

Smart Grid Development in China

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Purpose

- threefold
 - to explore key contemporary issues in China's significant advances in the smart grid issue-area
 - to reflect upon this specific Canadian trade mission to China
 - to initiate broader discussion regarding China's contributions to global energy sustainability, specifically, and the country's 'place in the world', more generally



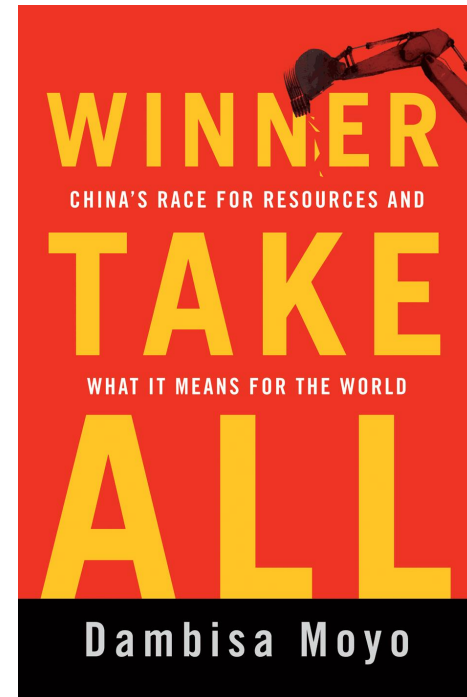
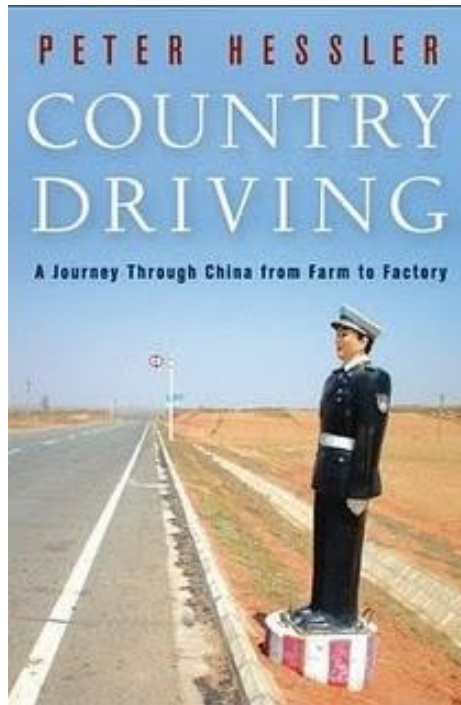
Outline

- Context: me, the mission
- China's electricity system
- China and smart grid development
 - the country's three-stage plan
 - key contemporary issues, 'unofficially'
 - 'what does smart grid mean?'
- Broader impressions of a newbie
- Final words



Context – 1/3

- ‘Me’ ... no ‘Sinologist’!





- **Canadian Smart Grid Mission**

- a DFAIT priority for 2012-13

- “Contribute to economic prosperity and job creation through continued implementation of the Global Commerce Strategy, with an emphasis on expanding and diversifying commercial relationships with emerging and high-growth markets.”

- industry association (1), entrepreneurs (5), utilities (2), academics (2)



www.international.gc.ca/about-a_propos/priorities-priorites.aspx?view=d;
www.sgcanada.org; www.powerstream.ca; www.awesense.com; www.clevest.com;
www.subnet.com; www.shiftenergy.com; www.vizimax.com; www.ireq.ca;
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Context – 3/3

- 9-17 June 2012
- met government, research institutes, utilities and industry ... ‘China Inc.’



