping connections and other openings in the equipment package shall be tightly capped and covered to prevent entrance of foreign material during shipping.

2. Equipment shall be properly covered, skidded and crated to facilitate handling and to withstand normal shipping and handling shocks and vibration.

3. All components shall be delivered FOB Jobsite on site without damage and in new condition. Supplier shall provide insurance up to delivery.

    a. Delivery shall be by truck to the jobsite, and shall be coordinated with the Owner and unloading Contractor.

4. If any equipment is stored prior to, or during shipment, all manufacturers are to protect from condensation, rain, rust, by appropriate means, including heaters and/or nitrogen, or other standard practice.

D. QUALITY ASSURANCE

1. The bidder shall have engineered, designed, tested, packaged and supplied, in the last five (5) years, at least three (3) steam turbine generator packages from the proposed manufacturing plant, which are similar in terms of steam turbine generator rating. Acceptable turbine suppliers include Siemens, Howden, TGM, & Elliott.

2. Comply with all applicable government regulations including the state of Missouri and all local regulations and codes.

3. The turbine generator set shall be manufactured in accordance with NEMA SM 23 for steam turbines and NEMA SM 24 for land-based turbine generators.

E. WARRANTY

1. General Warranty: Warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Supplier under requirements of the Contract Documents

2. Written Warranty: Executed by Supplier agreeing that the equipment will maintain the specified capacity and to repair or replace steam turbine generator and auxiliary components that fail in materials or workmanship within the specified warranty period.

3. Warranty Period: 12 months after acceptance of field performance test or 24 months after shipment, whichever comes last. Warranty shall include a 12-hour response time.

    a. Provide an optional cost to extend the warranty period to 24 months after acceptance of field performance test.

PART 2 – PRODUCTS

A. GENERAL INFORMATION

Turbine Operating Conditions		Design	Range
1.	Throttle Steam Pressure, psig	900	850-915
2.	Throttle Steam Temperature, F	750	750-875
3.	Throttle Steam Flow, pph	150,000	30,000-150,000
4.	Exhaust Pressure, psig	65	60-70
5.	Minimum Exhaust Temperature, F	By vendor	350 (Note 2)
6.	Maximum Exhaust Temperature, F	By vendor	450 (Note 3)

Notes:

1) The turbine must be capable of operating 100% of the time at any combination of operating conditions within the ranges listed.
2) Minimum turbine exhaust temperature allowed under any combination of operating conditions within the ranges listed (e.g. 150kpph throttle steam at 750°F).
3) Maximum turbine exhaust temperature allowed under any combination of operating conditions within the ranges listed (e.g. 30kpph throttle steam at 875°F). Steam attemperation shall be supplied if required to maintain exhaust temperature below listed value.

Expected Operating Hours		
1.	Steam Flow	Annual Hours
	0 pph (offline)	760
	100,000 pph	1,000
	130,000 pph	4,000
	140,000 pph	2,000
	150,000 pph	1,000

Utilities		
1.	Cooling Water	
	Quality	Cooling tower
	Cold Water Temperature, F	85
	Nominal Pressure, psig	25
2.	Instrument Air	
	Pressure, psig	80
3.	Auxiliary 60 psi Steam	
	Pressure, psig	60
	Temperature, F	400
4.	Condensate	
	Quality	Return Campus Condensate
	Pressure, psig	50
	Temperature, F	150
5.	Steam Attemperation Water	
	Quality	Return Campus Condensate
	Pressure, psig	150
	Temperature, F	150
6.	Electrical	
	House Power Voltage, VAC	480
	AC Control Voltage, VAC	120/208
	DC Control Voltage, VDC	125

Sound Requirements
1. Sound rating from turbine generator equipment shall be a maximum of 85 dBA at 3 feet

Generator		
1.	Type	Horizontal Synchronous
2.	Voltage, Volts	13,800
3.	Phase/Frequency	3/60 Hz
4.	Power Factor	0.85
5.	Insulation Class	

	a. Stator	F
	b. Rotor	H
6.	Enclosure Type	TEWAC
7.	Insulation Temperature Rise at Full Load	80°C over 40°C Ambient
8.	Duty	Continuous
9.	Efficiency @ Full Load, %	95.9 minimum

B. TURBINE

1. Turbine shall be constructed per NEMA SM-24.
    a. Oil operated combined trip and throttle valve with solenoid operated trip mechanism.
    b. Trip valve spring support.
    c. Multi-valve inlet with Electro-hydraulic actuator controlled by governor.
    d. Woodward, or approved equal, electronic governing system including a digital governor with hydraulic actuator with three speed pick-ups (two operating and one spare).
    e. Electronic over-speed protection with necessary associated independent speed pickups.
    f. Motor driven turning gear, if required.
2. Turbine shall be manufacturer's standard design with the following features:
    a. Stainless steel nozzles and blading.
    b. Stainless steel diaphragm vanes.
    c. Tilt pad type radial bearings.
    d. Kingsbury type tilt pad thrust bearing.
    e. Labyrinth ring seals.
    f. Full flow ASME Section 8 steam relief valve to protect turbine exhaust. Valve will be mounted in the turbine exhaust pipe. Minimum set pressure shall be 100 psig.
    g. Turbine casing shall be designed for continuous duty at the rated conditions. Horizontally split casing shall permit inspection of the rotating unit without disturbing steam seals.
    h. Rotating unit shall be statically and dynamically balanced and tested to 20% above trip speed. Dynamic rotor balance according to NEMA SM 23 edition. The turbine shaft shall be sized such that the first critical speed is a minimum of 10% higher than the trip speed.
    i. Turbine shall be hydrostatically tested in accordance with paragraph 8.3.2 of API 611 in

the factory prior to shipment. Manufacturer standard testing may be considered upon request. Testing procedures must be provided with bid for consideration.

j. A factory running test shall be performed in accordance with paragraph 8.3.3 of API 611. The Owner shall be given three weeks' notice (minimum) to witness the test. Manufacturer standard testing may be considered upon request. Testing procedures must be provided with bid for consideration.

k. Provide all required thermal and acoustic insulation systems. Insulation system shall be designed for easy removal for maintenance. It is anticipated the gear box will be enclosed in a soundproof enclosure.

    i. Include insulation blanket map for removal and reinstallation of covers.

l. Provide accommodations and all required components on the turbine skid to allow the main steam piping to be steam blown through the turbine inlet valve for pre- startup pipe cleaning.

m. Lube oil and control oil pipe shall be stainless steel.

n. Pipe, flanges and valves shall be per standards customarily used in the United States.

3. Turbine Instrumentation:

    a. Vibration monitoring system.

        i. System shall include either a vibration monitoring rack or transmitters monitored by the PLC.

        ii. Provide a complete system including probes, transmitter, cables and junction boxes. If a separate vibration monitoring rack is furnished, vibration data shall be provided to, and displayed by, the PLC. Included the following probes:

            1. X, Y probes at each joined bearing on turbine, gearbox and generator.

            2. Axial probes as required

            3. Key phasor probes as required

        iii. Include PLC alarms for high vibration and trips for high-high vibration.

        iv. If a vibration monitoring rack is furnished, include a relay output card for hardwired trips.

    b. Dual RTD bearing temperature probes. One RTD will be wired. Include temperature probes on all journal bearings, active thrust bearing, and inactive thrust bearing.

    c. Throttle steam pressure and temperature transmitter.

    d. Exhaust steam pressure and temperature transmitter.

    e. Lube oil supply pressure and temperature transmitter.

    f. Turbine gland steam pressure transmitter.

g. Local thermometer and sight flow indicator in oil drain lines.

h. Refer to Exhibits A-001 through A-004 for instrumentation furnished by others but wired to the Turbine Control System (TCS).

