

INTEGRATED RESOURCE & SUPPLY PLANNING (IRP) SUMMIT

March 27 – 28, 2017
Grand Hyatt Denver
Denver, CO

PRE-CONFERENCE WORKSHOP

**Capturing New Energy Market Dynamics
with High Renewable Generation**

MONDAY, MARCH 27, 2017

POST-CONFERENCE WORKSHOP

**Analyzing Whether/Where/
How Storage Fits in Your IRP**

WEDNESDAY, MARCH 29, 2017

SPONSORS



EUCI is authorized by IACET to offer 1.0 CEUs for the conference and 0.4 CEUs for each workshop



OVERVIEW

Utility resource planning staff must possess multiple talents to conduct and interpret the forecasts, analyses and formulation of recommendations that serve as their power organization's compass heading to guide future actions. The resulting IRP documents they prepare fundamentally chart long-term directions to prescribe how load must be served in their service territory. The plan — while deeply rooted in quantitative methodology and established industry norms — must still be flexible enough to accommodate temporal shifts in fuel pricing and market fluctuations triggered by economic, technological, regulatory and methodological adjustments.

The past few years have witnessed a “sea-change” in integrated resource planning best practices and methodology. The advance of renewable and distributed energy resources, slumping load growth, aggressive air quality regulations, greater emphasis on energy efficiency and demand side strategies — these and other shifts to what had been business as usual for utilities, have prompted a significant “re-set” to the IRP process.

This program is designed by integrated resource planners for integrated resource planners. It will tackle pressing current resource planning issues through several case studies that will provide a solid survey of “best practices” thinking and methodologies as the basis for ensuring that current integrated resource plans measure up to a power organization's future operational requirements. It will feature leading utility and other power resource planning professionals and experts addressing the key issues associated with these emerging operational environmental mandates, intermittent and variable energy resources, regulatory policies, and uncertainty factors.

LEARNING OUTCOMES

- Develop resource plans that incorporate the full palette of supply and demand options
- Describe how IRP planners can analyze, model and incorporate storage in IRPs
- Determine the value of portfolio flexibility for resource planning and market operations
- Explore how resource planning can help utilities and competitive power businesses in a transforming utility business model environment
- Identify how to properly account for all variables when analyzing, modeling and planning portfolio decisions
- Examine the cardinal elements of community-based, distribution integrated resource planning practices and how they relate to more traditional IRP practices
- Review lessons learned to understand the range of different approaches across the United States with regard to fully integrating distributed solar into utility planning
- Consider the broader range of inputs that future resource decisions should incorporate to achieve a more holistic system-wide valuation and planning approach
- Explore alternative methods of planning around the capacity standard for determining appropriate resource adequacy, reliability and reserve margin modeling in an IRP
- Assess the portfolio effects of renewable energy resources
- Evaluate careful planning associated with retirement analysis within the IRP construct
- Discuss the resource supply chain that resource planners must take into account from IRP to RFP to procurement to EPC fulfillment
- Appraise the accuracy of forecasting customer adoption of distributed energy resources to inform the IRP



“This was a great opportunity to discuss hot issues in the utility industry with other utilities and system operator representatives.”

Integrated Resource Planner, City of Anaheim

AGENDA

MONDAY, MARCH 27, 2017

12:30 – 1:00 pm

Registration

1:00 – 1:15 pm

Welcome and Overview

1:15 – 2:00 pm

IRP from the Grid Edge: Backwards to the Future

What are the differences between traditional integrated resource planning (IRP), which focuses primarily on choices for central station generation options with a dash of added distributed energy resources, and the emerging sets of “non-wires alternatives” identified in distribution integrated resource planning (DIRP), which works from the customer side of the meter and the grid edges backwards towards the substation? Early case studies demonstrate certain advantages of DIRP. With the need to replace multi-trillions of dollars of aging energy and water infrastructure, how can DIRP help to ensure all “no regrets” investments get made and expenditures on what could be strandable costs are minimized? This segment will examine the cardinal elements of community-based DIRP practices and how they can be more routinely incorporated into IRP and other energy planning tools.

