Las Vegas March 2017

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- **18 Breakout Session Chairs**
- 20 WTUI Supporting Staff

Conference Highlights

SUNDAY, March 19

5:30 p.m. to 8:30 Exhibitor-sponsored Welcome Reception Exhibit Hall, Pavilion B/C/D

Special raffles (users only) every 30 minutes, beginning at 6 p.m. Great prizes (see p 6 for list). Listen for announcements on the hour and half hour.

MONDAY, March 20

8:00 a.m. to 10:15 Chairman Chuck Casey's Welcome Grand Ballroom WTUI's value proposition, program updates,

treasurer's report,

introductions, presenta-



tions by the authorized service providers (ANZGT, IHI, MTU, TCT) This session sets the tone for the meeting; important to attend.

10:45 a.m. to 11:45 Gas-Turbine Business Update Grand Ballroom

Noted consultant Mark Axford reflects on 2016 market statistics and gives his predictions for 2017. This annual presentation is rated "two thumbs up" by most attendees.

2:30 p.m. to 5:30 Technical Program Begins

Breakout Sessions for the LM2500, LM5000, LM6000, and LMS100 engines (see p 4 for locations, other details).

6:00 p.m. to 9:30 Monday Night Reception Grand Ballroom

Join your colleagues for WTUI's first Monday Night Hoe-down: Tasty country BBQ, good company, entertainment by a highly acclaimed bootstomping band.

TUESDAY, March 21

Noon Awards Luncheon Pavilion A

Recipients of this year's Best Practices Awards for aero-powered generating plants, co-sponsored by WTUI and ČČJ, will be recognized during lunch. Other Western Turbine and vendor awards will be presented as well.

WEDNESDAY, March 22

1:00 p.m. Hoover Dam tour Busses board outside hotel lobby Pre-registration is required. Maximum accommodation is for 160 persons.

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50 Alvin Boyd calls it a career

> WTUI salutes its Secretary for his years of dedicated service to both the user group and the generation sector of the electric power industry



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PRESIDENT'S MESSAGE

WESTERN TURBINE Users

27th Annual Conference and Exhibition

Published by the **COMBINED CYCLE Journal**, **PSI Media Inc**

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Susie Carahalios Carahalios Media 5921 Crestbrook Drive Morrison, Colo 80465 susie@carahaliosmedia.com Tel: 303-697-5009 Fax: 303-697-5709 elcome to the Western Turbine Users Inc's (WTUI) 27th annual technical conference and exposition. Our mission remains to advance the reliability and operability of the General Electric line of aeroderivative gas turbines.

On behalf of the Board of Directors, Officers, and support staff, thank you for being a part of Western Turbine Users' 27th year of collaboration. What started as a small group of users to discuss their operational issues has now grown to be the largest LM user group in the world.

The power generation industry is changing quickly. As coal and nuclear plants are decommissioned simultaneously, the federal Clean Power Plan mandates historic levels of renewable energy supply challenging our LM turbines to start faster, start more often, and operate at lower emissions, lower power turndown, and higher output—all while staying reliable and available, and under budget.

Natural gas prices are at 20-year lows and experts expect them to remain at about this level in the near term, amplifying the relevance of gas turbine/generators. To remain competitive, you must maximize the flexibility of your aeroderivative engines to meet the needs of owners and regulators, and the "black box" future.

Please join me in sharing experiences with other LM users. We must challenge equipment suppliers to improve their products as we strive to improve the performance and extend the lives of our gas turbines and all support equipment. As a WTUI member your conference contribution is at the root of our success. You are a vital element of this volunteer organization as we answer the challenges ahead.

Chuck Casey, Riverside Public Utilities President, WTUI



The leading forum for aero users provides owner/operators of LM2500, LM5000, LM6000, and LMS100 gas turbines an opportunity to network with peers, and service providers, to identify opportunities for improving engine performance, availability, and reliability while holding emissions to the lowest practicable levels.

Program is under development. Prospective **delegates** and **exhibitors** are urged to contact WTUI conference staff today, by e-mail (info@wtui.com), and ask to be placed on the mailing list for meeting announcements as they are made available.

TECHNICAL

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Where to go (see floor plan, p 8)

Registration: Renaissance Ballroom Foyer Exhibition: Convention Center Breakfasts: Renaissance Ballroom Foyer Luncheons: Convention Center LM2500 Breakout Meetings: Renaissance Mojave Chair: John Baker, Riverside Public Utilities LM5000 Breakout Meetings: Renaissance Pasadena Chair: Perry Leslie, Wellhead Services Inc LM6000 Breakout Meetings: Renaissance Catalina/Madera Chair: Andrew Gundershaug, Calpine Corp LMS100 Breakout Meetings: Renaissance Sierra/Ventura Chair: Jason King, DGC Operations Sunday, March 20 AFTERNOON 2:00 to 7:30 Registration

3:30 to 5:30 New User Orientation/SPS Introduction, Renaissance Andreas Bryan Atkisson, Riverside Public Utilities **Registered active users only**

EVENING

5:30 to 8:30 Welcome Hospitality Reception, Convention Center All conference attendees and spouses/guests

Monday, March 21

| | MORNING |
|---|---|
| | 7:00 to 4:00 Registration |
| | 7:00 to 8:00 Breakfast |
| | All registered conference attendees |
| | 8:00 to 9:00 General Session, Catalina/Madera/Pasadena |
| | All registered conference attendees |
| | 9:00 to 5:00 Exhibit Hall open |
| 1 | Must have name badge to enter |
| | 9:00 to 10:15 Depot Presentations, <i>Catalina/Madera/Pasadena</i> |
| | All registered conference attendees |
| | 10:15 to 10:45 Break, Convention Center |
| | 10:45 to 11:45 Gas-Turbine Business Update, Catalina/Madera/Pasadena |
| | Mark Axford, Axford Turbine Consultants LLC |
| | All registered conference attendees |
| | 11:45 to noon GE Services Presentation, |
| | Catalina/Madera/Pasadena |
| | All registered conference attendees |
| | AFIERNOON |
| | Noon to 2:30 Lunch/Exhibits, Convention Center |
| | All registered conference attendees |
| | 2:30 to 5:30 Breakout Meetings: LM2500, LM5000, LM6000, LMS100 |
| | Users, Depots, and GE only |
| | EVENING |

6:30 to 11:00 Monday Night Reception, Renaissance Pool Deck All registered conference attendees and registered spouses/guests. Must have name

badge and must be 21 years old for entry.

