

Smart Cities: Science, i²e and Impact

NYU:poly

POLYTECHNIC INSTITUTE OF NYU

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NYU

Global population – heading towards 9 billion

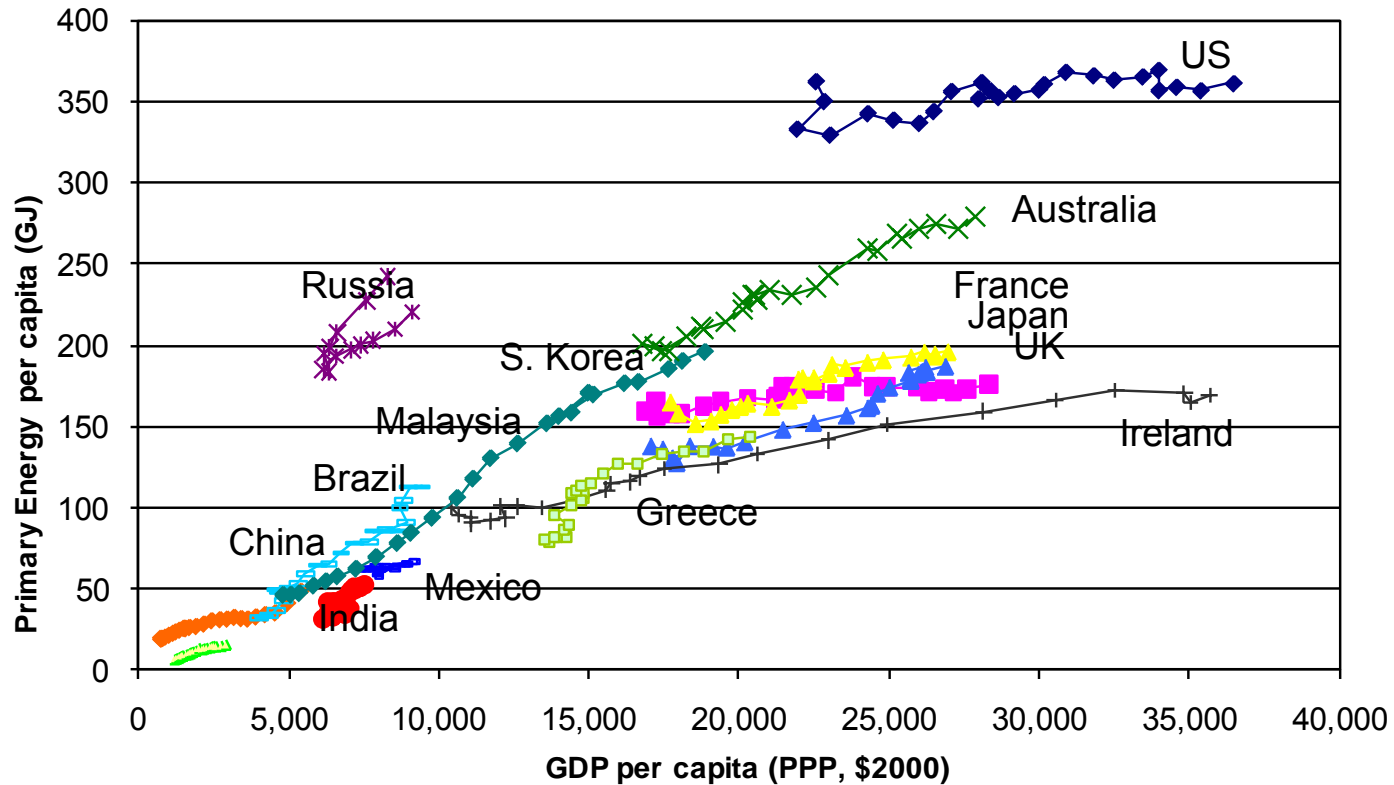


■ The emergence of an urban world

- 1950 - 70% of the world's population is rural
- 2012 – Over 50% is urban
- 2025 – Over 60% will be urban
- 2050 – Over 70% will be urban
 - More than 2 billion new urban residents



Energy demand and GDP per capita (1980-2004)



Source: UN and DOE EIA, Russia data 1992-2004 only



■ Demand on resources



- **With current technologies and our standard of living, 9 billion people require six “earths”**

