TRANSATLANTIC URBAN CLIMATE DIALOGUE – WORKSHOP # 4

Integrated Community Energy Systems: Sustainable City Building, Competitiveness and Economic Development

Guelph, Ontario May 15th–May 17th 2013
Workshop Proceedings

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Transatlantic Urban Climate Dialogue

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The Project

The fourth workshop of the **Transatlantic Urban Climate Dialogue (TUCD)** took place in Guelph, Ontario, Canada, May 15th–17th, 2013. This workshop is the last of four problem-focused, goal-oriented and geographically-specific exchanges between local climate and energy policymakers, technical experts and practitioners from German and North American metropolitan regions. The participants represented the urban regions of Northern Virginia, Guelph/Ontario, Stuttgart and the Ruhr Valley.

The overall goal of this project, scheduled to take place between 2011 and 2013, is to strengthen the formal search, review and application of mutually beneficial local-level energy and climate change policies between Germany and North America.

This dialogue is grounded in several model institutional partnerships and precedents of successful exchanges on urban sustainability between German and North American regions. These partnerships are characterized by the inclusion of governmental, academic and commercial partners. For instance, since 2000, the Northern Virginia Regional Commission has worked with the Verband Region Stuttgart to exchange and apply urban climate and sustainability policies. Guelph, Ontario, has worked since 2006 with metropolitan regions in Baden Wurttemberg to share best practices in applying comprehensive energy planning practices. The work of each of these partnerships has incorporated formal transfers and applications of urban sustainability innovations across the Atlantic.

www

Compare workshop proceedings:

→ Workshop #1
Gelsenkirchen
October 16th–19th, 2011
→ Workshop #2
Arlington/Alexandria,
Northern Virginia
May 2nd–4th, 2012
→ Workshop #3
Stuttgart
November 26th–28th, 2012

www.fu-berlin.de/tucd

Part I | Site Visits

The site visits included:

1 Hamilton Community Energy, Hamilton →

2 Sir Adam Beck Generating Station, Niagara Falls →

3 Flat Rock Cellars, Jordan →

4 Independent Electricity System Operator →

5 Mountain Equipment Co-op →

1 Hamilton Community Energy (HCE), Hamilton

Hamilton Community Energy's district energy system (DES) is a clean-burning, natural gas–fired facility that supplies electricity and hot-water heating to customers through combined (cogeneration) heat and power.

HCE produces nearly 50 percent of the system's total thermal requirements through natural gas-fired reciprocating engine which is connected to a generator. Exhaust heat is captured and used to produce 3.2 MW of additional thermal capacity. Three separate gas-fired 4 MW boilers are used for peak and standby heating demand. A heat exchanger and control valve at each customer site circulates thermal energy in a closed heating loop. The DES also produces 3.5 MW of electrical power that is either sold directly to the grid or provides standby power for City buildings.

HCE provides heat energy for thermal heating and domestic hot water to approximately 2.0 million square feet of institutional, commercial, and multi-residential space, and provides a standby source of electricity for key downtown customers, including City Hall. A pioneering satellite operation provides thermal energy, chilled water and domestic hot water to some laboratories, integrating conventional DES with geo exchange and solar thermal technologies.

More than just a provider of DES thermal heating services and turnkey energy solutions, HCE is also home to a public visitor and educational centre for school and college students, an ongoing part of HCE's commitment towards educating and developing compact sustainable communities.

2 Sir Adam Beck Generating Station, Niagara Falls

Ontario Power Generation's Niagara PlantGroup operates a complex of three hydroelectric generating stations on the Niagara River. Together with two smaller plants their capacity is almost 2,250 MW. The plant group's annual production is in the range of 12 billion KW hours, one third of the company's total hydroelectric capacity.

The two largest plants are the Sir Adam Beck Generating Stations (GS). GS no. 1 has a capacity of 498 MW, GS no. 2 is Ontario Power Generation's largest hydroelectric facility with a generating capacity of 1,499 MW.

The plant group's environmental management system is registrated to the standards of the International Organization for Standardization. Ontario Power Generation (OPG) strives to optimize the energy output of its plants while respecting the environment and works closely together with environmental groups. It is committed to becoming a sustainable energy development company and will achieve this goal by continuous improvement in ecosystem protection, energy and resource use efficiency, pollution prevention and community relations.

Sir Adam Beck Power Station

3 Flat Rock Cellars, Jordan

The winery strives to preserve the eco-system and to ensure a sustainable environment. The family enterprise with its 80 acres has incorporated environmentally responsible technologies, e.g.:

- Geo-thermal systems for all heating and cooling within the winery.
- Environmentally sensitive waste management systems.
- The use of ozone technology to clean barrels and tanks resulting in the use of no chemicals and only water run off.
- Low impact viticulture strategies to manage the vineyards.
- Gravity flow to reduce the energy required to transport wine through the winemaking process.
- Landscaping that complements and reflects the natural surroundings.
- Underground barrel cellar offering natural temperature and humidity control.
- Plenty of natural lighting to reduce energy costs.

Wine Tanks

4 Independent Electricity System Operator (IESO)

The IESO, which manages the wholesale electricity market in Ontario, is a not-for-profit corporate entity established in 1998 by the Electricity Act of Ontario. It is governed by an independent Board whose Chair and Directors are appointed by the Government of Ontario.