Western Turbine Users Inc

PROGRAM AS O

As of Feb 15

Tuesday, March 22 MORNING

| 7:00 to 4:00 | Registration |
|---------------|--|
| 7:00 to 8:00 | Breakfast |
| | All registered conference attendees |
| 8:00 to 4:30 | Exhibit Hall open |
| | Must have name badge to enter |
| 8:00 to 9:30 | Breakout Meetings: LM2500, LM5000, LM6000, LMS100 |
| | Active users only |
| 9:30 to 10:00 | Break, Convention Center |
| 10:00 to noon | Breakout Meetings: LM2500, LM5000, LM6000, LMS100 |
| | Users, Depots, and GE only |
| AFTERNOON | l i i i i i i i i i i i i i i i i i i i |
| Noon to 4:30 | Lunch/Exhibits, Convention Center |
| | All registered conference attendees |
| 2:30 to 5:30 | Special Technical Presentations |
| | All registered conference attendees |
| 2:30 to 3:30 | "Aero GT Control Systems 101," Catalina/Madera |
| | Mike Toll, Woodward Inc |
| | "EMI Diagnostics for Condition-Based |
| | Generator Testing," Sierra/Ventura |
| | James Timperley, Doble Engineering Co |
| | "Effects of California's Cap-and-Trade on the |
| | Power Sector," <i>Mojave</i> |
| | Jackie Ferlita, Element Markets Inc |
| 3:30 to 4:30 | "Importance of LM6000 OEM-Prescribed |
| | Maintenance, Catalina/Madera |
| | Dale Reed, Reed Services IIIc |
| | Ned Canadan LIPST Inc |
| | "Surregate Technologies for Water Chemistry" |
| | Mojave |
| | Denton Slovacek, Hach Company |
| 4:30 to 5:30 | "LM Engine Component Repair Options," Catalina/Madera |
| | Rick Kowalski, MT R&O LCC |
| | "Software-Based Emissions Monitoring," Sierra/Ventura |
| | Aaron Dodgson, Rockwell Automation Inc |
| | "Performance Testing: Boring is Good," |
| | NIOJAVE |
| | lina loduren, 12E3 |
| | |

Wednesday, March 23 MORNING

7:00 to 8:00 Breakfast 8:00 to 10:30 Breakout Meetings: LM2500, LM5000, LM6000, LMS100 Users, Depots, and GE only

10:30 to 10:45 Break, *Renaissance Ballroom Foyer* 10:45 to 11:45 GE New Products Update, *Catalina/Madera/Pasadena*

All registered conference attendees

11:45 to noon Wrap-up/Adjourn, *Catalina/Madera/Pasadena*

All registered conference attendees

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27th Annual Conference, Las Vegas, 2017

SOCIAL FUNCTIONS

he Western Turbine Users' annual meeting returns to Las Vegas for the third time in 2017. The organization's first visit here was in 1994, second in 2001; attendance records were set on both occasions. For those visiting Las Vegas for the first time, this is a favorite venue of many WTUI members: There's so much to do in this entertainment-rich city when the technical sessions are over and the exhibit hall is closed. If you run out of ideas, just visit the concierge desk at the South Point.

Social events are critical to the success of every user group because they enable attendees to meet in a relaxed environment and expand their networks for problem-solving. The WTUI is hosting several important functions as part of its 27th annual conference; they would not have been possible without the financial support of sponsors identified on signage in the exhibit hall and on the special acknowledgments page of this guide (p 38). Please thank them when you have the opportunity. Below are short descriptions of social events you won't want to miss.

Sunday: Exhibitor-Sponsored Hospitality Reception. This event, which includes the opening of the exhibition, begins promptly at 5:30 p.m. in Pavilion B/C/D and runs until 8:30. All conference attendees and spouses/ guests are invited. If you get lost, consult the South Point floor plan provided on p 8.

You get to meet with old friends, find new ones, visit vendors, and have some food while listening for your name to be announced as the winner of one of several special raffle prizes. Raffles are conducted at the top and bottom of every hour (users only), beginning at 6 p.m. Here's the lineup:

| 6:00 | iPad Mini 2 (16 GB). |
|------|---------------------------|
| 6:30 | GoPro® Hero LCD. |
| 7:00 | iPad Mini 2 (32 GB). |
| 7:30 | Apple Watch. |
| 8:00 | Apple iPad Air 2 (32 GB). |
| 8:30 | Apple iPad Air 2 (128 GB) |

Monday: The spouse tour is a five-hour excursion (bus loads at 9:30 a.m. outside the South Point lobby, returns at 2:30) that provides a glimpse into the extravagant lifestyle of the famousspecifically Wayne Newton's mansion (Casa de Shenandoah) and his mostprized Native American artifacts and remembrances from US presidents. The mansion is adorned with Louis XV and XVI antique furniture and his private art collection—including works by Renoir, Leroy Neiman, and Margaret Keane. You'll also see Newton's Aramus Arabian horses and exotic animal collection. A special fee of \$75 covers the tour and a surf-and-turf luncheon on the entertainer's back patio.

The Monday Night Reception. WTU's first Monday Night Hoe-down: Tasty country BBQ, good company, entertainment by a highly acclaimed boot-stomping band. Participation is exclusive to registered attendees and registered spouses/guests. Must have name badge and be 21 years old for entry.



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ACRONYMS TO REMEMBER

AGB—Accessory gearbox (also called the transfer gearbox)

AVR—Automatic voltage regulator

CCM—Condition maintenance manual

CCR–Customized customer repair

CFF—Compressor front frame COD—Commercial

operating date

CPLM—Critical-parts life management

CRF—Compressor rear frame

CWC–Customer web center (GE)

DEL-Deleted part

DLE–Dry, low emissions combustor

DOD–Domestic object damage

- EM—Engine manual
- FFA—Front frame assembly
- FOD—Foreign object damage
- FPI—Fluorescent penetrant inspection
- FSNL—Full speed, no load

GG—Gas generator (consists of the compressor and hot sections only)

GT—Gas turbine (consists of the gas generator pieces with the power turbine attached)

- HCF-High-cycle fatigue
- HGP-Hot gas path

HPC—High-pressure compressor

HPCR—High-pressure compressor rotor

HPCS—High-pressure compressor stator

HPT—High-pressure turbine

HPTN—High-pressure turbine nozzle

HPTR—High-pressure turbine rotor

IGB-Inlet gearbox

IGV–Inlet guide vane

IPT—Intermediate-pressure turbine (LMS100) IRM—Industrial repair manual

LM–Land and marine

LCF-Low-cycle fatigue

LO–Lube oil

LPC—Low-pressure compressor (not on LM2500; just LM5000 and LM6000)

LPCR—Low-pressure compressor rotor

LPT—Low-pressure turbine

LPTR—Low-pressure turbine rotor

LPTS—Low-pressure turbine stator

NGV–Nozzle guide vane

OEM—Original equipment manufacturer

PN—Part number

PT—Power turbine (turns a generator, pump, compressor, propeller, etc)

PtAl-Platinum aluminide

RCA-Root cause analysis

RFQ-Request for quote

RPL-Replaced part

SAC—Single annular combustor

SB–Service bulletin

SL–Service letter

SUP—Superseded part

STIG—Steam-injected gas turbine

TA—Technical advisor

TAT—Turnaround time

TAN—Total acid number (lube oil)

TBC—Thermal barrier coating

TGB—Transfer gearbox (also called the accessory gearbox)

TMF—Turbine mid frame and thermal mechanical fatigue

VBV—Variable bleed valve (not on LM2500; just LM5000 and LM6000)

VIGV–Variable inlet guide vanes

VSV–Variable stator vane

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- Assessment of maintenance

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- Onsite engine unpacking and installation
- Post overhaul engine start-up and system check

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WESTERN TURBINE LEADERSHIP TEAM

OFFICERS Chuck Casey

President Chuck is Utility Generation Manager for Riverside Public Utilities (Calif), which serves 280 MW over 105,000 electric residents and business customers with an



LM2500 combined cycle, four LM6000 peakers, and four GE10B1 peakers. He has 30 years of generation experiencespecializing in plant construction and commissioning, and regulatory compliance. Before joining Riverside in 2004, Chuck was a plant operator, I&E technician, plant manager. and consultant for Stewart & Stevenson, GE, and PurEnergy. He began his career as a nuclear electrician on US Navy fast attack submarines. Chuck was elected President of WTUI in 2013; during his 16 years with Western Turbine he has been LM6000 session chair, secretary, exhibit hall manager, and a member of the Board of Directors. He also serves as Chairman of the Southern California Public Power Authority Generation Group and participates in other industry user groups.

