

PUBLIC VERSION

Final Report Title: Small Modular Reactor (SMR) Long-Term Development Plan: Siting Selection and Technology Study

Name of Grantee: Societatea Nationala Nuclearelectrica S.A.

Name of Contractor/ U.S. Firm: Sargent & Lundy, L.L.C.



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**Societatea Nationala Nuclearelectrica (SNN)
SMR Long-Term Development Plan:
Siting Selection and Technology Study**

SMR Siting Assessment Final Report

Report SL-016985

Revision 0

September 29, 2022

S&L Nuclear QA Program Applicable:

Yes

No

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ISSUE SUMMARY AND APPROVAL PAGES

This is to certify that this document has been prepared, reviewed, and approved in accordance with Sargent & Lundy's Standard Operating Procedure SOP-0405, which is based on ASQ/ANSI/ISO 9001:2015: Quality Management Systems–Requirements.

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EXECUTIVE SUMMARY

Sargent & Lundy, L.L.C. (Sargent & Lundy) was selected by the U.S. Trade and Development Agency (USTDA) and Societatea Nationala Nuclearelectrica (SNN) to provide technical assistance (TA) related to a proposed Small Modular Reactor (SMR) Project in Romania. A part of this effort, Sargent & Lundy evaluated and provided recommendations on sites and technologies that would be favorable for implementing a first SMR nuclear power plant in Romania. In addition, Sargent & Lundy provided recommendations for siting, technology selection, and licensing. An assessment of the impact on the Romanian economy based on projected project costs was also performed and a summary of United States (U.S.) firms that could provide goods and services to SNN to design, license, and construct an SMR was developed.

The following Tasks were completed in support of the scope of work discussed above:

- Task 1 – Kickoff Meeting and Information Gathering Report (Attachment 1)
- Task 2 – Site Survey Report (Attachment 2)
- Task 3 – Site Selection Report (Attachment 3)
- Task 4 – SMR Technology Assessment Report (Attachment 4)
- Task 5 – Site Licensing Roadmap Report (Attachment 5)
- Task 6 – Development Impact Assessment Report (Attachment 6)
- Task 7 – U.S. Sources of Supply Report (Attachment 7)

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LIST OF ATTACHMENTS

Attachment 1. SL-016286, Rev. 0: Task 1 – Kickoff Meeting and Information Gathering Report

Attachment 2. SL-016453, Rev. 1: Task 2 – Site Survey Report

Attachment 3. SL-016895, Rev. 1: Task 3 – Site Selection Report

Attachment 4. SL-016689, Rev. 0: Task 4 – SMR Technology Assessment Report

Attachment 5. SMR-4346221-ST/R-STS-05, Rev. 0: Task 5 – Site Licensing Roadmap Report

Attachment 6. SL-016662, Rev. 0: Task 6 – Development Impact Assessment Report

Attachment 7. SL-016716, Rev. 2: Task 7 – U.S. Sources of Supply Report

Task 8 – SMR Assessment Final Report

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition/Clarification
ac	Acre(s)
CNCAN	National Commission for Nuclear Activities Control – Comisia Națională pentru Controlul Activităților Nucleare
CITON	Center of Technology and Engineering for Nuclear Projects
GIS	Geographic Information System
ha	Hectare(s)
IAEA	International Atomic Energy Agency
km	Kilometer(s)
kW	Kilowatt(s)
LCOE	Levelized Cost of Electricity
MWe	Megawatts Electric
NDA	Non-Disclosure Agreement
NEI	Nuclear Energy Institute
PPE	Plant Parameter Envelope
RATEN	Technologies for Nuclear Energy State Owned Company
ROI	Region of Interest
RFI	Request for Information
Sargent & Lundy	Sargent & Lundy, L.L.C.
SME	Subject-Matter Expert
SMR	Small Modular Reactor
SNN	Societatea Nationala Nuclearelectrica
SSG-35	IAEA Safety Standard Series No. SSG-35 “Site Survey and Site Selection for Nuclear Installations,” July 2015

Acronym/Abbreviation	Definition/Clarification
TA	Technical Assistance
U.S.	United States
USTDA	U.S. Trade and Development Agency

1. INTRODUCTION

Sargent & Lundy, L.L.C. (Sargent & Lundy) was selected by the U.S. Trade and Development Agency (USTDA) and Societatea Nationala Nuclearelectrica (SNN) to provide technical assistance (TA) related to a proposed Small Modular Reactor (SMR) Project in Romania. Objectives of the TA include evaluating and providing recommendations on sites and technologies that would be favorable for developing the first SMR nuclear power plant in Romania. Sargent & Lundy's scope of work includes providing recommendations to SNN for siting, technology selection, and licensing.

This Task 8 – SMR Siting Assessment Final Report summarizes the results of the following tasks and includes the attached Task 1 through Task 7 detailed reports, which together, meet the contract requirements:

- Task 1 – Kickoff Meeting and Information Gathering Report
- Task 2 – Site Survey Report
- Task 3 – Site Selection Report
- Task 4 – SMR Technology Assessment Report
- Task 5 – Site Licensing Roadmap Report
- Task 6 – Development Impact Assessment Report
- Task 7 – U.S. Sources of Supply Report

2. TASK 1 – KICKOFF MEETING AND INFORMATION GATHERING

During a kickoff meeting with SNN and Sargent & Lundy on May 6, 2021, Sargent & Lundy presented a preliminary project schedule and worked with SNN to establish the task completion schedule, project work plan, and approach to performing the work.

Sargent & Lundy issued a Request for Information (RFI) to SNN prior to the kickoff meeting (May 4, 2021), which requested relevant background information, documents, and other materials from SNN. The requested information included access to previous nuclear siting studies for Romania, and a high-level overview of the Romanian regulatory process. SNN responded on May 20, 2021.

The Task 1 Report was issued on May 27, 2021, for SNN review. SNN had no comments on the Task 1 Report, which was issued final on June 7, 2021. The Task 1 Report summarized and documented results of the kickoff meeting. Due to its proprietary nature, the Final Report is included as Attachment 1 to the Confidential Version of this report.

3. TASK 2 – SITE SURVEY

Sargent & Lundy developed the Task 2 – Site Survey Report in accordance with the following objectives:

- Identify and evaluate Potential Sites in a systematic, flexible, defensible, and quantitative manner.
- Provide information for use in selecting Candidate Sites with desirable safety, environmental, technical, and economic conditions.