C. SYNCHRONOUS GENERATOR

1. Acceptable manufacturers

a. ABB

b. Siemens

c. WEG

d. IDEAL Electric Company

e. Kato Engineering

2. Mechanical power from the gear box will be converted into 13,800-volt AC electrical power through a synchronous generator with the following characteristics.

a. The generator shall be appropriately sized based on a throttle steam inlet flow of 150kpph. The selected generator size shall be such that the package output is not generator limited.

b. The generator will be a foot mounted brushless revolving field, with a direct connected permanent magnet generator (PMG) to power the voltage regulators and exciter field.

c. The stator winding will be vacuum pressure impregnated insulated copper form-wound coils with six leads. Six (6) RTDs (two (2) per phase) shall be provided for the stator coils. Each bearing shall have dual RTDs (one (1) RTD will be wired). All RTDs shall be 100-ohm platinum. Provide Bearing Vibration Probes.

d. Generator line and neutral terminations shall utilize removable isolation links.

3. Generator exciter - regulator system shall provide the following:

a. Voltage Regulator: The generator shall be provided with dual solid-state voltage regulators, separate from the exciter. Dual voltage regulators shall implement automatic bumpless transfer. Regulators shall be Basler model Decs-250. Regulator shall be configured for safe manual adjustment of the generator voltage output without special tools, during operation, from 90 to 110 percent of the rated voltage. Regulation drift shall not exceed plus or minus 0.5 percent for an ambient temperature change of 20 degrees C.

b. Excitation uses no collector rings. Slip rings will be used for field ground protection. Provide brushes as required by SEL-2664 field ground module.

4. Generator Cooling

a. Type: Water to Air heat exchanger integral to the generator enclosure.

b. Capacity: Size to provide 110% of required cooling at maximum generator load.

c. Cooling water is defined in section Part 2, General Information, Page 16.

d. Water boxes and tube sheets shall be epoxy coated.

5. Generator Performance

a. Transient Frequency Performance: Less than 5 percent variation for a 50 percent step-load increase or decrease. Frequency recovers to remain within the steady-state operating band within five seconds.

b. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, the system will supply a minimum of 300 percent of rated full-load current for not less than ten (10) seconds and then clear the fault automatically, without damage to any generator system component.

c. Comply with NEMA MG 1 and specified performance requirements.

d. Regulator Bandwidth: Regulators shall have an operational bandwidth of plus or minus 0.5 percent of rated voltage.

e. Digital control and monitoring panel provides plus or minus 5 percent adjustment of output- voltage operating band.

f. Provide six (6) leads for differential protection.

g. Mechanical Rotor balance per NEMA standards.

h. Steady-state frequency operational bandwidth: 0.5 percent of rated frequency from no load to full load.

i. Steady-state frequency stability: When the system is operating at any constant load within rated load, there are no random speed variations outside the steady-state operational band and no hunting or surging of speed.

j. Output waveform: At no load, harmonic content measured line to line to neutral does not exceed 5 percent total and 3 percent for a single harmonic. The telephone influence factor, determined according to NEMA MG 1, shall not exceed 50.

6. Generator Monitoring

a. IRIS brand bus couplers must be included and shall be mounted on T1-T2-T3 terminals to monitor stator windings. An interface box shall be provided.

b. Include rotor flux probe in the generator air gap as made by GE or IRIS. Wire out probes to a terminal box for connection of temporary monitoring equipment (furnished by others). Permanent monitoring is not required. If this is not a standard offering, an option to add them must be included with the bid.

D. PRESSURIZED OIL SYSTEM

1. Combined lubrication and control oil system will be provided for the turbine and speed reduction gear box. All oil piping shall be stainless steel. The lubrication system shall contain as a minimum the following:

a. Carbon steel lubrication oil reservoir with site glass sized for a minimum three-minute capacity retention time at full flow rate. Reservoir to be coated per manufacturer standard coating system.

b. Reservoir shall include a connection for the Owner's portable oil purifier.

c. Oil Pumps:

    i. Shaft driven main oil pump

    ii. AC motor driven pump

        1. Motor shall be TEFC and conform to IEEE 841 standard for premium efficiency motors.

    iii. 125 VDC motor driven emergency backup/cool down pump

d. Two 100% shell and tube lube oil coolers with stainless steel tubes and epoxy coated tube sheets and water box. Provide transfer valve.

e. Duplex oil filters with transfer valve and replaceable filter elements. Filter element micron rating shall be as required to protect all equipment within the system, with a maximum rating of twenty-five (25) micron nominal.

f. Electric oil heater with thermostat in oil reservoir.

g. Oil temperature control shall utilize a thermostatic valve bypassing supply oil around oil cooler.

h. Instrumentation:

    i. Low oil pressure alarm switch

    ii. Low oil pressure trip switch

    iii. Auxiliary oil pump start switch

    iv. Dirty oil filter alarm switch

    v. Supply oil pressure transmitter

    vi. Oil supply temperature transmitter

    vii. Oil drain temperature transmitter

    viii. High oil supply temperature alarm switch

    ix. Oil tank level transmitter

    x. Local indicators for all transmitters.

    xi. All provided instrumentation shall be monitored by the TCS.

E. TURBINE GENERATOR MOUNTING BASE AND SKID ASSEMBLY

1. The turbine generator will be mounted to the existing turbine generator foundation that has a tabletop that is roughly 26’-9” x 11’-6”. A common steel base shall be provided for mounting the steam turbine and speed reduction gear. To the greatest extent possible the equipment shall be sized and located to fit within the existing foundation footprint.

2. The generator and steam turbine will be coupled to the gear box with a Rexnord flexible stainless steel disc spacer type coupling or approved equal, with a 1.5 service factor and a coupling guard. This coupling shall be dynamically balanced to a minimum of AGMA 10.

3. Skid piping shall include all piping necessary to collect cooling water piping, pressurized oil piping, condensate drains, and steam leak-offs to the edge of the base plate with flanges for field piping connections.

4. Skid wiring will include all conductors and conduit necessary to consolidate terminations for all skid instrumentation and control devices in a common terminal box.

F. SPEED REDUCTION GEAR

1. Speed reduction gear shall be designed and conform to all applicable AGMA standards.

2. The gear shall be parallel shaft, high precision case hardened and ground helical – toothed, and shall be enclosed in a dust and oil proof casing.

3. Design Criteria:

    a. Minimum AGMA service factor shall be 1.1

    b. Continuous operation from 0% to 100% Power

    c. Capable of withstanding 20% overspeed for 5 minutes

    d. Pinion damped critical speeds shall be above 120% of operating speeds under no load to full load condition

4. Bearings shall be provided with vibration probes and dual RTD temperature probes. One RTD will be wired.

5. Main oil pump shall be integral with the gear box.

6. Turning gear

    a. The speed reduction gear shall be supplied with electric turning gear with AC drive motor, clutch, coupling, and soft starter.

        i. AC drive motor shall be TEFC and conform to IEEE 841 standard for premium efficiency motors.

    b. Turning gear engagement:

        i. Engagement shall be automatic during spin down of the turbine.

        ii. Disengagement shall be automatic upon increasing turbine speed.

        iii. Means for manual engagement and disengagement by an operator shall also be

provided.

iv. Limit switches shall be provided to indicate engagement and disengagement within the TCS.

c. A handwheel shall be provided for manual turning.