China's electricity system – 1/5

- supply
 - generation in 2011: 4,604 TWh (30x Ontario)
 - capacity estimated at over 1,000 GW

Electricity generation, share by fuel, 2009

coal	79%
hydro	16%
nuclear	2%
gas	2%
wind	1%
others	<0.5%



China's electricity system – 2/5

- transmission and distribution
 - approximately 700,000 km of transmission lines (Hydro One has 29,000 km)



China's electricity system – 3/5

- demand / end-use

***Electricity
consumption,
share by sector
(of reported
activities), 2009***

industry	71%
residential	17%
commercial and public services	7%
agriculture / forestry	3%
transport	1%

China's electricity system – 4/5

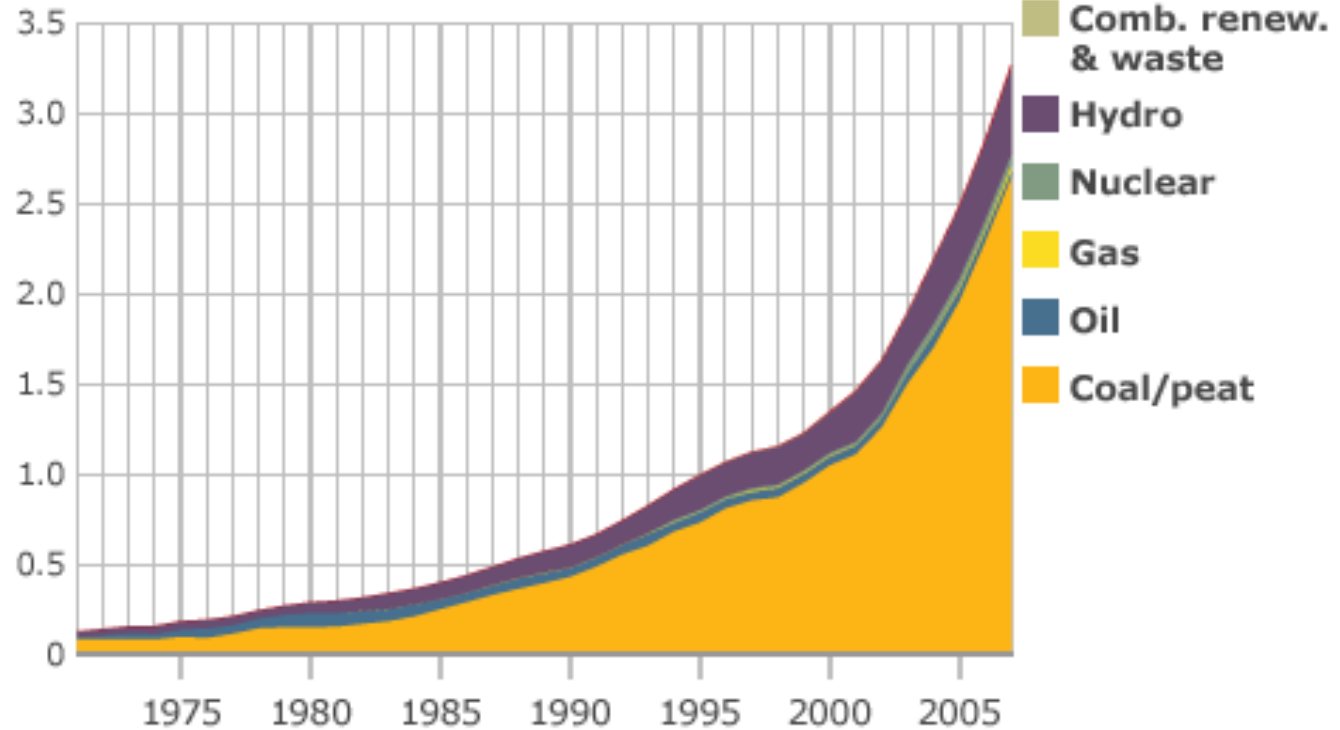
- governance
 - 2002: State Power Corporation dismantled
 - five state-owned holding companies for generating, with some IPPs (often in partnership with privately-listed arms of state owned companies)
 - two major transmission and distribution companies: State Grid Power Company and Southern Power Company

China's electricity system – 5/5

- growth: past and potential future

Electricity generation by fuel in China

Million GWh



Source: IEA Energy Statistics, Statistics on the Web: Electricity generation by fuel, People's Republic of China © OECD/IEA, 2009

China and smart grid development – 1/9

- National plan – stage 1
 - ‘planning and pilot stage’ (2009-2010)
 - demonstration projects
 - transmission, both UHV AC (1000 kV) and UHV DC (800 kV) lines
 - Shanghai World Expo Park, etc.

