

New York University, Wagner Graduate School of Public Service  
URPL-GP 2612 Adapting the Physical City: Innovations in Energy, Transportation, and Water  
Fall 2015, Tuesday 4:55-6:35 PM, Location: Goddard B06  
Professor Rae Zimmerman (rae.zimmerman@nyu.edu)

Office hours: Tues., 2-4 PM (updates <http://wagner.nyu.edu/zimmerman>) and by appointment

**NOTE: A more detailed syllabus is available for registered students on NYU Classes**

## **COURSE SYLLABUS AND OUTLINE**

**Summary and Objectives.** A revolution has been occurring in the way energy, transportation, and water services are provided and used that goes beyond the boundaries of individual buildings and communities, but connects with them. Cities have relied upon traditional infrastructure to provide energy, transportation, water, and environmental services. Now, new innovations continue to emerge that present opportunities to proactively address climate change, resource scarcity, environmental contamination, and social inequities while meeting service needs. These innovations have now become the foundation for both popular movements and business practices. Students will obtain knowledge and skills to evaluate the performance, resource demands and selected impacts of these innovations relative to one another and to conventional infrastructure in light of urban needs. The course also covers ways to incorporate these new technologies and adapt user behavior to plan neighborhoods, communities and regions to conserve resources, promote environmental protection, and reduce the consequences of service disruptions. Communications and information technology are often vital links for energy, water and transportation and ways to evaluate their influence on these other services are covered. Methods to balance alternative approaches to service delivery within planning and policy frameworks are also emphasized. The course covers the evolution of physical elements of cities, the environmental consequences and social adaptations to new technologies, and challenges cities continue to face in these areas. Transformations in planning standards and protocols to accommodate these new systems are addressed. The course combines separate streams of thought in the areas of smart growth, climate change adaptation and mitigation, environmental planning and greening cities with alternatives for energy, transportation and water.

### **Course Outline**

#### I. The Context of Cities for Public Services – Framing the Issues

1. September 8 Introduction: How to Adopt New Directions, Develop Innovations and Adapt Land Use Planning
2. September 15 Social Drivers for Infrastructure Innovation: Quality of Life, Population, & Social Justice
3. September 22 Environmental Drivers for Infrastructure Innovation: Catastrophes, Climate, & Public Services

#### II. Energy: Economies for Light, Heat, and Motion

4. September 29 Introduction: Energy Trends, Traditions and Hazard Impacts
5. October 6 Integrating Energy Infrastructure into the Built Environment: Green Buildings (October 13 No Class – Legislative Day)
6. October 20 Energy Technologies and Alternatives: Experiences from the Field
7. October 27 Tinkering with Tradition: Alternative Fuels and Technologies (including Nuclear Power)

#### III. Transportation: Transforming Vehicles, Fuel, Land Use, and Behavior

8. November 3 Transportation Trends, Traditions, and Hazard Impacts
9. November 10 Transportation (transit) Initiatives
10. November 17 Transportation (road-based, non-transit) Initiatives
11. November 24 A Call for Innovation: Environment, Land Use and Equity

#### IV. Water: Too Little, Too Much, Too Dirty, Too Expensive?

12. December 1 Trends, Traditions and Hazard Impacts for Water and Wastewater
13. December 8 Innovations in the Provision of Water Services

#### V. Integration: Greening the Gray City

14. December 15 Synthesis and Brief Discussion of Student Papers
- December 22 Final (hold for class as needed)

## COURSE INSTRUCTIONS

### Availability of Course Readings

Required and optional readings are listed by lecture, NOTE choices among readings. NYU Classes site is used extensively. Be sure to activate your NYU Classes accounts. Availability:

(1) Required Books: Bookstore and Bobst Library Reserve (Some books are online)

T. Beatley, editor (2012) *Green Cities of Europe*, Washington/Covelo/London: Island Press.

Also available online at library.nyu.edu (type title in search bar)

R. D. Bullard (2007) *Growing Smarter*, Cambridge, MA: MIT Press.

B. Hayes (2014) *Infrastructure. A Guide to the Industrial Landscape*. Revised and Updated W.W. Norton and Company.

A. Y. Hoekstra (2013) *The Water Footprint of Modern Consumer Society*, NY: Routledge.

National Academy of Sciences (NAS) (2010) *Electricity from Renewable Resources: Status, Prospects, and Impediments*, Washington, DC: National Academy Press. Also online.

