The Steam Generating Team

SGT

An Aecon / Framatome Company

When predictability matters, **choose SGT.**

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At some point, to ensure long-term operations and meet net-zero emission goals, your nuclear plant will need major component replacement. When that happens, you'll want predictability: of costs, scheduling and success. You'll want the Steam Generating Team (SGT).

As the **only** company executing steam generator replacements (SGR) in North America over the past eight years, SGT can deliver that predictability. Award-winning experience and unparalleled institutional knowledge are just a few of the reasons why.

Jointly owned by Framatome and Aecon, two world-renowned nuclear service providers, SGT has the resource flexibility and knowledge base to support an extensive range of projects, including multiple concurrent projects. Framatome is the world's foremost nuclear reactor constructor in terms of installed capacity and the global leader in the heavy component replacement market for power plants.

Framatome aims to assist our customers in producing competitive, safe, clean electricity and has been providing energy solutions, jobs, and economic support to local communities across the U.S. for over 60 years.

Aecon is an industry-leading nuclear constructor that provides end-to-end engineering, planning, and program and construction management services to nuclear and conventional power clients in the United States and Canada. As part of its extensive nuclear service offering, Aecon brings strong technical expertise in digital instrumentation, control engineering and specialized construction.

For major plant modifications, fleet programs and EPC projects, choose the industry's major plant modification leader for over 25 years.

Our people know: predictability matters.

Our people make predictability happen. SGT's goal is to work collaboratively with owners and plant personnel to provide cost and schedule certainty on any size of project. Our planning, scheduling, construction and project management processes, founded on accountability, support our ability to quickly react to emergent work, adapt to client requirements or challenges, and successfully implement large projects.

SGT's ability to leverage a staff of seasoned professionals who are dedicated to "your success – your way" distinguishes us from the others. When developing engineering change packages, we provide qualified personnel to ensure all federal, state and site requirements are met.

Structured to work multiple outages in parallel, SGT can quickly respond to emergent needs by deploying experienced personnel to work with on-site teams, quickly assess situations and move forward with congruent engineering and implementation efforts.

When it comes to project management, we are recognized for our proven and successful processes and performance.

From initial project scoping to final installation, SGT has the people and experience to plan and implement your project with predictable results.

A History of Heavy-Duty Performance

Major Component Replacement

SGT has over 25 years of industry-recognized experience in replacing heavy components. We've successfully completed steam generator (SG) or reactor vessel closure head (RVCH) replacements at nuclear power plants all over the United States and Canada. Using a process focused on continuously improving management techniques and project execution, we have repeatedly set world record outage duration benchmarks and domestic and international records for key schedule durations and safety performance.

SGRs necessitate a wide variety of approaches. SGT has experience with two-piece replacements in Westinghouse and CE units. This experience includes fit-up, welding and inspection of girth welds on thick-shell ASME components with the capability to provide a code-stamped vessel, as well as internal moisture separator component assembly and complete refurbishments of original steam drums. We also have experience with two-piece replacements that require confined space assembly of steam generator internals with stringent FME controls.

This broad range of implementation approaches, in combination with a comprehensive lessons-learned program, provides the SGT team with an extensive span of experiences to draw from in future projects.

Our Approach

During SG replacement projects, our team starts with machining to sever hot and cold leg piping. Once the pipe is cut, the old SGs are removed from containment and pipe end decontamination is performed. The pipe ends are machined to precise tolerances that match the Replacement Steam Generators (RSGs). Once the RSGs are set in place, remote machine welding is performed on the reactor coolant system piping using a narrow groove Gas Tungsten Arc Welding (GTAW) process. Narrow groove welding reduces total weld time and consistently produces high quality welds.

At some plants, an opening in the containment vessel is required. SGT has created and restored openings in concrete containments with steel liners and concrete secondary containments with steel primary containments. The concrete containments include post-tensioned configurations in addition to standard reinforced concrete.

SGT utilizes many tools to accurately remove and install SGs. These include photogrammetry, laser tracking, total station and laser scanning—whatever is needed to support the many facets of a project as complex as an SGR.

With over 25 years of industry-recognized experience, SGT has established world-record outage duration benchmarks for all three PWR NSSS designs. We have successfully completed 26 SGR, nine RVCH replacements and one pressurizer replacement with two additional SGR under contract.