Jim Bloomquist

Vice President Jim served as a WTUI board member before being elected one of the organization's vice presidents. He has more than 40 years of experience with Chevron and is a



subject-matter expert specializing in major electrical power systems and process and gas-turbine cogeneration facilities. Jim currently leads the Electrical Engineering Team for Chevron's California San Joaquin Valley Business Unit, an upstream oil producing company.

Bill Lewis

Vice President Bill is Plant Manager of a 700-MW combined-cycle facility in Lebanon, Pa. Previously, he was Plant Manager of PPL Generation LLC's Lower Mount Bethel Ener-



gy LLC. Before that assignment, he was responsible for the company's simple-cycle peaking gas turbines located in Connecticut, Pennsylvania, and Illinois. Lewis served six years in the US Navy as a Gas Turbine Specialist, rising to the rank of Petty Officer First Class before taking a shore-side job.

David Merritt

Vice President David, the Deputy General Manager for Kings River Conservation District, oversees the power generation and development, flood maintenance, and environmental



divisions. Previously, he spent 19 years with GWF Power Systems/GWF Energy LLC. There David managed three facilities, four LM6000 peakers, and a 23-MW solid-fuel-fired combustor with a steam turbine. Before joining GWF, David served in the US Navy.

Ed Jackson

Vice President Ed is Plant Manager of Missouri River Energy Services' Exira Generating Station in Brayton, Iowa. His gas-turbine experience includes Allison 501s, Solar Centaurs,



LM2500s, and LM6000s. Previously he was a combined-cycle plant supervisor at Maui Electric Co and a field service and commissioning engineer for Stewart & Stevenson. Jackson spent eight years in the US Navy as a GT systems technician (electrical).

Wayne Kawamoto

Treasurer

Wayne is one of the founders of the Western Turbine Users and has served on the Board and as Treasurer since incorporation. He has a BS degree in Civil Engineering

from the University of Hawaii and has held numerous positions in project management throughout his 40+ years of professional employment. Wayne is the Plant Manager of Corona Energy Partners Ltd.

Alvin Boyd

Secretary

Alvin has been working since May 2015 as an independent contractor for companies requiring his LM6000 and general powerplant expertise. He was O&M manager at Kings River Conservation District's Malaga Peaking Power Plant which was sold last spring. Before joining KRDC in 2011, Alvin spent 24 years at the Pasa-



dena (Calif) Water & Power Dept as power production superintendent managing the city's Broadway and Glenarm plants. He served nine years in the US Navy, mustering out as a Machinist Mate 1/c. Alvin served on the WTUI Board of Directors from 2008 to 2013, when he was elected secretary and co-manager of the exhibit hall.

BOARD OF DIRECTORS

John Hutson

Board Member John is a plant manager for NAES at the Orange Grove Energy Center in California's San Diego County. He has over 20 years of powergeneration experi-



ence—six years in the US Navy, four years on Siemens frame units, and eight years on GE aero engines. John has managed O&M for both LM2500 and LM6000 engines. He has a BS in Nuclear Engineering Technology from Thomas Edison State College and an MBA from the Univ of Connecticut.

Charles Lawless

Board Member Charles joined Southern California Edison Co as an IC&E technician in 2007 after serving as an electrician's mate on a nuclear submarine from 1998 to 2007.



At SCE, he was assigned to five LM6000 peakers. Charles earned a Bachelor's in Business Administration in 2012 and an MBA in 2013 from the Univ of Phoenix. He was promoted a year later to O&M supervisor for the utility's peakers. More recently he was appointed maintenance supervisor for two 7FA frame engines. SCE experience also includes responsibility for 25 solar PV installations and two fuel-cell plants.

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GROOME INDUSTRIAL SERVICE GROUP

Andrew Robertson, PE

Board Member Andrew works for Wellhead Services Inc as a plant manager in the Fresno area. He oversees the O&M for an LM6000-powered combined cycle, simple-cycle LM6000, two plants equipped



with P&W FT4s, and two 1.5-MW solar facilities. Andrew has been with Wellhead for 14 years and is a subject-matter expert for SCRs and emissions monitoring systems. Before joining Wellhead he spent seven years at Air Products & Chemicals managing cylinder filling operations and distribution. Andrew served five years in the US Navy as a nucleartrained officer in the submarine service. He has a BS in Mechanical Engineering from the Univ of California.

Jermaine Woodall

Board Member Jermaine is a Fleet O&M Manager for Exelon Generation. He has worked in various powerplant settings comprised of peaking units, frames, and



WESTERN TURBINE LEADERSHIP TEAM

renewables. Jermaine brings 15 years of industry experience to WTUI, gained in positions such as Instrumentation Controls & Electrical Technician. He also served in the US Navy for 10 years as an Aviation Electrician's Mate. An alumnus of the University of Phoenix, his academic credentials include Master of Business Administration and Bachelors of Science in Management with a minor in Electronics.

Devin Chapin

Board Member Devin has over 20 years of experience in power generation. For the past 15, he has worked at Turlock Irrigation District (Calif), a municipal utility. Devin is Power Plant Super-



visor, responsible for O&M management at TID's Almond Power Plant, which has four LM6000s. The oldest of these is a steaminjected LM6000PC Sprint, converted from an LM5000 STIG in 2003. The remaining three gas turbines represent GE's first production LM6000PGs, which are operated in simple-cycle mode and are valued for their rapid start capability. Devin has been involved with the LM6000PG project from the design phase through construction, commissioning, and commercial operation.

Howard Hoffmann

Board Member Howard works in Ameren Missouri's turbine engineering organization, which is responsible for O&M of the company's 14 gas-turbine facilities; it also provides engi-



neering support on steam turbines. At Ameren he has managed five simple-cycle energy centers equipped with LM6000s, plus GE and Siemens frames 7EA, 6B, and 501D5A. Howard's 25+ years of experience in power generation includes manager of engineering for an unregulated fleet of assets and field engineer for GE Power Systems.

Rick McPherson

Board Member Rick is plant manager of NRG's Walnut Creek Energy Park in the Los Angeles Basin, which is equipped with five LMS100 peakers. He has been involved with the project since con-



struction. Prior to joining NRG, Rick spent 26 years at Edison Mission Energy where

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he served as maintenance supervisor, operations supervisor, senior wind project manager, and plant manager at various projects in California, Utah, and Wyoming equipped with GE 7Es, Suzlon wind turbines, and LMS100s.

BREAKOUT SESSION CHAIRS

Bryan Atkisson

New Users Bryan is a Plant Manager for Riverside Public Utilities (Calif) with responsibility for four LM6000PCs and four GE10B1 peaking gas turbines. He has 16



years of experience operating and maintaining LM6000s and was involved in the construction and commissioning of the four Riverside units that he now manages. Bryan served eight years in the US Marine Corps, most of that time spent performing GT overhauls as a jet engine mechanic. He served WTUI as the LM6000 session chair for six years prior to joining the Board of Directors in 2013.

WESTERN TURBINE LEADERSHIP TEAM

Garry Grimwade LM2500

At Riverside (Calif) Public Utilities, Garry is responsible for operating and maintaining four LM6000s, four GE10s, and an LM2500-powered combined cycle.



Before his involvement with land-based aero engines, Garry spent a decade working with "big iron," including a 700-MW merchant facility and two GE "H" frames. He immigrated to the US in 1994 from the UK and joined the US Navy as an aviation machinist's mate, serving as a special-missions crewman. After leaving the service, Garry spent five years at the Pacific Gas Turbine Center (FAA Repair Station) as the lead in the rotor-balance department overhauling JT-8 and JT-8D engines.