Jean-Paul Rodrigue (2013) *The Geography of Transport Systems*, 3<sup>rd</sup> edition New York, NY: Routledge. 3<sup>rd</sup> edition. Available for viewing online at: <http://people.hofstra.edu/geotrans/>

P. L. Schiller, E. C. Bruun and J. R. Kenworthy (2010) *Introduction to Sustainable Transportation: Policy, Planning and Implementation*, Earthscan, Washington DC.

Optional: R. Zimmerman (2012) *Transport, the Environment and Security*, Cheltenham, UK and Northampton, MA: Edward Elgar Publishing, Ltd.

(2) Required readings from book chapters and articles: Bobst Library Reserve and Unique Copy Center for purchase

(3) Required Journal articles: From Bobst Library online and Unique Copy Center for purchase.

(4) Internet and/or NYU Classes – “Resources”/ “Documents” (listed by lecture number below).

(5) Power point slides will be posted on NYU Classes for the lectures each week.

### Course Assignments and Requirements

Detailed instructions are on NYU Classes under Resources/“Assignments”. Objectives are to:

- evaluate the impacts of decisions about how public services and development use environmental resources by applying “green or carbon calculators” to infrastructure;
- analyze/critique debates for a new infrastructure technology and competing alternatives;
- understand how to overcome obstacles to adopting new technologies; and
- identify energy, transportation, or water needs of a city to optimize environmental quality, resource conservation, and social equity.

1. Study questions and exercises. Due: Sept. 29; Dec. 1 before class: Two graded short exercises on readings and skills will be required. Students will have some choice within each exercise. Some ungraded study questions will be distributed to guide discussion of readings.

2. Mid-Term Paper. Due: Nov. 3: Analysis of a selected case or two comparative cases on the implementation and performance of alternative technologies using environmental and socioeconomic criteria. Students choose topics or cases and are first submitted for approval. The mid-term will in part provide a foundation for the final paper.

3. Final Paper Assignment and Selected Presentations: Paper on a case or case area used for the mid-term; in-class discussion of individual papers Dec. 15 and other times. Final Due: Dec. 22. All assignments are take-home exercises and papers to be prepared individually.

Course Grading Criteria. Study Questions: 30% (15% each); Mid-Term Paper: 30%; Final Paper and Class Discussion: 30%; Class Participation: 10%. **Academic Code: Students are required to comply with the Wagner Academic Code located on the course NYU Classes site and at <http://wagner.nyu.edu/students/policies/>.**

## **GP-URPL.2612 Fall 2015: Detailed Course Lecture Outline and Readings**

**NOTE: A more detailed syllabus is available for registered students on NYU Classes**  
Lectures for the semester are listed below with required and optional readings for each lecture.  
**NOTE: CHOICES AMONG REQUIRED READINGS LISTED - NOT ALL HAVE TO BE READ.** Some lectures may extend over more than one week. Several guest lectures are planned by professionals in government, academia, or the private sector in infrastructure innovations. Readings listed for those lectures will be covered in abbreviated form for those lectures. The order of some lectures may change given speaker schedules. Additional readings are added over the course of the semester as needed and where new information arises.

### **I. THE CONTEXT OF CITIES FOR PUBLIC SERVICES – FRAMING THE ISSUES**

The natural environment is a critical part of the infrastructure that supports human activity. Social and environmental drivers are covered for adaptation and change in energy, transportation and water, including environmental quality and quality of life considerations, global warming, resource depletion and uncertainty, and social justice issues such as inequitable costs and resource availability for public services. The first three lectures provide a framework for the specific energy, transportation and water sectors later in the semester, and include the definition of the innovation concept and its application to infrastructure.