G. STEAM ATTEMPERATION

1. Turbine exhaust steam shall be attemperated if necessary to maintain an exhaust temperature below the maximum allowed value specified in the Operating Conditions section. Equipment and piping components for attemperation shall be provided by the STG vendor for installation in the Owner's piping. These components shall include, at a minimum, the attemperator (desuperheater), spray water strainer fitted with manual blowdown valve, actuated spray water stop valve, actuated spray water control valve, and spray water flow meter.

2. Desuperheater

   a. Desuperheater shall be water spray injection type.

   b. End connections shall be raised face flanges for steam and spray water feed connections.

   c. Desuperheater nozzles shall be removeable & replaceable.

3. Spray Water Actuated Valves

   a. Actuated Valves shall be Fisher brand.

   b. Actuated valves shall be operated with compressed instrument air.

      i. Stop valve shall be pneumatic cylinder operated.

      ii. Temperature Control valve shall be air-diaphragm actuated.

   c. Actuated valves shall have manual override with handwheel.

   d. The temperature control valve may be integral to the attemperator, or an independent valve.

   e. Valves shall have raised face flange end connections.

   f. Valves shall be controlled by the turbine control system and wired to the turbine control panel.

4. Spray Water Strainer

   a. Strainer shall be Y-type.

   b. Strainer shall have raised face flange end connections.

   c. Strainer mesh shall be sized to protect against clogging of desuperheater flow paths and nozzles, and against entrance of solid particles into the steam system.

d. Strainer shall be fitted with a manual blowdown valve that can be blown down during operation. The valve shall be suitable for this service.

5. Spray Water Flow Meter

a. Flow Meter shall include flow element and differential pressure transmitter.

b. Flow element shall be orifice type. Orifice shall be designed for installation between orifice flanges provided by others.

c. Transmitter shall be remote-mount type with local readout display.

d. Transmitter shall be provided factory assembled to 5-valve process manifold with a bracket for 2" pipe mounting.

e. Flowmeter shall be wired to the turbine control panel and utilized for control of steam attemperation.

H. TURBINE GENERATOR CONTROL SYSTEM

1. The TCS shall be an integrated control system that incorporates alarms, turbine governing, lube/control oil system control and monitoring, bearing vibration and temperature monitoring, synchronizing, and generator excitation into a single control system. Data from all the primary devices for the generator, and turbine shall be collected at the steam turbine package PLC, and all PLC I/O made available to Wonderware over Ethernet. Data logging of alarms and trends shall be programmable and stored in the control system for a minimum of six (6) hours.

a. The Owner will provide 125VDC, 120VAC, and 120VAC UPS power as required.

b. The TCS will be located in an area with an ambient air temperature of up to 120 °F. Provide cooling as required for the TCS components.

2. Functional description of the TCS is as follows:

a. Provide automatic start-up with manual overrides.

i. Automatic controlled start with manual override for hot and cold starts.

ii. Critical speed avoidance - 2 speed bands.

iii. Speed/frequency control.

iv. Valve limiter.

v. Peak speed indication for overspeed trip.

vi. Dual speed/load dynamics.

b. Auto Synchronizing.

i. Automatic synchronizing only.

ii. Basler BE1-25 sync check relay shall be mounted at local generator control cabinet to provide circuit breaker close permissive.

iii. Provide an analog sync scope for troubleshooting.

iv. Generator shall be capable of synchronizing with the utility grid as well as with the other generators in the plant.

v. Generator protection relays, to be furnished and installed in the Generator Breaker control compartment by installation Contractor.

c. Online control.

i. Flow control.

ii. Frequency control.

iii. Speed control.

iv. Power output control.

v. Soft unloading and controlled shut-down.

d. Lube and control oil pump control.

e. Generator excitation control system.

i. Excitation control shall be by dual Basler DECS-250 voltage regulators integrated into the control system.

f. Generator load control/limiting.

g. Turbine exhaust pressure control/limiting.

h. Generator protection

i. TCS shall include a lockout relay, referred to below as an 86M.

1. The 86M shall be an Electroswitch Series 24 with integral coil monitoring, LED display, and dry contacts for monitoring by the TCS.

ii. SEL-300G relays will be furnished and installed in the breaker cubicle by the installation Contractor.

1. Provide settings files for 300G relays. Desired functions and output actions shall be as shown in table below:

Element	**Action**	**Method**
51V Voltage Restrained Phase Overcurrent	Trip	52 Trip 86M Trip
24 Volts/Hertz	Trip	52 Trip 86M Trip
27 Phase Undervoltage	Trip	52 Trip 86M Trip
32	Trip	52 Trip

Reverse Power		86M Trip
40 Loss-of-Field	Trip	52 Trip 86M Trip
46 Negative Sequence Overcurrent	Trip	52 Trip 86M Trip
51N Neutral Time-Overcurrent	Trip	52 Trip 86M Trip
59 Overvoltage Alarm	Alarm	(Com Port)
59 Overvoltage Trip	Trip	52 Trip 86M Trip
60 Loss-of-Potential	Alarm	(Com Port)
64F1 Field Ground	Alarm	(Com Port)
64F2 Field Ground	Trip	52 Trip 86M Trip
78 Out of Step	Trip	52 Trip 86M Trip
81D1 Over-Frequency	Trip	52 Trip 86M Trip
81D2 Over- Frequency	Alarm	(Com Port)
81D3 Under-Frequency	Alarm	(Com Port)
81D4 Under-Frequency	Trip	52 Trip 86M Trip
87 Phase Current Differential	Trip	52 Trip 86E Trip
87N Neutral Current Differential	Trip	52 Trip 86E Trip
Inadvertent Energization	Trip	52 Trip 86E Trip
Breaker Failure	Trip	86B

iii. Note that 86B is an existing switchgear bus lockout relay, 86E is a lockout relay to be installed remotely by the installation Contractor, and 52 refers to the existing generator breaker.

1. SEL-300G Relays will be part number 0300G105425XX42XX.
2. Relays will be powered by an existing 125VDC supply.
3. SEL 2664 Field ground module shall be furnished and installed by the turbine supplier.
4. Fiber connection between SEL-2664 and SEL-300G relays will be installed by the installation Contractor.

5. Generator CT's

    a. One set of C200 CT's (T4-T5-T6) dedicated for relaying.

    b. One set of metering class CT's (T1-T2-T3).

    c. One CT for voltage regulators (T5).

    d. All CT's shall be wired out to 600V shorting type terminal blocks with screw terminals.

    e. All CT's shall be window type

    f. All CT's shall have a secondary current rating of 5A.

6. Generator temperature monitoring.

i. Include provisions for hardwired trips to the TCS from relays (where required).

j. Mechanical protection: Relay to trip turbine through solenoid operated trip mechanism, de-energize to trip, sequential trip.

    i. Overspeed trip (2 out of 3).

    ii. High bearing vibration.

    iii. High bearing temperature.

    iv. Gear box monitoring.

    v. Low lube oil pressure.

    vi. High lube oil temperature.

    vii. High exhaust pressure.

    viii. Emergency stop push buttons.

    ix. Online testing functionality required.

k. System monitoring data will be displayed on a Human Machine Interface (HMI) and sent to the plant control system via a communication link.

    i. Turbine, generator, and gear box journal and thrust bearing temperature monitoring.

    ii. X-Y turbine journal bearing vibration monitoring.

    iii. Axial displacement monitoring for turbine thrust bearings.

    iv. Oil system temperature and pressure monitoring.

    v. Steam system monitoring for inlet steam pressure, exhaust steam pressure, exhaust steam temperature and steam flow.

vi. Trip valve position (trip valve to have online testing function incorporated).

vii. Turbine trip or overspeed trip.

viii. Lube oil pressure alarms and lube oil trip and auxiliary lube oil pump start and status.

ix. Generator protection relay lock-out.

x. Generator circuit breaker position.

xi. Remote turbine trip.

xii. Auxiliary oil pump start.

xiii. Manual turbine trip.

xiv. Circuit breaker open (trip) or close.

xv. All mechanical protection functions noted in item j above.

xvi. Provisions to add additional custom alarms.

l. Alarm annunciation and management

i. Management and integration of alarms from other components.

ii. Transmission of alarms to the Owner's Wonderware system.

iii. Alarm logging.

m. An HMI E-stop will be added to the Wonderware HMI by others to be utilized by the TCS. The TCS shall also have provisions for connecting an external hardwired emergency stop pushbutton to be furnished and installed by others.

n. Security program for password protection.