The report includes a summary of findings and a detailed account of work performed under Task 2, including a preliminary site list, siting criteria, the Plant Parameter Envelope (PPE), results of consultations with Romanian Environmental Authorities, geographic information system (GIS) maps, GIS data for Candidate Sites, and a list of Candidate Sites.

3.1. TASK 2.1 – SITING CRITERIA

Sargent & Lundy developed, in consultation with SNN, siting criteria consisting of exclusion criteria and discretionary criteria. Exclusionary criteria include major factors that can make large geographic areas less desirable for siting a nuclear power plant. Applying exclusionary criteria to the site survey allows the assessment to efficiently focus on areas that have the greatest probability of having desirable Potential Sites. Discretionary criteria address potentially challenging factors within a Candidate Area that can be effectively mitigated through practical engineering solutions.

As an element of siting criteria development, Sargent & Lundy developed a PPE for the reactor technologies under consideration using guidance in the Nuclear Energy Institute (NEI) document NEI 10-01. A PPE is a set of reactor- and owner-engineered parameters that are expected to bound the characteristics of a reactor that might later be deployed at a site. The parameters consist of design parameters and site parameters.

Sargent & Lundy compiled a list of water-cooled SMR technologies against the following criteria established by SNN:

- The technology can be licensed or the license is pending (and the technology can be implemented in less than 10 years).
- The technology is a multi-module-type, such that the loss of production for one module does not affect the production from the other reactor-modules or single module, if the existing infrastructure requires.
- The technology has load-following capabilities and is suitable to perform in grids with high percentages of variable renewable energy sources.

- The technology is based on light-water reactor principles due to the large amount of operational experience available in the world for this technology.

Based on the above criteria and publicly available information, including IAEA documentation, SMR vendor websites, and national nuclear regulatory websites, SMR technologies were identified for further evaluation.

An RFI was issued to SMR vendors requesting publicly available information. Sargent & Lundy relied on publicly available information and its siting and reactor technology knowledge and experience to develop bounding parameters to use in the siting survey.

Prior to moving into the next phase of the Project, a Stakeholder Workshop took place on August 31, 2021 and September 1, 2021. The purpose of the Stakeholder Workshop was to provide a high-level summary of the Project, a description of the exclusionary and discretionary criteria, and the proposed methodology for identifying Candidate Sites. This workshop included personnel from Sargent & Lundy, SNN, the Romania Ministry of Environment, CNCAN (National Commission for Nuclear Activities Control), Transelectrica, the Nuclear and Radioactive Waste Agency, and the Romanian Energy Regulatory Authority.

3.2. TASK 2.2 – CANDIDATE AREAS

To identify Candidate Areas within the ROI, Sargent & Lundy, with the support of the Center of Technology and Engineering for Nuclear Projects (CITON), constructed digitized GIS maps of the entire ROI, and reviewed available information from various sources. Sargent & Lundy eliminated areas within the ROI from further evaluation that failed to meet one or more exclusionary criteria.

3.3. TASK 2.3 – POTENTIAL SITES

Potential Sites were identified based on previous studies and by examining Candidate Areas to identify specific locations that appear, based on GIS maps and available aerial photography, to be suitable for nuclear power plant siting.

In addition, the project team identified Potential Sites by applying specific exclusionary criteria to Candidate Areas within all regions of the ROI. Key considerations included the availability of sufficient land suitable for the arrangement of the power plant and other required facilities.

The project team completed a study proposing additional Potential Sites, including locations on the site of partially decommissioned thermal power plants. The Project Team Proposed Sites also took into consideration the fact that the western part of Romania is strongly industrialized, with a strong dynamic of developing cities and localities.

3.4. TASK 2.4 – CANDIDATE SITES

Sargent & Lundy applied the processes and guidelines in the IAEA Safety Standard SSG-35 “Site Survey and Site Selection for Nuclear Installations,” July 2015 (SSG-35), to identify Candidate Sites, including the guidelines for the development of the survey criterion that will be used to identify preferred and alternative Candidate Sites as part of Task 3.

Sargent & Lundy evaluated the Potential Sites against the exclusionary and discretionary criteria to identify sites meeting all exclusionary criteria and to assess the major positive and negative attributes that would affect their suitability for a nuclear power plant.

The application of the exclusionary criteria eliminated Potential Sites. Next, Sargent & Lundy applied the discretionary criteria, which led to the final Candidate Sites.

3.5. TASK 2.5 – SITE SURVEY REPORT

Sargent & Lundy prepared and delivered a draft report to SNN that contained the findings and a detailed account of work performed under Task 2, including a preliminary site list, siting criteria, the plant parameter envelope, GIS maps, a ranking of potential sites, GIS data for candidate sites, and a list of candidate sites.

The Task 2 – Site Survey Report was issued to SNN for review and comment on August 21, 2021. Comments from SNN were received on September 9, 2021, and the final Report was issued on October 5, 2021. A revision to the report was issued to incorporate editorial changes. Due to its proprietary nature, the Final Report is included as Attachment 2 to the Confidential Version of this report.

4. TASK 3 – SITE SELECTION STUDY

In Task 3, Sargent & Lundy refined the sites identified as Candidate Sites in Task 2 into specific sites to evaluate in greater detail. This included moving sites by a distance of up to two kilometers (km).

The sites were evaluated to determine the area of land that is potentially suitable for the construction of the proposed SMR facility. These sites were then compared to the total area required for the SMR technologies based on the PPE information provided by the vendors for the Task 2 Report.

Site layouts were developed based on the PPE established in Task 2, aerial imagery, and topographic data and the candidate sites have sufficient area based on the PPE responses provided by the SMR vendors in Task 2.

The primary objective of Task 3 is to evaluate the candidate sites through a ranking and comparison process in accordance with IAEA SSG-35 (July 2015). As part of this process, each site was assessed for concerns with a given site or fatal flaws that would prevent construction and operation of the SMR, and the sites were ranked in order of their suitability for Project development.

Candidate Sites described in Section 3 were examined in detail to determine whether any have significant or unique infrastructure, engineering, environmental, or socioeconomic issues that would make them impractical or otherwise less desirable for development of the SMR. Candidate Sites were evaluated for Project development considerations, including:

- Safety-Related Criteria – Natural Hazards
- Safety-Related Criteria – Human-Induced Hazards and Nuclear Security
- Safety-Related Criteria – Radioactive Material and Emergency Planning
- Non-Safety-Related Criteria

The ranking criteria in the above four categories include 47 site characteristics related to public safety, nuclear security, nuclear fuel production licensing requirements, environmental impact, and engineering requirements. Each characteristic is defined as part of the exclusionary criteria (required) or discretionary criteria (desired). In addition, the ranking criteria evaluated were primarily technical and environmental, combined with some qualitative assessments of the nuclear regulatory and social impacts.