#### **Lecture 1. Introduction: How to Adopt New Directions, Develop Innovations, and Adapt Land Use Planning (September 8)**

Required Readings (to be extended through Lecture 2)

- Internet: ASCE (2013) 2013 Report Card for America's Infrastructure
- Internet & NYU Classes: U.S. EPA (2013) Our Built and Natural Environments: A Technical Review of the Interactions among Land Use, Transportation, and Environmental Quality, Second edition. Washington, D.C.: EPA  
<http://www.epa.gov/dced/pdf/b-and-n/b-and-n-EPA-231K13001.pdf>, pp. 80-87
- Bookstore/Library Reserve/Library Online: selected readings from Beatley, ed. (2012)

#### **Lecture 2. Social Drivers for Infrastructure Innovation: Quality of Life, Population and Social Justice (September 15)**

Required Readings

*A. Measuring Sprawl, Carbon Footprints, and Calculators:* Separate references circulated

*B. Social Justice*

- Bookstore/Library Reserve/library online: R. D. Bullard (2007) *Growing Smarter*, Cambridge: MIT.
- Internet: Various recent public opinion polls and surveys.

*C. Population: Numbers, density, location, and equity*

- Internet & NYU Classes: S. G. Wilson and T.R. Fischetti (May 2010) Coastal population trends in the US: 1960–2008. U.S. Bureau of the Census.  
<http://www.census.gov/prod/2010pubs/p25-1139.pdf>.
- Internet & NYU Classes: EPA (2013) Built & Natural Environments

Supplemental optional readings – equity (also covered for each type of infrastructure)

- Internet: Z. S. Naphtali, C. E. Restrepo & R. Zimmerman (2007) “Using GIS to Examine Environmental Injustice in the South Bronx. The Case of Waste Transfer Stations,” *Connect*, pp. 23-28. [http://www.nyu.edu/its/pubs/connect/spring07/pdfs/naphtali\\_gis.pdf](http://www.nyu.edu/its/pubs/connect/spring07/pdfs/naphtali_gis.pdf)

- C.E. Restrepo and R. Zimmerman (2008) “Environmental Justice,” *Encyclopedia of Quantitative Risk Analysis and Assessment*, E. L. Melnick and B. S. Everitt, eds. Chichester, UK: John Wiley & Sons, Ltd, Vol. 2, pp. 808-817.

### **Lecture 3. Environmental Drivers for Infrastructure Innovation: Catastrophes, Global Climate Change and Public Services and Adaptation Innovations (September 22)**

Required Readings. Readings are organized by sources and impacts of infrastructure disruptions and adaptations to reduce the consequences of extreme events.

#### *A. Sources and Impacts of Infrastructure Disruptions*

##### *Climate Change and Natural Hazards:*

Internet & NYU Classes : EPA (2013) Built & Natural Environments, pp.65-70

Choice of readings from IPCC, U.S. Global Change Research Program, and NOAA

Optional: Readings from *Science* and *PNAS*

##### *Human-Initiated Hazards:*

- National Transportation Safety Board reports, online
- Case studies of factors leading to infrastructure failures or performance problems attributed to design, construction, operation and maintenance; potential solutions

#### *B. Innovations for Mitigation and Adaptation to Reduce Risks to Infrastructure and Its Users*

- Internet & NYU Classes: U.S. Department of State *U.S. Climate Action Plan*
- Bookstore/Library Reserve/library online: R. D. Bullard, ed. (2007) *Growing Smarter*, selected readings

##### Optional

- Readings from *Science*; NYC *plANYC*
- Internet & NYU Classes: R. Zimmerman and C. Faris (2010) “Infrastructure Impacts and Adaptation Challenges,” Chap. 4 in *New York City Panel on Climate Change 2010 Report*, C. Rosenzweig and W. Solecki, Eds. *Annals NY Academy of Sciences*, Vol. 1187. New York, NY, NY Academy of Sciences, pp. 63-85. Available for class. <http://onlinelibrary.wiley.com/doi/10.1111/j.1749-6632.2009.05318.x/pdf>

## **II. ENERGY: ECONOMIES FOR LIGHT, HEAT, AND MOTION**

Traditional and innovative ways are discussed for approaching production, distribution, consumption of energy and byproduct utilization; trends in reliability and resiliency; options and alternatives for the provision of energy residences and industry.