3. The main control enclosure shall be welded steel with exterior phosphatized and baked enamel finish.

a. Panel shall be of welded steel construction in compliance with NEMA 12 with NEMA 1 installation restrictions due to door mounted components.

b. Lockable latching door.

4. The PLC shall be an Allen-Bradley Control Logix Series. PLC shall provide discrete I/O as required for the applications as well as 24 spare switch inputs, 12 spare switch outputs, 1 spare 16 channel analog input card, and one spare 16 channel analog output card. PLC shall be rated for an ambient environment of 32 degrees F to 140 degrees F. Redundant ethernet ports shall be provided. One port shall be for communication to the Wonderware system and one for communication to remote I/O.

a. All PLC and HMI programming shall be available to the Owner for monitoring, troubleshooting, and repair after system turnover.

b. The Wonderware connection shall have read and write capability.

5. An Allen-Bradley Human Machine Interface (HMI) shall be provided for access to the PLC data system. Touch screen shall have 12-inch color display, at a minimum. Screens are customized for each installation but shall include the following as a minimum:

    a. Directory screen and other screens required for HMI navigation.

    b. System overview screens showing system status, control mode, and summary of operating parameters.

    c. Start-up screen and showing real time trending of turbine speed, set point and actuator signal.

    d. Shutdown screen.

    e. Overview graphic showing temperature and shaft vibration level for each bearing.

    f. Screens displaying detailed information from principal control components.

    g. Last trip screen showing all temperature, pressure, vibration and operating parameters at the moment of last trip.

    h. Screens for set-points for control and monitoring parameters.

    i. First out indication (shut down).

    j. Information from the power monitor, including all data displayed locally at the monitor.

6. Provide the following door mounted devices:

    a. Emergency stop push button.

    b. Lube oil Hand/Off/Automatic switch.

    c. Circuit breaker position lights.

    d. Generator excitation control.

7. Turbine manufacturer shall provide a Woodward electronic governor, or approved equal, to operate in conjunction with the TCS PLC.

8. Turbine manufacturer shall provide a Woodward SPM or approved equal auto synchronizer with the following features:

    a. Fully automatic synchronizing.

    b. Synchronizing is supervised by the Basler BE1-25 sync check relay.

    c. Soft loading.

9. An SEL-735 multi-function power monitor will be provided by others and configures for communication with an existing Switchgear PLC. The TCS PLC shall communicate with the Switchgear PLC to retrieve and display the following information:

a. Voltage per phase and average voltage.

b. Current per phase and average.

c. Power.

d. kWh.

e. KVA.

f. Frequency.

g. Power Factor.

I. NEUTRAL GROUNDING REACTOR

1. Provide a neutral grounding reactor sized and rated to match the generator provided.

    a. The neutral grounding reactor shall be supplied with a NEMA 3R louvered, fiberglass enclosure with stainless steel hardware suitable for outdoor installation.

    b. The neutral grounding reactor winding shall utilize VPI suitable for outdoors and shall be provided with interconnection terminals and cable connections.

J. EXTERNAL INPUTS/OUTPUTS

1. The steam turbine generator package shall incorporate external inputs and outputs including, but not limited to, those listed in the following table:

Inputs to TCS			
Device	**Description**	**Function**	**Type**
86E	Electric Lockout Relay	Turbine Trip	Dry Contact
		Voltage Regulator Trip	Dry Contact
		86M Trip	Dry Contact
86B	Bus Lockout Relay	86M Trip	Dry Contact
86B	Bus Lockout Relay	Turbine Trip	Dry Contact
Bus PT	Bus Potentials 14,400:120 Wye connected	VR voltage matching and synchronizing control	115v L-L, 3-Phase
Generator PT	Generator Potentials 14,400:120 Wye connected	VR voltage matching, synchronizing control, turbine control, Excitation control	115v L-L, 3-Phase
SEL-300G (PRI)	Protective Relay (Primary)	86M Trip	Dry Contact
SEL-300G (BACK)	Protective Relay (Backup)	86M Trip	Dry Contact
52a	Gen Breaker Closed Status	Turbine and Generator control	Dry Contact
52b	Gen Breaker Open Status	Turbine and Generator control	Dry Contact
E-Stop	Remote E-Stop	Turbine Trip	Dry Contact

Various	Instrumentation in Exhibits A-001 through A-004	Various	4-20mA Analog
SWGR PLC	Real Power from Power Monitor	Metering	Datalink to Switchgear PLC
SWGR PLC	Reactive Power from Power Monitor	Metering	
SWGR PLC	Power Factor from Power Monitor	Metering	
SWGR PLC	Phase Amperes (A, B, C) from Power Monitor	Metering	
SWGR PLC	MWh Usage from Power Monitor	Metering	
SWGR PLC	All relay trips	Alarm/Feedback	
SWGR PLC	All relay alarms	Alarm/Feedback	

Outputs from TCS			
Device	**Description**	**Function**	**Format**
TCS	Breaker Close Command	CLOSE/25/86M	Dry Contact (Rated for 125VDC)

PART 3 - EXECUTION

A. MANUFACTURER RESPONSIBILITIES

1. The installation of the steam turbine generator shall be by a Contractor under separate contract. The manufacturer shall be responsible for performing all startup and testing and training functions contained herein. The manufacturer shall also provide information and assistance to the commissioning agent retained by the Owner. The manufacturer shall provide comprehensive check lists which must be completed by the installing Contractor prior to each scheduled site visit by the manufacturer's field representatives. See Part 3, paragraph C for scope of services.

B. DELIVERY, STORAGE, AND HANDLING

1. The manufacturer shall after 14-day advance notification deliver the steam turbine generator to the Job Site in new condition. An Owner's representative shall be present to document the new equipment condition upon delivery.

2. The Contractor (not equipment manufacturer) will provide materials and labor to offload, store and move the components to the job specific location. The Contractor shall be responsible for repair or replacement costs if the steam turbine generator package is damaged during offloading, storage or handling after delivery.

3. An authorized representative of the steam turbine generator package shall be on site during all equipment deliveries and assist in the supervision of the equipment receiving, inspection and rigging. This representative is responsible for verifying condition and component inventory.

The manufacturer shall allow for rigging and delivery to occur at off-hours and weekend rates.

4. An authorized representative of the steam turbine generator package shall be onsite during installation, start-up, testing, tuning, commissioning, training and performance demonstration as specified below.

