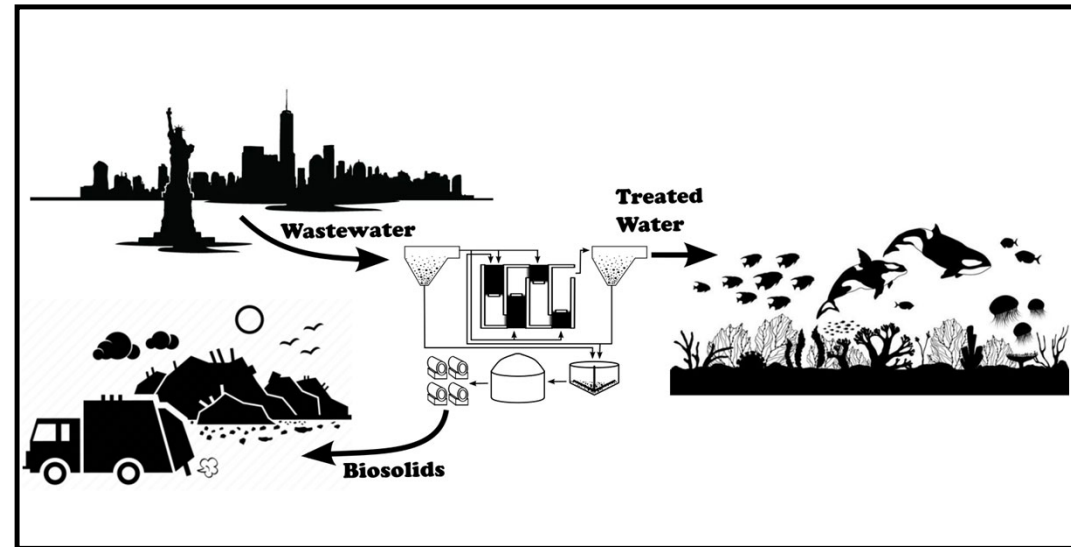


~~Wastewater Treatment~~ Water Resource Recovery



- 1849: The City began systematically to build sewers
- 1890s to early 1900s: First wastewater treatment plants constructed in Brooklyn and Queens
- 1972: Clean Water Act
- 1988: Ocean Dumping Ban ACT