Quantitative criteria were developed to generate numerical scores that reflect how well each site satisfied the discretionary criteria for each of the 47 site characteristics. The criteria included both an objective means of assigning a numerical score for each site characteristic and importance weighting factors, which

were used to adjust the numerical scores based on the relative importance of the site characteristics. The possible score on each site characteristic ranged from 1 to 5, and each importance weighting factor ranged from 1 to 10.

Detailed information was collected on environmental and technical conditions at each site and assessed and scored based on an evaluation of selected site criteria. Potential site locations that failed to meet one or more exclusionary criterion were subjected to further consideration; whereas discretionary criteria included within the ranking criteria were evaluated for significance. In general, discretionary criteria were evaluated to determine whether they had the potential to introduce adverse technical, safety, environmental, or licensing impacts.

The sites were ranked based on the weighted scores determined for each of the 47 criteria. The scores ranged from 73% to 62% of the maximum possible score and the report identified several preferred sites.

The Task 3 – Site Selection Report summarizes the results of the site ranking process and identifies Preferred Candidate Sites for future evaluation. The report was issued to SNN for review and comment on April 19, 2022. Comments from SNN were received on April 28, 2022. The Task 3 Report was issued for final review on May 13, 2022, and the final Report was issued on May 19, 2022. A revision to the report was issued to incorporate editorial changes. Due to its proprietary nature, the Final Report is included as Attachment 3 to the Confidential Version of this report.

5. TASK 4 – SMR TECHNOLOGY ASSESSMENT

The purpose of Task 4 was to develop a SMR technology assessment to assist SNN in evaluating SMR technologies based on commercial, contractual, and technical criteria currently deemed important to SNN and based on the current status of SMR technologies.

Sargent & Lundy worked with SNN to develop six categories and 56 criteria for evaluation along with inquiries to each of the vendors related to each of the criterion. These inquiries were submitted via an RFI to the SMR technology vendors. There were delays in responses since each of the vendors required an executed three-way Non-Disclosure Agreement (NDA) with SNN and Sargent & Lundy prior to submittal of the information.

Prior to receiving RFI responses from the vendors, Sargent & Lundy and SNN worked collaboratively to establish criteria weighting and scoring guidelines. Upon receipt of vendor responses on December 1, 2021, Sargent & Lundy utilized subject-matter experts (SMEs) to evaluate the responses from each of the vendors and score their responses per the established scoring guidelines. The overall ranking for the SMR technologies was then computed as the sum of the weighted average of the composite rankings for the technology assessment criteria. Sargent & Lundy discussed the scoring with SNN through several collaboration meetings to ensure alignment. Due to the dynamic nature of both the commercial and regulatory developments in the nuclear industry; an input data freeze date of March 7, 2022, was established for this evaluation.

Sargent & Lundy prepared the SMR Technology Assessment Report that contains the findings and a detailed account of work performed under Task 4. The purpose of the report was not to select or recommend the final SMR technology, but rather to evaluate the technologies available to determine which SMR technologies may be more favorable than others, based on the criteria identified by Sargent & Lundy and SNN.

The Task 4 – SMR Technology Assessment Report was issued to SNN for review and comment on March 16, 2022. Comments from SNN were received during an April 6, 2022 review meeting and the final Report was issued on May 3, 2022. Due to its proprietary nature, the Final Report is included as Attachment 4 to the Confidential Version of this report.

6. TASK 5 – SITE LICENSING ROADMAP

Task 5 was prepared by CITON with oversight and acceptance by Sargent & Lundy, as documented by this Task 8 Report. The Task 5 Report summarizes the activities required to license a site on which the building of SMRs is intended.

The licensing roadmap provides the 28 required tasks, including studies, site surveys, reports, and analyses required by applicable local Romanian and international regulations. The roadmap also provides a sequence of activities needed after site selection to obtain the site license and a Level 4 cost estimate and estimated duration for each of these activities.

The initial Task 5 – Site Licensing Roadmap was issued to SNN for review and comment on November 11, 2021. Initial comments from SNN were received on November 22, 2021. Additional follow up meetings with SNN were held in December 2021 and January 2022 to further develop the Site Licensing Roadmap and required document submittals. SNN final review and acceptance of the Task 5 Report was conducted in January 2022. The final Report was issued on February 1, 2022. Due to its proprietary nature, the Final Report is included as Attachment 5 to the Confidential Version of this report.

7. TASK 6 – DEVELOPMENT IMPACT ASSESSMENT

To complete Task 6, Sargent & Lundy first developed an estimate of the total overnight capital cost for the development of an SMR project in Romania on a dollars per kilowatt basis. This estimate was developed based on Sargent & Lundy's experience in the nuclear power industry and benchmarked against publicly available and private cost estimates of the SMR vendors evaluated in Task 4. Cost estimates included capital costs, engineering, procurement, and construction costs, and other owner's costs.

Sargent & Lundy then assessed the development impacts created by the Project, if implemented, by identifying the economic impact within Romania and developing a detailed methodology for measuring those impacts, including direct, indirect, and induced impacts.

The assessment also considered how the development impact can be measured and the anticipated benchmarks and timelines for achieving the development impact measures.

The initial Task 6 – Development Impact Assessment Report was issued to SNN for review and comment on December 29, 2021. Initial comments from SNN were received on November 11, 2022. As a result of comments from SNN and subsequent discussions between SNN and Sargent & Lundy, RFIs were issued to the SMR technology vendors identified in Task 4, on March 22, 2022. The RFIs requested that the SMR vendor provide their Levelized Cost of Electricity (LCOE) to confirm the LCOE range determined by publicly available information. The responses to the RFIs were received from the SMR vendors between March 28, 2022, and April 29, 2022. The Task 6 Report was updated and issued for final review to SNN on May 4, 2022. The final Report was issued on May 12, 2022. Due to its proprietary nature, the Final Report is included as Attachment 6 to the Confidential Version of this report.