Perry Leslie

LM5000 Perry has been a Plant Technician for Wellhead Electric Co at the Yuba City Cogeneration Plant since 2004. Respon-



sibilities include I&C and mechanical maintenance, and operations. He also is the GT management team leader for Wellhead. Previously, Perry spent six years as a field service technician for GE in the Bakersfield area, working on LM1600, LM2500, LM5000, and LM6000 engines. Earlier, he served in the US Navy for six years as a GT systems technician—electrical (GSE).

Andrew Gundershaug

LM6000

Andrew is the plant manager for Calpine Corp's Northern California Peakers (seven LM6000s). Previously he held various other positions at the company's generating assets in Northern California—including



operations manager, maintenance manager, DCS technician, and IC&E tech. He has been with Calpine since entering the industry in 1998 as IC&E tech at the Watsonville Cogeneration Plant, following graduation from UC Santa Cruz. Andrew currently is serving his fourth year as the LM6000 Breakout Session chair; the previous three years he served as LM5000 Breakout Session chair.



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Jason King LMS100

Jason currently works for DGC Operations LLC as the O&M Manager for Sentinel Energy Center LLC in North Palm Springs, Calif. He is responsible for the



safe operation and maintenance of eight LMS100 peaking gas turbines. Prior to joining the Sentinel Project in 2012, Jason served as the Plant Manager for Wildflower Energy LP where he was responsible for the safe operation of five LM6000s. Jason has worked in the power generation business for over 15 years and has experience ranging from construction, commissioning, and operations of both LMS100 and LM6000 gas turbines. Prior to working in power generation, Jason served five years in the US Marines Corps as a helicopter gas-turbine mechanic.

SUPPORTING STAFF Mike Raaker

Historian/Ambassador

What do diapers, toilet paper, jet engines, and WTUI have in common? Mike Raaker. He started his career at Procter & Gamble, assigned to install a cogeneration plant at the company's



towel and tissue plant in Oxnard, Calif. The LM2500-powered facility would keep Mike busy for the next 30 years and would lead to his, and wife Charlene's, participation in WTUI.

Charlene Raaker

Registration Coordinator

As WTUI's Registration Coordinator (and Mike Raaker's better half), Charlene has been supporting the organization for almost as long as it has been in existence. Charlene's is the "voice on the



other end of the line" whenever anyone calls the group.

Wayne Feragen

Webmaster Wayne is Senior West Coast Plant Manager for Noresco, currently responsible for powerplants in Colton, Calif, and San Diego. Wayne



has over 23 years of powerplant experience, starting as a Gas Turbine Electronics Technician First Class in the US Navy. After leaving the service, he went to Newark Pacific Paperboard and ran an LM2500. After that, he worked at two Sunlaw plants running LM2500s. Wayne has served as WTUI's Webmaster for the last eight years.

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ORAP® UPDATE

Automated data collection assures accuracy

By Salvatore A DellaVilla Jr, CEO, Strategic Power Systems[®] (SPS)

t is important that SPS continue to provide industry benchmarks leading up to, and during, the annual WTUI conference. Your participation in the ORAP[®] program allows us to aggregate data and provide meaningful analytics to the group.

Our effort to provide the high-quality information required for decision-making demands automated collection of data from the control system. We bring this to your attention now because our engineers and analytics team are seeing more and more issues related to the manual submittal of data. For example, you may have noticed that we do not provide any metrics for starting reliability. Our experts are concerned that the information submitted to SPS regarding starts is increasingly inaccurate and we are not confident in the starting reliability data to provide it as an industry benchmark. As stated in IEEE Standard 762, the document SPS uses to guide the processing of ORAP data, "a starting failure is an unsuccessful attempt to bring a unit from shutdown to the in-service state within a specified period (which may be different for individual units). Repeated initiations of the starting sequence without accomplishing corrective repairs are counted as a single attempt." Simply, if the unit does not reach breaker closure in a specified period of time, it is considered a failure to start.

Additionally, we are questioning much of the information reported to us from NERC GADS. We continually see issues in the fidelity of the data as that information relates to causes of downtime and duration. Our engineers have conducted a dataquality comparison referencing one of our long-time customers that recently moved from submitting data directly to us versus submitting NERC GADS data.

We found NERC GADS data are inherently high-level and do not have the same granularity of detail that ORAP requires. Plus, NERC GADS does not require users to identify component-level root causes to forced-outage events, a detail that creates issues when trying to compare this customer to the rest of the fleet.

These data also raise concerns with the manufacturer. Periodically, we conduct quality reviews with the OEMs. During these reviews we often are questioned on the accuracy of events that have been

submitted from NERC GADS reports. All the issues identified above make it difficult to use NERC GADS data to allow meaningful and accurate comparison with the rest of the fleet in ORAP.

The easiest way to remedy these issues is by use of automated data collection from the control system. By

WEST

automating the data, the system records each mission, from startup to shutdown including all major states from signal to start, through the permissives, to ignition, flame established, acceleration, breaker closure, through each change in load state, to shutdown, and then the cool-down period. This is the only way to eliminate human error and ambiguity and ensure data accuracy.

However, we still do need input from your maintenance staff regarding the symptom, corrective action, and eventually the root cause of outages to ensure that the full scope of the event is captured correctly. There always will be a human element to this reporting.

Table 2: Comparing capacity(CF) and reserve standby (RSF)factors regionally

| Parameter | 2016 Aero | 2011-2015 Aero |
|---------------------------------------|--------------|-------------------|
| West | | |
| CF, % | 13.6 | 20.5 |
| RSF, % | 72.9 | 67.8 |
| Midwest: | | |
| CF, % | 21.3 | 10.8 |
| RSF, % | 67.9 | 75.4 |
| Northeast: | | |
| CF, % | 25.8 | 15.5 |
| RSF, % | 65.4 | 71.2 |
| South: | | |
| CF, % | 15.4 | 13.9 |
| RSF, % | 72.7 | 76.4 |
| Note: West includes Alaska and Hawaii | | |



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ORAP® UPDATE

That said, SPS has prepared the latest RAM KPIs from ORAP (Table 1). Our engineers have completed an exhaustive review of the data and analyzed it for accuracy. The information compiled in the table comes from 607 aero units for 2016 and 1,092 units for the 2011-2015 period. The aeroderivative gas turbines in the sample include engines from GE, P&W, and Siemens AGT (formerly Rolls-Royce) and represent units operating worldwide.

There was a minimal increase in annual operating (service) hours for peaking units from the 2011-2015 period to 2016; availability decreased by about 1.1% for 2016 and reliability was pretty consistent within the two time periods. Cycling units operated 163 hours less in 2016 than they averaged in 2011-2015; availability stayed exactly the same, while reliability decreased slightly (0.1%). Baseload units operated 176 less hours in 2016 versus 2011-2015 and annual starts decreased.

The regional analysis in Table 2 shows capacity factor was down by 6.9% in the West, but showed an increase of 10.5% and 10.3% in the Midwest and Northeast, respectively. Another interesting thing to note is that all regions with the exception of the West, had a reduction in reserve standby factor.

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Purple

One-day pass, Tuesday only *Must have membership*

Green

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Program is under development. Prospective **delegates** and **exhibitors** are urged to contact WTUI conference staff today, by e-mail (info@wtui.com), and ask to be placed on the mailing list for meeting announcements as they are made available.