- **“Once-in-a-century” opportunity**
 - **Urban innovation means job security**
 - **\$160 to \$300 trillion of new urban infrastructure will be built**
 - **Coming two decades are high stakes**
 - **Do cities right, a century of high quality life**
 - **Do cities poorly, misery index goes up**

■ **Mayor Bloomberg's challenge**

- **Sustain NYC as a world capital**
 - **Put applied science and technology at the core**
 - **Develop outcomes with high impact, including new companies and jobs in emerging industries**

■ Our response: CUSP

- **Triple helix** – joining academia, corporations, government to develop new urban science and technology
- **Global** – leveraging NYU’s global network and global academic and corporate partners
- **Living laboratory** – using NYC’s urban assets (data and problems) to prototype and develop smart urban solutions
- **Entrepreneurial** – featuring NYU-Poly’s successful track-record of creating new companies and jobs
- **Transformational** – refurbishing 370 Jay Street in downtown Brooklyn
- **Synergistic** – partnering with the faculty of NYU-Poly and partner universities

Cities must excel

- **Cities are where the people are**
 - Where resources are consumed
 - Where economic activity happens
 - Where innovation happens
- **Cities must be**
 - Efficient, resilient, sustainable
 - Quality of life, equity, citizen engagement
- **Cities are in a global competition for talent, capital, ...**

Technology + social science can help

The CUSP Partnership

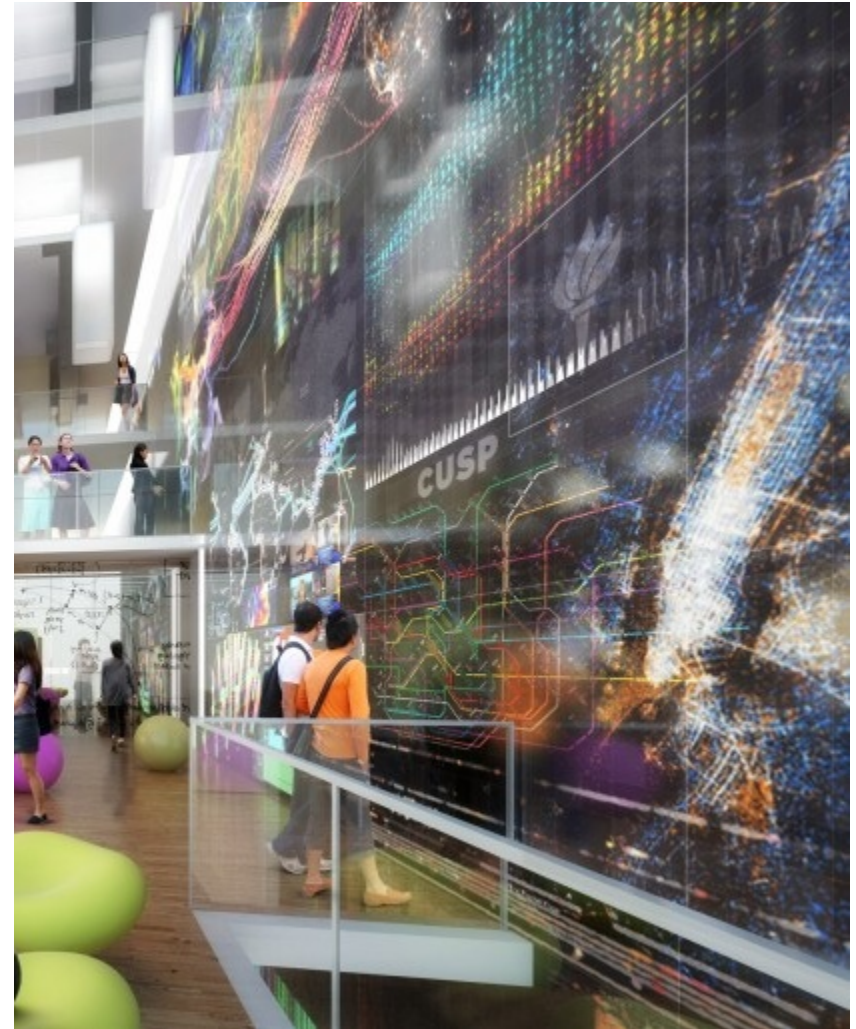
- **The University Partners:**
 - NYU, NYU-Poly, CMU, Univ. of Toronto, Warwick University, CUNY, IIT-Bombay
- **The Industrial Partners:**
 - IBM, Cisco, Siemens, Xerox, Con Ed, National Grid, ARUP, IDEO, AECOM
- **City and State Agency Partners:**
 - NYC Agencies, MTA, Port Authority

