Bruce Orloff – Canadian Smart Grid Leader – IBM Canada

September 26, 2013

IBM Energy & Utilities

Perspectives of Network Flexibility and Renewables

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Renewable Integration

Conventional Sources
How do we integrate renewable power with conventional sources?

Transmission Grid

Solar Generation

Wind Power

Energy Storage

Smart control and dispatching system

Dispatching curve

Wind forecasting

Solar forecasting

Remote control

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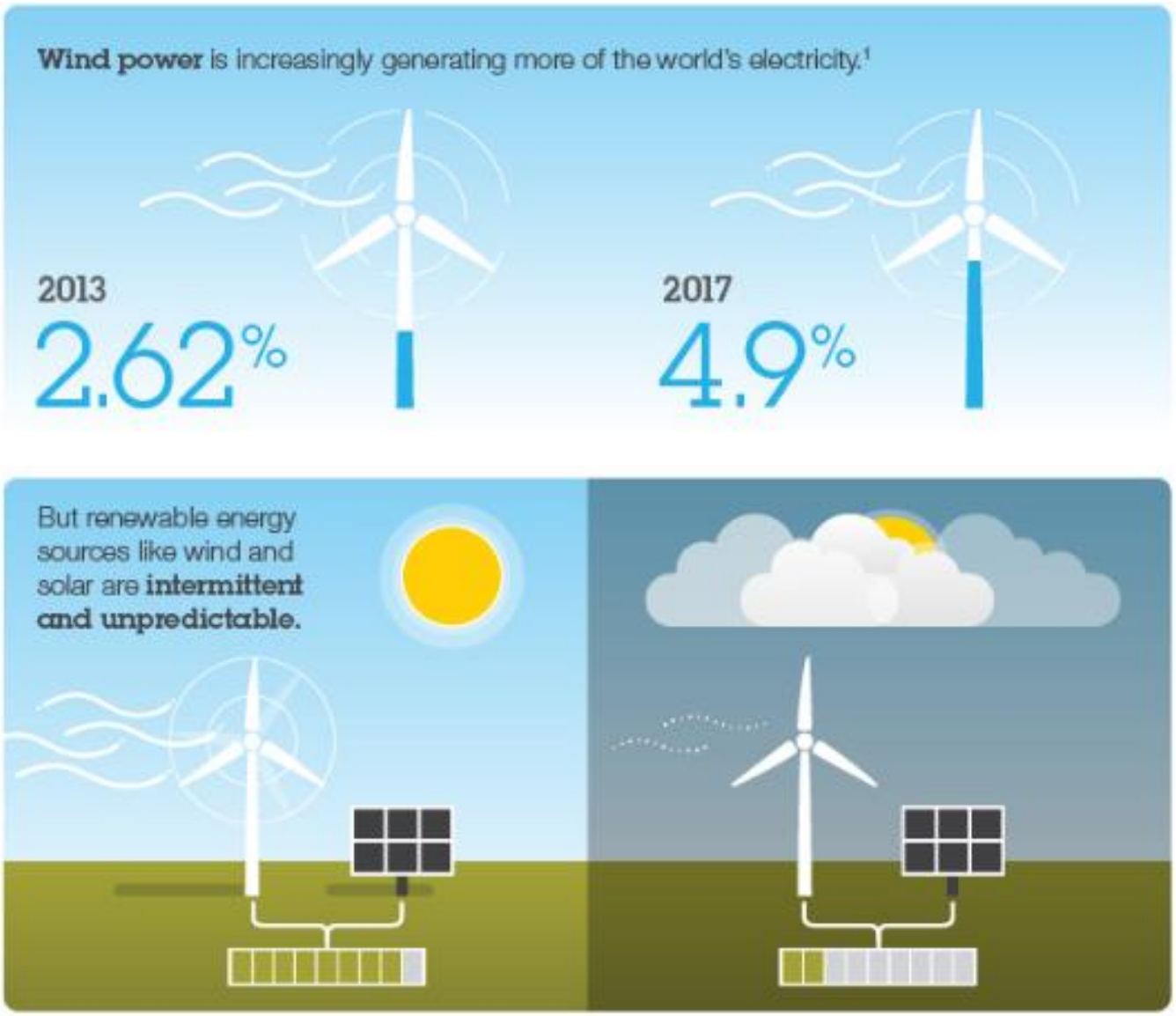
Sophisticated Weather Forecasting and Analytics Matures Renewable Energy Market