8. TASK 7 – U.S. SOURCES OF SUPPLY

To complete Task 7, Sargent & Lundy performed a study to identify U.S. sources of supply for all goods and services required to implement an SMR in Romania. The study includes detailed information about the prospective U.S. exporters, potential goods and services, and how U.S. exporters could participate in project implementation. The study focuses on major equipment and major services, including companies from the following areas:

- Engineering firms
- Potential goods for U.S. equipment manufacturers
- Construction firms
- Operations and maintenance firms
- Other professional service firms of a substantial nature (e.g., legal, finance)

The report identifies U.S. companies that could support the development and operation of an SMR in Romania based on available metrics. Also, the type of major equipment likely to be required to construct an SMR is listed.

This report was funded by the U.S. Trade and Development Agency (USTDA), an agency of the U.S. Government. As such, the USTDA requested Task 7 be included to provide information on potential opportunities for U.S. suppliers. The intention of Task 7 is not to limit potential suppliers of goods and services to the U.S.

The Task 7 – U.S. Sources of Supply Report was issued to SNN for review and comment on January 12, 2022. SNN had no comments on the Task 7 Report, which was issued final on February 1, 2022. The final Report is included as Attachment 7 to this report.

9. RESULTS

Sargent & Lundy collaborated with SNN to ensure the dynamic processes involved with these evaluations continued to meet SNN's priorities for a potential SMR Project in Romania. Sargent & Lundy's scope of work included providing evaluations to SNN for siting, technology selection, licensing, and economic impact.

With the completion of Task 2 and Task 3, the first two stages of the siting process for a nuclear installation, as described in SSG-35, have been completed: (1) Site Survey, in which Candidate Sites are identified after the investigation of a large region and the rejection of less desirable sites; and (2) Site Selection, in which the candidate sites are assessed by screening, evaluation, comparison, and ranking on the basis of safety and other considerations to select one or more Preferred Candidate Sites. Completion of Task 3 resulted in sites that are all viable for proceeding to the Site Evaluation process and could be suitable for the reactor technologies evaluated. The scope of the Site Evaluation process as per IAEA Specific Safety Requirements No. SSR-1, "Site Evaluation for Nuclear Installations," should include factors relating to the site and factors relating to the interaction between the site and the proposed nuclear technology, for all operational states and accident conditions, in particular accidents that could warrant emergency response actions.

Task 4 evaluates light-water reactor SMR technologies based on responses provided by the SMR vendors to Sargent & Lundy's RFI. The evaluation provides rankings of the technologies based on their current status and SNN's current priorities. The evaluation provides a tool that can be updated in future evaluations based on new information from vendors or changes in weighting factors. The final reactor technology and vendor selection should be based on inputs from this report, combined with other evaluations and commercial discussions being performed by SNN.

Task 5 documents the steps required to license an SMR in Romania, including reports and interfaces required, along with an estimated cost and duration for these activities.

Task 6 estimates the potential positive impacts to the Romanian economy during the development, construction, and operation of a new SMR through construction and operation jobs, as well as tax benefits. However, success of the Project hinges on the ability of the Project stakeholders to integrate with international suppliers of goods and services and to gain the necessary experience and knowledge needed over a long-term horizon.

Task 7 provides a representative list of U.S. firms that can provide engineering, manufacturing, construction, O&M support, and other professional services as needed to support successful Project

Task 8 – SMR Assessment Final Report

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implementation that would ultimately lead to an autonomous nuclear industry within Romania. As this report was funded by the U.S. Trade and Development Agency (USTDA), an agency of the U.S. Government, Task 7 provided information on potential opportunities for U.S. suppliers. The intention of Task 7 is not to limit potential suppliers of goods and services to the U.S.

Sargent & Lundy's technical assistance to SNN has helped to facilitate a path to further evaluate shortlisted sites and technologies and to better identify activities required to license and construct Romania's first SMR.

**ATTACHMENT 1. SL-016286, REV. 0:
TASK 1 – KICKOFF MEETING AND INFORMATION
GATHERING REPORT**

ATTACHMENT NOT INCLUDED IN PUBLIC VERSION OF REPORT

ATTACHMENT 2. SL-016453, REV. 1: TASK 2 – SITE SURVEY REPORT

ATTACHMENT NOT INCLUDED IN PUBLIC VERSION OF REPORT

ATTACHMENT 3. SL-016895, REV. 1: TASK 3 – SITE SELECTION REPORT

ATTACHMENT NOT INCLUDED IN PUBLIC VERSION OF REPORT

**ATTACHMENT 4. SL-016689, REV. 0:
TASK 4 – SMR TECHNOLOGY
ASSESSMENT REPORT**

ATTACHMENT NOT INCLUDED IN PUBLIC VERSION OF REPORT

**ATTACHMENT 5. SMR-4346221-ST/R-STS-05,
REV. 0: TASK 5 – SITE LICENSING
ROADMAP REPORT**

ATTACHMENT NOT INCLUDED IN PUBLIC VERSION OF REPORT

**ATTACHMENT 6. SL-016662, REV. 0:
TASK 6 – DEVELOPMENT IMPACT
ASSESSMENT REPORT**

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ATTACHMENT NOT INCLUDED IN PUBLIC VERSION OF REPORT

ATTACHMENT 7. SL-016716, REV. 2: TASK 7 – U.S. SOURCES OF SUPPLY REPORT

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NUCLEARELECTRICA

Societatea Nationala Nuclearelectrica (SNN)

**SMR Long-Term Development Plan:
Siting Selection and Technology Study**

Task 7 – U.S. Sources of Supply

Report SL-016716

Final – Revision 2

7/11/2022

S&L Nuclear QA Program Applicable:

Yes

No

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ISSUE SUMMARY AND APPROVAL PAGE

This is to certify that this document has been prepared, reviewed, and approved in accordance with Sargent & Lundy's Standard Operating Procedure SOP-0405, which is based on ASQ/ANSI/ISO 9001:2015: Quality Management Systems–Requirements.

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Task 7 – U.S. Sources of Supply

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition/Clarification
A/E	architect/engineering
BOP	balance of plant
ENR	Engineering News-Record
IAEA	International Atomic Energy Agency
NEIL	Nuclear Electric Insurance Limited
NSSS	nuclear steam supply system
O&M	operations and maintenance
OEM	original equipment manufacturer
Project	proposed first SMR nuclear power plant in Romania
ROI	region of interest
S&L	Sargent & Lundy
SNN	Societatea Nationala Nuclearelectrica
SMR	small modular reactor
TA	technical assistance
USTDA	United States Trade and Development Agency

1. INTRODUCTION

Sargent & Lundy (S&L) was selected by the U.S. Trade and Development Agency (USTDA) and Societatea Nationala Nuclearelectrica (SNN) to provide technical assistance (TA) related to a proposed small modular reactor (SMR) project in Romania. S&L's objectives include both evaluating conditions and providing recommendations that would be favorable for developing the first SMR nuclear power plant in Romania (the "Project"). The scope of work includes recommendations to SNN for siting, technology selection, and licensing.