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WTUI EXHIBIT HALL



EXHIBIT HALL

Alphabetical order by company as of February 15

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| AAF International112 |
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| Advanced Filtration Concepts |
| Advanced Turbine Support LLC |
| Aero Controls & DLE Consultant |
| Aero Land & Marine LLC 110 |
| AGTServices 206 |
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| Airflow Sciences Corp |
| Airgas Specialty Products |
| Ameridrives |
| AMETEK Power Instruments |
| AP+M |
| Arnold Group |
| Babcock & Wilcox |
| Baseload Power and Generation Parts & Services LLC |
| BASE Corp |
| Beamex |
| Borri Power (US) Inc1008 |
| Braden Manufacturing LLC123 |
| Bradly Griffin LLC 1124 |
| Bremco Inc |

| Company | Booth |
|---|-------|
| Brush Aftermarket | 124 |
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| Camfil Power Systems | 805 |
| CEMTEK Environmental | 811 |
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| Danfoss High Pressure Pumps | 127 |
| Dekomte de Temple LLC | 1012 |
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| Evoqua Water Technologies | 101 |
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| Forney Group | 1103 |
| Fossil Energy Research Corp (FERCO) | 200 |
| Fusion Inc | 1108 |



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| GE | | NANO Co Ltd | |
| GE Inspection Technologies | | National Breaker Services | |
| GE Power | | National Electric Coil | |
| Global Industrial Solutions | | National Mechanical Services Inc | |
| W L Gore & Associates Inc | | Nederman/Pneumafil | |
| Groome Industrial Service Group | | OEM Parts Network | 727 |
| GSF Services | 1126 | Olympus America | |
| GT Ice | | Orr Protection Services | |
| Hach Company | | Parker Hannifin Corp | |
| Haldor Topsoe Inc (SCR Group) | | Peerless-Aarding | |
| Hilco | 726 | Peter Paul Electronics Co | |
| Hill Brothers Chemical Co | | Petrotech Inc | |
| HRST Inc | | PME Babbitt Bearings | |
| Hy-Pro Filtration | | Precision Iceblast Corp | |
| IHI | | Primoris ARB Inc | |
| Innovative Steam Technologies | | ProEnergy Services | |
| Integrated Turbomachinery Inc | 210 | Protec Services Inc | 1123 |
| Iris Power-Qualitrol | 211 | Proven Compliance Solutions Inc | |
| Jet Aviation Specialists Inc | | Puretec Industrial Water | |
| Johnson Matthey | 212 | Quality Generator Services | |
| Kidde Fire Systems | | Quality Industrial & Marine | |
| Kobelco Compressors America Inc | | Quest Integrity Group LLC | 1125 |
| Koenig Engineering Inc | 213 | Randall Environmental | |
| M & C Tech Group NA | | Relevant Solutions LLC (Switch Filtration) | |
| Maximum Turbine Support Inc | | REXA | |
| Mee Industries Inc | | Robinson Fans Inc | 1009 |
| Meggitt | | Rochem Technical Services USA Ltd | 813 |
| Metrix Instrument Co | | Score Energy Ltd | 705 |
| MFE Rentals | 1113 | SISU Energy & Envirnomental | |
| Mitsubishi Hitachi Power Systems Americas Inc | | S J Turbine Inc | |
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| Stellar Energy | |
| Strategic Power Systems Inc | 413 |
| STS Aviation Group | |
| Sulzer Turbo Services Houston Inc | |
| SVI Dynamics | |
| Sweeney/Hydratight Brand | |
| Synergy Catalyst | |
| T2E3 Inc | 913 |
| TAS Energy | 701 |
| Tech Development | |
| Technical Training Professionals | 201 |
| TMEIC Corp | |
| TransCanada Turbines Ltd | |
| Turbine Generator Maintenance | |
| Turbine Inlet Cooling Association | |
| Turbine Technics Inc | |
| Turbine Technology Services Corp | |
| TVS Filters | |
| Universal Analyzers Inc | |
| USA Borescopes | 1129 |
| VAW Systems | |
| Vector Systems Ltd | |
| Weir Specialty Pumps (Roto-Jet) | |
| Wellhead Construction Inc | 815 |
| WK Enterprises | 1131 |
| Woodward Inc | |
| World of Controls Corp | |
| Wunderlich-Malec | |
| Zokman Products Inc | |

EXHIBIT HALL

Numerical order by booth number as of February 15

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| 101 | Evoqua Water Technologies |
| 104 | Gas Turbine Controls Corp |
| 105 | Champion GSE |
| 106 | Advanced Chemical Technology Inc |
| 107 | Advanced Turbine Support LLC |
| 108 | Wunderlich-Malec |
| 109 | |
| 110 | Aero Land & Marine LLC |
| 111 | Air Hygiene |
| 112 | AAF International |
| 113 | Babcock & Wilcox |
| 115 | Advanced Filtration Concepts |
| 1200 | Concord Management Services/Concord Engineering |
| 121 | Airgas Specialty Products |
| 122 | BASF Corp |
| 123 | Braden Manufacturing LLC |
| 124 | Brush Aftermarket |
| 125 | CLARCOR Industrial Air |
| 126 | |
| 127 | |
| 128 | Detector Electronics Corp |
| 129 | Electrical Maintenance Consultants Inc |
| 130 | Environex Inc |
| 131 | Aero Controls & DLE Consultant |
| 200 | |
| 201 | Technical Training Professionals |
| 205 | Primoris ARB Inc |

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| Booth | Company |
|-----------------------|-----------------------------------|
| 206 | AGTServices |
| 207 | GT Ice |
| 208 | Hach Company |
| 209 | HRST Inc |
| 210 | Integrated Turbomachinery Inc |
| 211 | Iris Power-Qualitrol |
| 212 | Johnson Matthey |
| 213 | Koenig Engineering Inc |
| 215 | Woodward Inc |
| 221 | Zokman Products Inc |
| 222 | Mee Industries Inc |
| 223 | Metrix Instrument Co |
| 224 | Munters Corp |
| 225 | National Breaker Services |
| 226 | Olympus America |
| 227 | Orr Protection Services |
| 228 | Peter Paul Electronics Co |
| 229 | PME Babbitt Bearings |
| 231 | . Groome Industrial Service Group |
| 301 | GasTOPS Ltd |
| 305 | Maximum Turbine Support Inc |
| 306 | ECT Inc |
| 308 | Randall Environmental |
| 310 | Haldor Topsoe Inc (SCR Group) |
| 312 | Jet Aviation Specialists Inc |
| 313 | Chromalloy |
| 321 | IHI |
| 322 | Puretec Industrial Water |
| 324 | TVS Filters |
| 326 | Petrotech Inc |
| 327Baseload Power and | d Generation Parts & Services LLC |
| 328 | Quality Generator Services |
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Company