5. The steam turbine generator package shall be stored in a weathertight manner that prevents damage to the equipment.

C. FIELD TESTS, START-UP SERVICE, AND MANUFACTURER'S COMMISSIONING

1. The manufacturer shall perform start-up and manufacturer's commissioning service. The following responsibilities are required for the steam turbine package. The installation Contractor will provide labor necessary to assist Manufacturer during start up. The startup and commissioning services for the steam turbine package shall be as follows:

    a. Inspection

        i. The manufacturer will inspect all the equipment at the project site as it is removed from the shipping means. Any and all damage/deficiencies will be recorded and reported to MU or an approved representative immediately. MU's representative will be present during all off-loading, rigging, and setting of the equipment into place. Assume minimum 2 days on site for inspection and delivery.

        ii. All manufacturers' pre-startup procedures shall be submitted to the Owner for review.

    b. Construction Phase

        i. Assume minimum of four construction site visits upon request by Owner. One inspection is prior to setting equipment, cold alignment and completion of piping and electrical feeds. One of these visits shall be to review completion of manufacturer's inspection check lists and verify satisfactory completion.

    c. Pre-Startup

        i. Upon completion of construction phase and approximately 1 to 4 weeks before anticipated commencement of commissioning, the manufacturer shall be onsite to assist. Assume this effort to be a minimum of 80 hours, five 8-hour days for each of two representatives.

        ii. The manufacturer will observe and provide direction for all pre-startup activities associated with the equipment provided. Provide documentation of pre-startup activities, including recording measurements, performance data, test results, and other applicable information as appropriate. This includes but is not limited to the following:

        iii. Perform cold steam-pipe stress tests.

            1. Review interconnection of all field-installed piping, power and control wiring.

2. Setting, testing, tuning, and commissioning of voltage regulators.
3. Review and approve relay test results.
4. Observe cold alignment of skid components prior to final steam piping fit-up.
5. Provide technical support on any inter-package interface issues.
6. Provide technical support on any plant interface issues.
7. Inspect all field wiring including a point-to-point checkout.
8. Inspect all auxiliaries: drain lines, cooling water, auxiliary power, etc.
9. Supervise flush of lube/control oil system.
10. Review and approve protective relay test results

d. Startup

i. When steam and electrical interface are complete, and loads are available for full system operation the turbine manufacture shall conduct system start-up.

ii. The manufacturer will observe and provide direction for all startup activities associated with the equipment provided. This includes but is not limited to:

1. Hot steam pipe reaction checks.
2. Static testing of all controls, safety, and trip functions.
3. Preliminary functional testing.
4. Testing the drive train up to rated speed.
5. Close the breaker and produce electrical power.
6. Synchronize the generator.
7. Tune all PID loops and other miscellaneous controls.
8. Setting, testing, tuning and commissioning of voltage regulators.
9. Provide technical support on any plant interference issues, which includes some customization to meet plant dynamics.
10. Perform remaining functional tests.
11. The manufacturer will provide training over a period of three days to MU operations personnel. To accommodate off-shift training, training will be provided to three separate groups and each group will be scheduled to receive 8 hours of instruction.

iii. After equipment is installed and operable and any other equipment

necessary for its operation is installed. Supervise operation of equipment covered by contract for two 5-day weeks of eight-hour days to assure its proper functioning; make necessary observations, investigations, and adjustments. Changes or adjustments shall be summarized and provided to the Owner.

e. Post Commissioning

i. Upon request of the Owner the manufacturer shall conduct post commissioning. A minimum of 5 days shall be included.

1. Address any questions regarding operations of the system.
2. Examine trend log data for potential problems and issues.
3. Perform any fine adjustments to controls to meet plant dynamics.
4. Resolve any remaining follow-up/open issues.
5. Assist with Owner commissioning.

ii. The Manufacturer shall conduct tests based on steam flow rates to determine that equipment functions properly and meets performance guarantees. Contractor-installed calibrated instruments will be used for determining test readings.

iii. The Manufacturer shall prepare a written start-up and commissioning report that records the results of all testing and performance to turn over to the Owner's commissioning agent.

iv. If guaranteed performance is not indicated in tests, make necessary corrections, including replacement. After such corrections are completed, demonstrate that equipment functions properly, and that guaranteed performance is obtained.

D. TRAINING

1. In addition to training which occurs during Start-Up and Commissioning Services, the Manufacturer shall provide a factory-authorized service representative to train personnel to adjust, operate, and maintain the steam turbine generator system. Training shall consist of classroom and hands-on demonstration.

2. All training sessions shall be video recorded by the manufacturer and provided to the Owner in a format and delivery media as directed by the Owner.

3. Program shall include (3) 8-hour shifts of classroom and hands-on training and explanation of start-up, normal operation, maintenance procedures, overhaul, use of special tools, troubleshooting, and other topics addressed in on-site training sessions. It shall be Owner's decision which percentage is classroom time and which percentage is hands-on time. Allow for off-hour rates for half the training time to permit attendance by off-hour personnel.

4. The program will also include 24 hours of advanced classroom and hands-on training for

selected MU instrumentation technicians. The emphasis for this training is the governor system and advanced troubleshooting techniques.

5. Twelve (12) copies of training manuals and detailed drawings, schematics, and procedures manuals used during training sessions shall be provided.

6. All training materials shall also be submitted in searchable pdf format approximately four - weeks before pre-startup.

7. Provide the Owner with six weeks of notice prior to the scheduled training.

E. SPARE PARTS

1. The Manufacturer will supply one set of spare parts for the steam turbine generator system. These are to include all scheduled maintenance for the first year of operation (including commissioning and startup), as well as consumable spares.

2. Submit list with prices of recommended spare parts.

VII. INSURANCE REQUIREMENTS

A. Contractor agrees to maintain, on a primary basis and at its sole expense, at all times during the life of any resulting contract the following insurance coverages, limits, including endorsements described herein. The requirements contained herein, as well as the University's review or acceptance of insurance maintained by Contractor is not intended to and shall not in any manner limit or qualify the liabilities or obligations assumed by Contractor under any resulting contract. Coverage to be provided as follows by a carrier with A.M. Best minimum rating of A- VIII.

1. **Commercial General Liability** Contractor agrees to maintain Commercial General Liability at a limit of not less than $2,000,000 Each Occurrence, $5,000,000 Annual Aggregate. Coverage shall not contain any endorsement(s) excluding nor limiting Product/Completed Operations, Contractual Liability or Cross Liability.

   Contractor may satisfy the minimum liability limits required for Commercial General Liability or Business Auto Liability under an Umbrella or Excess Liability policy. There is no minimum per occurrence limit of liability under the Umbrella or Excess Liability; however, the Annual Aggregate limit shall not be less than the highest "Each Occurrence" limit for either Commercial General Liability or Business Auto Liability. Contractor agrees to endorse The Curators of the University of Missouri, its officers, employees and agents as Additional Insured on the Umbrella or Excess Liability, unless the Certificate of Insurance state the Umbrella or Excess Liability provides coverage on a "Follow-Form" basis.

2. **Business Auto Liability** Contractor agrees to maintain Business Automobile Liability at a limit not less than $2,000,000 Each Occurrence. Coverage shall include liability for Owned, Non-Owned & Hired automobiles. In the event Contractor does not own automobiles, Contractor agrees to maintain coverage for Hired & Non-Owned Auto Liability, which may be satisfied by way of endorsement to the Commercial General Liability policy or separate Business Auto Liability policy.

3. **Workers' Compensation & Employers Liability** Contractor agrees to maintain Workers' Compensation in accordance with Missouri State Statutes or provide evidence of monopolistic state coverage. Employers Liability with the following limits: $500,000 each accident, disease each employee and disease policy limit.