A diverse set of other organizations have expressed interest in joining the partnership

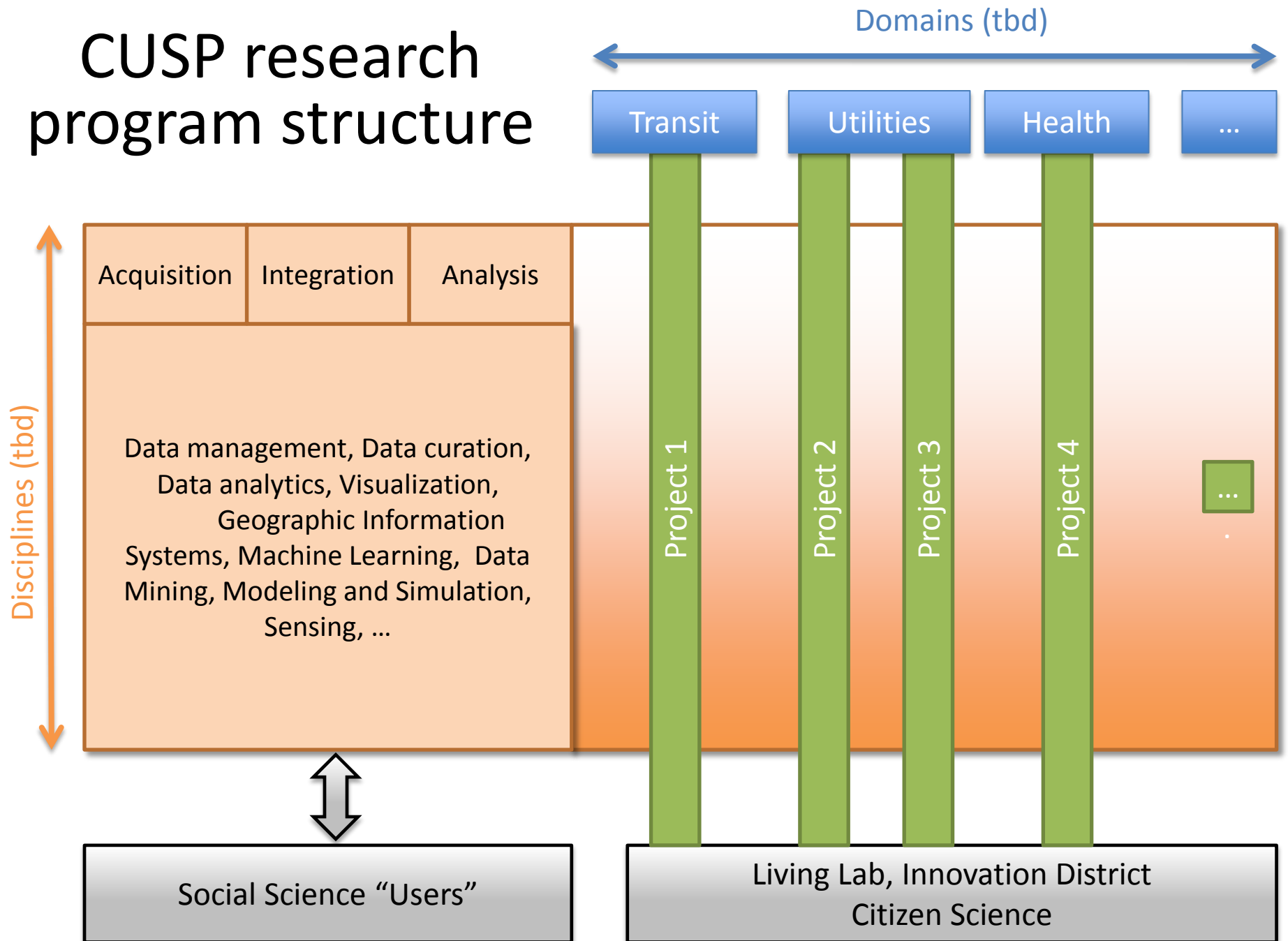


The CUSP Vision brings “Big Data” to NYC

The Center for Urban Science and Progress (CUSP) is a unique public-private research center that uses **New York City as its laboratory and classroom** to help cities around the world become more productive, livable, equitable, and resilient. **CUSP observes, analyzes, and models** cities to optimize outcomes, prototype new solutions, formalize new tools and processes, and develop new **expertise/experts**. These activities will make CUSP the world’s leading authority in the emerging field of “Urban Systems”