China and smart grid development – 2/9

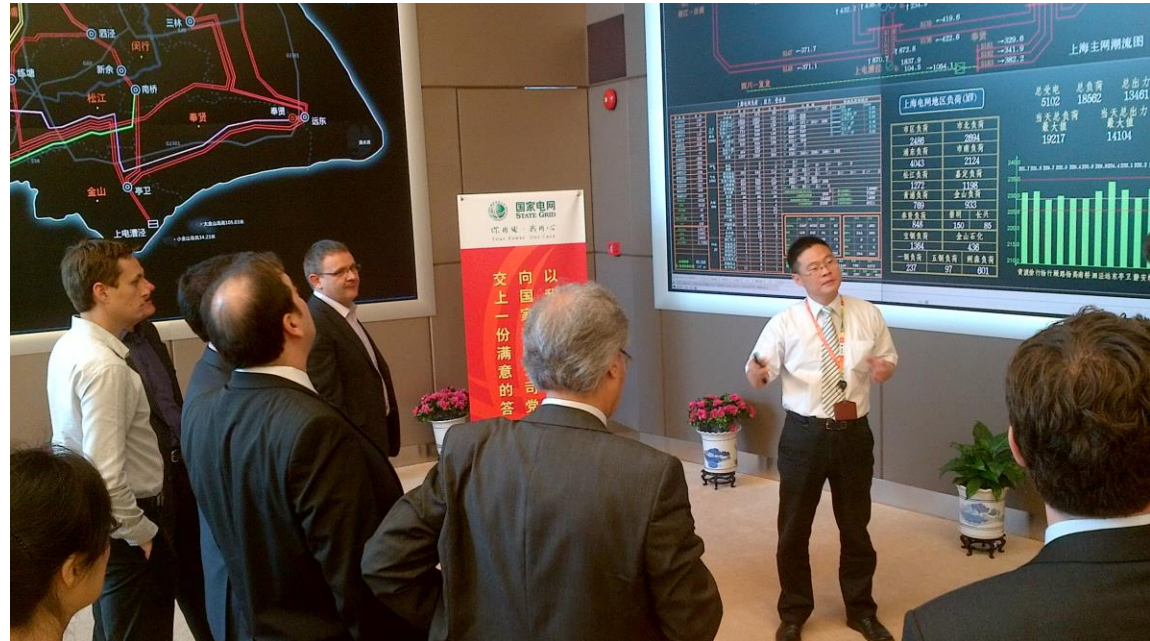
- National plan – stage 2
 - ‘the construction phase’ (2011-2015)
 - focus on:
 - generation
 - transmission
 - transformation
 - distribution
 - consumption
 - dispatching

China and smart grid development – 3/9

- National plan – stage 3
 - ‘improvement stage’ (2016-2020)
 - ‘SGCC will have completed the building of Strong and Smart Grid for enhancing the capability of resources allocation, grid reliability, operation efficiency and interaction among power grid, power sources and consumers’
 - integrated significant amounts of renewables (150 GW wind and 40 GW solar)
 - built about 7,000 smart substations

China and smart grid development – 4/9

- Key contemporary issues, ‘unofficially’
 - 1 - transmission



China and smart grid development – 5/9

- Key contemporary issues, ‘unofficially’
– 2 - storage



China and smart grid development – 6/9

- Key contemporary issues, ‘unofficially’
 - 3 – end-use



China and smart grid development – 7/9

- ‘What does smart grid mean?’
 - Different societies prioritise different elements of the smart grid