Tom Stanton, Principal Researcher for Energy and Environment, National Regulatory Research Institute (NRI)

2:00 – 3:00 pm

Planning for a Distributed Disruption: Innovative Practices for Incorporating Distributed Solar into Utility Planning

The rapid growth of distributed solar photovoltaics (DPV) has critical implications for U.S. utility planning processes. A comparative analysis of roughly 30 recent utility integrated resource plans or similar studies was conducted to inform utility planning. The analysis reveals a spectrum of approaches to incorporating DPV across nine key planning areas, and it identifies areas where even the best current practices might be enhanced. The nine key areas include:

- 1) Forecasting DPV deployment
- 2) Ensuring robustness of decisions to uncertain DPV quantities
- 3) Characterizing DPV as a resource option
- 4) Incorporating the non-dispatchability of DPV into planning
- 5) Accounting for DPV’s location-specific factors
- 6) Estimating DPV’s impact on transmission and distribution investments
- 7) Estimating avoided losses associated with DPV
- 8) Considering changes in DPV’s value with higher solar penetration
- 9) Integrating DPV in planning across generation, transmission, and distribution

Fully integrating distributed solar into utility planning requires more tightly linking distribution, transmission, and resource planning. A few states and regions — especially California, New York, and New England — have started to develop these more comprehensive processes, but there are still many issues to address. This segment will provide lessons learned to understand the range of different approaches across the United States and highlight innovative practices that should help accelerate those changes.

Andrew Mills, Staff Research Associate – Electricity Markets and Policy Group, Lawrence Berkeley National Lab (LBNL)

3:00 – 3:15 pm

Afternoon Break



“The conference was very informative & educational. It helped to learn the challenges and perspectives of other utilities facing in their long term planning.”

Manager-Energy Market Analysis, Austin Energy

AGENDA

MONDAY, MARCH 27, 2017 (CONTINUED)

3:15 – 4:00 pm



IRP Coordination with Distributed Resource and Customer Technology Planning

As increasing levels of distributed resources interact with utility electric systems, utility planners must not only have visibility of these resources, but also must have a view into the future as to their impact on system reliability and overall resource planning needs. While IRP resource valuations have historically considered bulk scale assets in meeting resource needs, utility planners are increasingly incorporating distributed solutions that can contribute toward optimized resource needs while having the potential to provide increased customer options and savings. This segment will consider the broader range of inputs that future resource decisions should incorporate to achieve a more holistic system-wide valuation and planning approach.

Jim Wilde, Director – Resource Planning, Arizona Public Service (APS)

4:00 – 4:45 pm



Communicating with IRP Stakeholders: Don't Bury the Headline!

Renewable generation is visible and distributed. Its proliferation means that more stakeholders are increasingly interested in what their local utility is doing, mainly because renewable generation is part of their daily lives. This ever-expanding group of stakeholders, however, is often not sophisticated about utility operations. As a result, it's increasingly important that an IRP communication with them be simple and clear. This isn't just a utility's mandate though. Regulators also understand that they are under a public microscope. This increased scrutiny is evident in the current resource planning efforts of the Hawaiian Electric Companies, which operate the electric utility on five islands. Since 2012, they have filed four resource plans in response to Orders from the Hawai'i Public Utilities Commission and a legislative mandate to attain 100% RPS within 30 years. (The media announced each filing with front page headlines.) Over these five years, the Commission rejected outright the first two resource plans, tacitly rejected the third, wrote an 'Inclinations' paper essentially directing the utility's operation, and invited dozens of intervenors into the planning process. How the Companies responded makes for an enlightening journey into clear communication and lessons learned, while providing insights to IRP professionals with similar challenging conditions.

Rich Maggiani, Principal, Solari Communication

4:45 – 5:30 pm

IRP a la California

California is evolving the Long-Term Procurement Program (LTPP) into an IRP process, focused on cost-effective greenhouse gas (GHG) reduction. Senate Bill SB 350, passed in September 2015, reinstated a centralized planning process within Load Serving Entities (LSEs) in California. Since deregulation occurred in the 1990s, the planning business fell to the regulators with participation from all parties including LSEs. During that time a "need" finding would result in a targeted procurement directed to the affected LSE to implement. But, re-inventing centralized planning within the LSEs purview is a bit like back-to-the-future with a twist. The contemporary twist is a mix of aggressive GHG reduction, during a time of increasing load uncertainty from Community Choice Aggregators, increasing Distributed Energy Resources, (DERs) and aggressive Energy Efficiency programs. The state agencies and LSEs are working together to develop an efficient and effective IRP program with California-unique goals. This significant change in doing business has been given the urgency of "all hands on deck". This segment will provide insight and up-to-date progress of the IRP program development in California, and how some of the IRP planning principles may transfer to utilities in states where GHG reduction measures, load reduction and other contemporary challenges are moving into greater prominence.