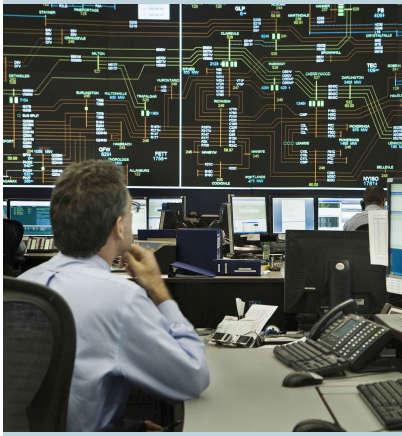
The IESO 18-Month Outlook anticipates adequate generation and transmission capability to support system reliability. Ontario's first transmission-connected solar projects will come online over the next 18 months. When added with solar generators on low-voltage networks, these facilities will combine to generate 2.2 terawatt hours (TWh) of annual electricity by the end of 2014. That embedded generation will reduce demand for electricity from the transmission grid – particularly during the summer when air conditioning use is at its highest.

Summer peaks are also being impacted by consumers cutting back their energy use in response to conservation initiatives, time-of-use rates, market prices and other incentives. Large energy users – such as factories, universities or hospitals – who are eligible for the

ieso
Power to Ontario.
On Demand.

Global Adjustment Allocation will play a notable role in that drop, reducing their electricity consumption on the hottest days of the summer.

Ontario‘s power grid is also expected to encounter more frequent instances of surplus baseload generation in the spring and summer seasons of 2013 and 2014. This is due to multiple factors, including lower off-peak demand for electricity, increased nuclear capacity and more renewable generation. IESO system operators manage surplus baseload generation through a range of tools and processes – including exports, manoeuvering nuclear units and, beginning in September 2013, dispatching wind generators. The IESO already has in place other efforts – such as centralized wind forecasting and increased visibility of embedded generation output – that will provide greater operational awareness and efficiency in running the system.



IESO Control Room

IESO has been certified LEED Silver for Leadership in Energy and Environmental Design by the U.S. Green Building Council, in a program for operations and maintenance of existing buildings.

The IESO has a green purchasing policy for office and building supplies, recycling and has reduced water consumption by 34 per cent over the past two years. It also has a sub-metering system to track building and cooling tower consumption, plus a weather station to control lawn irrigation.

5 Mountain Equipment Co-op

Mountain Equipment Co-op (MEC) is a Canadian consumers‘ cooperative, which sells outdoor recreation gear and clothing to its members exclusively. MEC is notable for its commitment to environmental protection. As a co-op, MEC sells only to customers who hold a lifetime membership, which is technically a share and can be purchased by anyone for $5. MEC bills itself as Canada‘s largest supplier of outdoor equipment. Since its founding in Vancouver, British Columbia in 1971, MEC has expanded across Canada.

Mountain Equipment Co-op

MEC has undertaken many initiatives in the name of attempting to fulfill its value of social responsibility, including the following:

- As a member of 1% for the Planet, MEC donates 1% of its gross revenue each year to environmental causes.
- Is a member of the Fair Labor Association.
- In May 2007 MEC became a bluesign member. Bluesign is a third party environmental, health and safety standard for the textiles industry.
- Operates a garment recycling program for polar fleece and polyester garments. This program has been discontinued as of January 2009 due to lack of use.
- Is a founding member along with CPAWS of ‚The Big Wild‘, an online initiative to protect 50% of Canada‘s wild spaces.
- In 2007 MEC launched its ‚Ethical Sourcing Blog‘, which examines the relationships between MEC‘s supply chain and a variety of human rights issues.

- MEC promotes a variety of outdoor education opportunities to its membership via an online calendar of events service. Postings must be related to instructional, non-motorized wilderness activities or environmental initiatives.
- In December 2007, MEC became the first retailer in Canada to stop selling certain water bottles and food containers containing bisphenol A, a chemical used to make some plastics that has been linked in some studies to increased incidence of cancer and other diseases.
- In 2010 MEC launched a new Green Building/Operating initiative called MEC GBS (Green Building Systems). The intention of the initiative is to ensure MEC retains its leadership in building and operating environmentally friendly facilities.

Part II | Workshops[1]

Main questions:

What can be done in order to establish a sustainable community and to connect it to economic development?

How to create a sustainable green economy?

What are direct and indirect impacts of the integrated energy system on energy cost saving?

What parallels in terms of green job creation can be noticed and compared in all three countries?

1 The following summaries consist of notes taken during the conference in combination with the presentation slides of the speakers.

Panel I | Community-based energy programs and local economic impact

InnovationCity Bottrop

Presentation by Lord Mayor of Bottrop, Bernd Tischler

Bottrop as InnovationCity:

- Bottrop was the winner of a competition in North-Rhine Westphalia in order to reduce CO_2 emissions by 50% until 2025 and can call itself InnovationCity Ruhr
- In so far, Bottrop serves as a laboratory for the "Energiewende" with "Bottom-up" instruments like district heating, micro CHP, photovoltaics, car-sharing, E-busses, climate adaptation measures
- The main focus lies on: Living, Working, Energy, Mobility and Urban Development
- To improve the city's focus areas, weekly meetings with the most important stakeholders are carried out
- Declaration of a pilot area with 70,000 inhabitants

InnovationCity Ruhr Manual – Blueprint for Urban Retrofitting:

- Introducing ambitious goals in an open process of cooperation between economy, science and politics
- Main challenge: Retrofitting existing buildings
- Pilot project: Transferring three houses to "Plus-Energy Houses" (houses, which produce more energy than they use)
- Participation and support of the inhabitants as a key aspect
- InnovationCity is producing economic benefits in Bottrop
- Experience in Bottrop can be exported, therefore German industry is very interested in the city

Blueprint for Urban Retrofitting

Transitioning Neighborhoods to Carbon Neutral

Presentation by Karen Nasmith, Director of Project Neutral (Guelph/Toronto)

Introduction of Project Neutral:

- Focus on neighborhoods, local leadership, participation and replicability
- Bottom-up approach: working with groups of individuals
- Building awareness through establishing carbon footprints
  - Comparing it to homes in the neighbourhoods
  - Goal: reaching a shift in thinking about climate protection
- Creating action plans via a 'Neighborhood Challenge Tool'
- Action carried out in the form of Neighborhood Campaigns

Acting as a Catalyst

The Rationale:

- → 25 million Canadians live in existing urban neighborhoods
- → Residential sector: 25–60% of municipal GHG emissions
- → Retrofitting established communities is the challenge

Project Neutral Achievements:

- → Household survey
  - 2011: 120 households
  - 2012: 400 households
- → Starting a public campaign called “Get Charged“
- → Establishment of a web tool called “Neighborhood Challenge”
- → Introducing a community-wide retrofit initiative
- → Being active on different levels such as workshops, volunteer parties, canvasses, coffee parties, school contests, public events, etc.

www

→ www.gettingto80.ca

Community-Scale Home Energy Retrofits

Presentation by Clifford Maynes, Executive Director of Green Communities Canada

Green Communities Canada as an umbrella organisation:

- → 25 community organisations across Canada
- → Main target: residential energy efficiency
- → Focus on bottom-up and transformative change
- → Community-scale retrofits in order to get richer and cleaner
  - Bill savings
  - Jobs and business opportunities
  - Local economic stimulus
  - Home value and comfort

Retrofitting is effective but costly:

- → Need for a new strategy that transforms the housing stock
- → Benefits: saving money and saving energy on the long run
- → Marketing is the biggest challenge
  - Participation as crucial element
  - Strong leadership needed – credibility, trust
  - Multiple partners – trusted channels
  - Repeated message
  - High visibility, presence
  - Local branding – vivid communications
  - $ Incentives, give-aways
  - Recognition – e.g. Guelph Green Home label

Financing needs to be competitive:

- → Interest rate, low, fixed
- → Payback terms: 5–20 years
- → Transferability
- → Quick, easy approvals, underwriting
  - Tax, bill history, quick credit
  - Borrowing limits (e.g. 90% of value)
- → Focus on bigger retrofits - $10-20K
- → Forget the 'golden rule'
  - Positive cash flow misses non-bill benefits
  - Limits based on ability to pay, choice

Infrastructure and Cities: Smart Grid

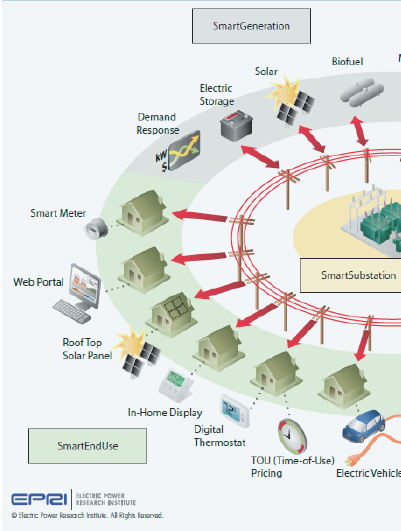
Presentation by Tim Gibson, Vice-President Smart-Grid, Siemens Canada Ltd

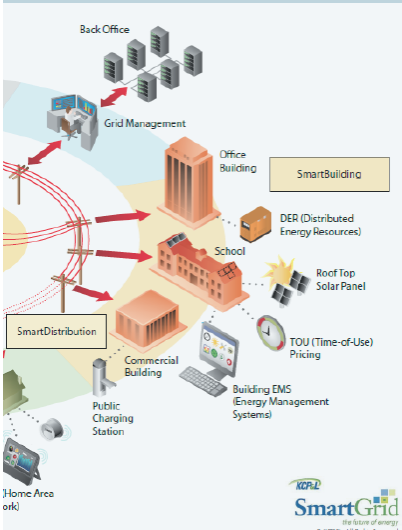
"New Urban Millennium":

- → Tremendous increase in world population to 9bn in 2050 vs. 7bn in 2010
- → Urban population expected to increase to around 70% in 2050 vs. around 50% in 2010
- → Climate Change is a fact and is threatening humans and biosphere
- → Increasing interdependence of economies, politics, culture & other areas of life
- → Cities as Powerhouses: 50% of world GDP is produced in cities with a population over 750,000
- → Major energy and climate factor: 75% of energy consumed in cities; 80% of CO_2 emissions are produced in cities

Changing the energy system requires new solutions:

- → Problem with the distribution of transformers: they have to handle more rash
- → Yesterday's grid (one way)
  - Little to no consumer choice
  - One-way limited communication
  - One-way power flow
  - Reactive maintenance
  - Few sensors and analog control
  - Centralized energy sources
- → Tomorrow's grid (network-like)
  - Many consumer choices
  - Bi-directional communication
  - Bi-directional power flow
  - Condition-based maintenance
  - Pervasive monitoring and digital control
  - Distributed energy generation
  - Self-monitoring and high visibility





