

## International Symposiums on Microgrids Series

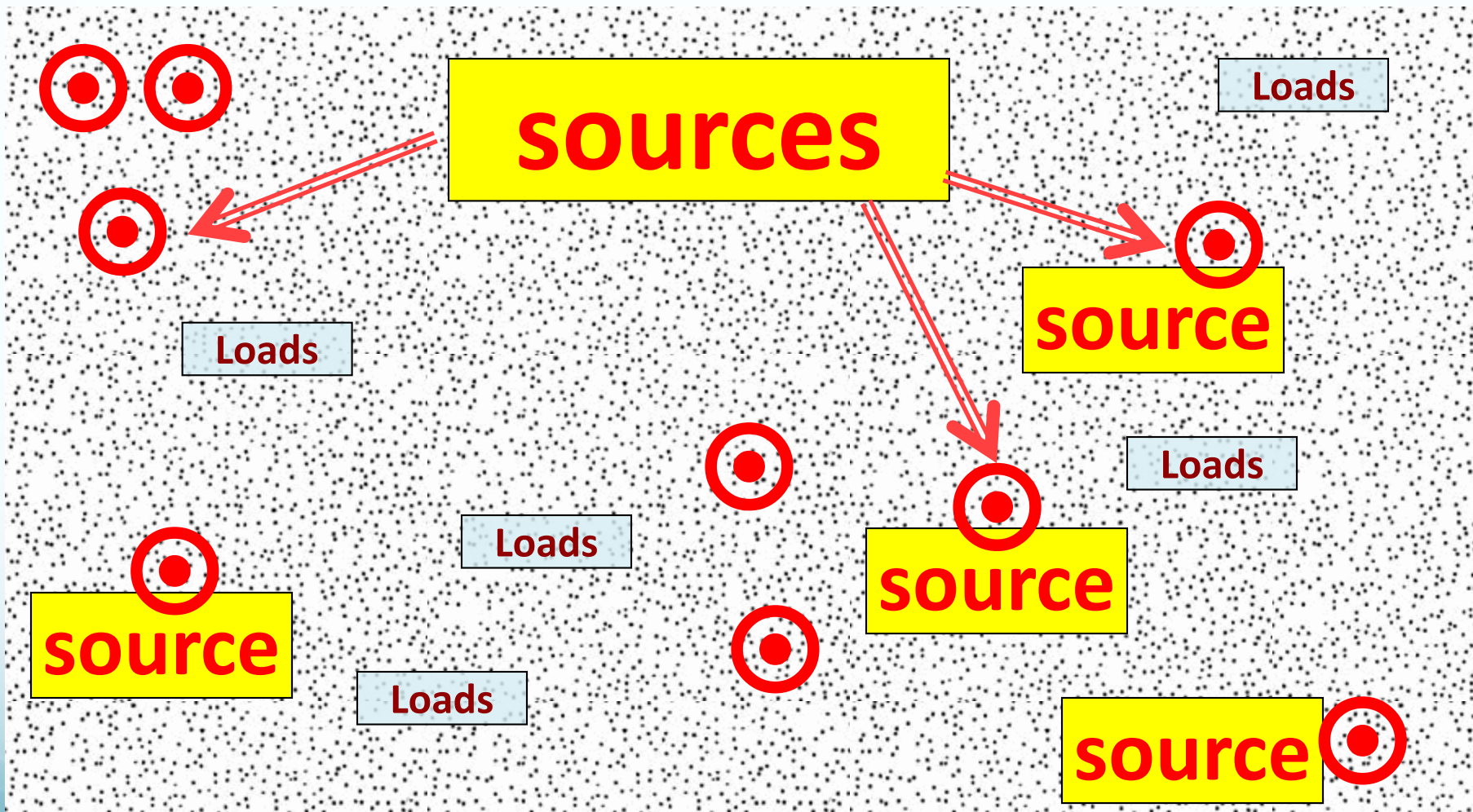
*Chris Marnay*

[ChrisMarnay@LBL.gov](mailto:ChrisMarnay@LBL.gov) - <http://building-microgrid.lbl.gov/>

Farid Katiraei, Hiroshi Asano, Jaeho Choi,  
Nikos Hatziargyriou, & Johan Driesen