S&L's site-selection process for SNN's SMR long-term development plan is designed to follow a sequence that begins with the definition of the region of interest (ROI) and completes with the selection and evaluation of candidate sites. Thereafter, S&L is to assess selected SMR technologies for compatibility with candidate sites. Once the candidate sites and SMR technologies are determined, it is S&L's responsibility to complete a licensing road map that identifies studies, analyses, and surveys that will be needed to license the selected site along with a budget and schedule for completion.

During a kickoff meeting between SNN and S&L on May 6, 2021, S&L presented a preliminary schedule and worked with SNN to establish the task completion schedule, project work plan, and approach to performing the work. Prior to the meeting, S&L provided SNN a list of background information, documents, and other relevant materials needed from SNN to support the site selection study. The Task 1 report, issued on May 27, 2021, summarized and documented results of the kickoff meeting. Subsequently, the Task 2 report (*Site Survey Report*) was issued on October 5, 2021; it summarized the results of the candidate site selection process and identified a reasonable number of candidate sites for further evaluation.

Following issuance of the Task 2 report, S&L completed the following tasks:

- **Site Selection (Task 3)**—S&L evaluated candidate sites to identify one or more preferred sites through a ranking and comparison process following International Atomic Energy Agency (IAEA) Safety Standards Series No. SSG-35.
- **SMR Assessment (Task 4)**—Based on SMR technology criteria provided by SNN, S&L initially identified SMR technologies to be evaluated for compatibility with the preferred candidate sites. In collaboration with SNN, S&L then developed the evaluation, comparison, and ranking criteria for assessing the remaining SMR technologies.

- **Licensing Roadmap (Task 5)**—S&L developed the licensing roadmap to provide the sequence of activities needed after site selection to obtain the site license. The roadmap accounts for the specific attributes of the selected site and the assessed technologies.
- **Development Impact Assessment (Task 6)**—S&L assessed impacts from the development of the Project, if implemented, and developed the methodology for measuring those impacts.
- **U.S. Sources of Supply (Task 7 [this report])**—S&L evaluated U.S. sources for supplying goods and services required to implement the Project. This report details information about prospective U.S. exporters, potential goods and services, and how U.S. exporters could participate in Project implementation.

As part of Task 8, S&L will produce a comprehensive, final report that includes all findings, recommendations, and conclusions of Tasks 1–7 upon the final task completion.

As stated, this report pertains to Task 7 (U.S. Sources of Supply). To complete this task, S&L compiled a list of major firms with experience in the power industry, utilizing industry data as published by Engineering News-Record (ENR) and specific to nuclear power when applicable, to assist SNN with successful project implementation. Areas of focus for the potential firms included the following:

- Engineering firms
- Potential goods that can be supplied by U.S. manufacturers
- Construction firms
- Operations and maintenance (O&M)
- Other professional service firms of substantial nature

This report concludes with thoughts on how U.S. sources of supply could impact the Project.

As this report was funded by the U.S. Trade and Development Agency (USTDA), an agency of the U.S. Government, Task 7 provided information on potential opportunities for U.S. suppliers. The intention of Task 7 is not to limit potential suppliers of goods and services to the U.S.

2. U.S. SOURCES OF SUPPLY

Nuclear power in the United States provides a net generating capacity of approximately 95.5 GW_e from 93 commercial nuclear reactors, accounting for nearly 20% of the country's total electric energy generation. The U.S. fleet represents the highest net capacity of any country; the United States is followed by France with 61.3 GW_e from 56 reactors, then by China with 49.6 GW_e from 52 reactors. Since the Atomic Energy Act of 1954, U.S. nuclear power has led the industry in technological advances, operational standards, and regulatory oversight. As a carbon emission-free technology, nuclear power is expected to remain a crucial part of energy resource planning, and investment into SMR technology and plant designs could make nuclear power more accessible in locations throughout the United States and other parts of the world.

S&L's work associated with Task 4 (SMR Assessment) details potential SMR technologies for a proposed SMR project in Romania. Each candidate technology was reviewed and ranked according to criteria developed by S&L and SNN, including details about construction, O&M, and proposed supply chain processes. The details as they relate to the specific SMR technologies are documented in the Task 4 report.

Independent of the various SMR candidates, the following subsections of this report detail potential goods that can be provided by U.S. equipment manufacturers and services required to implement the Project.

2.1. ENGINEERING FIRMS

The list in Table 1—provided by Engineering News-Record’s (ENR’s) *2021 Top 500 Design Firms Sourcebook*—provides U.S. engineering firms with experience in the nuclear power industry. The full-service architect/engineering (A/E) firms can provide professional services to SNN for the Project, starting with conceptual design and licensing activities and extending to commercial operation and thereafter. This list has been filtered to only include U.S. nuclear power firms; it is not all inclusive of capable U.S. engineering firms.

Table 1 — ENR Top U.S. Design Firms in Nuclear Power

ENR Rank	Firm	2020 Nuclear Power Design and Engineering Revenue (US\$ MIL.)	Headquarters	Services	NQA-1 Nuclear Safety Program (Y/N)	10CFR Part 50, Appendix B (Y/N)
1	Sargent & Lundy	215.5	Chicago, Illinois	Full service A/E firm	Y	Y
2	Enercon	139.5	Kennesaw, Georgia	Full service A/E firm	Y	Y
3	Jacobs	115.7	Dallas, Texas	Full service A/E firm	Y	Y
4	Tetra Tech Inc.	26	Pasadena, California	Environmental Services	N	N
5	United Engineers and Constructors, Inc.	20	Mt. Laurel, New Jersey	Full service A/E firm	N	N
7	Greenman-Pedersen Inc.	16.3	Babylon, New York	Full service A/E firm	N	N
8	Zachry	15.4	Stonington, Connecticut	Full service A/E firm	Y	Y
11	Burns & McDonnell	5.7	Kansas City, Missouri	Full service A/E firm	Y	Y
12	Black & Veatch	4.6	Overland Park, Kansas	Full service A/E firm	Y	Y
14	AECOM	1.3	Dallas, Texas	Full service A/E firm	Y	Y
15	Geosyntec Consultants	1.2	Boca Raton, Florida	Environmental Services	Y	Y

Notes:

1. Firms are marked as “N” when the existence of quality programs for NQA-1 or 10CFR Part 50, App. B could not be confirmed.
2. ENR reporting is from 2021 and uses revenue data from 2020.