Tomorrow's grid
© Tim Gibson

→ Smart grids mean balancing different energy sources and peak/low points

The example of Kansas City, which was established to serve as a best-practice example, shows: Smart Grid infrastructure is located in the center, local businesses around it:

→ Smart substation controller
→ Distribution automation and self healing grid
→ Intelligent demand response
→ Real-time operations information management and security
→ New policies and systems to improve safety and reducing grid vulnerability
→ Expansion of consumer options
→ Reduction of capital and operational costs
→ Promotes energy efficient behaviour
→ Community education to foster awareness of energy conservation
→ Increased reliable and cost-effective electricity
→ Enables active consumer participation within the grid

Ontario Power Authority's Conservation and Demand Management

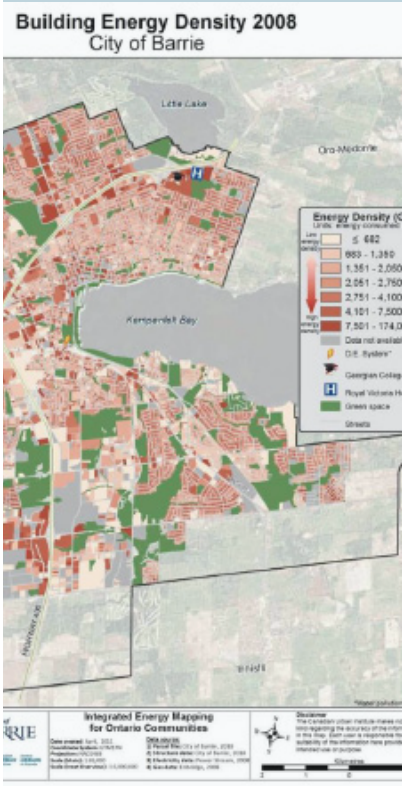
Presentation by Julia McNally, Director, Market Transformation of Ontario Power Authority

Ontario's Electricity Transformation:

→ Eliminating coal by 2014 is the biggest climate change initiative in North America
→ Leader in Smart Grid solutions with 4.7 million smart meters in Ontario
→ Promoting Renewable Energies
→ Ambitious conservation targets

Ontario Power Authority characteristics and goals:

→ Long-Term Energy plans: 7,100 MW of peak demand and 28 TWh by 2030
→ Procuring new supply like e.g. photovoltaics
→ Enabling conservation across the province
→ Reducing Greenhouse Gas Emissions
→ Introducing a Social Benchmarking Project, which tells consumers about their consumption rates
→ Flexible programs tailored to customers needs (individuals as well as industry)
→ Start of a Conservation Fund for high-efficiency chilling system called "Ice Bear Project"
→ Capability Building: Providing tools to enable energy savings



Example of energy mapping
© Julia McNally

Integrated Community Energy Solutions:

→ Horizon Energy Mapping
  - Mapped electricity density (kWh/m2), building age and other relevant metrics for all Horizon customers
  - Used output to target effectiveness of the deployment of CDM programs

QUEST Community Energy Protocol:

→ Guide for municipalities, LDCs and gas utilities to undertake energy planning

→ Enables municipalities and LDCs to better understand and coordinate respective planning exercises

Retrofitting was recognized as the future challenge in terms of energy efficiency and conservation:

- The InnovationCity Ruhr Manual, a Blueprint for Urban Retrofitting could serve as a role-model for North American cities
- Retrofitting is effective but costly; Looking at the financing model of Bottrop: incentives of industry partners, special programmes of the local banks, federal public incentives on state/federal level

Participation as crucial element for reaching ambitious energy goals

- Engagement of the local inhabitants is vital to realize the implementation of new energy infrastructure
- Local participation ensures the achievement of systematic targets concerning the future decentralization of energy systems

Decentralization as the major development concerning future energy infrastructure

- From one-way systems to Smart Grid systems: Bi-directional power flows will require the participation of local entities and a new distribution system
- Individual/Micro-CHP as a big future chance

Data is the next fuel: the more data, the more possibility to manage energy

- Both, Bottrop and Guelph are working on a systematic collection of data of energy use
- Integrated smart metering system (electricity, gas, water and heat) as an economical challenge

Panel II | Thermal Energy Networks and their role in attracting investments and stimulating local economic development

Guelph Community Energy Initiative

Presentation by Ron Collins, Vice-President, Business Development and Partnerships, Guelph Hydro Inc

Guelph will create a healthy, reliable and sustainable energy future by continually increasing the effectiveness of how we use and manage our energy and water resources:

→ Prioritized Strategies 2008–2031
- Above-code building efficiency encouraged
- Energy performance labels
- Transport efficiency
- Heat recovery (New district heating infrastructure planned)
- Renewables
- New energy services supply company

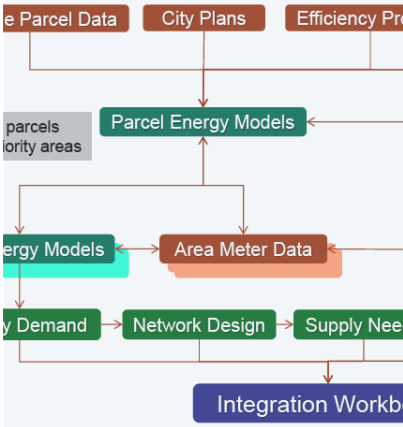
Guelph Thermal Energy Strategic Plan (TESP) as a key component:

→ The purpose is to develop a desired end state or objective for district energy in Guelph

→ The TESP is a joint development between the City of Guelph and Envida Community Energy Inc. that engaged an international team of experts led by Garforth International, the author of the Guelph Community Energy Plan

→ The Goals for TESP include: creating 50% heating market share, enable financial returns, foster economic development, reaching environmental goals, supply security and create business structures

→ Most important is the strategic commitment by the city



Simplified process overview of the thermal energy strategic plan of Guelph
© Ron Collins

Dinslaken – Potentials of CO_2 reduction through supra-regional district heating networks

Presentation by Thomas Döking, Stadtwerke Dinslaken

Introducing Stadtwerke Dinslaken (City Utility Dinslaken)

→ 95% owned by the City of Dinslaken

→ Turn over (Electricity, Natural Gas, Water): 96.1 Mio €

→ Turn over (District Heating): 72.8 Mio €
- Connected Heat Load: 690 MW
- Heat Supply: 835.6 GWh
- Length of Grid: 543 km
- Connected Objects: 13,200

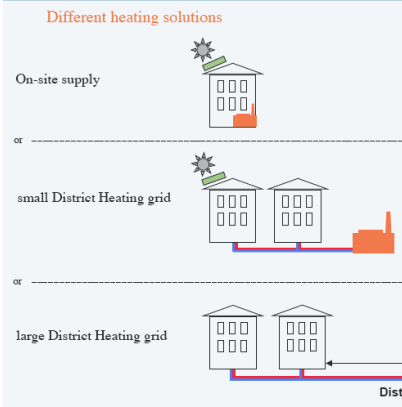
Facts and Figures – district heating and CHP in Germany

→ The district heating connected load in Germany is approximately 57,000 MWth

→ 13% CHP share in electricity production

→ The district heating customers are: 46% private homes, 36% public buildings, commercial and trade sector and 18% industry.

→ The total length of the district heating grid in Germany is approximately 100,000 km



Different heating solutions
© Thomas Döking

Specific advantages of the system used in Dinslaken

- Around 70–80% of the profit comes from district heating
- Only 1% of heat-only boiler energy
- District Heating System is adaptable to lots of different sources
- Two biomass plants, heat storage, coal-fire CHP plant
- Trying to distribute the energy sources on different pillars
- The bigger the heat network, the better
- Many different energy sources and therefore competitive prices
- High potential to minimize primary energy consumption
- Comfortable solutions for customers (no boiler, no chimney)

Ettlingen – Thermal Energy Services in a Municipal Multi-Utility

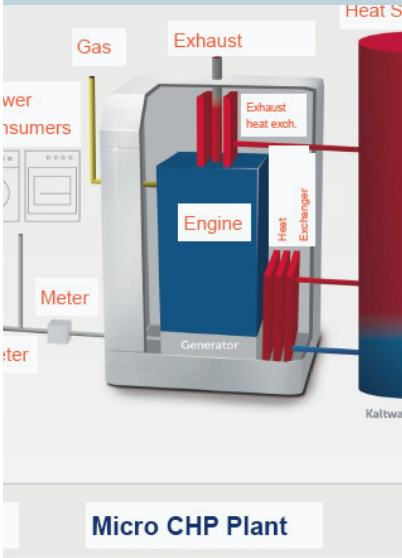
Presentation by Stefan Blüm, Head of Energy Services, Stadtwerke Ettlingen

Introducing Stadtwerke Ettlingen (City Utility Ettlingen)

- 100% owned by the City of Ettlingen
- Functions: Electricity, Gas, Water, Heat, Energy Services, Public Baths, historic convention center, runs municipal services like e.g. street lightning
- Supplied area: 30 km²-core town and outskirt villages
- Gas supply: 434 GWh/a (15 M therm/yr)
- Gas network length: 250 km
- Electricity supply: 200 GWh/a; peak load of 35 MW
- Network length: low voltage 231 km, medium voltage 89 km
- District Heating: multiple „island“ networks in Ettlingen and nearby

Specific characteristics of Stadtwerke Ettlingen

- Driving the Climate Protection Plan, which was introduced by the city
- Renewable Energy Funds (photovoltaic, windpark)
- Micro CHP approach for individual households; feeding the surplus energy into the grid
- Economic impact
  - Regional value-added analysis
  - For each product sector: calculating the share of sales income which is re-invested within town region Germany
  - Direct and indirect job creation
  - Loss of money with public baths and the historic convention center



Individual household power plant
© Stefan Blüm

Markham District Energy

Presentation by Bruce Ander, President and CEO of Markham District Energy

Energy utility owned by the City of Markham

District energy (thermal grid) is an enabler for the application of distributed generation technologies, results in significant community energy efficiency gains, and provides the platform for fuel switching.

Energy policy in Ontario

- Energy is energy. Energy is not only electricity.
- The debate in Ontario, and in many other NA jurisdictions, is dominated by electricity
- Over 90% of the Canadian population will live in urban centres by the year 2050
- As much as 60% of energy consumed in our urban centres is to heat and cool buildings or provide thermal energy for processing
- Thermal energy should therefore be the dominant policy discussion but it is largely absent in policy or planning

What motivated Markham to invest in a thermal grid strategy?