*Tianjin 2014 Symposium on Microgrids*

Friday 14 Nov 2014



# Future Landscape

**Megagrid “M•grid?”**  
**macrogrid / utility grid / legacy grid**

**community / utility microgrid /  
area EPS island / EID / milligrid  
“m•grid?”**

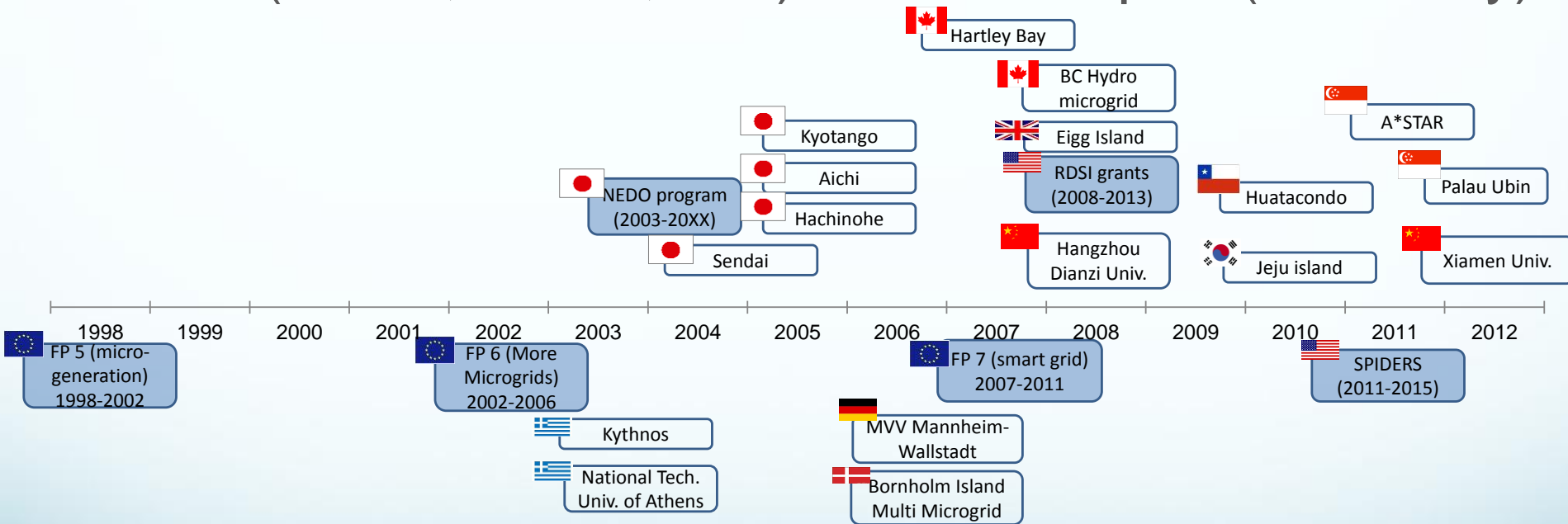
**true microgrid /  
facility island  
“μ•grid?”**

Marnay, Chris, and Judy Lai.  
“Serving Electricity and Heat  
Requirements Efficiently and with  
Appropriate Energy Quality via  
Microgrids,” *Electricity Journal* vol.  
25(9), Oct 2012.

**nanogrid  
“n•grid?”**

EU → Japan → US (RDSI, SPIDERS)

→ Asia (China, Korea, etc.) → US & Japan (resiliency)



RDSI = Renewable and Distributed System Integration

SPIDERS = Smart Power Infrastructure Demonstration

for Energy Reliability and Security



- series of 10 international microgrid symposiums,  
from 2005 in Berkeley, CA, U.S.A.

(Montreal 2006, Nagoya 2007, Kythnos Is. 2008, San Diego 2009,  
Vancouver 2010, Jeju Is. 2011, Évora 2012, Santiago 2013 )

