

# CLOSING THE WATER CYCLE, RECOVERING ENERGY AND RESOURCES IN THE CITIES OF THE FUTURE

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Vladimir Novotny, PhD, PE, BCEE

Presented by the Engineering School of Sustainable Infrastructure and the Environment

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## ABSTRACT

Introducing the worldwide Cities of the Future initiative, the presentation will highlight current developments and concepts of the new paradigm leading towards water centric sustainable communities whereby stormwater conveyance is mostly on the surface and rehabilitated and restored urban surface and ground water bodies are integral parts of the entire water cycle (Novotny & Novotny 2011). The major drivers are urban population increase and migration, global climatic changes, deteriorating older infrastructure, and diminishing resources. The backbone of the new paradigm approach to building new cities and retrofitting the old to become sustainable is distributed water and energy reclamation from used water and stormwater and reusing them in a partially or fully closed urban metabolic cycle based on the concept of the four R's: reduce (conserve), reclaim, reuse and restore. Implicit in these designs is a significant reduction of energy use from nonrenewable sources and water conservation is the most efficient measure to reduce GHGs (Novotny 2012 a&b). In addition, nutrients, biofuel, hydrogen, heat, electricity, and organic solids can be recovered and reclaimed for reuse. Current and near future developments of sustainable water centric "ecocities" in Canada, China, Singapore, Sweden, and other countries will be introduced.

## BIO-SKETCH

**Vladimir Novotny** is Professor Emeritus at Marquette University (Milwaukee, WI) and Northeastern University (Boston, MA) and an internationally recognized scholar and educator. Currently, he is also a partner of AquaNova LLC in Gloucester (MA). He has published three books and made numerous keynote presentations on this 21<sup>st</sup> century defining topic in China, Japan, Democratic Korea, Europe, Canada, and the US. In 2009 he was appointed to the IWA's Steering Committee for The Cities of the Future. He received an award from the Boston Society of Civil Engineers for his 2011 endowed COF Freeman lecture on this topic at MIT.

## REFERENCES

Novotny, V. and E. Novotny. 2011. Water Centric Cities of the Future-Towards Macro Scale Assessment of Sustainability. Ch. 13 in Howe, C. and C. Mitchell, Ed., *Water Sensitive Communities*, IWA Publishing.

Novotny, V. 2012a. Water and Energy Link in the Cities of the Future-Achieving Net Zero Carbon and Pollution Emissions Footprint. Ch. 3 in V. Lazarova et al., Eds., *Water/Energy Interactions of Water Reuse*. IWA Publishing.

Novotny, V. 2012b. Toward Balanced and Sustainable Water-energy Management in the Cities of the Future. *Influents*, Water Environment Association of Ontario, Vol. 7, Spring.