China and smart grid development – 8/9

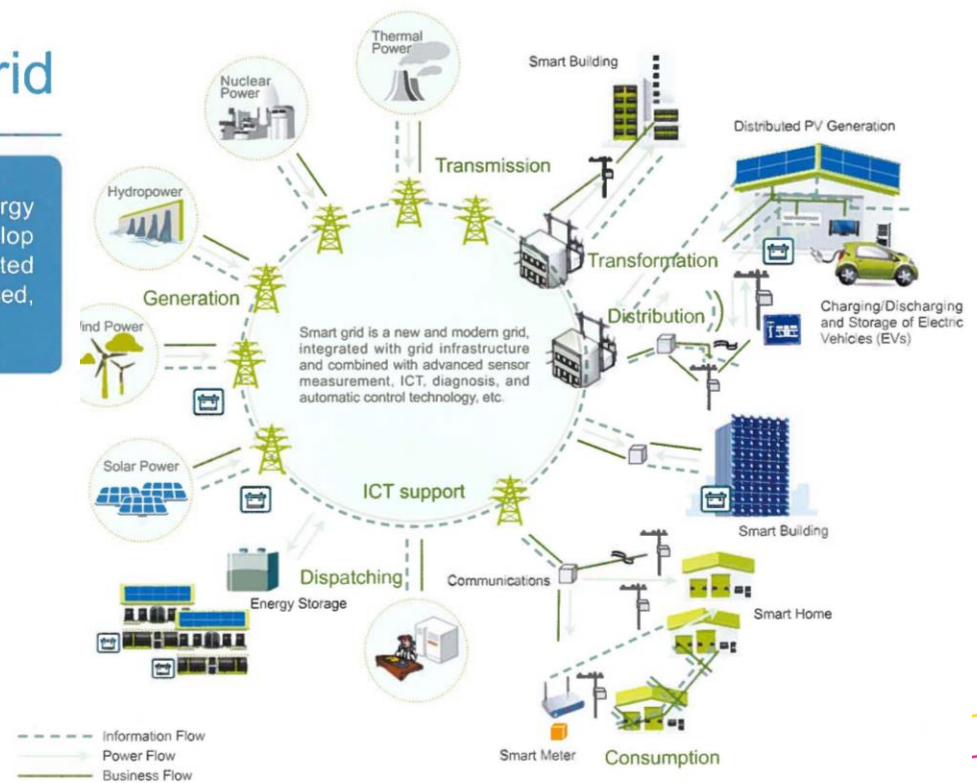
- ‘What does smart grid mean?’
 - In China, the language is ...
 - ‘strong & smart grid’
 - The priority ...
 - already been suggested by previous slides ...

China and smart grid development – 9/9

- ‘What does smart grid mean?’

Concepts of Strong & Smart Grid

In order to optimize energy resources allocation, improve clean energy access, meet power demand growth, SGCC has proposed to develop Strong & Smart Grid, based on a UHV grid backbone and coordinated development of subordinate grids at all levels, featured as being IT-based, automated and interactive.