- Security of Local Energy Supply
- Self-reliance and resiliency
- Resilience: Many Ontario power plants are possibly affected by blackouts due to hurricanes, etc.
- Pro Solar only because of CO_2 emissions, not resilience
- To drive local Economic Development
- Environmental Performance
- Investment Opportunity

Markham District Energy characteristics

- 2 Thermal Grids
- 4 Energy Plants (14,300 tons CW, 46 MWth HW, 15.7 MWe CHP)
- 18 kilometres thermal energy distribution system
- Serving 7.0 million ft^2

International District Energy Association (IDEA)

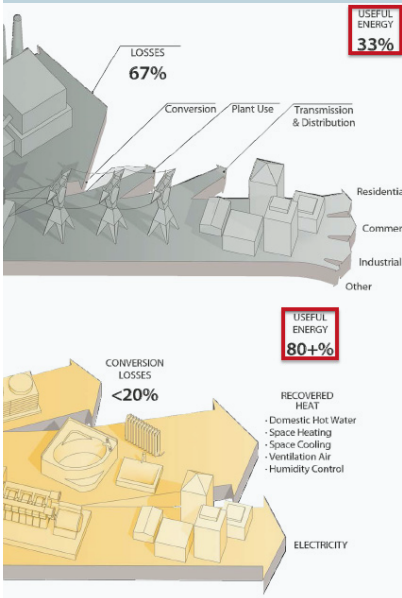
Presentation by Brad Bradford, Community Energy Planner

Introducing IDEA

- Existing since 1909: 104 years
- 1800 members in 25 nations
- 56% end-user systems, majority in North America
- Major urban utilities, public and private universities and colleges are members

Shifting scale and risk

- "We are all part of a transformative movement"
- Heat dominates all other energy uses
- Production largely dominated by fossil fuels
- Copenhagen and Denmark as a reference
  - Electric power infrastructure increased and decentralized rapidly in the last 20 years
  - Share of renewable energies is crucial in Denmark



Future energy infrastructure
© Brad Bradford

District Energy heating as an important step towards a sustainable energy future in regard that heat dominates all other energy uses:

- Clever systems are adaptable to different sources: the bigger the heat network, the better
- Economic impact significant in the examples of Dinslaken and Ettlingen (Germany)
- Bigger challenge in North America because additional infrastructure for cooling is needed
- The security of local supply and the self-reliance are main drivers for Markham (Canada) to invest in thermal energy systems

Resilience was recognized as a central element in establishing district heating systems

- Especially important in North America due to frequent natural disasters
- Creating systems, which survive political and technical changes, is a challenge
- Shifting scale and risk: towards a zoning of energy supply and away from fossil fuels
- Waste-water treatment as future opportunity

Proposal: a transatlantic competition between municipalities via web-tool could create new incentives of development

Locally based expert presentations and high-level statements on community energy systems and their implementation

What integrated community energy systems and the community energy initiative mean to the City of Guelph

Presentation by the Mayor of the City of Guelph, Karen Farbridge

- The Transatlantic Urban Climate Dialogue is a great opportunity to share the same challenges
- Government of Ontario announced that the communities are going to be involved in a sustainable future
- An important challenge is the link between sustainable and economic development
- City of Guelph aims to integrate energy goals in planning tools
- 50% of the local energy needs are thermal
- There is a growing market of heat systems in North America

Canadian German Chamber of Industry and Commerce

Presentation by Yvonne Denz, Department Manager of the Canadian German Chamber of Industry and Commerce

- The Chamber is recognized as the official representative of German industry in Canada and promotes bilateral economic relations
- The German-Canadian Chamber is the primary contact for economic activities between Germany and Canada
- One of our tasks is to host trade delegations and organize industry conferences as well as trade show participations
- Among others, our office in Montreal has been focussing on the areas of renewable energies, energy efficiency, and environmental technologies
- Over the past 10 years, Germany has experienced an impressive development: from an 8% share in 2000, renewable energies accounted for 23 % of German electricity supply in 2012
- This goes hand in hand with a dynamic renewables' sector: in 2011 around 370,000 people were employed in this sector, and almost 28 billion Euros were invested
- In final energy consumption, biomass and biogas are predominant with 50% amongst the renewable energy technologies followed by wind energy with 14% and solar energy with 11%
- On a local level, communities are involved in renewable energies. Jühnde, a small town with a population of 750 people located in the heart of Germany, has been energy self-sufficient for more than six years - through a biogas plant and a thermal power station fed with wood chips

Renewable Energies and Implementation Actions

Presentation by Martin E. Nohe, Chairman of the Northern Virginia Regional Commission and Member of the Board of County Supervisors, Prince William County

- Energy strategies need to fit local community
- Participation as a key aspect towards the way to alternative energy sources
- Best-Practice exchange is extremely valuable

Guelph Chamber of Commerce

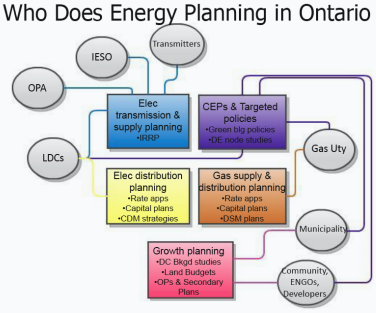
Presentation by Lloyd Longfield, CEO of Guelph Chamber of Commerce