4. **Contract Language**
   The Curators of the University of Missouri, its officers, employees and agents are to be Additional Insured with respect to the project to which these insurance requirements pertain. A certificate of insurance evidencing all coverage required is to be provided at least 10 days prior to the inception date of the contract between the contractor and the University. Contractor/Party is required to maintain coverages as stated and required to notify the University of a Carrier Change or cancellation within 2 business days. The University reserves the right to request a copy of the policy. The University reserves the right to require higher limits on any contract provided notice of such requirement is stated in the request for proposals for such contract.

5. **Indemnification**
   The Contractor agrees to defend, indemnify, and save harmless The Curators of the University of Missouri, their Officers, Agents, Employees and Volunteers, from and against all loss or expense from any cause of action arising from the Contractor's operations. The contractor agrees to investigate, handle, respond to and provide defense for and defend against any such liability, claims, and demands at the sole expense of the Contractor or at the option of the University, agrees to pay to or reimburse the University for the Defense Costs incurred by the University in connection with any such liability claims, or demands.

   The parties hereto understand and agree that the University is relying on, and does not waive or intend to waive by any provision of this Contract, any monetary limitations or any other rights, immunities, and protections provided by the State of Missouri, as from time to time amended, or otherwise available to the University, or its officers, employees, agents or volunteers.

   Failure to maintain the required insurance in force may be cause for contract termination. In the event the Agency/Service fails to maintain and keep in force the required insurance or to obtain coverage from its subcontractors, the University shall have the right to cancel and terminate the contract without notice.

   The insurance required by the provisions of this article is required in the public interest and the University does not assume any liability for acts of the Agency/Service and/or their employees and/or their subcontractors in the performance of this contract.

VIII. INSTRUCTIONS FOR PROPOSAL RESPONSE

Responses should be enumerated in the same order and fashion of the Mandatory and Desirable Specifications outlined within. Respondents are required to fully respond with compliance statementsto each of the mandatory specifications. Respondents are required to fully respond with description of ability and how to meet the evaluation questions.

Respondents must be clear and concise in responses in order to be fully credited in the evaluation. Attach and reference any relevant documentation that would ensure the evaluating committee can determine if both Mandatory and Desirable specifications are met. If "no response" or insufficient response to substantiate compliance is provided, the University reserves the sole right to reject supplier's proposal from

further consideration. **Do not include responses that are superfluous or irrelevant to the specific question asked and do not include large graphics.** These are not valuable in the volume of information the various evaluating teams must review. **Proposals must be submitted in the number and manner as specified below:**

Volume I – Functional Section – Must be submitted in a separate electronic file titled **"RFP #21100 Steam Turbine - Functional Response**" PDF format and must contain in this order:

- Response to Information for Respondents and General Conditions;
- Mandatory Specifications and supplier responses, as outlined in Section X;
- Desirable Specifications and supplier responses, as outlined in Section XI; and
- If there is a supplier related contract that must be signed as part of doing business, it should also be included in this section.

Volume II – Financial Section – Must be submitted in a separate electronic file titled **"RFP #21100 Steam Turbine - Financial Response**" PDF format and must contain in this order:

- Request for Proposal Form with any supplemental pricing schedules, if applicable.
- Authorized Respondent Representation.
- Financial Summary including additional costs, if any, for Desirable Specification Compliance, functional or technical.
- Attachment A - Supplier Diversity Participation Form.
- Attachment B – Supplier Registration Information.

Respondent must complete and return the University Proposal Form with proposal response. Supplier quote sheets are not acceptable forms of bidding and could cause rejection of response. All proposals must be delivered electronically with the following in the subject line: **Request for Proposal #22100 for Steam Turbine Generator, and delivered via email to Teresa Vest at vestt@umsystem.edu**. Please allow sufficient time for electronic submission to pass through University of Missouri security protocols.

Note: Any Respondent's Request for Proposal that makes material modifications to the University'sTerms and Conditions may be found non-responsive, as solely determined by the University.

Confidentiality of Information:
All records received from a Supplier will be deemed public records and presumed to be open. If the supplier submits with the Request for Proposal any information claimed to be exempt under the Revised Statues of Missouri, Chapter 610, this information must be placed in a separate envelope andmarked with:

"This data shall not be disclosed outside the University or be duplicated, used, or disclosed in whole orin part for any purpose other than to evaluate the Request for Proposal; however, if a contract is awarded to this Supplier as a result of or in connection with the submission of such information, the University shall have the right to duplicate, use, or disclose this information to the extent provided in the contract. This restriction does not limit the University's right to use information contained herein ifit is obtained from another source."

IX. EVALUATION AND CRITERIA FOR AWARD OF PROPOSAL

Respondents must meet the mandatory/limiting criteria to be "qualified" for scoring. If requirements are not met, the respondents are disqualified from further evaluation/award. Qualified remaining respondents will be scored on their ability to meet scored desirable criteria, which includes qualitatively,how specifications are met. A team of individuals will evaluate and assign points to suppliers'responses to the

evaluation questions. At the sole option of the University, the functional/technical review team may decide to go on a site visit, at their expense, or request suppliers to perform a presentation/demonstration to confirm specifications are met as provided in responses. The University could elect to not award to a potential respondent if site visits/presentations revealed compliance inconsistency.

The University may request suppliers selected as finalists to come onsite to the University, at the supplier's expense, for presentations as part of the RFP selection.

Proposals will be awarded based upon the following functional and financial evaluation:

Performance – 5 pts (10%)
- Efficiency, Turndown, MWh Output, Auxiliary Power Requirements, Peak MW

Service and Parts – 15 pts (30%)
- Overhaul Costs, Duration, and Frequency (Major/Minor), Recommended Spare Parts List and Costs, Proximity of Nearest Service Center/Providers from 65211, Warranty and Service Agreement, Overhaul Complexity, Ease of Repair, Ease of Access

Unit Construction – 5 pts (10%)
- Fitment into available space and extent of required foundation modifications, Shipping Splits (size/weight), Major Component Weights, Ease of Installation, Differentiating Features of Key Components, Ease of Construction

Diversity Participation / Missouri Business
- Meet requirements of diversity participation – 2.5 pts (5%)
- Missouri Service-Disabled Veteran – 1.5 pts (3%)
- Missouri Based Business – 1 point (2%)

Financials – 20 pts (40%)

X. MANDATORY CRITERIA

Respondents MUST meet all mandatory requirements in this section in order to continue with a response to this RFP. Any Respondent that does not meet all the following requirements will be removed from further consideration. Respondents must provide a written, affirmative response to each of the criteria stated below and provide substantiating information to support your answer. The substantiating information for each answer shall be clearly broken out in the RFP response materials to support each criterion.

A. Provide timeline indicating delivery of all equipment to jobsite within 55 weeks after award.
    a. Confirm Yes _____ or No _____ and provide substantiating information to support your answer.

B. Equipment fitment within the available space in the existing Power Plant, as described in Section VI, Technical Specifications, and on the exhibits, is required. Provide sufficient dimensioned equipment drawings and arrangements to clearly demonstrate. Bidder shall place the proposed equipment on Exhibits A-005 and A-006, AutoCAD files provided. Equipment placement shall demonstrate adequate room for equipment, access, maintenance, and required pull spaces.
    a. Confirm Yes _____ or No _____ and provide substantiating information to support your answer.

C. Provide documentation of at least 5 years manufacturers' experience in the power generation industry for each piece of major equipment supplied.

a. Confirm Yes _____ or No _____ and provide substantiating information to support your answer.