### **Lecture 4. Energy Trends, Traditions, and Hazard Impacts (September 29)**

#### **Exercise 1 Due by September 29 prior to class**

##### Required Readings

#### *A. Characteristics of and Trends in Energy Production and Consumption CHOOSE 1*

- 2014 reports and databases from the U.S. Energy Information Administration; U.S. EPA; International Energy Agency; World Bank; Council on Environmental Quality
- Hayes (2014) *Infrastructure*

#### *B. Introduction to Renewable Energy*

- Internet & Bookstore: National Academy of Sciences (2010) *Electricity from Renewable Resources: Status, Prospects, and Impediments*. Washington, DC: National Academy. [https://download.nap.edu/catalog.php?record\\_id=12619](https://download.nap.edu/catalog.php?record_id=12619) (Click download free pdf on left)

Optional readings: Patterns and Trends in electric power outages, e.g.,

- Library online: J.S. Simonoff, C.E. Restrepo, and R. Zimmerman (2007) “Risk Management and Risk Analysis-Based Decision Tools for Attacks on Electric Power,” *Risk Analysis*, Vol. 27, No. 3, pp. 547-570. Available for class.
- U.S. EIA databases and reports

**Lecture 5. Integrating Energy Infrastructure into the Built Environment: Green Buildings (October 6) Guest Lecturer: LEED certified speaker, consulting firm (TBA)**

Required Readings

- Internet & NYU Classes : EPA (2013) Built & Natural Environments, pp. 14-16
- Internet: U.S. EPA (October 2008) *Reducing Urban Heat Islands: Compendium of Strategies*. <http://www.epa.gov/heatisld/resources/compendium.htm>
- Internet & NYU Classes: Fiona Cousins (February 2007) “Down to Zero,” *ARUP Journal*. [http://www.arup.com/\\_assets/\\_download/88C68E29-19BB-316E-4055A7DFC5EF7ECB.pdf](http://www.arup.com/_assets/_download/88C68E29-19BB-316E-4055A7DFC5EF7ECB.pdf)

*Cases for reference:* From City of NY plaNYC 2030 (2011), green buildings plan (2012) and NYC Green Codes Task Force (2010).

**October 13. No Class – University Holiday.**

**Lecture 6. Energy Technologies and Alternatives: Experiences from the Field (October 20) Guest Lecturer: Electric Power Utilities speaker (TBA)**

Required Readings

- Bookstore/Library Reserve: Hayes (2014) Infrastructure
- Extensive lecturer’s slide presentations will be available after class.

**Lecture 7. Tinkering with Tradition: Alternative Fuels and Technologies (including Nuclear Energy) (October 27)**

*A. Renewable Forms of Alternative Energy*

Required Readings

- Bookstore/Library Reserve: Hayes (2014) Infrastructure
- Internet: U.S. Department of Energy, Incentives databases
- Internet & Bookstore: National Academy of Sciences (2010) *Electricity from Renewable Resources: Status, Prospects, and Impediments*. Washington, DC: National Academies. [https://download.nap.edu/catalog.php?record\\_id=12619](https://download.nap.edu/catalog.php?record_id=12619) (Click download free pdf on left), pp. 258-265 (section on “Renewable Electricity Integration”); newer readings.
- Bookstore/Library Reserve/Online: Selections from Beatley, ed. (2012).
- Solar, Wind: Current readings on the viability of the technologies and case studies

*B. Nuclear Power*

Required Readings

- Bookstore/Library Reserve: Hayes (2014) Infrastructure; readings from nuclear energy organizations

*Cases on nuclear power to be covered in lecture: Nuclear Waste Repository at Yucca; Fukushima and the World’s Reaction to Nuclear Power*

### **III. TRANSPORTATION: TRANSFORMING VEHICLES, FUEL, LAND USE, AND BEHAVIOR**

Traditional transportation methods and their social, economic and environmental implications; options for green transportation including travel mode, travel technology, and amount of travel.