Impressions – 1/6

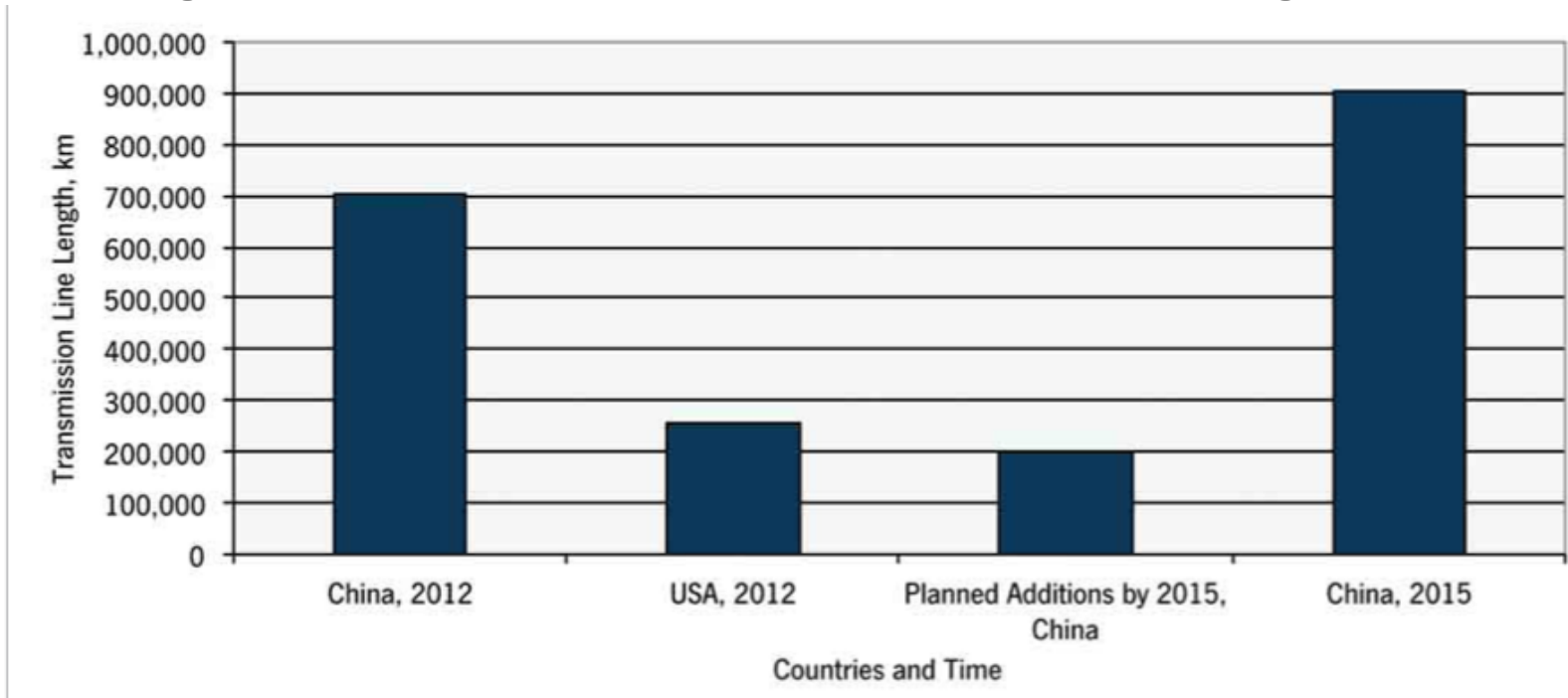
- ‘China is large.’
 - the obvious: ... population, GDP, area, etc.
 - in the electricity space (already flagged)
 - State Grid Corporation of China
 - largest utility in the world
 - ranked 7th in Fortune Global 500
 - annual revenue close to C\$300 billion
 - 1.5 million employees



Impressions – 2/6

- ‘China continues to grow.’