Plant	Year[1]	OEM[2]	CS	SGR[3]	RVCH	CO[6]	Two-piece
Completed Projects							
Point Beach 1	1984	W	W	●			●
DC Cook 2	1988	W	W	●			●
Catawba 1	1996	W	BWI	●			
Point Beach 2	1996	W	W	●			●
McGuire 1	1997	W	BWI	●			
McGuire 2	1997	W	BWI	●			
Salem 1	1997	W	W	●			
St Lucie 1	1997	CE	BWI	●		●	
Indian Point 2	2000	W	W	●			
Calvert Cliffs 1	2002	CE	BWI	●			●
Calvert Cliffs 2	2003	CE	BWI	●			●
Oconee 1	2003	B&W	BWI	●	●	●	
Oconee 3	2003	B&W	BWI		●		
Oconee 2	2004	B&W	BWI	●	●	●	
Oconee 3	2004	B&W	BWI	●		●	
Prairie Island 1	2004	W	Framatome	●			●
Turkey Point 3	2004	W	Framatome		●	●	
ANO 1	2005	B&W	Framatome	●	●	●	
Callaway	2005	W	Framatome	●			
St Lucie 1	2005	CE	Framatome		●	●	
Turkey Point 4	2005	W	Framatome		●	●	
St Lucie 2	2007	CE	Framatome	●	●	●	
Salem 2	2008	W	Framatome	●			
Diablo Canyon 2	2008	W	W / ENSA	●			
Diablo Canyon 1	2009	W	W / ENSA	●			
TMI 1	2009	B&W	Framatome	●		●	
Waterford 3	2012	CE	W / ENSA	●	●	●	
Sequoyah 2	2012	W	W / DOOSAN	●		●	
Bruce 6	2021	AECL	BWXT	●			
Watts Bar 2	2022	W	W / DOOSAN	●		●	
In-Progress Projects							
Bruce 3	2024	AECL	BWXT	●			●
Bruce 4	2025	AECL	BWXT	●			●
Bruce 5	2027	AECL	BWXT	●			
Bruce 7	2029	AECL	BWXT	●			
Bruce 8	2031	AECL	BWXT	●			

[1]Year Date of replacement outage
[2]OEM NSSS Supplier
[3]CS Replacement Component Supplier
[4]SGR Steam Generator Replacement
[5]RVCH Reactor Vessel Closure Head replacement
[6]CO Containment Opening required

Major Plant Modification Projects and Capabilities

When it's time to engineer, plan and implement major plant modifications like heat exchanger replacements, feedwater heater replacements, piping system repairs and replacements or the addition of an independent spent fuel storage installation (ISFSI), SGT utilizes our proven EPC model.

As with any entirely new projects, changes must be made in all engineering disciplines. In addition, changes must be made to PRA, operations, maintenance, security and all aspects of plant operations.

Our engineering competencies encompass civil, structural, mechanical and electrical, among others. This allows us to design, modify, analyze and evaluate all your systems. Whether you're installing major components or replacing piping, SGT uses Framatome's metrology services to provide accuracy you can count on.

We specialize in rigging, handling and moving large heavy components through limited space while minimizing modification to plant structures and components.

That expertise includes a first-of-a-kind soil injection procedure that has been nominated for an NEI Top Innovative Practice (TIP) award.

For ISFSI, SGT works with local craft and subcontractors to ensure the sub-surface and soil is sufficient to support the ISFSI complex. SGT can implement our safeguard program to ensure security information is protected while developing new security buildings and systems to protect the ISFSI complex.

SGT's construction competencies are second to none. We can erect any scaffolding, supports, work platforms and both permanent and temporary facilities needed as well as accompanying electrical and security systems, HVAC, along with primary, secondary and fire protection piping.

No matter the level of documentation, licensing or permits you require, we have the experience to provide the necessary support. And if a containment opening or safety-related concrete rehabilitation is required, we can do that too.

EXPERIENCED EPC CONTRACTOR

A proven track record of successful delivery on engineering, procurement and construction (EPC) projects.

Major component replacement projects occur infrequently in the lifespan of a plant. SGT's flexible turnkey/EPC approach often puts us in a better position to handle large projects than plant teams focused on regular everyday tasks.

From planning through close-out, SGT works to maintain the same personnel throughout the project lifecycle. This eliminates inefficiencies and potential miscommunications when assigning work to a different company. Our experience allows us to manage risks and minimize impacts on any concurrent plant activities.

Integrated Engineering

Project success is predictable when our experienced design engineering team integrates fully with your engineering and construction teams as well as subcontractors.

Our team is on-site during implementation, to ensure installation requirements are met and to respond quickly to changes in the field. We have experienced engineering change package (ECP) writers who have developed and reviewed ECPs for approximately half of the PWR power plants in North America. Personnel highly qualified in EPRI ACAD orientation, engineering fundamentals and systems engineering, and who are familiar with your site programs and procedures, are prepared to provide innovative, first-of-a-kind designs when needed.

Procurement

SGT can efficiently procure nuclear safety and non-safety materials, commercial materials, equipment and components. We maintain an SGT-approved suppliers list with optional use of ASLs from our parent companies and customers. In addition, our commercial grade dedication, quality receipt inspection processes and warehouse management, tools and experience ensure you'll always have the right items at the right time.