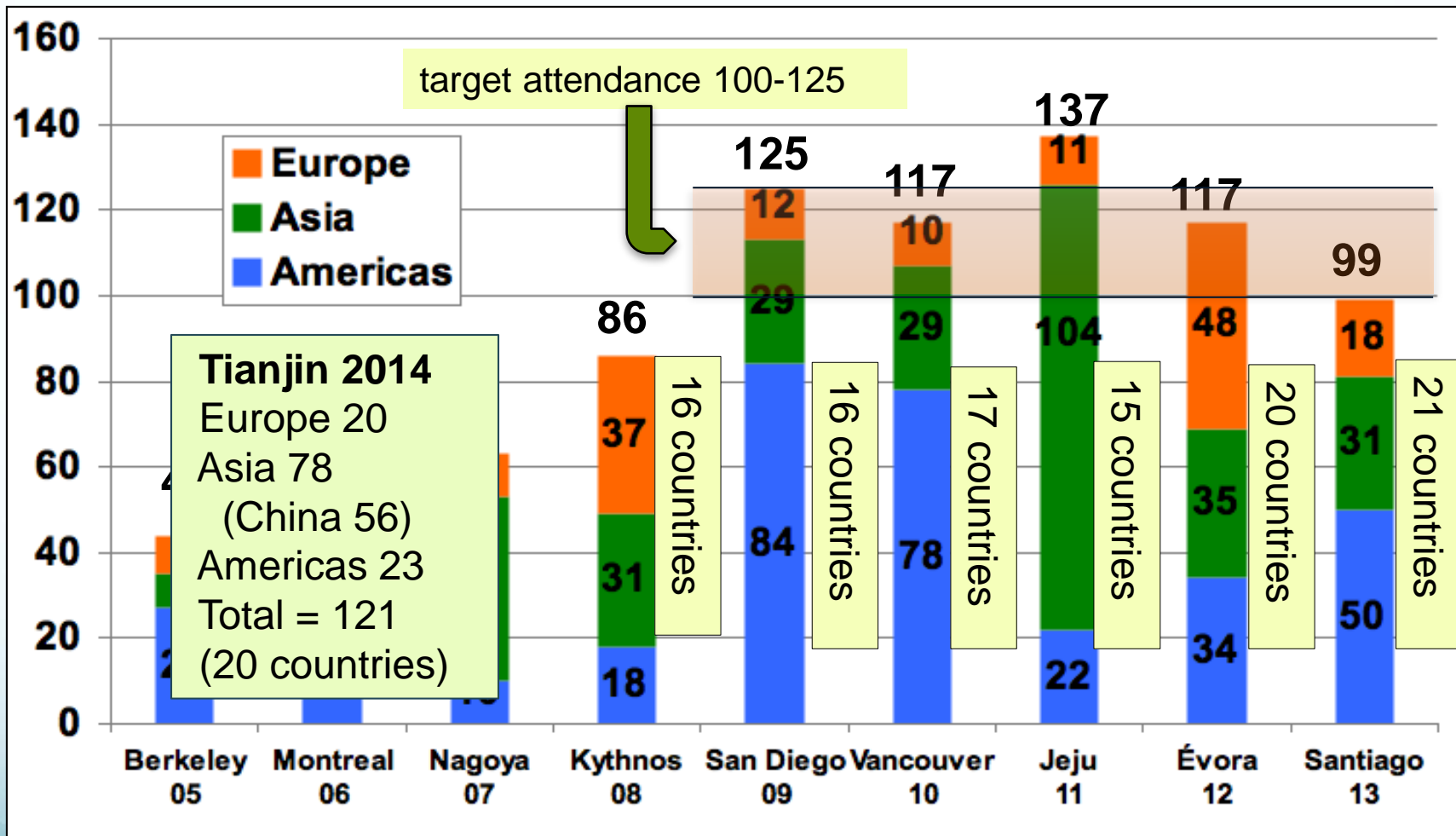
- idea hatched at the  
1<sup>st</sup> International Conference on Integration of Renewable and  
Distributed Energy Resources (IRED), Brussels, Dec. 2004  
(Napa Valley 2006, Nice 2008, Albuquerque 2010, Berlin 2012)

- 6<sup>th</sup> IRED, Kyoto, 17-20 Nov. 2014 closes the loop

# Organization

- informal origins shapes the approach
- no central organization, local character
- not usually any registration fee, sponsorship collected locally
- roughly rotates around regions, Asia, Europe, & Americas
- symposiums by-invitation-only, informal (only ppts., no papers)
  - include researchers, program managers, policymakers, private sector reps. (sponsors), etc.
- speakers chosen by regional Steering Committee members
- posters chosen by Publications Committee
- special magazine issue planned for this Symposium
- best speakers & poster presenters will be invited
- a panel session since Jeju's disasters panel

# Attendance Limited



Chris Marnay (Chair), Berkeley Lab  
staff: Judy Lai, Shiqiao (Tyler) Yan

## **Asia & Oceania:**

Toshifumi Ise, Osaka U.  
Saad Sayeef, CSIRO  
Hiroshi Asano, CRIEPI  
Alex Chong, A\*STAR  
Ryoichi Hara, Hokkaido U.  
Jaeho Choi, Chungbuk National U.  
Meiqin Mao, Hefei U. of Tech.