2.2. POTENTIAL GOODS U.S. EQUIPMENT MANUFACTURERS CAN SUPPLY

Table 2 identifies major and commodity-type equipment that U.S. suppliers have the opportunity to manufacture and supply for a typical light-water SMR project. This equipment list includes the SMR vendor original equipment manufacturer (OEM), the balance of plant (BOP), and other auxiliary equipment associated with the construction and operation of an SMR plant. Due to the wide breadth of equipment, there are a significant number of U.S. manufactures that could be suppliers for the Project. The U.S. manufacturers should utilize the equipment listed in Table 2 to determine what equipment they can best provide; however, this list is not comprehensive, and depending on the SMR technology selected, the equipment list may vary. A partial list of some major U.S. equipment manufacturers is provided in Table 3; note that the list of U.S. manufacturers is not comprehensive.

Table 2 — Potential Goods U.S. Equipment Manufacturers Can Supply

OEM Equipment	
Reactor Vessel and Associated Equipment	
Civil/Structural Equipment	
Expansion Joints – Fabric	Pre-Engineered Metal Buildings
Painting	Structural Steel
Mechanical and Chemical Equipment	
Air Compressors and Dryers	Condenser, Main, and Vacuum Air-Removal Package
Breathing Air Compressor	Condenser – Vapor
HVAC – AHUS/FCUs/Split Systems with Condenser	Condenser – Wet
HVAC – Nuclear Air Treatment Systems (Including Carbon Trays)	Cooling Tower
HVAC – Bubble-Tight Dampers	Chemical Feed Equipment; Chemical Addition Package
HVAC – Fans	CRH Air Bottle and Rack and Access
HVAC – Dampers (Fire, Smoke, Volume, Control, Blast)	Deaerator
HVAC – Duct Mtd Electrical Coils and Unit heaters	De-Gasifier Package
HVAC – Duct Mtd Water Cooling Coils	Demineralizers and Demineralized Water Treatment Skid
HVAC – Chillers/Condenser	Dewatering Skid, Mobile
HVAC – Airflow Measuring Stations	Desuperheaters
HVAC – Humidifiers	Drum Dryer Package
HVAC – Louvers	Expansion Joints – Nonmetallic
HVAC – Filter Media	Expansion Joints – Metallic
Auxiliary Boiler	Expansion Joints – HVAC Ductwork
Compactor	Eye Wash Station
Condenser – Air Cooled	Feedwater Heaters

Task 7 – U.S. Sources of Supply

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Fire Protection Systems	Valves – Cast Steel
Fire Detection Systems	Pumps – General Service
Fuel Gas Scrubbers and filters	Pumps – Sumps
Fire Hose House	Pumps – Vacuum
Fire Hydrants, PIV, Isolation Valve	Reverse Osmosis Skid; Neutralization Skid; Tubular Ultra Filtration Skid; CIP Skid; Amine Addition Skid
Gas Analyzer	Sample Panel – Water Quality
Gaskets – Spiral Wound	Spent Fuel Filter Handling Package
Hoist – Turbine Building, Shop Cranes, Monorail Hoist	Steam Jet Air Ejectors
Heat Exchangers – Air Cooled	Steam Turbine and Steam Turbine Generator
Heat Exchangers – Plate and Frame	Tanks – Field Erected
Heat Exchangers – Shell & Tube	Tanks – Poly – FRP
Heat Exchangers, ASME Section III	Tanks – Thermal Energy Storage
Heat Exchangers, ASME Section VIII	Tanks – Shop Fabricated
Ion Exchange Skid	Turbine – Bypass Valves
Liquid Filters	Turbine – Lube Oil
Oil Separator	Turbine – Lube Oil Conditioner
Oil/Water Cylindrical Style Oil Separators	Valves – Butterfly
Piping – Concrete Circulating	Valves – Composite Ball for Chemical Service
Pipe Fabrication (Alloy) – High Energy	Valves – Forged Steel
Pipe Fabrication – Low Energy	Valves – Gas Service
Pipe Suppliers – RFP/HDPE	Valves – General Service Control
Pipe Hangers and Supports	Valves – Metal Seated Ball
Pressure Vessels, ASME Section III	Valves – Motor Operators
Pumps – Boiler Feed	Variable Frequency Drives
Pumps – Circulating Water Vertical	Waste Disposal Container and Grapple
Pumps – Condensate Vertical	Water Treatment – Makeup Water
Pumps – Chemical Metering	Water Treatment (Potable); Sewage Treatment; Sewage Lift Station; Condensate Rinse/Recycle Pump Skid, Condensate Regeneration Skid
Pumps – Fire	
Electrical Equipment	
DC Battery	Isolated-Phase Bus Duct
DC Battery Charger	Motor Control Centers – Low and Medium Voltage
Bus/Cable Bus	Motors – Low Voltage
Bus/Non-Segregated bus	Motors – Medium Voltage
Cable – Control	Power Distribution Centers (PDCs)
Cable – Instrument/Thermocouple	Protective Relaying
Cable – Low-Voltage Power	Medium-Voltage Switchgear and Low-Voltage Switchgear

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Cable – Medium-Voltage Power	Variable Frequency Drives
Diesel Generators	Transformers
Freeze Protection	UPS
Instrumentation and Controls Equipment	
Analyzers – Conductivity	Instrument – Flow
Analyzers – Dissolved Oxygen	Instrument Transmitters
Analyzers – Hydrazine	Meter – Fuel Gas Flow
Analyzers – pH	Radiation Detectors
Analyzers – Phosphate	Programmable Logic Controller
Analyzers – Sodium	Switches – Level
Analyzers – Silica	Switches – Pressure
Analyzers – Hydrocarbon Monitoring	Thermocouples and RTDs
CEMs System	Valve Positioners
Distributed Control System	Vibration Monitoring System – Rotating Equipment
Instrument Fittings	
Construction Equipment	
Crane Rental	Heavy Haul/Heavy Lift
Testing Equipment	
Performance Testing Equipment	

Task 7 – U.S. Sources of Supply

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Table 3 — U.S. Equipment Manufacturers