#### **Lecture 8. Transportation Trends, Traditions, and Hazard Impacts (November 3)**

##### **Midterm Due November 3**

##### **Required Readings**

###### **A. *Transportation Characteristics, Patterns and Trends: Highways, Transit***

- Internet & NYU Classes: readings on transit access and jobs
- Bookstore and Online (<http://people.hofstra.edu/geotrans/>): Jean-Paul Rodrigue (2013) *The Geography of Transport Systems*, New York, NY: Routledge. Selected sections.
- Bookstore: P.L. Schiller, E.C. Bruun and J.R. Kenworthy, *An Introduction to Sustainable Transportation*, Washington, DC: Earthscan, pp. 1-21

**Optional:** American Public Transportation Association (APTA) (current)

###### **B. *Hazards Affecting Transportation: CHOOSE 2* readings below**

*Extreme Weather, Global Climate Change and Energy Resource Scarcity:*

- Internet: Selected TRB, NCHRP reports
- Internet & NYU Classes: Victoria Transport Policy Institute readings on transportation and land use
- Internet & NYU Classes: U.S. DOT, FHWA and Oak Ridge National Laboratories reports on transportation carbon footprints and other environmental factors.

##### **Optional**

- Bookstore/Library Reserve: R. Zimmerman, *Transport, the Environment, and Security*, Ch. 2 (patterns, trends), 3 (global climate change), 6 (natural hazards), and 7 (security).

#### **Lecture 9. Transportation (rail-based transit) Initiatives (November 10)**

**Guest Lecturer: MTA (TBA)**

##### **Required Readings**

- Bookstore/Library Reserve/ Online (<http://people.hofstra.edu/geotrans/>): Jean-Paul Rodrigue (2013) *The Geography of Transport Systems*, New York, NY: Routledge.
- Bookstore/Library Reserve: P.L. Schiller, E.C. Bruun and J.R. Kenworthy, *An Introduction to Sustainable Transportation*, Washington, DC: Earthscan, pp. 96-100

**CHOOSE 1** reading below:

- Internet & NYU Classes: MTA (2009) Greening Mass Transit & Metro Areas. Final Report of the Blue Ribbon Commission on Sustainability and the MTA. New York, NY: The MTA. <http://web.mta.info/sustainability/pdf/SustRptFinal.pdf>
- Library Reserve: T. Beatley (2000) Ch. 4: "Transit Cities: Public Transport Innovations & Priorities," *Green Urbanism*, Washington, DC: Island Press, pp. 109-136.

##### **Case References:**

- Bookstore: P.L. Schiller, E.C. Bruun and J.R. Kenworthy (2010) *An Introduction to Sustainable Transportation*, Washington, DC: Earthscan, pp. 198; 203; 259-295.

- Internet & NYU Classes: New York City (April 2011) *plaNYC. A Greener, Greater, NY*. [http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/planyc\\_2011\\_planyc\\_full\\_report.pdf](http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/planyc_2011_planyc_full_report.pdf) Transportation, pp. 86-99.
- Bookstore/Library Reserve/Library online: Readings from Beatley, ed. (2012).

## **Lecture 10. Transportation (road-based, non-transit) Initiatives (November 17)**

**Guest Lecturer: NYC DOT (TBA)**

### Required Readings

#### *A. Alternative Modes of Travel*

- Bookstore/Library Reserve: Hayes (2014) *Infrastructure*
- Bookstore & Online (<http://people.hofstra.edu/geotrans/>): Jean-Paul Rodrigue (2013) *The Geography of Transport Systems*, New York, NY: Routledge. Selected sections.