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|--------|-----------------------------------|
| 1024 | Nalco Co |
| 1025 K | obelco Compressors America Inc. |
| 1025 | National Electric Coil |
| 1020 | |
| 1027 | Peerless-Adruing |
| 1028 | Innovative Steam Technologies |
| 1029 | Stellar Energy |
| 1031S | ulzer Turbo Services Houston Inc |
| 1100 | STS Aviation Group |
| 1103 | Forney Group |
| 1105 | Ameridrives |
| 1106 | Beamex |
| 1108 | Fusion Inc |
| 1110 | Proven Compliance Solutions Inc |
| 1111 | Kidde Fire Systems |
| 1112 | Filtration Group |
| 1113 | MFE Rentals |
| 1115 | |
| 1117 | Doble Engineering Co |
| 1117 | Donaldson Company Inc. |
| 1113 | National Machanical Convises Inc. |
| 1121 | National Mechanical Services Inc |
| 1127 | |
| 1123 | Protec Services Inc |
| 1124 | Bradly Griffin LLC |
| 1125 | Quest Integrity Group LLC |
| 1126 | GSF Services |
| 1127 | Spectrum Systems Inc |
| 1128 | Eastman Chemical Co |
| 1129 | USA Borescopes |
| 1131 | WK Enterprises |
| | |

| Booth | Company |
|------------|-----------------------------------|
| 010 | SVI Dynamics |
| 910 | Tech Development |
| Q12 | Turbine Technology Services Corp. |
| 91Z | T2F3 Inc |
| 915 | Parker Hannifin Corn |
| 915 920 | |
| 920 | CleanAir Engineering |
| 921 077 | StandardAero |
| 922 073 | Superay Catalyst |
| 923 | TMEIC Corp |
| 925 925 | Liniversal Analyzers Inc |
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| 928 | Sweenev/Hydratight Brand |
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| 931 | Nederman/Pneumafil |
| 1000 | Caldwell Energy |
| 1001 | World of Controls Corp |
| 1005 | Precision Iceblast Corp |
| 1006 | AMETEK Power Instruments |
| 1007 | Bremco Inc |
| 1008 | Borri Power (US) Inc |
| 1009 | Robinson Fans Inc |
| 1010 | Clean and Science Co Ltd |
| 1011 | |
| 1012 | Dekomte de Temple LLC |
| 1013 | Drake Controls LLC |

1015.....ProEnergy Services 1021.....SSS Clutch Co 1022.....Emerson Automation Solutions



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Western Turbine history

Editor's note: "It is an interesting and challenging proposition to look back over time. Remembering and reconstructing events, like beauty, is in the eyes of the beholder. However, there are circumstances that demand a look back, and, typically, these circumstances are related to people whose contributions have made, and continue to make, a difference. And that describes WTUI to a tee.

"Since its inception, it has been a group of people with a mission and that mission has been all about adding value." hese words from Sal DellaVilla, CEO, Strategic Power Systems Inc, provided motivation for this section covering the many facets of WTUI history: the pre-incorporation years, the years since incorporation, and the LM engines themselves.

WTUI has a history primarily because of people like Wayne Kawamoto, Mike Raaker, DellaVilla, Mark Axford, Steve Johnson, and a few others who have been around since before the beginning of the organization, have good memories, took good notes, and are loathe to deposit in the circular file anything that someday might be of value. All contributed to this historical perspective on the world's largest independent user organization dedicated to gas turbines. As you read the next few pages, keep in mind that the company and plant affiliations cited are consistent with the timing of the reference. In some cases, the individuals mentioned are still employed by those organizations, in others the companies may no longer exist, or plants have been renamed.

Before incorporation

The history of WTUI dates back about 10 years prior to incorporation. During the late 1970s, the US was challenged with oil and gas shortages and record-high fuel prices—much of this caused by wasteful



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energy practices. Remember when automobiles were averaging 9 mpg and some power boilers were operating at efficiencies as low as 60%?

In 1978, President Jimmy Carter signed into law the Public Utility Regulatory Policies Act (Purpa), aimed at correcting some of the problems. For the first time, utilities were required to purchase electricity from qualified cogenerators at a price equivalent to what it would have cost the utilities to produce the same power with their least-efficient equipment. This had two effects: It forced the utilities to shut down marginal equipment and it ushered in the era of high-efficiency cogeneration facilities.

The 15-yr power-purchase contracts typical of that time were particularly advantageous to companies with processes having fuel-to-product efficiencies of 80% or more. The Northeast and West Coast, saddled with the highest energy prices in the nation, were the prime locations for cogeneration plants. GE, one of the first companies to recognize this opportunity, began marketing its Turbine Business Operation's LM2500 package, initially capable of 17.8 MW. In the early 1980s, GE introduced the LM5000 package, capable of 50 MW.

Utilities were not going to take all this lying down. Concerned with the ability of small energy producers to provide electricity reliably, and consistently, they developed a set of strict rules that created a lot of pain for someone entering into a contract and failing to meet the requirements. Example: Failure to meet the 80+% availability requirement at the contracted capacity could result in the loss of a month's revenue; in the extreme it might require repayment of annual profits.

During the first few years of Purpa, the number of cogeneration sites on the West Coast grew dramatically—each usually having a unique process to earn Qualifying Facility status. However, the turbines, packages, and processes did not start and run as expected. GE engines were very good at operating for short periods, with a rest to perform maintenance.

But most sites were required to run for weeks—sometimes months—without a shutdown, depending on the process supported. Starter failures, igniter liberation, fuel-nozzle failures, etc, caused many sleepless nights for the operators as well as the OEM. Both parties stood to lose considerable sums if the turbines and packages could not be made reliable.

GE found itself running from site to site trying to put out fires and keep the owners from defaulting on their contracts. Generating units on both the East and West Coasts were experiencing the same types of failures, making it obvious that owner/operators needed to share best practices and lessons learned among themselves and with the OEM.

GE's business leaders—like Bill Baker, Mike Hynd, Dan Harmon, and Horace Magely—were traveling cross country regularly to support their customers. To differentiate between the two distinct groups of owner/operators, the OEM began to refer to them as Western Turbine Users (WTU) and Eastern Turbine Users (ETU). The acronym WTUI came into being after the group formalized and incorporated in 1990.

To share information, users gathered at each other's sites for tours of the equipment and to share individual experiences. GE was always part of these meetings. The host site would supply meeting space and usually lunch or dinner. The group began with four attendees, growing to eight, 20, 40—about the point it was no longer feasible for a single operator site to manage and fund the quarterly get-togethers.

As far back as I can remember, GE hosted a sales and customer appreciation meeting in Cincinnati—years later, in Houston—which usually culminated with a relaxing team-building event. Many productive relationships among GE personnel and users were nurtured during these three-day meetings.

Many of the temporary fixes and improvements made by operators to keep their sites running in the early years were reviewed by GE and many became permanent fixes for all sites. A major contributor to fleet availability and reliability improvement was the sharing of parts. Each participating site would generate a list of its inventory and share that with the other participating sites.

We could get parts to each other much quicker than GE. This worked very well when the group was small, but it got a bit cumbersome as the group grew and some folks "forgot" to return parts. Parts-sharing continues today, but on a more personal basis.

Package improvements were another benefit of user meetings. Example: Owner/operators realized turbines could fire hotter and produce additional power just by "turning up the wick." Output of the LM2500 increased from 17.8 to 21 MW over the first few years with very little hot-section life reduction. The increased revenues more than paid for the additional wear and tear on parts.

Plus, many cost-effective repair and overhaul procedures were developed working with small authorized repair facilities—like Batch Air Inc. Some of those were borrowed from aircraft procedures and became standard, authorized repairs for combustors, blades, nozzles, bearings, and frame parts on land-based machines. They reduced the cost of operating LM engines by a significant amount.

The option to use repaired parts versus new parts and expecting GE to warrant the engines became an issue with the OEM in the early years. That was understandable: Users were installing remanufactured parts, and if they failed during the shop warranty period, GE was responsible for the damage.

Users were in hands-on creative mode, continually developing new repair procedures and bringing on innovative vendors that developed such improvements as the Orange Box (individual T-54 thermocouples), longer-lived repairs for bearings and combustors, etc; some were adopted by GE as time passed.

As the number of LM sites grew, WTUI came to be recognized as the place to learn and benefit from both GE and other owner/ operators. As the organization expanded, the cost of managing conferences was more than any one company could support. This forced WTUI in 1990 to begin the second phase of its history as an incorporated business. It permitted dues collection, golf outings, tennis tournaments, evening entertainment, and other managing tools that have made WTUI the world-class organization it is today.