AVANTech	EnerSys
ABW Technologies	Enpro Industries
Aerofin	EVAPCO
Air Monitor Corporation	Flowserve Corporation
American Crane and Equipment Corporation	General Electric
American Tank & Vessel	Greenheck Fan Corporation
American Warming Ventilation	Holtec International
Ametek	Honeywell International
Aurora Pumps (Pentair Group)	Indeeco
Babcock & Wilcox	Ingersoll Rand
Carrier Global	ITT
Caterpillar	Joseph Oat Corporation
Chattanooga Boiler & Tank Company	Lennox International
Crane Group	Marmon Industrial Water
Central Texas Iron Works (CTIW)	Parker Hannifin
Cummins	Pittsburg Tank
Curtiss Wright	Ruskin Company
Ellis & Watts Global Industries	SPX Cooling Technologies
Emerson – Fisher	Thermal Engineering International
EnergySolutions	Westinghouse

2.3. CONSTRUCTION FIRMS

The chosen SMR firm tasked with designing and developing the Project’s reactor modules will likely lead the construction effort for the plant’s nuclear steam supply system (NSSS). In support of the NSSS construction effort, however, the Project will need additional construction support with tasks such as project management, BOP design, and oversight with respect to engineering, procurement, and construction. Table 4—provided by ENR’s *2021 Top 400 Contractors*—provides U.S.-based construction firms within the power industry. As with the equipment manufacturers, there are more such firms capable of providing these services than those listed. Additionally, local support and more specialized construction firms will be needed to support project implementation but are not included herein. Table 4 has also been filtered from ENR’s complete list of top 20 contractors in power to only list U.S. companies.

Table 4 — ENR Top U.S. Contractors in Power

ENR Rank	Firm	2020 Power Industry Revenue (US\$ MIL.)	Headquarters
1	Bechtel	3,980.00	San Francisco, California
2	Kiewit Corporation	2,043.40	Omaha, Nebraska
3	Mortenson	1,922.00	Minneapolis, Minnesota
4	Infrastructure & Energy Alternatives	1,206.50	Indianapolis, Indiana
5	Swinerton	1,035.10	San Francisco, California
6	Day & Zimmermann	986	Philadelphia, Pennsylvania
7	Michels Corporation	870.9	Brownsville, Wisconsin
8	Black & Veatch	718.7	Overland Park, Kansas
9	Burns & McDonnell	592.6	Kansas City, Missouri
10	Moss	532.8	Fort Lauderdale, Florida
11	Jingoli-DCO	529	Lawrence Township, New Jersey
12	McCarthy Holdings, Inc.	520.2	St. Louis, Missouri
13	United Engineers and Constructors, Inc.	509.1	Mt. Laurel, New Jersey
14	DEPCOM Power	489.2	Scottsdale, Arizona
15	Electrical Consultants, Inc.	463.3	Billings, Montana
16	Fagen, Inc.	416.9	Granite Falls, Minnesota
17	Barton Malow Holdings LLC	408.2	Southfield, Michigan
19	Ferreira Construction Co., Inc.	387.8	Branchburg, New Jersey

Note: ENR reporting is from 2021 and uses revenue data from 2020.

2.4. OPERATIONS AND MAINTENANCE

The end goal of a country developing a national nuclear program is to safely operate its fleet with little or no reliance on international support. As the local industry matures, local labor gains plant O&M experience through the guidance of contracted experts. This knowledge transfer process takes time, however, occurring over decades. The U.S. nuclear industry has experience developing international programs in Asia and the Middle East. Projects in this environment best succeed when a dedicated team of experienced personnel are aligned with long-term operational goals rather than short-term economic gains.

Operators of U.S. nuclear facilities have extensive experience with operating and maintaining nuclear power plants. Table 5 lists the major holding companies associated with nuclear power plant operation along with the number of operating units.

Table 5 — Select US Nuclear Operators¹

Operator	Total Operating Units
Constellation Energy	21
Duke Energy	13
Entergy	5
NextEra Energy / Florida Power & Light	7
Tennessee Valley Authority	7

These companies and their subsidiaries could provide the O&M experience needed for successful plant operation, from general operational consulting to even having a partial stake in the Project. In addition to plant operation and routine maintenance work provided by the operating company, major equipment inspection and maintenance can be provided onsite by the OEM.

¹ <https://www.nei.org/resources/statistics/us-nuclear-plant-owners-and-operators>

2.5. OTHER PROFESSIONAL SERVICES

In addition to direct services, U.S. firms can support the design, development, and construction of a power plant indirectly, as other necessary professional services can be provided by a wide variety of U.S.-based companies:

Public Accounting

The largest U.S.² public accounting firms—Deloitte, Ernst & Young, KPMG, and PwC—all have vast experience supporting clients in the power industry. In addition to preparing, reviewing, and auditing financial statements, these firms can provide consulting services on other services such as tax planning, payment accounting systems, and cyber security.

Financial Services

Similar to the public accounting firms, the major U.S. banks—JPMorgan Chase, Bank of America, Citigroup, and Wells Fargo—all have existing business that provide financial services to the power industry across the world. Non-retail investment banking firms—like Goldman Sachs and Morgan Stanley—as well as alternative investments, are also available to provide financial and lending services to projects involving clean energy technology such as nuclear SMR design.

Legal Services

Law firms based in the United States are readily available to support international clients on electric power generation projects. Examples of large U.S. law firms specializing in the industry are Vinson & Elkins and Baker Botts, both of which have their corporate headquarters in Houston, Texas.

Insurance

From an insurance perspective, Nuclear Electric Insurance Limited (NEIL) is a mutual insurance company that insures all U.S. nuclear power plants and some international facilities. The company is based in Wilmington, Delaware. NEIL promotes the importance of safe, clean nuclear power, and its financial interests are inherently tied to the success of the nuclear power industry.

² Legal headquarters for all listed firms is London, England.

3. CONCLUSION

As noted in the report for Task 6 (Development Impact Assessment), the development, construction, and operation of a new nuclear power plant using SMRs would result in significant and positive impacts to the local Romanian economy by providing construction and operation jobs as well as tax benefits; however, the success of the Project hinges on the ability of the Project stakeholders to integrate with international supplies of goods and services and gain the necessary experience and knowledge needed over a long-term horizon. Firms in the United States, of which only a portion are described in this report, can provide engineering, manufacturing, construction, O&M, and other professional services as needed to ensure successful project implementation that would ultimately lead to an autonomous nuclear industry within Romania. However, the intention of this report is not to limit potential suppliers of goods and services to U.S. firms.