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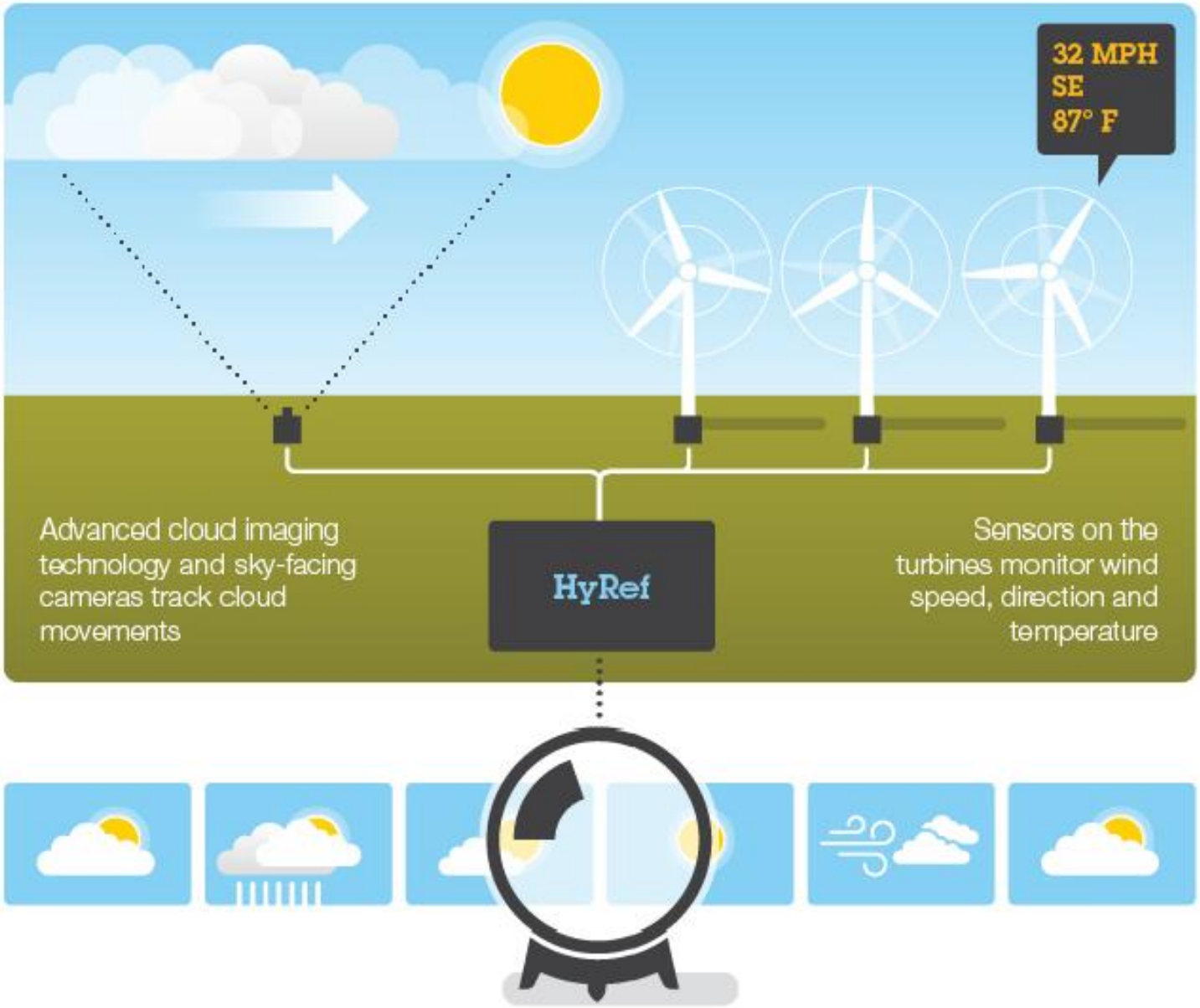
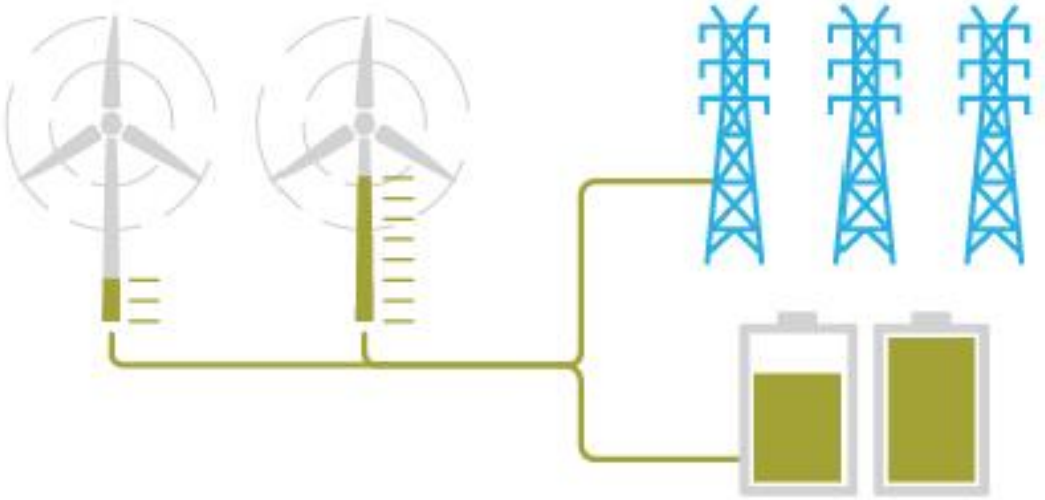
A solution

The Hybrid Renewable Energy Forecasting solution (HyRef) uses data gathered from monitoring devices and analytics technology to produce accurate local weather forecasts within a wind farm as far as one month in advance, or in 15-minute increments.



