

EXECUTIVE SUMMARY

Travel to Munich, Germany during the 2013 summer enabled by the IGERT program provided a unique opportunity to study smart grid deployment and energy related activities in central Europe. The trip included coordination with Ph.D. students at the Technical University of Munich, publication and presentation at two technical conferences and other miscellaneous energy related activities.

The trip took place during what was labeled as a 50-yr rain, which caused widespread flooding, 1,000's of evacuations throughout Germany, disrupted and delayed travel services for several weeks. Despite these problems, the length of the eight-week trip enabled rescheduling such that most of the planned activities were successful.

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1. Coordination with the Technical University of Munich

With the help of IGERT TUM contact Dr. John Anderson, two Ph.D. students at the Technical University of Munich were coordinated with for their work in smart grid deployment. Maximillian Irlbeck and Vasileios Koutsoum both study similar smart grid deployment success and challenges in Germany as my own research on smart grid deployment success in the U.S. The following photo was taken at their research facility at the Garmish TUM facility.



Figure 1. TUM Ph.D. Students Maximillian Irlbeck and Vasileios Koutsoum

Specifically these students are part of Germany's E-Energy program that promotes and studies the development of smart grids in six regions of Germany. Mr. Irlbeck and Mr. Koutsoum are together responsible for evaluating the success of the utilities in the six regions and preparing a report for the Ministry of Economics.

Meeting with these students and discussing their preliminary results highlighted similar problems for German and European utilities companies as U.S. utilities. These problems range from politics, to limited value propositions, to the aging workforce, and lack of shared lessons learned. Particular challenges to Germany stemming from their stronger use of renewable energy was discussed with respect to the lack of energy storage, and

the country's goals to discontinue use of all nine nuclear facilities by 2020, two of which have already been shut down.

The following photo represents a common image in Germany indicating the desire to reduce reliance on nuclear energy. Translated it says "no thank you to nuclear power."



Figure 2. No Thank You Nuclear Power

In addition to these discussions, my meetings with these students will result in future coordination with respect to conferences and publications in our shared areas of interest.

2. Technical Conferences

An important milestone of the trip to Germany included publication and presentation in two conferences in the smart grid area of interests. Participation in these conferences would not have been possible without IGERT support for which I am especially thankful.

A. "Smart Greens," Aachen, Germany

The first conference was the Smart Greens conference in Aachen, Germany from May 9th – 10th. The paper topic developed for this conference is titled "Smart Grids and Small Utilities: A Preliminary Analysis on the Contribution of Utility Size to Successful Smart Grid Deployment." Presentation of this paper received interesting questions after presentation that may lead to a tangent investigation into a classification of smart grid projects in either regulated or unregulated markets.

This paper was presented in the "Smart Grids" section among other topics on 1) A Comprehensive Framework for Smart Cities, 2) Research in Sociology on Smart Grid Project, is it a Wager? 3) SoftGrid: A Green Field Approach of Future Smart Grid, 4) Practical Information about Sustainable Mobility for Smart Cities, and 5) Smart Energy Efficient Buildings – A Living Lab Approach.

B. "Central Europe Towards Sustainable Buildings." Prague, Czech Republic

The second conference was in Prague, Czech Republic from June 24 – 28th. The paper developed for conference publication was "Transitioning to Smart Grids: A Preliminary Case for Regional Roadmaps."

This conference was less technical than the first and more focused on sustainability in urban architecture and urban planning. Presentations by Ph.D. students and candidates highlighted international work on the development of "Active Buildings," urban block ecosystem refurbishment, bionic facades, and user-friendly planning tools for sustainability objectives.

At this conference I met with Dr. Petra Liedl, a German native and University of Texas professor in the School of Architecture who is visiting Germany for the summer. Dr. Liedl works with Dr. Noveselec in a thermal lab on the UT campus in Austin and is working on a climate and façade tool to be used in early planning phases to maximize energy saving potential. I plan to meet with her again on her return to Austin.

3. Other Energy Activities

The third aspect of the trip to Munich included other energy-related activities. These included research into the smart grid efforts of Green City Energy, the cities main electric utility. I was unable to get a response back to my inquiries with this utility so I did not have any direct contact with them.

1. Hydro-Electric Power Plants

Munich has multiple hydro-electric power plants along the Isar River as shown in the following diagram.