Figure: Current and Future Transmission Line Length in China



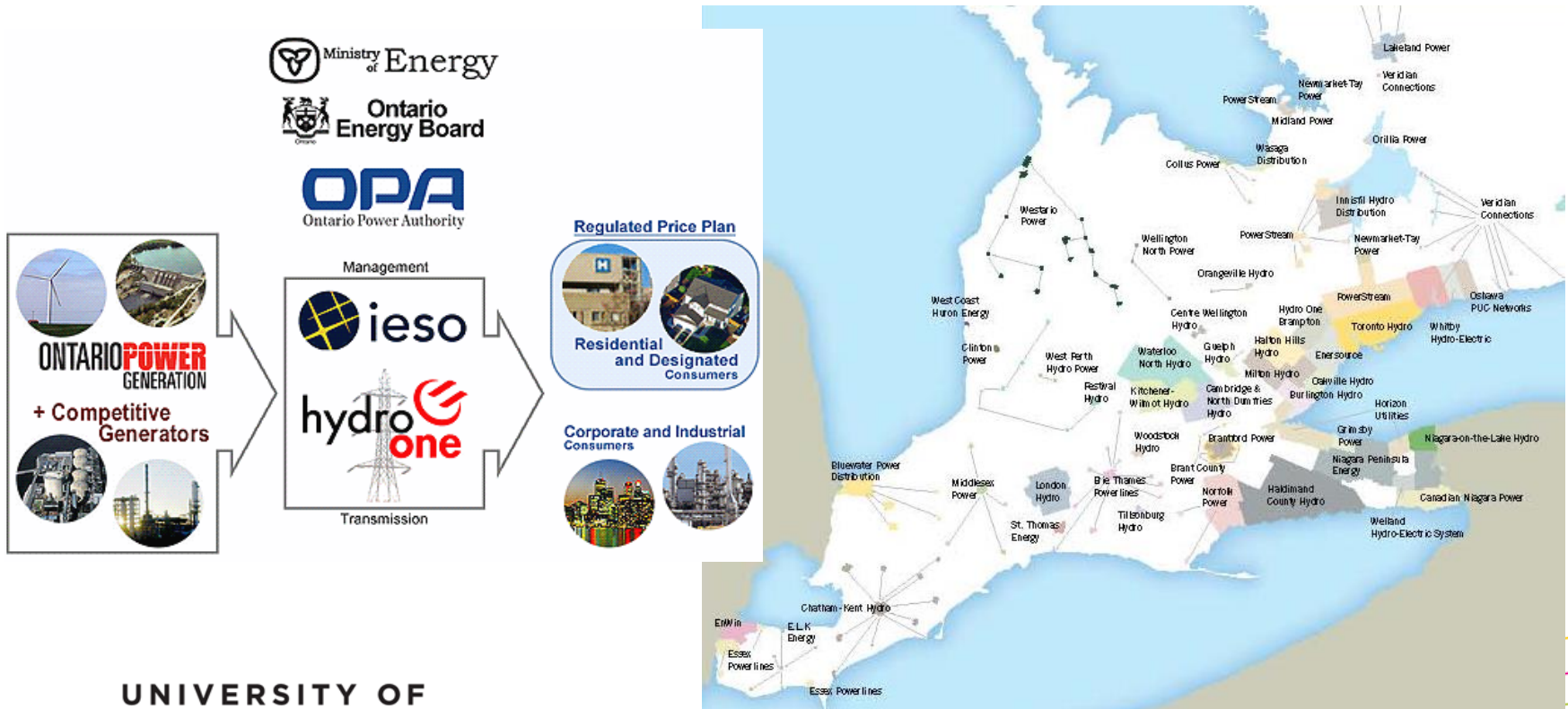
Impressions – 3/6

- ‘China is modern and affluent (in places).’



Impressions – 3/6

- ‘China gets things done.’



Impressions – 4/6

- ‘China is reaching out, beyond its borders.’
 - within the power sector, generally

上海日报 | Mobile Version | Wednesday, 30 May, 2012 | Last updated 5 minutes ago

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State Grid seals second investment in Brazil

Source: Agencies | 2012-5-30 | NEWSPAPER EDITION

STATE Grid Corp of China yesterday said it has agreed to buy electricity transmission assets in Brazil from Spain's Actividades de Construcción y Servicios SA for US\$531 million and assume debt of US\$411 million, the latest in a series of overseas acquisitions by Chinese power companies.



The story appears on **Page A11**
May 30, 2012

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Impressions – 5/6

- ‘China is reaching out, beyond its borders.’
– in smart grid, it wants collaboration



Impressions – 6/6

- ‘China is reaching out, beyond its borders.’
– in smart grid, it wants markets

China Pours Money into Smart Grid Technology

China’s international technology ambitions

As is the case throughout the **green energy sector**, Chinese leaders are betting that if they can roll out a smarter electricity grid before the United States, China can not only address their domestic energy challenges but also get a head start on technology standardization. And they see standardization as a critical step toward moving up the value chain and playing a stronger role in global technology markets.



Final words – 1/2

- Canada's China strategy
 - resource-based and energy-based
 - can be so much more
 - challenges therein



Final words – 2/2

- Waterloo's China strategy
 - activities
 - opportunities

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 - Guide
 - Definitions
 - Forms

Are you:

- a Canadian SME or researcher?
- wanting to work with a foreign partner?
- looking to solidify a international partnership for future R&D collaboration?