Mike Raaker, WTUI historian/ambassador

After incorporation

I will always remember the chain of events that led to the introduction of Strategic Power Systems Inc (SPS) to three of the founders of the Western Turbine Users: John Tunks, the organization's first president (California Cogeneration Operators Inc), Ernie Soczka (Destec's San Joaquin Cogen), and Bob Fields (Container Corp of America). The meeting took place at Ricky's Hyatt in Palo Alto, Calif, in fall 1990, just prior to WTUI's incorporation. The number of GE LM units operating in cogeneration service, especially in California, was rapidly increasing because of Purpa.

Existing users, who already were meeting at various plants, wanted a more formal structure to support the expanding base of operators. They understood new users would require operat-

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ing knowledge and experience, and would share their desire for continuous product improvement.

They also understood the need to establish and follow a uniform process that the Western Turbine Users, as an organization, could use to track and report the availability and reliability performance of the LM5000 and LM2500 fleets. The objective was to have unbiased and accurate data to document the performance of their gas turbines and plant equipment. The users wanted data and metrics they could share among themselves, and with GE. SPS hoped WTUI would agree that ORAP® (for Operational Reliability Analysis Program) was the system they needed.

The first link in the chain of events was a call I received from Lou Pasquarelli, an old GE friend. Lou explained that both the Western Turbine Users and the GE Marine & Industrial business unit (today a part of GE Power) were interested in tracking the reliability and availability of the LM product family to support the expanding user base.

He suggested I contact John Campbell (now deceased) who was GM of the Customer Service business unit to discuss the opportunity. John understood the market for the LM product line was growing and recognized that for continued success, product performance had to meet customer expectations. He recognized the benefits ORAP offered and invited me to Cincinnati to present the system. Afterwards, he decided that GE would fund and use ORAP to cooperate with and support the Western Turbine Users—cooperation and support that continues today.

In due course, John, Larry Lewis (then the GE point of contact, now retired), and I made several plant visits in California to introduce the LM users to ORAP. From the Shasta mountain range to Santa Clara, from Los Angeles to Bakersfield, the goal was to grow user participation on the ORAP system, and to begin the reporting and feedback process.

The objective was to obtain and process plant data as quickly as possible and to show meaningful results. We were on our way. We had the strong endorsement of GE and the Western Turbine Users, and our job was to demonstrate and add value for the users.

WTUI veterans know that the success of this conference did not just happen by accident. The word "serendipity" does not apply to WTUI. Its success has been built on the efforts of dedicated people with vision and a long-term commitment to their industry—and to each other. Now, after 27 years of hard work, a meeting that started out in a few plant

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> The first meeting attended by SPS staff was Sacramento, March 1991. There were 130 registered attendees—including users, vendors, spouses, and guests. The board of directors included Tunks (he had moved on to Stewart & Stevenson Services, S&S, by this time), Soczka, Fields, Jim Hinrichs (Sithe Energies), Wayne Kawamoto (Wheelabrator Norwalk and WTUI treasurer, an office he continues to hold), and Steve Johnson (Simpson Paper, Shasta Mill).

> At that meeting, Hinrichs became the WTUI president, a position he was to hold for 17 years. Other founding members of the organization who were present included: Mike Raaker (Proctor & Gamble), Jack Dow (Sithe Energies), Jim Bloomquist (Chevron), and Brian Hulse (Destec Bakersfield). Tom Christiansen of SPS was given the opportunity to present to the users and to solicit their participation on the ORAP system. The goal was to add more users on ORAP and to produce a formal data analysis and report as soon as possible.

> **The first ORAP report** went out to both participating users and GE in June 1991. It included data from 24 operating plants representing 19 LM2500s and 14



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LM5000s, and provided an overview of the reliability metrics that the users desiredincluding component causes of downtime and engine removal rates.

Interestingly, these LM units operated with very high service factors (greater than 85%), and had hours-per-start ratios ranging from 135 to 250)-exactly what you would expect from cogeneration units. At the time, SPS had a commitment from an additional 20 operating plants to join and participate on the ORAP system.

Newsletters. From January 1993 through February 1994, WTUI and SPS issued monthly newsletters to all participating members that discussed various technical topics or other items of interest. In the February 1994 newsletter, for example, Johnson wrote "LM5000 Compressors: Cold-End Problems." He had already provided an article of interest on "LM5000 Lube Oil Chip Detection." where he informed that "a chip detection system is a very vital tool." Another article by Kawamoto on "Enhanced Steam Injection" addressed an approach that Wheelabrator Norwalk implemented for improved NO_x abatement.

In the early 1990s, "fall mini conferences" were held to address specific technical issues. For example, Hulse, a board member at the time, arranged a conference at the Pacific Suites Hotel in

San Luis Obispo, where issues such as gas-path coatings were discussed. The idea was to add value for the user community by regularly publishing newsletters and conducting mini-conferences.

ORAP. By the time the first newsletter was issued, ORAP participation had grown to 40 plants and new people were getting involved. The January 1993 edition notes that Brent Newton had joined the board, while the terms of both Soczka and Fields were ending. The visionary founders of WTUI had laid the groundwork for the inevitable changing of the guard. WTUI was preparing for change.

Looking through these newsletters offers a memorable trip back in time. To illustrate: In February 1994, items of interest included the following:

- Announcement that Hulse had submitted the winning design for the WTUI logo, which still is in use today.
- Jack and Gae Dow were identified as the "go-to" team regarding the 1994 conference in Las Vegas.
- SPS would begin taking and issuing notes for each of the LM product line breakout sessions, a practice that continues today.

Breakouts. From the beginning, the two and a half days of breakout sessions covering each LM product line have provided the foundation for sharing knowledge

and solving problems. These invaluable sessions provide the opportunity for users to openly discuss installation and commissioning issues, O&M concerns, lessons learned, and the opportunities for plant improvements.

Technical discussion covers the engine, package, controls and all ancillary systems. The intent is to share and document, thereby creating a history through the notes of relevant and meaningful "real life" experiences to help the operating community improve as a group.

Over the years, discussion leaders for the breakout sessions have included Jimmie Wooten (DPS Juniper), Frank Oldread (Destec), Johnson (K&M Services), Grant McDaniel (Carson Cogen), Joel Lepoutre (S&S), Roy Burchfield (Sithe Energies), Norm Duperron (Bonneville Pacific Services), Mel Murphy (Kingsburg Cogen), Bob Anderson (Florida Power Corp), Charlie Hoock (Calpine), Kevin Koszalka (TGB Cogen), James Hardin (El Paso Cogen), and Bob Mason (Goal Line LP).

Also, Rich Frank (GECS Camarillo), Chuck Casey (Goal Line LP), Bob Nelson (SMUD), Chris Kimmich (Nevada Cogen), Bill Lewis (PPL), John Baker (Calpine), Bryan Atkisson (City of Riverside), James Charles (Ripon Cogen), Mark Breen (Wood Group), Chuck Toulou (Ripon Cogen), Don Haines (Panoche





Energy Center), David Merritt (Kings River), Andrew Gundershaug (Calpine), Perry Leslie (Yuba City Cogen), and Jason King (DGC Operations).

The hard work and dedication of the discussion leaders is what makes the breakout sessions so successful and meaningful. Plus, the technical sessions have been strongly supported by GE and the depots, adding to their value.

Winds of change. WTUI conferences continue to grow annually, providing opportunities to renew old friendships and establish new ones. Equally important, the conference attracts a significant percentage of new users and attendees each year who bring fresh ideas and perspective vital to long-term health.

Continuing growth testifies to the hard work and dedication of the organization's leadership, and to the increasing value and need for face-to-face information exchange. Such success, however, brings change and occasionally presents very real challenges to the relatively small group of volunteers who make WTUI happen.