## **Europe & Africa:**

Johan Driesen, K.U. Leuven  
Nikos Hatziaargyriou, NTUA  
Britta Buchholz, ABB AG  
João Peças Lopes, INESC TEC & FEUP  
Miky Albu, Politehnica U. Bucharest

## **The Americas:**

Reza Iravani, U. of Toronto  
Farid Katiraei, Quanta Tech.  
Siddharth Suryanarayanan, CO State U.  
Guillermo Jiménez, U. of Chile  
Ben Kroposki, NREL



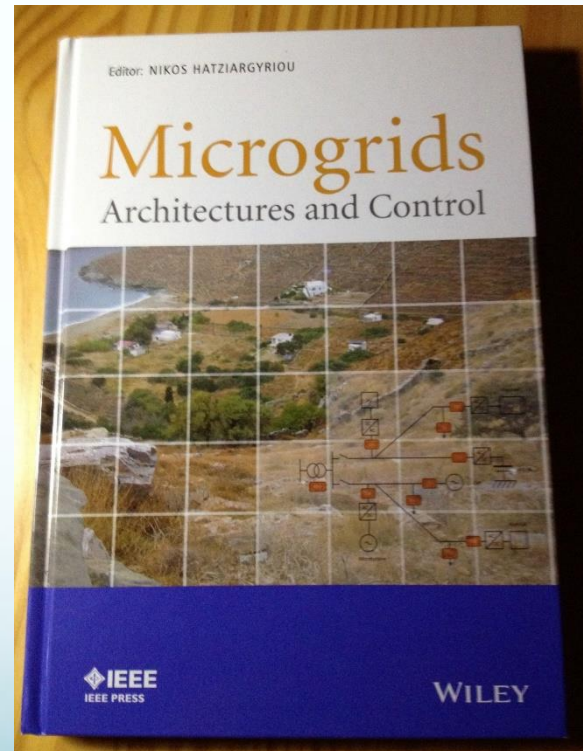
# Berkeley 2005





# Evolving Literature

- one-day retreat at U.C. Berkeley Faculty Club
- Jonathan Lynch of Northern Power Systems spoke
- Tadahiro Goda, Mitsubishi Electric, spoke
- IEEE Xplore library,  
~1,000 conference papers,  
~300 journal articles  
(first by Bob Lasseter in 2001)



# Montréal 2006





# Mont-Tremblant

- more formal structure required by NRCan
- Lisa Dignard-Bailey, NRCan Chaired Local Organizing Committee
- Satoshi Morozumi described the NEDO demonstrations:  
(Sendai, Hachinohe, Kyotango, Aichi)
- Manuel Sanchez, covered European Union research
- Merrill Smith, U.S. DOE did not attend
- Bernard Treanton  
substituted for  
Mark Rawson, CEC



# Nagoya 2007



**Nagoya 2007 Symposium on Microgrids**  
**Mielparque-Nagoya Hotel, Nagoya, Japan 6 Apr 2007**



# NGK NaS Factory

- noticeable improvement in technical quality of presentations
- power electronics, communications, and PQ emphasized
- also protection, islanding procedures, etc.
- Ben Kroposki, NREL, described standards setting, loop closing
- Europe won
- P&E article