#### *B. Alternative Vehicular design, fuel type, and fuel usage – recent advances*

- Bookstore/Library Reserve: P.L. Schiller, E.C. Bruun and J.R. Kenworthy (2010) *An Introduction to Sustainable Transportation*, Washington, DC: Earthscan, pp. 25-46; 52-53; 63-73; 87-96; 100-111; 236-244.
- Internet: Renewables – General References and Databases from U.S. Department of Energy (EIA); energy efficiencies from transportation alternatives

#### Hydrogen

- Internet & NYU Classes: U.S. Congressional Research Service( January 14, 2004) “A Hydrogen Economy and Fuel Cell: An Overview.” <http://www.policyarchive.org/handle/10207/bitstreams/1915.pdf>

#### Hybrid/Electric Vehicles

- Internet: Union of Concerned Scientists (June 2012) *State of Charge: Electric Vehicles’ Global Warming Emissions and Fuel-Cost Savings across the United States* [http://www.ucsusa.org/assets/documents/clean\\_vehicles/electric-car-global-warming-emissions-report.pdf](http://www.ucsusa.org/assets/documents/clean_vehicles/electric-car-global-warming-emissions-report.pdf)

## **Lecture 11. A Call for Innovation: Environment, Land Use and Equity (November 24)**

### Required Reading (unless indicated otherwise)

- Bookstore and Online (<http://people.hofstra.edu/geotrans/>): Jean-Paul Rodrigue (2013) *The Geography of Transport Systems*, New York, NY: Routledge. Selected sections.

#### *A. Reducing Transportation Impacts on the Environment*

- Internet & NYU Classes: Victoria Transport Policy Institute studies on land use and travel behavior
- Internet & NYU Classes: EPA (2013) *Built and Natural Environments* (sections on transportation). <http://www.epa.gov/dced/pdf/b-and-n/b-and-n-EPA-231K13001.pdf>
- Selected city initiatives to reduce environmental impacts

#### *B. Equity*

- Bookstore/Library Reserve: R. D. Bullard, ed. (2007) *Growing Smarter*. Cambridge, MA: MIT Press. Section III: Transportation Equity, pp. 215-320. Skim.

#### *C. Alternative Modes (in addition to rail transit): Biking, Walking, Bus Transit, Street Redesign*

(1)Biking and Walking: Trends and types of biking alternatives; land use support for walking and biking

- Internet & NYU Classes: Alliance for Biking and Walking (2014) *Bicycling and Walking in the United States 2014 Benchmarking Report*.

<https://www.bikewalkalliance.org/storage/documents/reports/2014BenchmarkingReport.pdf>. Skim.

(2) Bus Transit; Bus Rapid Transit

- Internet and NYU Classes: Bus Rapid Transit (North America) John Niles and Lisa Callaghan (June 2010) From Buses to BRT: Case Studies of Incremental BRT Projects in North America, San Jose, CA: Mineta Transportation Institute, San Jose State University. [http://www.reconnectingamerica.org/assets/Uploads/2010\\_bus2brt.pdf](http://www.reconnectingamerica.org/assets/Uploads/2010_bus2brt.pdf)

(3) Street Redesign

*Case Examples:* Roadway design: Smart Streets; Complete Streets; Ecological Corridors

- Optional: Bookstore/ Library Reserve: R. Zimmerman, *Transport, the Environment, and Security*, Chap. 4 (pp. 147-151 streets); Chap. 5 (pp. 166-174 ecological corridors)

#### **IV. WATER: TOO LITTLE, TOO MUCH, TOO DIRTY, TOO EXPENSIVE?**

Issues and alternatives associated with the supply and quality of drinking water, wastewater management, and flood control; energy, water and environmental tradeoffs

#### **Lecture 12. Trends, Traditions and Hazard Impacts for Water and Wastewater (Dec. 1)**

##### **Exercise 2 Due: December 1 prior to class**

##### **Required Readings**

- Bookstore, Library Reserve: A.Y. Hoekstra (2013) *The Water Footprint of Modern Consumer Society*, New York, NY: Routledge. Selected sections to be assigned.