CUSP research program structure

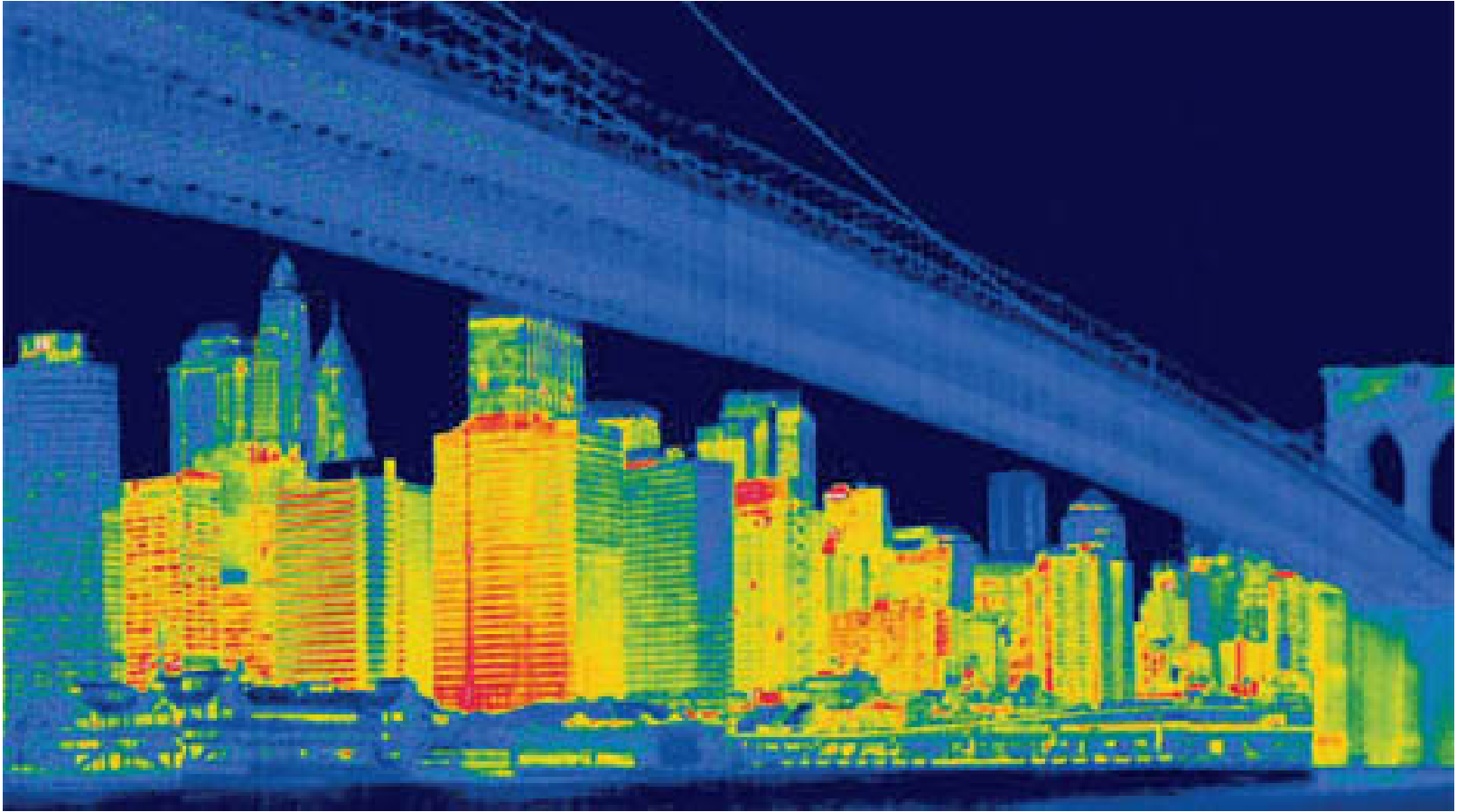


In 5 years, CUSP will be a major center for Urban Informatics



- **50 full-time senior researchers**
 - 30 faculty, 20 industrial
- **30 Postdocs**
- **430 Masters students and 100 PhD candidates**
- **Located in Downtown Brooklyn**
 - 60,000 sq ft leased from January 2013;
 - 150,000 sq ft post-2017 in 370 Jay Street (pending assessment)
- **Funding to \$70M/yr**
 - Government (esp. Federal)
 - corporate, philanthropic, academic

Manhattan in the IR



What can be done with the data?