Jul-Aug 07

## Microgrids

*by Nikos Hatziargyriou,  
Hiroshi Asano, Reza Iravani,  
and Chris Marnay*

An Overview of Ongoing  
Research, Development, and  
Demonstration Projects



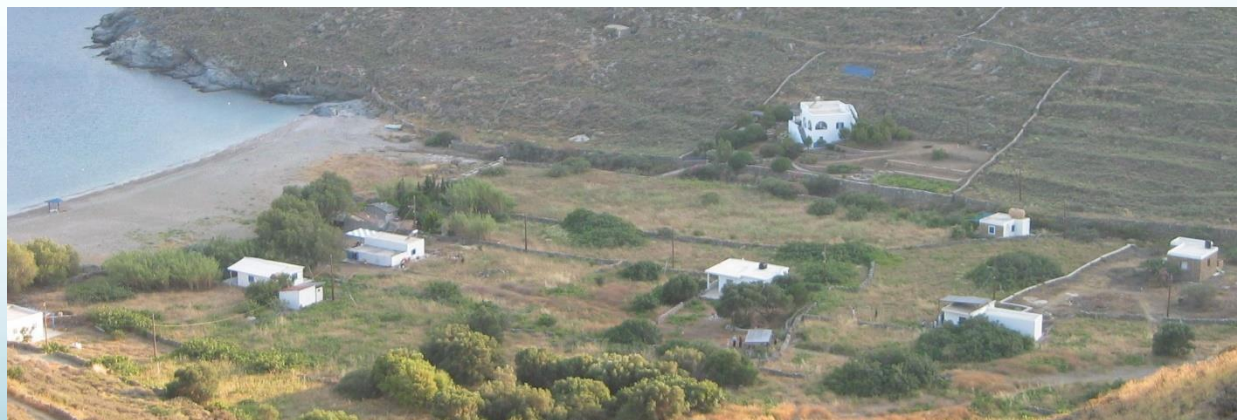


# Kythnos Is. 2008



# Gaiduromantra

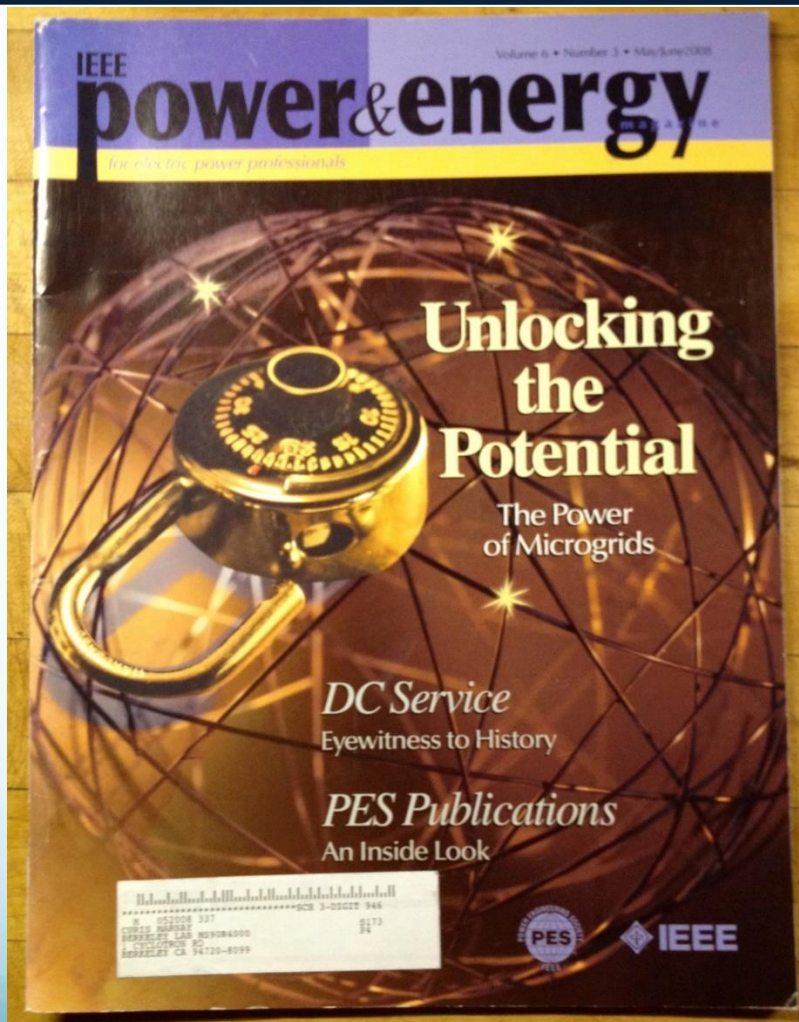
- best picture, and almost double attendees of Berkeley Symposium
- results coming in  
(NEDO projects, Continuum Bronsbergen, etc.)
- Korea participation significant, DC microgrid
- Power and Energy special microgrids issue June-July 2008
- other areas emerging, V2mg, multi-microgrid interaction, AS provision, ...
- remote applications, Gaiduromantra





