Company Overview

Sco$ Zepplin

1/15/2018

TECH-ENABLED ENGINEERING AND SOFTWARE PLATFORM FOR THE GLOBAL POWER AND PROCESS INDUSTRIES
SERVING THE POWER & PROCESS INDUSTRIES

POWER

NUCLEAR
- World leader - significant installed base
- All major reactor types
- Expert onsite training and consulting services

FOSSIL
- Coal; clean coal technology
- Natural gas, including IGCC

PROCESS

UPSTREAM OIL AND GAS
- Computer-based tutorials and simulation of production and LNG systems

REFINING / PETROCHEMICAL
- Computer-based tutorials and simulation of all major unit operations
- System and control verification
- Advanced capabilities around concepts, designs and system interactions

We help clients reduce risk, increase revenue and lower costs

This information is qualified in its entirety by the disclaimers set forth on page 2 of this Investor Presentation, available at http://www.gses.com/investors/
PRO-FORMA REVENUE – ~$100M (LTM)¹

By Segment
- Nuclear Training & Consulting: 60%
- Performance Improvement: 40%

By Industry
- Nuclear: 79%
- Fossil: 13%
- Process:
  - Asia: 4%
  - Europe: 3%
  - North America: 93%
- Engineering Services: 4%
- Other: 2%

By Geography
- North America: 75%
- Asia: 12%
- Europe: 12%
- Energy/Other: 3%
- OEMs: 5%
- EPCs: 5%
- Government: 3%

¹ Pro forma for the Absolute Consulting acquisition on September 20, 2017

This information is qualified in its entirety by the disclaimers set forth on page 2 of this Investor Presentation, available at http://www.gses.com/investors/
Where we are headed...
TECH-ENABLED ENGINEERING AND SOFTWARE PLATFORM
FOR THE GLOBAL POWER AND PROCESS INDUSTRIES
COMMERCIAL NUCLEAR
Business Landscape

Delivering the Nuclear Promise

... multiyear strategy to transform the industry and ensure its viability for consumers as well as its essential role in protecting the environment.
NuScale Small Modular Reactor

- Containment
- Pressurizer
- Steam Generators
- Reactor Pressure Vessel (RPV)
- Reactor Core
Reactor Building Cross Section

Reactor Building houses NuScale Power Modules, Fuel Pool, and Reactor Pool
NuScale Power History/Status

- 2000 – DOE MASLWR program
- 2007 – NuScale Power, LLC
- 2008 – Design certification pre-application process started
- 2010 – Single unit simulator commissioned
- 2011 – Fluor becomes lead investor
- 2012 – 12-unit control room simulator commissioned
- 2016 – Design Certification Application (DCA) (12,000+ pages)
- 2017 – DCA accepted for docketing
**Licensed Operators for a 12-Unit Plant**

**10CFR 50.54(m) staffing requirements:**

Table 1. Minimum Requirements\(^{(1)}\) Per Shift for On-Site Staffing of Nuclear Power Units by Operators and Senior Operators Licensed Under 10 CFR Part 55

<table>
<thead>
<tr>
<th>Number of Nuclear Power Units Operating(^{(2)})</th>
<th>Position</th>
<th>One Unit</th>
<th>Two Units</th>
<th>Three Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>One Control Room</td>
<td>One Control Room</td>
<td>Two Control Rooms</td>
</tr>
<tr>
<td>None</td>
<td>Senior Operator</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Operator</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>One</td>
<td>Senior Operator</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Operator</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Two</td>
<td>Senior Operator</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Operator</td>
<td>3</td>
<td>4</td>
<td>5(^{(3)})</td>
</tr>
<tr>
<td>Three</td>
<td>Senior Operator</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Operator</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

5 operators x 6 control rooms = 30  
30 operators x 6 shifts = 180
NRC Audit of Staffing Plan Validation (SPV) Implementation

• August 2016 audit concluded:
  – SPV test methodology was acceptable – scenarios were challenging and well orchestrated
  – Post critique was detailed and appropriately discriminated workload issues
  – Observers provided critical assessment
  – Simulator provided acceptable test platform

• NRC HFE group reported to NRC management that reduced staff at NuScale should no longer be a high risk concern
Benefits of a Simulator

- Design Benefits:
  - System engineering, PRA, Safety Analysis
  - New employee training
- Human Factors Engineering (HFE) program development (NUREG-0711)
- Effective communication tool:
  - Investors
  - Politicians
  - Regulators
  - Customers
  - Public
Multi-unit Severe Accident Modelling using Parallel Processing MAAP4-CANDU – for PSA
SEVERE ACCIDENT SIMULATION IN MULTI-UNIT CANDU REACTORS

MAAP4-CANDU does not have the capability to explicitly model severe accident progression in multiple reactors.

Previously, the severe accident progression in multiple reactors-unit is simulated by one of two methods:

1. Scaling down the containment and multiplying the fission product release by an appropriate factor depending on the number of units undergoing the accident.

2. Running MAAP4-CANDU in benchmark mode. In benchmark mode the mass and energy output from a single unit MAAP4-CANDU simulation is used as an input into a full scale containment model.
SEVERE ACCIDENT SIMULATION IN MULTI-UNIT CANDU REACTORS

Unit 1 MAAP
Unit 2 MAAP
Unit 3 MAAP
Unit 4 MAAP

Manual Calculations and Assumptions
Common Containment

OPG needed an efficient way to model multi-unit severe accident progression with MAAP4-CANDU.
SEVERE ACCIDENT SIMULATION IN MULTI-UNIT CANDU REACTORS

Unit 1 MAAP
Unit 2 MAAP
Unit 3 MAAP
Unit 4 MAAP

Common Containment
HD - Simulation Platform

Standard Interface
Standard Interface
Standard Interface

GSE SYSTEMS®
Human Factors Engineering
GSE technology platform and resources selected to partner with Idaho National Laboratory (INL) to study Human Factors Engineering for the Move to Digital Control Systems – Improved Strategies for Operations

- **Funding by DOE-NE**
- **Drive Innovation**

- **Commercialization End Point**
- **Technology, Regulator and Financial Support**
Generic PWR Simulator
GSE Technology Platform - GPWR

Over 20 Users - Worldwide

- Training
- Cyber Analysis
- HFE
- HIL Testing
- New Model Development
- Modeling Refinement

GPWR Users

- 67% Colleges-Univ.
- 22% Government - Labs
- 11% Commercial

GSE SYSTEMS
Your performance improvement partner
CONCLUSIONS

- Flexible Technology Platform
- Well Benchmarked Globally
- Engineering Grade Application
Thank you
Questions?