- **Optimize operations**
 - traffic flow, utility loads, services delivery,
- **Monitor infrastructure**
 - bridges, potholes, leaks, ...
- **Better planning**
 - zoning, public transit
- **Travel and intersection patterns** (epidemiology)
- **Hazard detection** (leaks, plumes)
- **Emergency management**
- **User apps**

What's success after five years?

- Define and elaborate “Urban Science”
- A vibrant world-class center pursuing such
- Train several hundred people in this new field
- “Quick win” projects impacting the city and its citizens
- Commercialization of CUSP technologies
- Bring new tools to the social sciences

“Big data” is different

- Big data brings new capabilities
 - Better identification of outliers
 - Finer stratification
 - Better construction of proxies
 - Better validation of models
 - The power of correlation
- Big data brings new challenges
 - Data quality
 - Data in diverse hands
- Data access concerns in several dimensions (CUSP will have a Chief Data Officer)
 - Proprietary
 - Critical infrastructure vulnerabilities
 - Privacy

Figure 17: Histogram of Multifamily EUIs

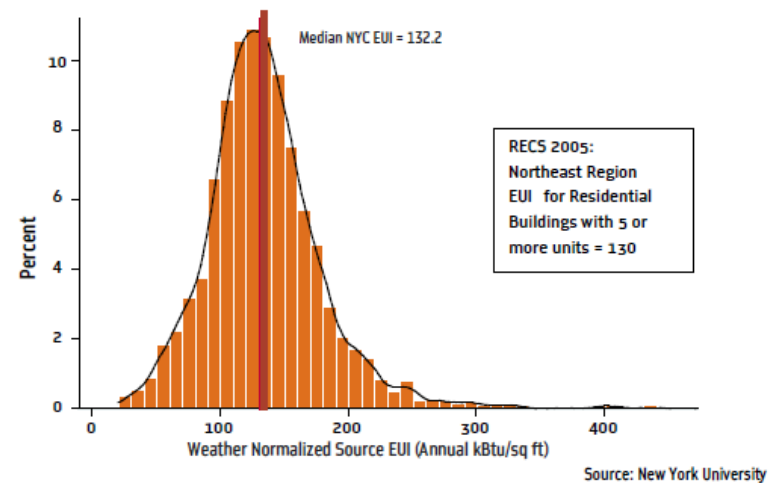
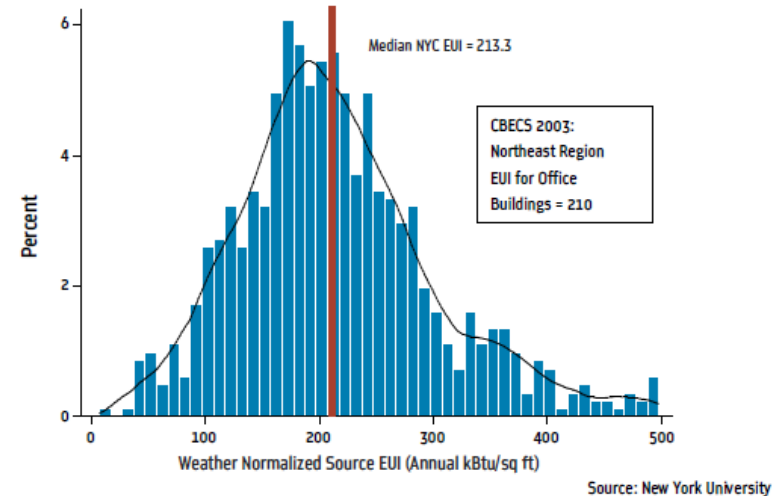


Figure 18: Histogram of Office Building EUIs



D. Hsu and C. Kontokosta, NYC Local Law 84 Benchmarking Report, 2012



Questions/Comments

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