SL-016716 - U.S. Sources of Supply
Supplier Contact Information

Business Name	Address	Telephone	Email Address
AVANTech	2050 American Italian Way Columbia, SC 29209	803-407-7171	Online email portal: https://avantechllc.com/contact
ABW Technologies	6720 191st PI NE Arlington, WA 98223	360-618-4400	sales@abwtec.com
Aerofin	4621 Murray Place P.O. Box 10819 Lynchburg, VA 24506	434-845-7081	info@aerofin.com
Air Monitor corporation	1050 Hopper Ave Santa Rosa, CA 95403	707-238-3721	Online quote request portal: https://www.airmonitor.com/quote/
American Crane and Equipment Corporation	531 Old Swede Road Douglassville, PA 19518	610-385-6061	info@americancrane.com
American Tank & Vessel	15810 Park 10 Place Suite 210 Houston, TX 77084 (Central/Pacific Coast)	281-492-7778	green@at-v.com (storage tank emissions)
American Warming Ventilation	219 S. Church Street Suite 200 Bowling Green, OH 43402-2816	855-948-0904	Online email portal: https://awv.com/contact/
Ametek	1100 Cassatt Road Berwyn, PA 19312	610-647-2121	info.corp@ametek.com
Aurora Pumps (Pentair Group)	800 Airport Road North Aurora, IL 60542	888-987-8680	Online email portal: https://www.pentair.com/en-us/education-support/contact-us/pool-spa-equipment-customer-service.html
Babcock & Wilcox	1200 E Market Street Suite 651 Akron, OH 44305	330-753-4511	Online email portal: https://www.babcock.com/contact-us/
Carrier Global	13995 Pasteur Boulevard Palm Beach Gardens, FL 33418	561-365-2000	Online email portal: https://www.carrier.com/residential/en/us/contact-us/
Caterpillar	100 NE Adams Street Peoria, IL 61629	309-675-2337	Online email portal: https://www.caterpillar.com/en/contact.html
Chattanooga Boiler & Tank Company	1011 East Main Street Chattanooga, TN 37408	423-266-7118	sales@cbtank.com
Crane Group	330 West Spring Street Suite 200 Columbus, OH 43215	614-754-3000	info@cranegroup
Central Texas Iron Works (CTIW)	1100 Winchell Drive Waco, TX 76712	254-776-8000	info@ctiw.com
Cummins	Corporate Office Building 500 Jackson Street Columbus, IN 47201	651-787-7071	Jamie.Ferguson@cummins.com (Only for emails ending in ".mil", ".gov" or ".us")
Curtiss Wright	130 Harbour Place Drive Suite 300 Davidson, NC 28036	704-869-4600	info@curtisswright.com
Ellis & Watts Global Industries	4400 Glen Willow Lake Lane Batavia, OH 45103	513-752-9000	Online email portal: https://www.elliswatts.com/contact/
Emerson - Fisher	205 S Center Street Marshalltown, IA 50158	641-754-3011	Online email portal: https://go.emersonautomation.com/contact-us?_gl=1*1d8v9hj*_ga*ODE2NTgyOTczLjE2NTc4MTQzMjc.*_ga_1MGRRDNV9H*MTY1Nzg5NDcwOS4yLjEuMTY1Nzg5NTk2Ny4w
EnergySolutions	299 South Main Street Ste. 1700 Salt Lake City, UT 84111	801-649-2000	info@energysolutions.com
EnerSys	2366 Bernville Road Reading, PA 19605	610-208-1991	Online email portal: https://www.enersys.com/en/contact-us/
Enpro Industries	5605 Carnegie Blvd Suite 500 Charlotte, NC 28209	704-731-1500	N/A
EVAPCO	P.O. Box 1300 Westminster, MD 21158	410-756-2600	marketing@evapco.com
Flowserve Corporation	5215 North O'Connor Blvd Suite 700 Irving, TX 75039	972-443-6500	Online email portal: https://www.flowserve.com/en/support/contact-us/

SL-016716 - U.S. Sources of Supply
Supplier Contact Information

Business Name	Address	Telephone	Email Address
General Electric	5 Necco Street Boston, MA 02210	617-443-3000	Online email portal: https://www.ge.com/contact/general
Greenheck Fan Corporation	P.O. Box 410 Schofield, WI 54476	715-359-6171	info@greenheck.com
Holtec International	1001 N US Highway 1 Jupiter, FL 33477	561-427-2300	Online email portal: https://holtecinternational.com/contact-us/contact/
Honeywell International	855 S Mint Street Charlotte, NC 28202	800-323-4576	Online email portal: https://www.honeywell.com/us/en/contact/business-inquiries
Indeeco	425 Hanley Industrial Ct St. Louis, MO 63144	314-644-4300	Online email portal: https://indeeco.com/contact
Ingersoll Rand	800 Beaty St Building E Davidson, NC 28036	704-896-4000	Online email portal: https://www.ingersollrand.com/en-us/modals/contact
ITT	1133 Westchester Avenue White Plains, NY 10605	914-641-2000	Online email portal: https://www.itt.com/contact
Joseph Oat Corporation	2500 Broadway Camden, NJ 08104	856-541-2900	sales@josephoat.com
Lennox International	2140 Lake Park Blvd Richardson, TX 75080	972-497-5000	liisourcing@lennoxintl.com
Marmon Industrial Water	4475 Corporate Drive Burlington, Ontario L7L 5T9 Canada	905-332-1404	info.miw@marmonwater.com
Parker Hannifin	6035 Parkland Blvd Cleveland, OH 44124	800-272-7537	cparker@support.parker.com
Pittsburgh Tank	1500 Industrial Drive Monongahela, PA 15063	724-258-0200	sales@pghtank.com
Ruskin Company	3900 Dr. Greaves Road Grandview, MO 64030	816-761-7476	Online email portal: https://www.ruskin.com/About-Us/Contact-Ruskin
SPX Cooling Technologies	7401 W. 129th Street Overland Park, KS 66213	800-462-7539	Online email portal: https://www.spxcooling.com/contact/
Thermal Engineering International	18000 Studebaker Road Suite 400 Cerritos, CA 90703	323-726-0641	sales@thermalengint.com
Westinghouse	4000 Town Center Blvd Suite 210 Canonsburg, PA 15317	412-374-4111	customerservice@westinghouse-products.com