# Power & Energy

## (Jun-Jul 2008)





# San Diego 2009

## San Diego 2009 Symposium on Microgrids



*Faculty Club, UC San Diego  
La Jolla, CA  
17 & 18 September 2009*



# Thanks, Sponsors!



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FUNDAÇÃO  
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# Brewery Included

- attendance now 125, 1.5 days plus a half-day RDSI session
- current pattern established, 3 clear regions & remote applications
- private sector sponsorship, Solar Turbine, SDG&E, Pareto Energy, Eaton, B.C. Hydro, SMUD, EPRI, Sierra Nevada, ...
- focus shift to urban applications and broader smart grid visions
- first speakers from Australia, Chile, and China (863 program), & Singapore
- resiliency emerging





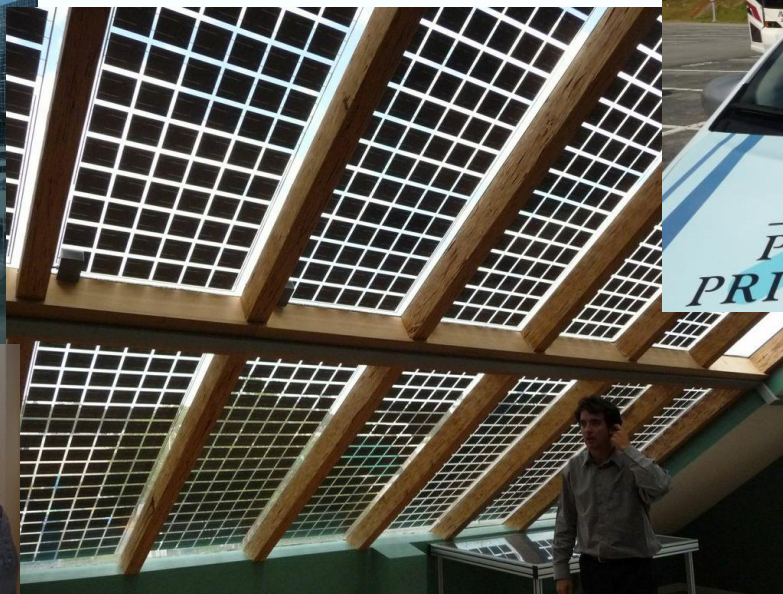




# Highlight Hotel

- at very swish Fairmont Pacific Rim hotel, \$500-\$1000/night
- microgrids mature
- first Thai speaker, interesting projects but no further info.
- interest in urban community scale microgrids (milligrids)

## Japan's 4 Smart Community Pilot Projects





## Jeju 2011 Symposium on Microgrids

Seogwipo KAL hotel

Jeju Island, Korea, May 26 to 27 2011



# Tsunami Sadness

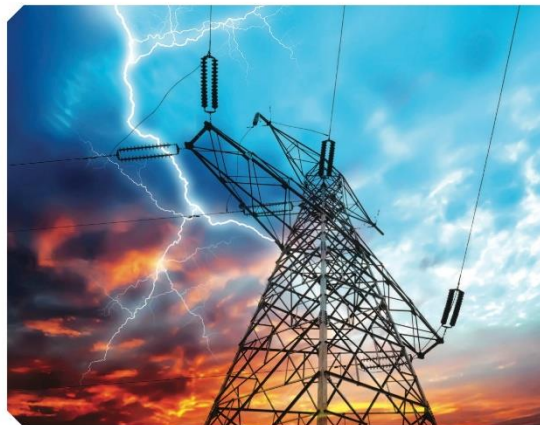
- runner up for the best picture
- very well supported by Korean sponsors (KOMEA, etc.)
- size became a problem
- 11 Mar. Tohoku earthquake, tsunami, & radiation leak
- resilience became the imperative (Superstorm Sandy, Oct. 2012)
- disasters was first panel reflected this turning point
- first poster session





## Powering Through the Storm

Microgrids  
Operation  
for More  
Efficient  
Disaster  
Recovery



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**By Chad Abbey,  
David Cornforth,  
Nikos Hatziaargyriou,  
Keiichi Hirose,  
Alexis Kwasinski,  
Elias Kyriakides,  
Glenn Platt, Lorenzo  
Reyes, and Siddharth  
Suryanarayanan**