- Congratulations to Mayor Farbridge to show leadership in terms of community energy
- Energy is part of a wider discussion about sustainability
- Environmental Sustainability contains the following aspects:
  - Economic sustainability: growing manufacturing base in Guelph
  - Social sustainability: how do we get the most out of human workforce and integrate them in the community?
  - Cultural sustainability: European model of town squares applicable
- Entrusted network of knowledge between Germany and Canada
- Farm-based energy is important for the agricultural industry in Guelph

Quality Urban Energy Systems of Tomorrow (QUEST)

Presentation by Brent Gilmour, Executive Director of QUEST

- Smart energy communities as an opportunity, especially for Ontario
  - Challenges: reduce costs, increase long term adaptability and resiliency, reduce environmental impacts
  - Opportunities: improve efficiency, use lost energy, use waste as an energy source, use local alternative energy sources
- Focus on design, integration and maintenance of smart energy community systems
- QUEST provides market intelligence research, networking, industry support and serves as a meeting point across Canada
- Networking with the actors of Energy Planning in Ontario is a strength



Energy planning in Ontario
© Brent Gilmour

→ Policy Principles of QUEST:
  - Match land use needs and mobility options
  - Match energy options to local context
  - Send clear and accurate price signals
  - Manage risks and be flexible
  - Emphasize performance and outcomes in policy and regulations
  - Pursue policy and program stability

→ Technical Principles of QUEST:
  - Improve efficiency
  - Optimize exergy
  - Manage heat
  - Reduce waste
  - Use alternative energy resources
  - Use grids strategically

Ontario Power Authority (OPA)

Presentation by Colin Andersen, CEO of Ontario Power Authority

Ontario's Transformation

→ Ambitious conservation targets (7,100 MW of peak demand and 28 TWh by 2030)
→ Smart grid leaders (4.7 million smart meters in Ontario, time-of-use rates)
→ Significantly cleaner supply mix
  - Eliminating coal by the end of 2014
  - Significant increase in renewable and clean energy

→ Guelph as a long-time leader and partner in district energy efforts
→ OPA: long-term planning, conservation programs, reliable, cost-effective, sustainable electricity supply
→ Establishing the Cleaner Ontario Mark: provincial brand for CDM programs
→ GIS-based energy mapping as important strategy

North-Rhine Westphalia (NRW) – Goals in terms of Energy Policy

Presentation by Annette Voigt, Ministry of Economic Affairs, Energy and Industry of the State of North Rhine-Westphalia

NRW – the economic center and the energy state no.1 of Germany

→ NRW has 18 million inhabitants; GDP and population both nearly 22 % of Germany
→ As the most important industry location in Germany, North Rhine-Westphalia generates roughly 30% of the electricity required in Germany and at the same time consumes over 40% of electricity used for industrial purposes
→ A power plant capacity of roughly 39,000 MW is installed here. This is about 25% of the installed capacity in Germany

- → 28,200 employees working on the development and utilization of renewable energy technologies in 3,600 companies generating total sales of more than 8.7 billion euros
- → Roughly 35% of greenhouse gas emissions in Germany come from NRW
- → Objectives of Energy Policy in NRW:
  - Environmental Capability
  - Security of supply
  - Economic efficiency
- → NRW accepts the challenge of climate change with clear strategies and route maps
  - Climate protection as an economic driver for our state
  - Energy Turnover offers Economic Opportunities
  - Most important measures: climate protection at local level, retrofitting, energy saving initiatives for low-income households, expansion of command heat and power
- → Conclusion: "Energiewende" is happening locally
- → Integrating players at all levels: the service provider of NRW, EnergyAgency.NRW tries to bring together a big variety of stakeholders

Verband Region Stuttgart

Presentation by Markus Siehr, Verband Region Stuttgart

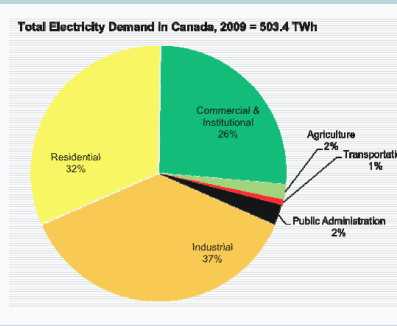
- → Topography forms a natural barrier to the district heating infrastructure
- → Buildings with district heating require only half the energy and therefore they are very popular
- → Energy-Turnaround policy is effecting the Stuttgart Region heavily in a positive sense
- → Solar and rooftop solar panels are becoming a standard

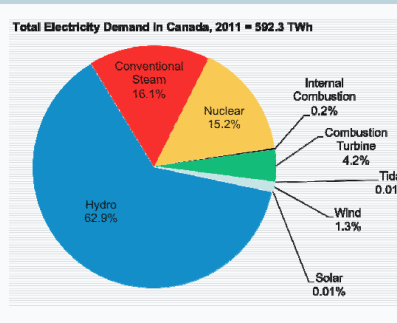
Energy and Canadian Electricity

Presentation by Jan Carr, Board Member of Guelph Hydro Inc. and former CEO of the Ontario Power Authority

Canada in the world of energy

- → 5th largest producer of energy and energy resources
  - Largest uranium producer – 1/3 of global supply
  - 2nd largest hydroelectric – 13% of global total
- → 5.8% of global energy is produced in Canada or from Canadian resources
  - 4% of global electricity produced in Canada
  - Canadians are 0.5% of global population





Total electricity demand in Canada
© Jan Carr

→ Canadian energy sector
  - 5.9% of GDP
  - 20% of annual new investment
  - 100,000 directly employed
  - 22% of total export revenue