Jenifer Hedrick, Senior Project Manager – Integrated Resource Planning, Southern California Edison (SCE)

5:30 – 6:30 pm

Networking Reception

AGENDA

TUESDAY, MARCH 28, 2017

8:00 – 8:30 am

Continental Breakfast

8:30 – 9:15 am

Establishing a Capacity Standard for Resource Adequacy / Reliability / Reserve Margin Modeling in an IRP

Ensuring reliability of service is usually considered the most important requirement for a utility. The standard used to determine what is the appropriate capacity needed to minimize reliability risk, however, is a bit less precise than many realize. And many times the usual LOLP metric does not adequately align with the lowest reasonable cost to customers or reflect the physical risk of wholesale markets. This segment will explore alternative methods of planning around the capacity standard for determining appropriate resource adequacy, reliability and reserve margin modeling in an IRP:

- Overview of establishing a planning margin — what and why?
- Considering various metrics and comparing outcomes
 - o Loss of load probability (LOLP)
 - o Loss of load hours/loss of load expectations (LOLE/LOLH)
 - o Expected unserved energy (EUE)
 - o Based on expected value of lost load (VOLL)
- Using adequacy modeling to establish peak capacity value of intermittent resources
- Value and relevance of using revised adequacy planning assumption
- Reactions from stakeholders and commission re: shift in adequacy planning metric

Phillip Popoff, Manager – Integrated Resource Planning, Puget Sound Energy (PSE)

9:15 – 10:15 am

State of Charge in an IRP

Energy storage offers a wide array of benefits that will optimize and improve the grid, such as allowing for more efficient market operations, accommodating the efficient integration of renewables, and providing more flexibility to respond to forecast errors. This segment will address:

- What energy storage can do for the system
- How the value of energy storage can be maximized to meet system needs
- How storage resource planning can translate into low-cost solutions for ratepayers.

Randell Johnson, Chief of Analytics, Alevo Analytics



“An excellent forum to hear about and discuss the current and key resource planning issues facing the utility world.”

Director of Resource Planning, BC Hydro

10:15 – 10:30 am

Morning Break

10:30 – 11:15 am

Assigning Proper Planning Assumptions for Solar in IRPs

The explosion of solar development — at both the distributed and utility scales, and geographically across the entire North American continent — has introduced the need for resource planners to incorporate solar resource assumptions into their IRPs. Yet, multiple dynamics associated with solar development make it challenging for IRP professionals to develop a good “fix” on what planning metrics to use for their particular utilities. Technological advances and the commoditization of component pricing have dramatically re-calibrated levelized costs of energy (LCOE) associated with the delivery of solar. Add to those factors the variability of development scenarios, the nature of net energy metering policies, the presence or absence of federal tax credits, renewable portfolio mandates, the influence of more restrictive emission reduction and environmental regulations, and so on. This segment will provide guidance on relevant considerations utility resource planners must take into account to apply appropriate metrics for their IRP modeling and analyses.

Eran Mahrer, Senior Director – Utilities, First Solar

AGENDA

TUESDAY, MARCH 28, 2017 (CONTINUED)

11:15 am – 12:15 pm

Assessing Portfolio Effects of Renewable Energy Resources

Traditionally, the least cost energy resource becomes the dominant supply resource in an IRP. However, minimizing overall supply costs necessitates overcoming the natural concentration effect of least cost renewable generation to build a balanced supply portfolio. Understanding how to evaluate the risks and trade-offs of different renewable resources and measure their portfolio effects has become a new challenge in resource planning. This segment will examine what analysis is necessary to properly evaluate the impact of renewable energy resources on resource portfolios by:

- Understanding the gravitational pull of market participants to build the “least cost” resources, but not accounting for the possible repressed market pricing
- Determining marginal portfolio value of wind versus solar in planning portfolios
- Understanding the impact of meteorology on resource selection
- Minimizing overall supply costs after incorporating uncertainty assumptions
- Selecting the “best” resource plan for overall market conditions

Gary Dorris, President, Ascend Analytics

12:15 – 1:30 pm

Group Luncheon

1:30 – 2:15 pm

Careful Planning of Retirement Analysis within the IRP Construct

Current IRP tools have modeling constraints when it comes to properly accounting for the true cost of retiring an asset versus a replacement option. Performing a retirement analysis requires careful planning and consideration of several factors, beyond just evaluating the cost of generation. These multiple factors fall into quantitative and qualitative categories that specifically reflect the utility’s particular rate base, asset portfolio and corporate culture. Most capacity expansion models evaluate the ongoing costs to run existing generators. But, often, they do not readily account for costs and/or savings that are baked into the rate base, such as income and property taxes, the “return on”, depreciation, as well as incremental transmission and distribution costs that are incurred or saved as a result of retiring a generator before the net book life. This segment will discuss the utility costs’ output modeling adjustments that are appropriate to account for these savings to customers when unit retirements are weighed, which may include reliability, compliance, flexibility, diversity and affordability for its stakeholders.

Edward Achaab, Director – Integrated Resource Planning, NiSource



“EUCI has once again brought together an excellent team of industry experts to deliver a very informative and wide-ranging look on the IRP planning process.”

Head – Generation Special Projects, Jamaica Public Service Co



“Great speakers and excellent topics that are the current hot topics at most utilities.”

Senior Engineer, APS

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AGENDA

TUESDAY, MARCH 28, 2017 (CONTINUED)

2:15 – 3:15 pm

From IRP to RFP to Procurement to EPC

The process to go from planning for a resource to procuring or building it is increasingly important for planners to properly account for in their IRPs. This segment will demonstrate how to evaluate and account for resources starting with planning, then extending through to the commencement of commercial operations. Each stage of the process will be examined to document the right approach for incorporating the entire supply chain process, taking into account:

- Integrated resource planning portfolio optimization
- Requests for Proposal (RFP)
- Procurement
- EPC

Discussion will also consider such process questions as:

- Are there any regulatory requirements that must precede the resource procurement?
- What happens if there is an independent evaluator, and how should that be reflected in the IRP?
- Are there any planning distinctions for owned vs non-owned resource providers?
- Are there different IRP paths prescribed for procurement of thermal vs renewable resources?

Benson Joe, Manager, Black & Veatch Management Consulting, LLC

3:15 – 3:30 pm

Afternoon Break

3:30 – 4:45 pm

Forecasting Customer Adoption of Distributed Energy Resources

Forecasting customer adoption of distributed energy resources (DER) is increasingly important in utility planning studies since it affects the need for generation, transmission, and distribution investments. The future quantity of DER is driven, at least partially, by customer decisions that are beyond the control of utility planners. The rate of adoption depends on many factors, some of which are changing rapidly, including the upfront cost of the DER, availability and level of incentives, and retail rate designs that affect the bill savings from customer-sited DER. These changes in the drivers of DER adoption increase the challenge of forecasting installations. Resource planners have developed a variety of tools and approaches to create these forecasts. In this segment, practitioners will describe their approach to forecasting DER adoption, highlighting some of the tradeoffs in terms of transparency and complexity.

Panel Discussion

4:45 pm

Conference Adjournment



“Excellent agenda, and list of speakers. Right on target with issues I’m dealing with right now.”

Manager of Resource Planning, Puget Sound Energy



“This is a perfect forum to share, learn and take home a better/broader understanding of the issues facing our industry.”