D. Respondent must provide evidence that all equipment and materials have an acceptable history of satisfactory, reliable service for a period of at least 5 years at similar capacity, configuration, pressure, and temperature.
Confirm Yes _____ or No _____ and provide substantiating information to support your answer.

E. PLC provided for the new equipment shall be Allen Bradley as described in Section VI.
a. Confirm Yes _____ or No _____ and provide substantiating information to support your answer.

F. All equipment meets the sound requirements as described in Section VI. Sound attenuation coverings are provided if they are necessary to meet these requirements.
a. Confirm Yes _____ or No _____ and provide substantiating information to support your answer.

G. The bidder must guarantee the performance Turbine Generator to meet or exceed the operating data listed in the table below. The bidder shall fill in all blanks in the table with guaranteed values. Generator power output shall be guaranteed at the specified throttle flow when operating under the design conditions specified in Section VI, Part 2.A. The bidder must select a throttle flow rate between 100 kpph and 140 kpph for the second power output guarantee point.:
a. Confirm Yes _____ or No _____ and provide substantiating information to support your answer.

1.	Power Output	
	Steam Flow	Power Output
	150,000 pph	_____ kW
	_____ pph	_____ kW
2.	Auxiliary power requirements (Maximum):	_____ kW

XI. DESIRABLE CRITERIA

It is the Respondent's responsibility to supply sufficient and complete information for a full evaluationof all items in this section, including detailed explanations.

A. The Bidder shall submit the following expected performance data by filling in the blanks provided:

1.	Power Output @ design conditions in Section VI, Part 2. A			
	Steam Flow	Annual Hours	Power Output	Annual Energy
	100,000 pph	1,000	kW	kWh
	130,000 pph	4,000	kW	kWh
	140,000 pph	2,000	kW	kWh
	150,000 pph	1,000	kW	kWh

2.	Auxiliary power requirements:	kW
3.	Generator capability at rated pf (_____ pf)	kVA

4.	Output voltage	V
5.	Generator efficiency at rated load and power factor (_____ pf)	%
6.	Temperature rise of the following at full load	
	a. Generator stator winding	°C
	b. Generator rotor winding	°C
	c. Generator exciter stator winding	°C
	d. Generator exciter rotor winding	°C

7.	Turbine Exhaust Temperature @ design conditions in Section VI, Part 2. A	
	Exhaust Flow, pph	Exhaust Temperature (Upstream of Desuperheater)
	100,000	°F
	130,000	°F
	140,000	°F
	150,000	°F

8.	Performance @ 850°F Throttle Temperature & Design Pressure		
	Exhaust Flow, pph	Power Output	Exhaust Temperature (Upstream of Desuperheater)
	100,000	kW	°F
	130,000	kW	°F
	140,000	kW	°F
	150,000	kW	°F

9.	Steam Attemperation			
		Min Throttle	Max Throttle	Max Spray
	Steam Throttle Flow	30,000 pph	150,000 pph	pph
	Throttle Steam Temperature	875 °F	800 °F	°F
	Throttle Steam Pressure	915 psig	915 psig	psig
	Turbine Exit Steam Temperature	°F	°F	°F
	Attemperator Flow	pph	pph	pph
	Attemperator Exit Steam Temperature	°F	°F	°F
	Generator Power Output	kW	kW	kW

10.	Generator Efficiency at 0.85pf	
	Steam Flow, pph	Efficiency
	100,000	%
	130,000	%
	140,000	%
	150,000	%
11.	Generator capability with one cooler out of service	kVA

12.	Excitation system ceiling voltage (per unit of rated field voltage)	p.u.
13.	Excitation system voltage response time	V/sec
14.	Field Voltage	
	No load	V
	Peak capacity, 0.85 pf	V
15.	Field Current	
	Peak capacity, 0.85 pf	amps
16.	Impedance, capacitance, and percent reactance on the peak kVA base and at rated voltage of 13.8kV	
	Direct axis synchronous at rated current, X_d	
	Transient unsaturated at rated current, X'_{du}	
	Transient saturated, X_d	
	Subtransient (at rated voltage) X''_d	
	Zero sequence (at rated voltage) X_o	
	Negative sequence (at rated voltage) X_2	
	Synchronous impedance, Z_d	
	Three-phase capacitance to ground, mfd	

B. The Bidder shall provide a description of the equipment being quoted:

1.	Steam Turbine	
	Manufacturer and Model:	
	Type (Impulse/Reaction):	
	Speed:	rpm
	Number of Stages:	
	Gear box manufacturer:	
	Turning gear motor size:	
2.	Generator	
	a. Manufacturer and type	
	b. Rated voltage:	V
	c. Speed:	rpm
	d. Short circuit ratio:	
	e. Rated kVA and basis of rating:	
	f. Power factor:	
	g. Exciter Type:	

D. Bidder shall submit standard outline drawing of the turbine generator unit which shall show at least

the following information:

a. Weights of major components (including heaviest single lift required for placement and/or maintenance).

b. Dimensions (length, width, height) adequate for placement on the existing foundation and within the existing building, including turbine room hook height required for service and maintenance.

c. Number and size of Owner's connections.

d. Excitation switchgear dimensions, if applicable.

e. Neutral grounding reactor enclosure dimensions.

f. Generator terminal enclosure dimensions.

g. Clearance diagram for generator rotor removal, straight and skewed.

h. Clearance diagram for generator cooler removal.

i. Outline drawings of lube oil reservoir and pump skid.

E. Bidder shall submit the following miscellaneous data by completing the blanks provided:

1.	Turning gear data	
	a. Speed of turbine rotor:	rpm
	b. Motor size:	hp
2.	Cooling water flow expected	
	a. Lube oil coolers:	gpm
	b. Gland steam condenser:	gpm
	c. Generator cooler:	gpm
3.	Cooling water pressure drop expected	
	a. Lube oil coolers:	psid
	b. Gland steam condenser:	psid
	c. Generator cooler:	psid
4.	Tube diameter	
	a. Lube oil coolers:	in
	b. Gland steam condenser:	in
	c. Generator cooler:	in
5.	Gland Steam Flow	
	a. Maximum	pph
	b. Minimum	pph
6.	Lube oil system	

	a. AC oil pump:	
	i. Motor size:	hp
	ii. Flow rate:	gpm
	iii. Head:	ft
	b. DC oil pump	
	i. Motor size:	hp
	ii. Flow rate:	gpm
	iii. Head:	Ft
	c. Jacking oil pump	
	i. Motor size:	hp
	ii. Flow rate:	gpm
	iii. Head:	ft
	d. Lubricating oil circulation rate through coolers	gpm
	e. Total volume of lube oil required	Gal U.S.
7.	Equipment Service	
	a. Maximum lift for minor overhaul	lbs
	b. Maximum lift for major overhaul	lbs
	c. Maximum lift for any service	lbs
	d. Minimum required crane height	lbs
	e. Recommended Minor Overhaul Schedule	First @ __yrs, then every __ years
	f. Recommended Major Overhaul Schedule	First @ __yrs, then every __ years
	g. Minor Overhaul Duration	Work hrs
	h. Major Overhaul Duration	Work hrs
	i. Minor Overhaul Cost (Present day value)	$
	j. Major Overhaul Cost (Present day value)	$

REQUEST FOR PROPOSALS
FOR
FURNISHING AND DELIVERY
OF
STEAM TURBINE GENERATOR 10 AND AUXILIARIES
FOR
THE CURATORS OF THE UNIVERSITY OF MISSOURI
ON BEHALF OF
UNIVERSITY OF MISSOURI – COLUMBIA CAMPUS
RFP # 22100
DUE DATE: MARCH 25, 2022
TIME: 1:00 PM, CT

The undersigned proposes to furnish the following items and/or services in accordance with all requirements and specifications contained within this Request for Proposal issued by the University of Missouri.