President Jim Hinrichs and the officers and directors in place during the first few years of the new millennium faced significant challenges as the need for WTUI's services increased markedly while the duty cycle for the LM sector of the industry was migrating from base- to part-load generation and there was a question as to whether GE could continue to support WTUI with the same commitment as it had in the past.

The good news was growing conference attendance, which went from an average of 470 in the 1996-2000 period to 667 from 2001 to 2005. In the last four years, the average attendance was nearly 800. With this success came the difficulties associated with venue selection; relatively few locations can accommodate groups of this size. Plus there were the additional work loads associated with registration, meeting attendee expectations, etc. More hands were needed; the volunteers could no longer do everything.

Both the organization and its owner/ operator members were forced to adjust to market influences. The once dominant cogeneration market was contracting; units were operating fewer hours per start and they were beginning to cycle. SPS verified the market shift using ORAP data that the company provided for the Combined Cycle Journal's report on the 17th annual conference in Phoenix.

SPS stated in that report, "Two operating profiles are distinctly visible: A baseload duty between 1995 and 1999, and a cycling duty between 2002 and 2006. The years 2000 and 2001 appear to be a transition period where the shift in duty cycle began." ORAP data also indicated that annual service hours had decreased by more than 40% comparing the new paradigm against the old. Further, that service hours per start had decreased by about 60% and the number of annual starts had increased—all as gas prices were spiking.

As the duty cycle was changing, the LM6000 and LM2500 solidified their positions as the product lines for growth, and component life, coatings, and emissions were the issues that had to be addressed.

Growth of depot support. It was during the market evolution that GE communicated to the board that it would not be able to sustain WTUI support at the same levels as in the past. The board took that in stride, solidifying its relationships with the depots and redoubling its efforts to assure that the annual meeting's technical content, and the currency and relevancy of issues covered, would continue to meet expectations.

Larry Flood (EPCO), Rich Recor (Sithe Energies' Greeley), Mike Horn (Calpine), Mike Pankratz (FPB Cogen), Joe Campanelli (Air Products), John Cates (Globeleq), Robert Kofsky (Modesto Irrigation District), and others put in extra hours



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to ensure that WTUI's mission would be sustained.

Always all about people. When SPS was located in upstate New York, a major benefit of the conference's timing was the opportunity to fly to the West Coast for a week and leave the bitter cold behind. Often, we would leave in a snow storm and return to a snow storm. The opportunity to participate in the Sunday golf or tennis event coordinated by the users (Hinrichs, Kawamoto, Bloomquist, and Ronnie McCray) always was a highlight.

My golf was bad (and still is), but the chance to catch up with old friends and the opportunity to make new acquaintances made it easy to laugh off the comments on my game. Golf with guys like Mark Dobler (Fulton Cogen), Jim Murray (Fulton Cogen), Tony Thornton (Turbine Technology Services), Ron Brooks (United Cogen), Don Haines (City of Santa Clara), Roy Davis (GE), Wayne Feragen (City of Colton), Mike Kolkebeck (City of Colton), Don Driscoll (SSOI), and others always provided the welcome opportunity to mix business with pleasure.

The formal event begins Sunday afternoon with the New User Orientation, which is followed by the opening of the exhibit hall. Jack Gunsett (Kinder Morgan) conducted the orientation for years, eventually passing the baton to Oldread, who later put it in Bob Boozer's (Reed Service) hands. Boozer retired in 2015 and responsibility for New User Orientation now rests with Bryan Atkisson (Riverside Public Utilities). The goal of the session is to introduce first-timers to LM engines, terminology, nomenclature, and other hands-on knowledge and experience to prepare them for the discussions that would take place during the breakout sessions beginning Monday morning. SPS also participates in the New User Orientation to introduce ORAP.

Monday morning the conference begins. Members look forward to the first session and to the ritual handing-out of much-desired WTUI jackets awarded to those users at the session whose names are pulled from the fish bowl.

The months of preparation by the board, the breakout-session chairs, and the depots (Air New Zealand Gas Turbines, MTU Maintenance, TransCanada Turbines, and IHI) kick the conference into high gear. Western Turbine is about organizations and people who see value in what the user group offers and provides, and they want to be a part of it. As the exhibit hall fills with friends, family, and colleagues, the mood is good-spirited, and all are ready for business and a fun time.

In our industry, there are many conferences and user groups, all founded with a desire to add value. And they do. But WTUI is special. It is celebrating its 27th year not just because of the desire and need to share information and knowledge, but rather because it is genuinely focused on the user.

There is a strong sense that the full WTUI membership is interested in fleet performance. By helping to drive improvement fleet-wide, members improve their own plants. Competition among users exists, to be sure; however, there is a very real sense that the WTUI membership wants the term "best in class" to apply to the whole fleet. And they want unbiased third-party data data available through ORAP.

The hard work and effort that has carried WTUI to its 27th year is a significant feat, and SPS has had the pleasure of supporting the group for most of those years.

It is clear that WTUI has a strong commitment to excellence, and a clear vision for continually adding value for its membership. In sum, WTUI is special—not only for its service to the users, but for the users' service to it.

> Salvatore A DellaVilla Jr, CEO, Strategic Power Systems Inc



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Alvin Boyd weighs anchor, sails into retirement

The greater aero user community wishes Alvin Boyd fair winds and following seas on his retirement, which begins when President Chuck Casey closes the 27th annual conference of the Western Turbine Users Inc at noon, Wednesday, March 22.

Alvin learned how to operate a lathe and handle a wrench in the US Navy, mustering out as a Machinist Mate 1/c. Like 13 of his 18 colleagues on the Western Turbine leadership team, he opted for a shoresidepower career after serving in the armed forces (profile, p 14).

Alvin's years of unselfish service to the Western Turbine Users were celebrated at the Las Vegas meeting. He served on the Board of Directors from 2008 to 2013, when elected secretary and managing chairman of the exhibit hall upon Casey's elevation to president. Board member Jermain Woodall will be appointed secretary by the Board of Directors, and also co-chair of the exhibit hall with Bill Lewis, when Alvin is piped ashore Wednesday noon.

Casey saluted Secretary Boyd as one of the hardest-working of the WTUI volunteers. Organization of the exhibit hall, the president said, takes five months of serious effort to accommodate the needs of 160 or more exhibitors and to design a floor plan that optimizes traffic flow among other things. One of Alvin's many accomplishments was the development of the sponsorship program to fund the group's first-rate Sunday evening reception celebrating the opening of the exhibit hall.

Kohler launches Victory Turbine

The Western Turbine Users Inc annual meeting apparently is adding a new dimension: An incubator for industry startups. Recall that Derek King launched Mega-Watt Consulting at the 2016 meeting upon



his retirement from generator manufacturer Brush. This year, it's Rodney W Kohler's turn to talk up his startup, Victory Turbine, geared to deliver owner/operators solutions for O&M and efficiency improvements.

Kohler is a familiar face at WTUI, having attended most meetings over the last decade. You can spot him in the exhibit hall by his attire: One of very few attendees wearing a jacket and tie.

Victory Services is representing three exhibitors at this year's meeting: Zokman Products, Caldwell Energy, and the Turbine Inlet Cooling Assn. Kohler will be at one of those booths; stop by and see how he might help you.

By way of background, Kohler, like many attendees, got his start in the military—the US Air Force, as a ground equipment mechanic. Later, he earned an engineering degree.

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Say hello to the newest member of our team.



Feel free to stop by the booth and welcome Mike Trejo to WTUI!



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