Director – Energy Supply Planning, Northwestern Energy

PRE-CONFERENCE WORKSHOP

Capturing New Energy Market Dynamics with High Renewable Generation

MONDAY, MARCH 27, 2017

7:30 – 8:00 am **Registration and Continental Breakfast**

8:00 – 11:45 am **Workshop Timing**

OVERVIEW

Renewable resources are on a rapid course to become the primary source of economic energy. The implications of this inexorable rise of renewables creates new market dynamics that radically alter traditional planning notions. The long-preserved boundaries of base, intermediate and peaking resources to meet a smooth sinusoidal load curve has yielded to a saw-tooth net load that rapidly ranges from surpluses to deficits. The hallowed grounds of long-run equilibrium conditions of a CC or CT have become confounded with declining implied heat rate curves and extreme intermittency. This workshop will examine the market manifestation of increased renewables that creates planning conditions where matching the volatility of prices becomes as important as establishing the average price of energy, and requires consideration of the following elements:

- Quantifying the impact of renewables on market price volatility
- Establishing new criteria for long-run equilibrium
- Considering the implications of shifting day ahead (DA) vs real-time (RT) market dynamics
- Contrasting price shapes against price dynamics
- Weighing the marginal value of wind versus solar

LEARNING OUTCOMES

- Evaluate the distorting effects of renewable energy resources on present and future supply and demand fundamentals
- Analyze the impact of technological change on present and future supply and demand fundamentals
- Examine the consequences on IRPs of the demise of long-run equilibrium conditions that support traditional thermal generation
- Assess over-supply conditions, their price ramifications and how IRPs should reflect these structural changes

AGENDA

- Supply and Demand Fundamentals
 - Genesis of the flexible resource shortage
 - Impact of renewables on market price volatility
 - Origins of day-ahead (DA) and real-time (RT) market price spreads, with implications for resource valuation
- Impact of Technological Change on Future Supply and Demand Fundamentals
 - Economics of batteries for regulation, ramping and load-shifting
 - Electric vehicles (EVs) as fixed and flexible load adoption and growth
 - Internet of Things (IoT) to aggregate flexible demand

MONDAY, MARCH 27, 2017 (WORKSHOP CONTINUED)

- Demise of Long-run Equilibrium Conditions to Support Traditional, Thermal Generation
 - o Why traditional, thermal generation can't earn a "normal" return
 - o How to establish new equilibrium conditions
 - o Integrating regional fundamentals with long-run expectations of new generation costs
- Assessing Over-supply Conditions and Their Price Ramifications
 - o Potential and extent over the next decade of over-supply conditions
 - o Impact of over-supply on market price dynamics
 - o Implications for cost-of-service and value of generation

INSTRUCTOR



Dr. Gary Dorris
President, Ascend Analytics

Gary Dorris, Ph.D., President, Ascend Analytics has been a thought leader in energy modeling and risk analysis for 20 years. He has led the development of over a dozen resource plans and pioneered new techniques for risk based resource planning and portfolio selection. Dr. Dorris has developed new techniques in risk management that integrate uncertainty around both the physical and financial aspects of a utilities portfolio. His analytic innovations have extended toward the development of over a dozen software applications used by over 50 energy companies. In 2001, Dr. Dorris won distinguished recognition from the IPE for contributions to the field of energy risk management.



"Conference had solid content with engaging speakers discussing timely issues. Good opportunity to discover a common set of shared concerns from other planning groups, and to get some fresh ideas about how to tackle these challenging issues."

Senior Manager – Capacity Planning, TVA



"The program included many high quality presenters addressing the pressing issues of the day for utility planners."

Director of Integrated Resource Planning, AEP



"We often find ourselves hearing and reading material that only confirms our exacting views. EUCI brings together the experience and emerging approaches of industry leaders from around the world. Much of the value of these presentations stems from discovering what we did not know."

Division Director, NW Power and Conservation Council

POST-CONFERENCE WORKSHOP

Analyzing Whether/Where/How Storage Fits in Your IRP

WEDNESDAY, MARCH 29, 2017

7:30 – 8:00 am **Registration and Continental Breakfast**

8:00 – 11:45 am **Workshop Timing**

OVERVIEW

Some of the biggest energy challenges the electric grid faces can be solved by combining advanced analytics and energy storage systems. Implementing energy storage systems into the grid will allow for a wide array of benefits that will optimize and improve the grid, such as allowing for more efficient market operations, enabling the integration of more renewables, and providing more flexibility to respond to forecast errors. These benefits are dependent on the integration of modernized technologies with advanced data analytics and simulation capabilities that provide energy decision-makers knowledge regarding: renewable integration, transmission and generation, resource investment, as well as providing a detailed analysis for market, ancillary services, risk analysis, forecasting, connection studies, and co-optimizations of generation. This workshop will examine modeling tools that offer capabilities to capture the operations of energy storage and provide ratepayers with a cost-effective capacity resource.