With this level of insight, utilities can **better manage** the variable nature of wind and solar, and more accurately forecast the amount of energy that can be redirected into the power grid or stored.



Understanding the value

HyRef can increase the amount of **renewable power generation** integrated in the grid by

10%

where otherwise this energy would be lost.[2]

This amount of **additional energy** can power more than

14,000

homes.[3]

[1] Global Wind Energy Council
[2, 3] Based on the Zhangbei 700MW Demonstration Project

IBM

How does Analytics enable the Smarter Energy future

- A coordinated, global Smarter Energy team within IBM Research across nine global Research labs and >45 additional locations, worldwide
- Creating differentiated and re-usable “first-of-a-kind” technologies and solutions
- Working in partnership with government, industry associations, academia, and IBM clients

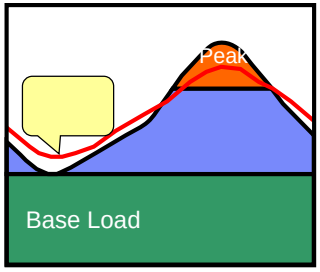
Key research projects in areas such as:

GRID OPERATIONS

- Outage planning and Response Optimization
- Field Force Optimization
- Electric vehicle integration
- Asset Management Optimization
- Condition-based maintenance

PORTFOLIO PLANNING

- Wind/solar farm layout
- Condition-based maintenance
- Power forecasting



DEMAND MANAGEMENT

- Demand planning and load forecasting
- Demand response
- Transactive control

BEHAVIORAL MODELING

- Social computing
- Simulation of agents
- Preference modeling
- Energy use scheduling

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Meter Data Analytics Scenarios

OPPORTUNITY AREAS

Taking advantage of the world's largest database of interval electricity consumption data, a strategic asset for the Province of Ontario.

Conservation & Demand Management

- TOU impacts assessments
- Rate design analysis
- Program effectiveness
- Individual customer recommendations

Market Enablement

- Consumer Education
- Retailer program design
- Bilateral contract risk management
- Participant bids/offers inputs

Distribution Service Reliability

- SAIFI / CAIDI calculations
- Distribution Planning

Loss Identification

- Tamper flag analysis
- Energy balancing
- Theft analytics: voltage, pattern recognition,…

POTENTIAL USERS

- LDCs
- Retailers
- Energy service providers
- IESO
- OEB
- OPA
- Generators & Other Market Participants
- Universities

GENERAL BENEFITS

- Province-wide perspectives
- Economies of scale
- Enhanced analysis and capabilities
- Consumer education

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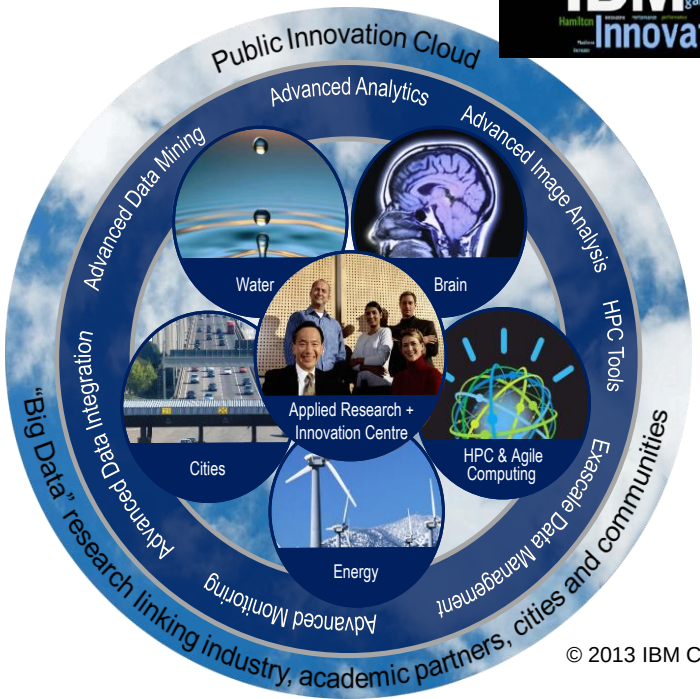
IBM Canada Research and Development Centre

- Launched April 10, 2012
- Southern Ontario Smart Computing Innovation Platform (SOSCIP)
- Highly dependent on collaboration for success
  - Strong University partners
  - Outreach to industry (SMEs) across Ontario
- $210M Project
  - IBM invests in Computing Infrastructure; 145 new positions
  - Government partnership - $20M Federal; $15M Provincial
  - 3 year project timeframe
- Analytics Driven / Skills Transfer (HPC and Cloud)
  - To the wider academic community
  - To Ontario's industry



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