Coal phase out

→ Federal
  - All existing coal-fired electricity generation units to meet a carbon dioxide (CO_2) emission standard of 375 tonnes per gigawatt-hour (GWh) upon reaching end of economic life (to be no longer than 45 years)
  - Effective July 1, 2015

→ Ontario
  - Coal-fired to be fully retired
  - Effective December 31, 2014
  - North America's biggest GHG initiative

An Operational Outlook for Ontario's Electricity System

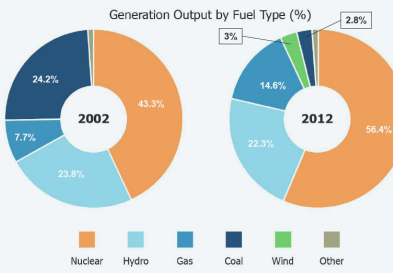
Mark Wilson, Director of Settlements, Independent Electricity System Operator (IESO)

Introducing IESO

→ Directing the flow of electricity to meet the province's power needs
→ Balancing demand for electricity against available supply through the wholesale market
→ Managing the $10-billion wholesale market
→ Oversee emergency preparedness activities for Ontario's power system
→ Send real-time price signals to trigger demand response

The IESO is the reliability coordinator for Ontario and works closely with other jurisdictions to ensure energy adequacy across North America

→ Installed capacity: 35,850 MW
→ Total annual energy consumed: 141,3 TWh (2012)
→ Costumers: 4.7 million
→ Transmission lines: 30,000 km



Generation output by fuel type, Ontario
© Mark Wilson

Renewable Integration: Areas of focus

- → Forecasting
  - Ability to predict output from variable resources is essential for maintaining system reliability and market efficiency
- → Visibility
  - New processes such as direct telemetry and reporting ensure visibility of large-scale embedded wind and solar generators
- → Dispatch
  - Integration of renewables into the economic dispatch will address issues like surplus baseload generation

Emerging technologies provide benefits:

- → Increased flexibility
- → Leverage and optimize existing infrastructure
- → Peak management and load shifting
- → Other reliability-related services (i.e., ramping, load-following, SBG relief)
- → Deferred or diminished capital investments
- → Potential for economic development and job creation

Ontario has made significant progress in expanding demand response capacity but some barriers must be overcome:

- → How to enable smaller loads to participate?
- → Increased role for aggregators?
- → Changes to tools, processes, systems, settlements etc.
- → Technology/equipment requirements – i.e., telemetry
- → Need for cost consistency among providers
- → Improved price signals
- → Public awareness and customer education opportunities

Future of TUCD

In April 2013 TUCD received a grant for an extension of the project from the Transatlantic Program of the Federal Republic of Germany as Part of the European Recovery Program (ERP) of the Federal Ministry of Economics and Technology. TUCD*plus* runs from October 2013 to September 2013.
The core structure of the TUCD*plus* will be the same as the previous TUCD-project.

Two workshops are planned:

1. *The first workshop will take place February 2014 in Berlin, Germany, under the working title "Community Energy Planning and Implementation as a Critical Enabler in Activating the Business Community to Drive Local and Regional Economic Development"*
2. *The second workshop will take place June 2014 in Washington, DC, USA, under the working title "Developing the Key Institutional, Regulatory and Structural Issues of Successful Municipal Utilities and their Role in Implementing CEP's and Driving Local and Regional Economic Development"*

Approximately 40 participants (elected officials, senior corporate representatives, technical experts and practitioners) from Germany, Canada and the United States will participate.

Again, the Environmental Policy Research Centre (FFU) of the Freie Universität Berlin will oversee this project.

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Ontario Power Authority, CEO

Dr. Blüm, Stefan

Stadtwerke Ettlingen, Manager – Heating Services and Energy Contracting

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Community Energy Planner

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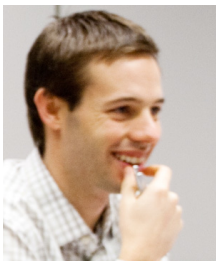

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Farbridge, Karen

Mayor of Guelph

Garforth, Peter

Principal, Garforth International LLC, and Special Energy Advisor to the City of Guelph

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Nachhaltig mobile Region Stuttgart, Head of the Office

Gibson, Tim

Vice President – Smart Grid
Siemens Canada Limited
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Gilmour, Brent

Quality Urban Energy Systems of Tomorrow (QUEST), Executive Director

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Kerr, Rob

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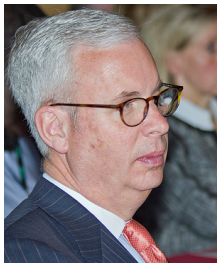
Kiwitt, Thomas

Verband Region Stuttgart, Managing Director



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Transatlantic Urban Climate Dialogue

Research Focus	Cities and Environmental Change
Institutions	**Forschungszentrum für Umweltpolitik,** FU Berlin
	Massachusetts Institute of Technology (MIT), US
	The George Marshall International Center at Dodona Manor, US
	AvH Network “Cities and Climate”
	Virginia Tech University’s Metropolitan Institute, US
	The Northern Virginia Regional Commission, US
Head of the Project	**Prof. Dr. Miranda Schreurs**, FFU
	Dr. Dale Medearis, Northern Virginia Regional Commission, USA
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Financial Support	Bundesministerium für Wirtschaft und Technologie
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