LEARNING OUTCOMES

- Discuss the current framework of integrated resource plans
- Identify how energy storage differs from conventional resources and how it can be implemented to the grid
- Recognize what the benefits are of integrating energy storage technology and smart data analytics to the grid
- Illustrate how these models offer capabilities to capture operations of advanced energy storage systems



“Well organized and well-run conference with a good cross-section of presenters representing their approaches on how to develop a thorough and defensible IRP.”

Supervisor – Strategic Transmission Analysis, Madison Gas & Electric

AGENDA

- Discuss the Current Framework of Storage in Integrated Resource Plans
 - Review the MA “State of Charge” report, which illustrates the deployment of storage systems in integrated resource plans (IRPs)
- Examine Market Barriers to Storage
- Identify How Energy Storage Differs from Conventional Resources and How It Can Be Implemented to the Grid
- Assess How Modeling, Advanced Analytics and Simulation Can Reflect Operations of Advanced Energy Storage Systems
 - Reflecting the benefits of integrating energy storage technology and smart data analytics to the grid
 - Determining MW, MWh, sizing, locations, placement and timing of energy storage
 - Considering storage in capacity and allocation planning
 - Production planning
- Illustrate How the Benefits and Cost of Energy Storage Systems Can Be Properly Reflected in IRPs

INSTRUCTOR



Dr. Randell Johnson

Chief Analyst, Alevo Analytics

Dr. Randell Johnson is Chief Analyst at Alevo and spearheads the company’s analytics team, which is charged with maximizing the full international deployment potential of the company’s revolutionary battery storage systems. He is a holder of five advance degrees in engineering, electronics, and quantitative finance, Dr. Johnson has built an unprecedented resume in his 20-year career, with more than \$35 billion of energy infrastructure projects across 70 countries in his engagement portfolio. Utilizing Alevo Analytics’ computing technologies, he advises regulators, utilities, generators, equipment manufacturers, as well as governments, investment and industrial developers to help them comprehend the full value proposition of battery storage projects.



“A great overview from a wide cross-section of industry experts.”

Energy Resource Analyst, EWEB



“Outstanding survey of topics for planners...”

Resource Planner/Economist, Central Minnesota Municipal Power Agency

INSTRUCTIONAL METHODS

Case studies, PowerPoint presentations and group discussion will be used in this event.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

Participants must sign in/out each day and be in attendance for the entirety of the conference to be eligible for continuing education credit.

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EUCI is authorized by IACET to offer 1.0 CEUs for the conference and 0.4 CEUS for each workshop.

EVENT LOCATION

A room block has been reserved at the Grand Hyatt Denver, 1750 Welton St., Denver, CO 80202, for the nights of March 26-28, 2017. Room rates are US \$239 plus applicable tax. Call **303-295-1234** for reservations and mention the EUCI event to get the group rate. The cutoff date to receive the group rate is March 6, 2017 but as there are a limited number of rooms available at this rate, the room block may close sooner. **Please make your reservations early.**

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Please contact Stephen Coury at scoury@euci.com or 720-988-1228 for more information.

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PLEASE SELECT

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 - PRE-CONFERENCE WORKSHOP:** MONDAY, MARCH 27, 2017: US \$1895, EARLY BIRD on or before MARCH 10, 2017: US \$1695
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- PRE-CONFERENCE WORKSHOP ONLY:** MONDAY, MARCH 27, 2017: US \$595, EARLY BIRD on or before MARCH 10, 2017: US \$495
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OR Enclosed is a check for \$ _____ to cover _____ registrations.

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Your registration may be transferred to a member of your organization up to 24 hours in advance of the event. Cancellations must be received on or before February 24, 2017 in order to be refunded and will be subject to a US \$195.00 processing fee per registrant. No refunds will be made after this date. Cancellations received after this date will create a credit of the tuition (less processing fee) good toward any other EUCI event. This credit will be good for six months from the cancellation date. In the event of non-attendance, all registration fees will be forfeited. In case of conference cancellation, EUCI's liability is limited to refund of the event registration fee only. For more information regarding administrative policies, such as complaints and refunds, please contact our offices at 303-770-8800. EUCI reserves the right to alter this program without prior notice.