If you said "yes" to the all the questions above - then Going Global Innovation funding is right for you.

Going Global Innovation

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International Research Partnerships Grant

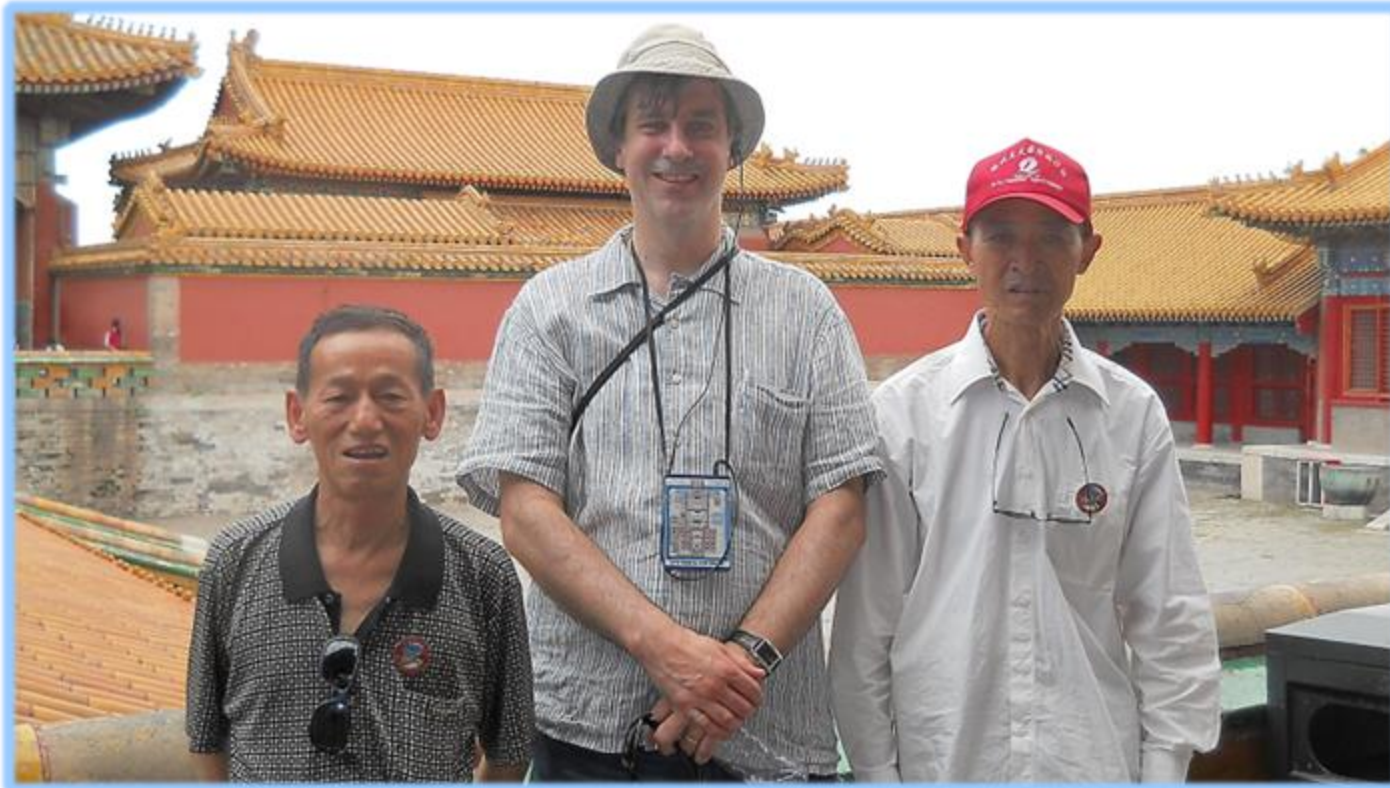


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www.tradecommissioner.gc.ca/eng/funding/ggi/ggi.jsp;
research.uwaterloo.ca/international/news.html; wise.uwaterloo.ca

Discussion

- presenter's contact details



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