Construction and Construction Management

Our construction management approach is schedule-driven and cost-focused with procedures tailored to both safety-related and non-safety projects. We continuously integrate design and technical requirements with a rigorous readiness review process. Our constant improvement and learning culture ensure accountability and predictability.

SGT also works closely with labor organizations and integrates them into key planning processes. We are a signatory to the building trades' "General Presidents Project Maintenance Agreement" ("GPPMA") and a member of the GPPMA Executive Committee.

When you contract with us, you can expect a robust communications plan that includes:

- Weekly project management team meetings
- Plan-of-the-day meetings
- Updates on daily shift schedule status
- Performance metrics tailored to project/ customer needs
- Design engineering reviews to ensure compliance with technical requirements
- Additional management oversight from planning/ engineering through the execution phase

Fleet Programs

It's simple: a single common management team provides consistency, efficiency and savings from repeated implementation.

When it's time to mobilize staff for key positions, SGT draws from both Framatome and Aecon resources nationwide as well as local craft and support. This provides a unique platform for utilities implementing a fleet-wide modification (FLEX, ISFSI, etc.) with a consistent methodology, approach and team.

The ability to have a single team execute modifications at all units within a fleet provides an opportunity for implementation of lessons learned and a standardized final product, enhancing cost and schedule performance and simplifying future fleet operation.

Studies and Consulting

Utilizing industry-leading expertise from two world-class companies, Framatome and Aecon, SGT has the experience and skill set to handle all aspects of engineering studies including problem definition, design exploration, optimization and effective communication of conclusions.

Specific areas of engineering expertise include:

- Containment analysis and design
- Seismic analysis
- Natural phenomena evaluations
- Engineering change packages
- ASME Section III (Div. 1 and Div. 2) and Section XI
- Dynamic loading
- First-of-a-kind designs
- Implementation optimization
- Outage workforce management

Program Support

When you partner with SGT, you can expect complete holistic program support. That includes a programmatic approach to both fleet and FLEX modification evaluations and implementations as well as integrated design and construction option evaluation. And when it's time for subsequent license renewal modifications, we will be ready to help.

Quality Assurance

The SGT nuclear quality program has been audited by numerous utilities, and SGT is currently maintained on various nuclear utilities' approved vendor lists. Our QA program meets all requirements of 10 CFR 50 Appendix B. SGT's 10 CFR 50 Appendix B/NQA-1 Quality Assurance Manual serves as the baseline quality program for steam generator replacement projects. However, with each project, we carefully review the customer's QA requirements and have the flexibility to adapt or modify procedures for customer- or project-specific needs.

Performance Improvement

SGT has identified and implemented systematic processes for performance improvement which are designed to minimize errors and eliminate significant events. It's our way of ensuring the very best results for our customers. Recognizing that safety, human performance improvement and process reliability are elements critical to superior performance, we concentrate on continuous improvement within these areas.

Built into our work processes and future project planning are systems that include:

- Performance improvement
- Oversight structure
- Project performance improvement plans
- Clearly communicated expectations and accountability
- Performance measures
- Problem identification and tracking/trending systems
- Formal cause analysis
- Observation and self-assessment processes
- Lessons learned


STOP
STOP

Safety

SGT'S #1 goal for every project is to complete the work with zero injuries.

SGT offers a comprehensive program emphasizing safety in the work environment. The program also addresses everyone's responsibility to be aware of and uphold safe work practices.

Constant safety awareness is achieved through posters, banners and regular communications.

Our proactive approach to safety includes:

- Employee orientation
- Project status briefings
- Safety meetings
- Daily inspections
- Safety awards

SGT's work in the area of safe work practices has been recognized by a number of organizations:

- National Safety Council Milestone Award
- National Safety Council Perfect Record Award

SGT achieved ZERO lost-time accidents or OSHA recordable injuries while working more than 1-million-man hours during three SGR outages.

ALARA

SGT is committed to the ALARA philosophy.

The primary emphasis of SGT's ALARA program is dose prevention, not dose tracking, and SGT continually strives to improve its ALARA performance.

The goal of SGT's ALARA program is to minimize personnel exposure and the generation of radioactive waste. This goal is accomplished through comprehensive planning and training and innovative technologies derived from our focus on teamwork and leveraging lessons learned from previous SGR projects.

Award-Winning Projects

Power Engineering Nuclear Project of the Year

- FPL, Turkey Point 3 and 4 RVCH Replacement
- Entergy, ANO 1 SGR and RVCH Replacement
- St Lucie 2 SGR (Diablo Canyon 2 SGR – Runner up)
- Diablo Canyon 1 SGR
- Waterford 3 SGR & RVCH — Finalist

ENR/McGraw-Hill Construction Energy Project of the Year Award

- Callaway SGR
- Salem 2 SGR — Finalist
- Waterford 3 SGR & RVCH — Finalist

Power Magazine Top Plant

- Diablo Canyon 1 SGR
- Waterford 3 SGR & RVCH

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