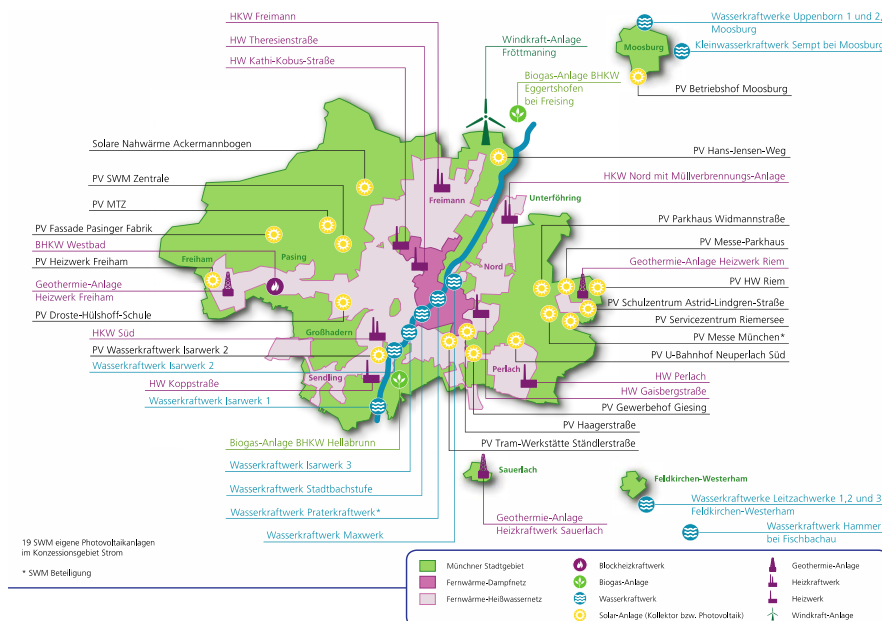


Figure 3. Munich Power Plants

I visited two of these and brought back a DVD of the construction of the Das Praterkraftwerk shown in the following picture. This hydro-electric plant was built as an underground power station with a capacity of 2500 kW and meets the needs of 4000 Munich households.

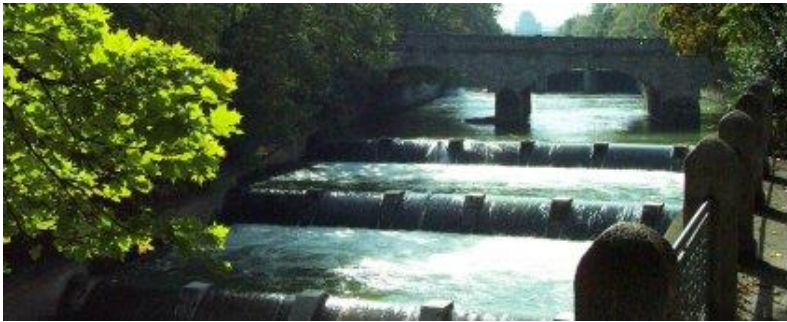


Figure 4. Praterkraftwerk

2. Green Infrastructure

My initial objective upon arriving in Munich was to take a photo journal of green infrastructure within the city. I quickly realized green infrastructure is highly prevalent throughout Munich including four parks in all directions from my apartment. Below is one small example of green infrastructure on my block.



Figure 5. Green Infrastructure in Munich

3. Deutsches Museum

Comparable to Washington's Smithsonian, the Deutsches Museum in Munich is one of the world's most important collections of science and technology with over 100,000 historically significant objects. Highlights include the first motorized aircraft built by the Wright brothers, the U1 submarine, the first program-controlled computer, and Diesel's original engine. Below is a photo of my son in the children's section called "Kid's Kingdom" learning about wave energy.



Figure 6. Oliver Tajchman in the Kid's Kingdom

4. Trip Logistics

A Transportation

Transportation to the two technical conferences was conducted via Germany's system of high-speed trains with the purchase of a Eurail pass. Inter-city travel within Munich and to Garmish was conducted via the U-Bahn, S-Bahn, and city bus system with the purchase of Isar cards.



Figure 7. High-Speed Train

B. Lodging

Lodging during the trip consisted primarily of a rented flat in Munich, as well as hotels for the conference trips to Aachen and Prague.

C. International SOS

Email communication from the International SOS system, required by the University of Texas for international travel, was highly valuable for monitoring the weather situation. Due to the language barrier this communication would have been much more difficult using existing German weather warning systems.