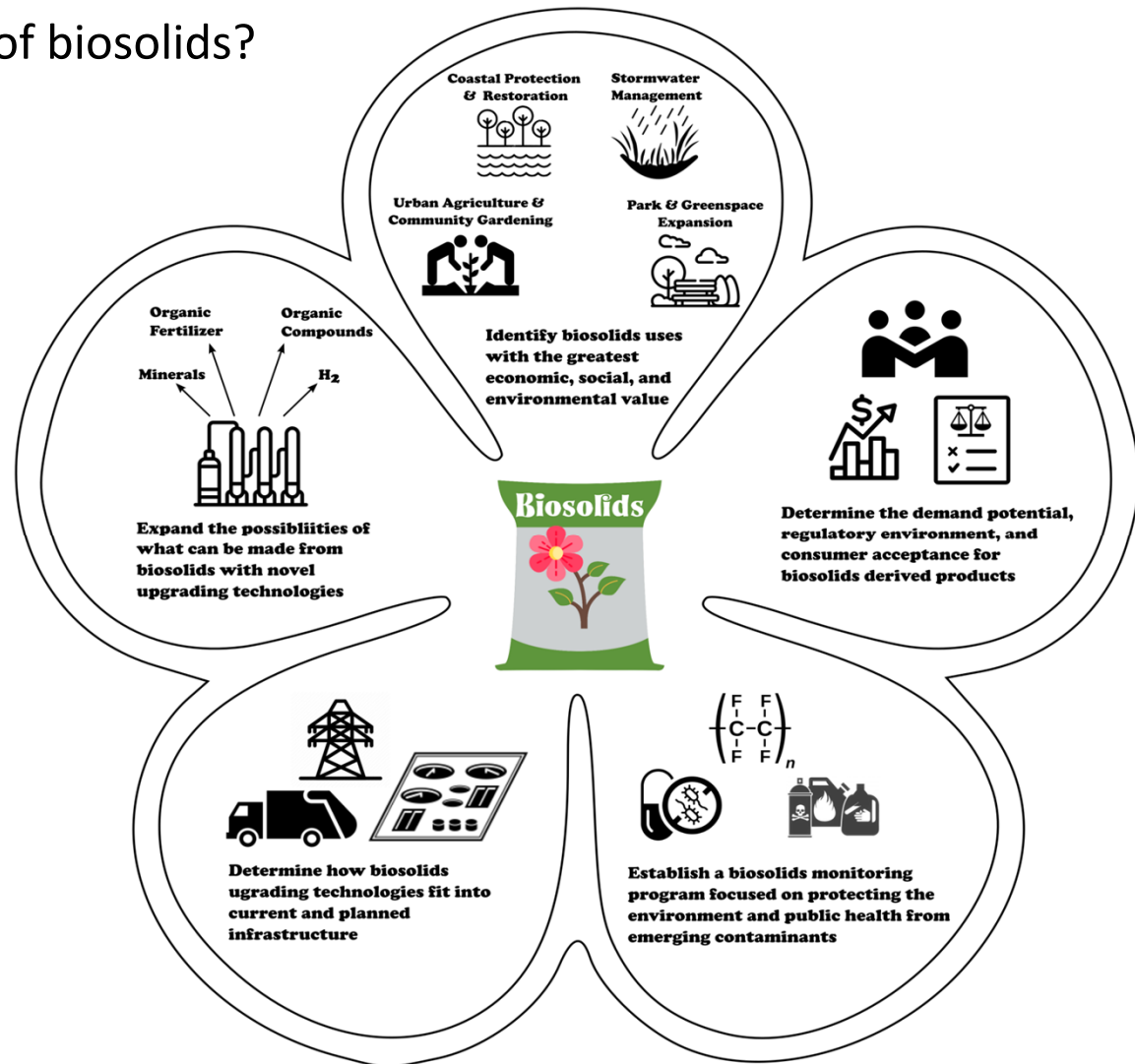
Imagine if New York viewed waste as a valuable resource rather than a problem and used waste to bring sustainable benefits to a range of people. What would that look like?

Team Lead: *John Fillos, Department of Civil Engineering*

| Name | Department | Faculty Expertise (Assets) |
|-------------------|---------------------------------------|---|
| Hillary Brown | Architecture | Sustainability, infrastructure planning |
| Marco J. Castaldi | Chemical Engineering | Thermal processing of organic waste |
| Jeff Morris | Chemical Engineering/Levich Institute | Rheology, complex fluids, mixture flow |
| Urs Jans | Chemistry | Chemical analysis of contaminants |
| Ann (Beth) Wittig | Civil Engineering | Air quality management |
| Naresh Devineni | Civil Engineering | Data science (environmental focus) |
| Krish Ramalingam | Civil Engineering | Water resource recovery engineering |
| Alex Rosenthal | Civil Engineering | Process modeling |
| Michael Bobker | CUNY Institute of Urban Systems | Energy Management |
| Mehdi Samimi | Economics & Business | Strategic Management |

How do we shift from waste to recovery of biosolids?

- ❖ Identify and maximize valuable uses
- ❖ Expand the possibilities of what can be made
- ❖ Properly integrate biosolids recovery and reuse into city infrastructure
- ❖ Determine demand, regulations, and public acceptance
- ❖ Establish a monitoring program to ensure that biosolids are safe

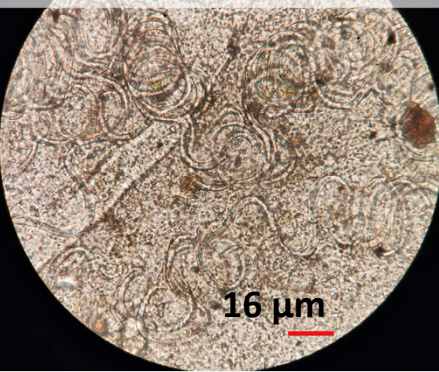


Sludge rheology and flow

Microscopic structure → Macroscopic properties → Process scale flow optimization

Microscopic images

Untreated Sludge:

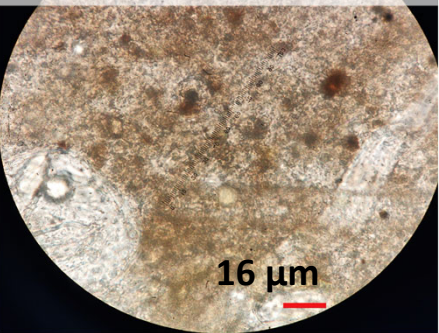


Macroscopic images

Digested Sludge:



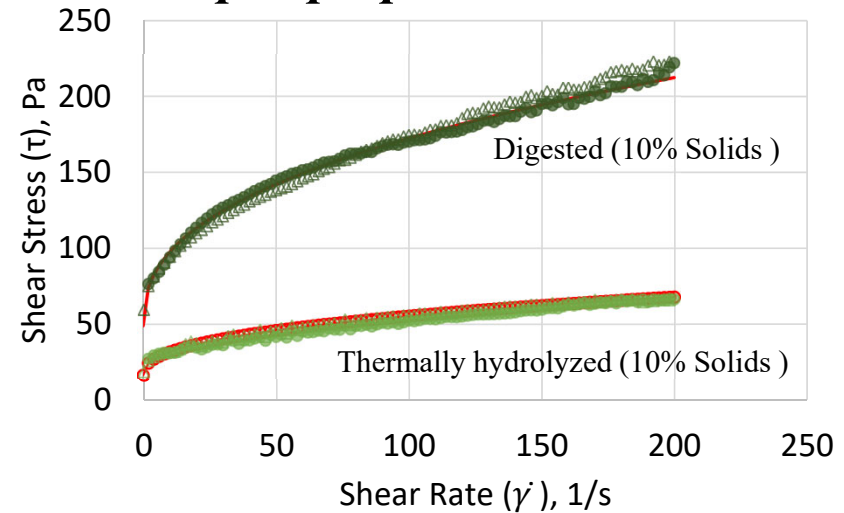
Thermally Hydrolyzed Sludge



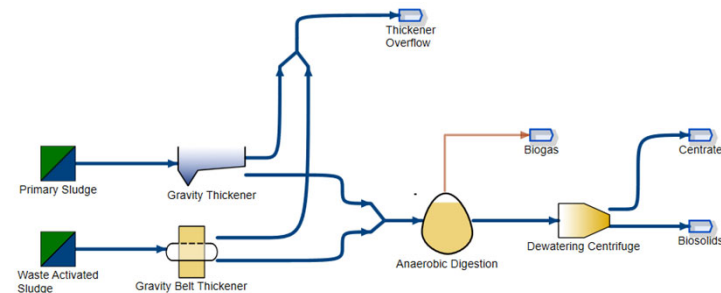
Thermally Hydrolyzed Digested Sludge:



Macroscopic properties



→ Process scale fluid mechanics



Strategic Management of Biosolids Valorization Pathways

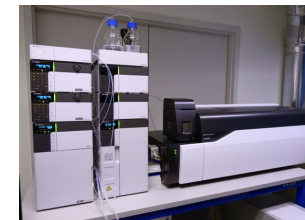
Business, economic, and social perspectives:

- **Technology comparison:** Drawing on the Triple Bottom Line and ESG frameworks, we analyze the impact of alternatives across different aspects of performance.
- **Technology management:** Treating alternatives as different technologies, we study the life-cycle and the types of innovations involved in the project.
- **Stakeholder management:** Appreciating the crucial role of stakeholders, we develop a stakeholder management strategy.
- **Strategy implementation:** Using Balanced Scorecard approach, we develop a strategy map to visualize the steps which in turn facilitates the implementation of project.

Path Forward



Advisory Committee



Proof-of-concept Studies



Biosolids Regional Workshop



Funding Strategy