Digital Object Identifier: 10.1109/MPY.2014.2301524  
Date of publication: 17 April 2014

DISASTERS, WHETHER NATURAL OR MAN-MADE, compromise the quality of life for all involved. In such situations, expeditious recovery activities are deemed imperative and irreplaceable for the restoration of normalcy. However, recovery activities rely heavily on the critical infrastructures that supply basic needs like electricity, water, information, and transportation. When disasters strike, it is likely that the critical infrastructures themselves are affected significantly, hampering efficient recovery processes, thus presenting a Catch-22 conundrum. In this article, we present examples from different parts of the world where distributed energy resources, organized in a microgrid, were used to provide reliable electricity supply in the wake of disasters, allowing recovery and rebuilding efforts to occur with relatively greater efficiency.

may/june 2014

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IEEE power & energy magazine

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## Évora 2012 Symposium on Microgrids

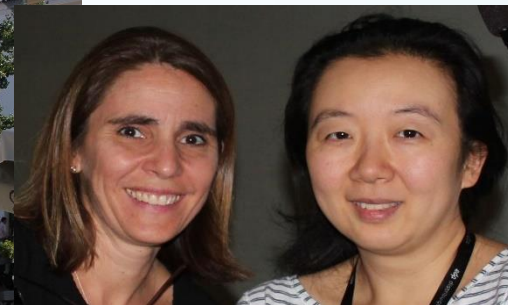


Évora Hotel, Évora, Portugal  
3 and 4 September 2012



# Mature Event

- regional rotation established, 3 regions, 2 packed days
- broad research strength, 22 presentations, 22 posters, panel
- first speaker from Taiwan on DC microgrids
- first ever speakers from India & South Africa
- Steve Wade presented on the Isle of Eigg
- presentation on Malaysia
- special panel on demand response





# Santiago 2013

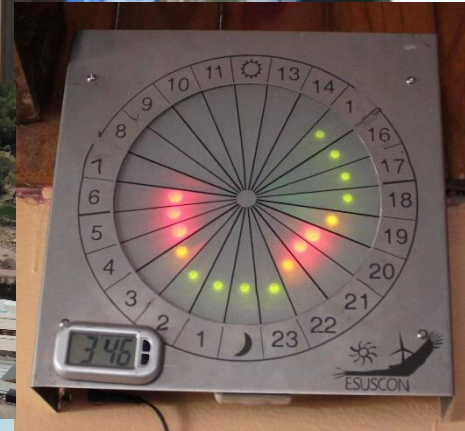
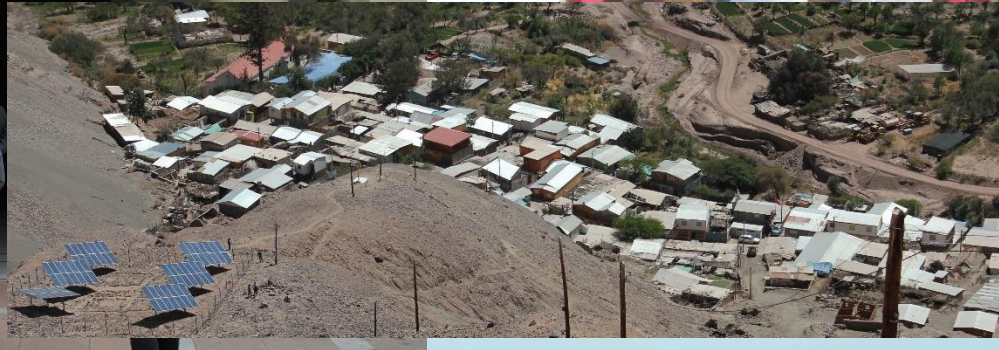
## Sheraton Santiago, Hotel & Convention Center Santiago, Chile - 11 & 12 September 2013





# 99 + Huatacondo

- very challenging location, 40<sup>th</sup> anniversary of the coup
- 99 attendees, Asia 31, Europe 18, Americas 50
- but, limited Latin American attendance, China 8
- focus on remote applications





- this brings us to Tianjin
- first Chinese participation in Jeju
- Meiqin MAO, Hefei University of Technology,  
and Chengshan WANG, Tianjin University, Symposium Chairs
- Local Organizing Committee faced big challenges