The proposal price shall be FOB MU Power Plant, 314 Elm Street, Columbia, MO 65211.

Itemized price shall include separate line items for the following as specified herein:

Item Description	**Total Price**
Steam turbine generator package and equipment as outlined in Section VI, Technical Specifications, Part 2	
Recommended spare parts	
Field services as outlined in Section VI, Technical Specifications, Part 3, #C	
Training as outlined in Section VI, Technical Specifications, Part 3, #D	
Spare parts as outlined Section VI, Technical Specifications, Part 3, #E	
TOTAL COST	

In addition, provide the following alternate pricing:

Item Description	**Total Price**
Provide a per diem rate for additional on-site training by factory certified engineer beyond what is included in the base proposal. Include any travel cost as necessary.	
Provide a per diem rate for a factory certified service technician for additional service beyond what is included in the base proposal. Include any travel cost as necessary.	
Provide the cost and coverage of an optional 2-year warranty.	

AUTHORIZED RESPONDENT REPRESENTATION

Authorized Signature	Date
Printed Name	Title
Company Name	
Mailing Address	
City, State, Zip	
Phone No.	Federal Employer ID No.
Fax No.	E-Mail Address
Number of calendar days delivery after receipt of order: _____	Payment Terms: _____ Note: Net 30 is default. Early pay discounts encouraged.
Select Payment Method: SUA ACH Check	
Circle one: Individual Partnership Corporation	
If a corporation, incorporated under the laws of the State of_____	
Licensed to do business in the State of Missouri?_____yes _____no	
Maintain a regular place of business in the State of Missouri? _____yes_____no	

This signature sheet must be returned with your proposal.

ATTACHMENT A – SUPPLIER DIVERSITY PARTICIPATION FORM

The University of Missouri System is committed to and supports supplier diversity as an essential part of the University's mission and core values. The University's Supplier Diversity efforts reflect this mission.

Tier 2 Supplier Diversity Information - The University strongly encourages Supplier Diversity participation in all of its contracts for goods and services. Tier 2 Spend is spend reported by primary (non-diverse) suppliers of the University of Missouri who subcontract work to, or make purchases from a diverse supplier. Depending upon the contract, primary (non-diverse) suppliers will be asked to submit Tier 2 information with Women and Diverse Owned companies. Suppliers have two options in reporting Tier 2 dollars depending on the terms of the contract: Direct and Indirect. Awarded suppliers may be asked to utilize CVM Solutions for reporting Tier 2 spend.

- Direct dollars - those dollars directly spent with Women and Diverse Owned suppliers in the fulfillment of the contract.

- Indirect dollars - based on a percentage of revenue the University represents to the supplier. An example is as follows:
    - Supplier's Total Revenues: $10,000,000
    - Revenues from University $: $ 4,000,000
    - University % of Total Revenues: 40% (#2 divided by #1)
    - Total MBE Dollars $: $ 150,000
    - Total WBE Dollars $: $ 150,000
    - Total University Attributable MBE $: $ 60,000 (#3 multiplied by #4)
    - Total University Attributable WBE $: $ 60,000 (#3 multiplied by #5)
    - Total University Attributable MWBE $: $ 120,000 (Sum of #6 and #7)
    - University % Attributable Revenue: 3% (#8 divided by #2)

1. Does your company have a Supplier Diversity Program? If so, describe efforts your company has made to increase business with Women and Diverse Owned businesses (i.e. does your company have a policy statement, participate in outreach activities, promote diverse firm subcontracting, publicize contract opportunities, provide certification assistance, etc.?) Please provide examples (use additional pages if needed): _____

2. If you are a non-diverse owned company, what percentage of your company's total contracting and procurement spend for the prior year was with Women and Diverse Owned businesses? Are you able to provide this information specific to University of Missouri business? _____

3. If you are a non-diverse owned company, complete the following table indicating the percentage your company will subcontract with certified Women and Diverse Owned businesses should your company be the successful bidder. Note: If your company does not plan to use Women and Diverse Owned businesses to fulfill your contract obligations, please explain why not.

Supplier Name	% of Contract	Specify Direct or Indirect

If there are questions regarding supplier diversity at the University, contact Teresa Vest, vestt@umsystem.edu.

----------THIS FORM MUST BE SUBMITTED WITH THE RESPONSE----------

ATTACHMENT B - SUPPLIER REGISTRATION INFORMATION

Completion of this section is strongly encouraged. Please review and check ALL applicable boxes.

SMALL BUSINESS CONCERN: _____Yes _____No

The term "small business concern" shall mean a business as defined pursuant to Section 3 of the Small Business Act and relevant regulations issued pursuant thereto. Generally, this means a small business concern organized for profit, which is independently owned and operated, is not dominant in the field of operations in which it is bidding. We would consider any firm with 500 employees or less a "small business concern".

WOMAN OWNED BUSINESS (WBE): _____Yes _____No

A woman owned business is defined as an organization that is 51% owned, controlled and/or managed, by a woman. The determination of WBE status depends solely on ownership and operation and is not related to employment. The firm should be certified by a recognized agency (e.g., state, local, federal, etc.). Please see Public Law 106-554 for more detail.

MINORITY BUSINESS ENTERPRISE (MBE): _____Yes _____No

A minority business is defined as an organization that is 51% owned, controlled and/or managed by minority group members. The determination of minority status depends solely on ownership and operation and is not related to employment. The firm should be certified by a recognized agency (e.g., state, local, federal, etc.). Please see Public Law 95-507 for more detail. Place an X by the appropriate space below.

_____ Asian-Indian - A U.S. citizen whose origins are from India, Pakistan and Bangladesh

_____ Asian-Pacific - A U.S. citizen whose origins are from Japan, China, Indonesia, Malaysia, Taiwan, Korea, Vietnam, Laos, Cambodia, the Philippines, Thailand, Samoa, Guam, the U.S. Trust Territories of the Pacific or the Northern Marianas.

_____ Black - A U.S. citizen having origins in any of the Black racial groups of Africa.

_____ Hispanic - A U.S. citizen of true-born Hispanic heritage, from any of the Spanish-speaking areas Mexico, Central America, South America and the Caribbean Basin only

_____ Native American - A person who is an American Indian, Eskimo, Aleut or Native Hawaiian, and regarded as such by the community of which the person claims to be a part.

VETERAN BUSINESS ENTERPRISE _____Yes _____No

SERVICE-DISABLED VETERAN BUSINESS ENTERPRISE _____Yes _____No

A Veteran or Service-Disabled Veteran business is defined as an organization that is 51% owned, controlled and/or managed by Veterans. The firm should be certified by a recognized agency (e.g., state, local, federal, etc.). Please see Public Law 109-461 for more detail.

MISSOURI FIRM: _____Yes _____No

A Missouri Firm is defined as an organization which has and maintains within the State of Missouri a regular place of business for the transaction of their business.

SUPPLIER'S CERTIFICATION:

The undersigned hereby certifies that the foregoing information is a true and correct statement of the facts and agrees to abide by the laws of the State of Missouri and the rules and regulations of the University of Missouri System now in effect including any subsequent revisions thereof. Supplier acknowledges that it is his/her responsibility to keep the information current by notifying the University of Missouri of any changes.

_____ _____

Signature and Title of Person Authorized to Sign this Form Date

----------This page intentionally left blank. ----------