CHOOSE 3 readings below:

- Internet & NYU Classes: Readings on global sanitation and water supply from the World Health Organization, the UN, the World Bank, and other sources.
- Internet & NYU Classes: EPA (2013) Built & Natural Environments, pp.16-19;46-56
- Library Reserve: M. Palaniappan, E. Lee, A. Samulon (2006) “Environmental Justice and Water,” in *The World’s Water 2006-2007*, P.H. Gleick, ed. Washington, DC: Island Press, pp. 117-135.
- Internet & NYU Classes: City of New York (April 2011) *planNYC. A Greener, Greater, NY*. Water supply pp. 74-85; waterways (water quality) pp. 58-73. [http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/planyc\\_2011\\_planyc\\_full\\_report.pdf](http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/planyc_2011_planyc_full_report.pdf)
- Internet & NYU Classes: readings on and databases for water finance

Examples of cases to be discussed in class:

- Flood risks in urban areas
- Bookstore/Library Reserve: P.H. Gleick (2009) “Three Gorges Dam Project, Yangtze River, China,” in *The World’s Water, 2008-2009*, P.H. Gleick, ed. Washington, DC: Island Press, pp. 139-150.
- Internet & NYU Classes: U.S. EPA (August 2010) *Green Infrastructure Case Studies: Municipal Policies for Managing Stormwater with Green Infrastructure*. Washington, DC: U.S. EPA. [http://www.epa.gov/owow/NPS/lid/gi\\_case\\_studies\\_2010.pdf](http://www.epa.gov/owow/NPS/lid/gi_case_studies_2010.pdf)
- NYU Classes: R. Zimmerman and N. Gilbertson (December 1999) “The North River Wastewater Treatment Plant, NYC,” New York, NY: NYU-Wagner, ICIS.



### **Lecture 13. Innovations in the Provision of Water Services (December 8)**

#### Required Readings

- Bookstore, Library Reserve: Arjen Y. Hoekstra (2013) *The Water Footprint of Modern Consumer Society*. London, UK and New York, NY: Earthscan/Routledge

CHOOSE 2 readings below:

- Library online: J. Parrott (November 2007) “The Ins and Outs of Stormwater Management,” *Planning*, pp. 26-31.
- Internet & NYU Classes: U.S. EPA green infrastructure cases and methods
- Internet & NYU Classes: NYC Green Infrastructure Plan – A Sustainable Strategy for Clean Waters, Executive Summary (c2010), New York, NY: NYC, 16 pp.
- Library Reserve & Library online: Selections from Beatley, ed. (2012).

#### *Success Stories:*

- Internet: U.S. EPA (2002) Section 319 Success Stories Vol. III: The Successful Implementation of the Clean Water Act’s Section 319 Nonpoint Source Pollution
- NYU Classes: NYC (December 2008) Sustainable Stormwater Management, Main report; appendices. New York, NY: City of NY. NYC DEP (2011) Staten Island Bluebelt

### **V. INTEGRATION: GREENING THE GRAY CITY**

Integrating greener infrastructure into the life of cities – concepts and cases; interdependencies among physical components of energy, transportation, and water in cities; the role of communications and information technologies in the viability of alternative infrastructure technologies. What have we left out? Have we made a difference? Has investment changed the course of infrastructure needs and the development of renewables? Basic course themes and questions will be revisited. Students will contribute insights from their own papers.

### **Lecture 14. Synthesis and Brief Discussion of Student Papers (December 15)**

#### Required Reading

- Bookstore/Library online: (Synopsis) T. Beatley “Conclusion: Green Cities of Europe as Compelling Models,” in T. Beatley, ed., *Green Cities of Europe*, pp. 215-224.

Optional: (Synopsis for infrastructure financing) R. Zimmerman (2014) “Strategies and Considerations for Investing in Sustainable City Infrastructure,” Chapter 7 in *The Elgar Companion to Sustainable Cities: Strategies, Methods and Outlook*, edited by D. A. Mazmanian and H. Blanco, Cheltenham, UK: Edward Elgar pp. 133-153. Available for class.

**VI. No in-class exam, but hold December 22, the class exam date for class needs and continued paper discussions. Final papers due (via email: December 22).**