



Adaptable, Resilient, Green Infrastructure

Mayors' Innovation Project 2011

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Challenges for Cities of the Future

Three new goals

Three examples



800,000

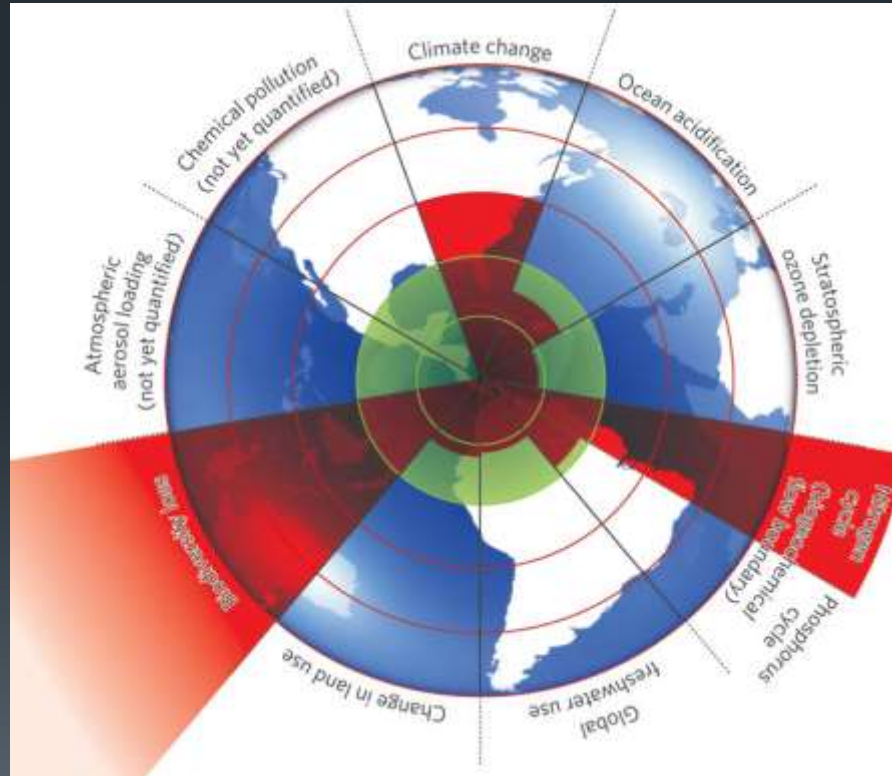
New people last week.

This week.

Next week.

Every week for the next 4 decades.

Planetary boundaries





Reliability

We continue to build infrastructure that
is designed for the way the weather
used to be



Affordability

We continue to build infrastructure that made sense when energy was cheap and resources were plentiful



“It is riskier to continue with business as usual than it is to change.”

Glen Daigger, Chief Technology Officer
CH2MHill

IS THERE A SOLUTION?

Add 3 goals to capital spending:

1. Adaptable
2. Resilient
3. Green



Adaptable

1. Plan for the worst plausible scenarios
2. Make incremental investments that keep options open
3. Do “No Regrets”



Resilient

1. Range of strategies (portfolio of options)
 2. Operating at multiple scales
 3. Diversity of drivers



Green

1. Clean water
2. Save energy
3. Beautify the city
4. Make streets open space
5. Improve health

Example: Increase urban vegetation

How?

1. Regional scale

Connect parks and restore river courses

2. Drainage basin/district scale

Plant trees and rain gardens upstream of pipe

3. Street scale

Vegetate the Rights of Way

4. Building scale

Adopt *Green Factor* landscape code

Seattle Green Factor

- Based on Berlin model
- Requires 30% - 60% of lot to function as if landscaped
- Code provides menu of choices
- Results so far:
 - 50% green roofs
 - 50% permeable paving
 - 75% vegetated walls



Modeled benefits:



- A 13 % reduction of stormwater runoff
- A 9% reduction of energy demand
- A 12% reduction of greenhouse gases

ANOTHER EXAMPLE: Use waste water collection system for district scale heating and cooling

How?

1. Regional scale

At treatment plants harvest heat for internal operations

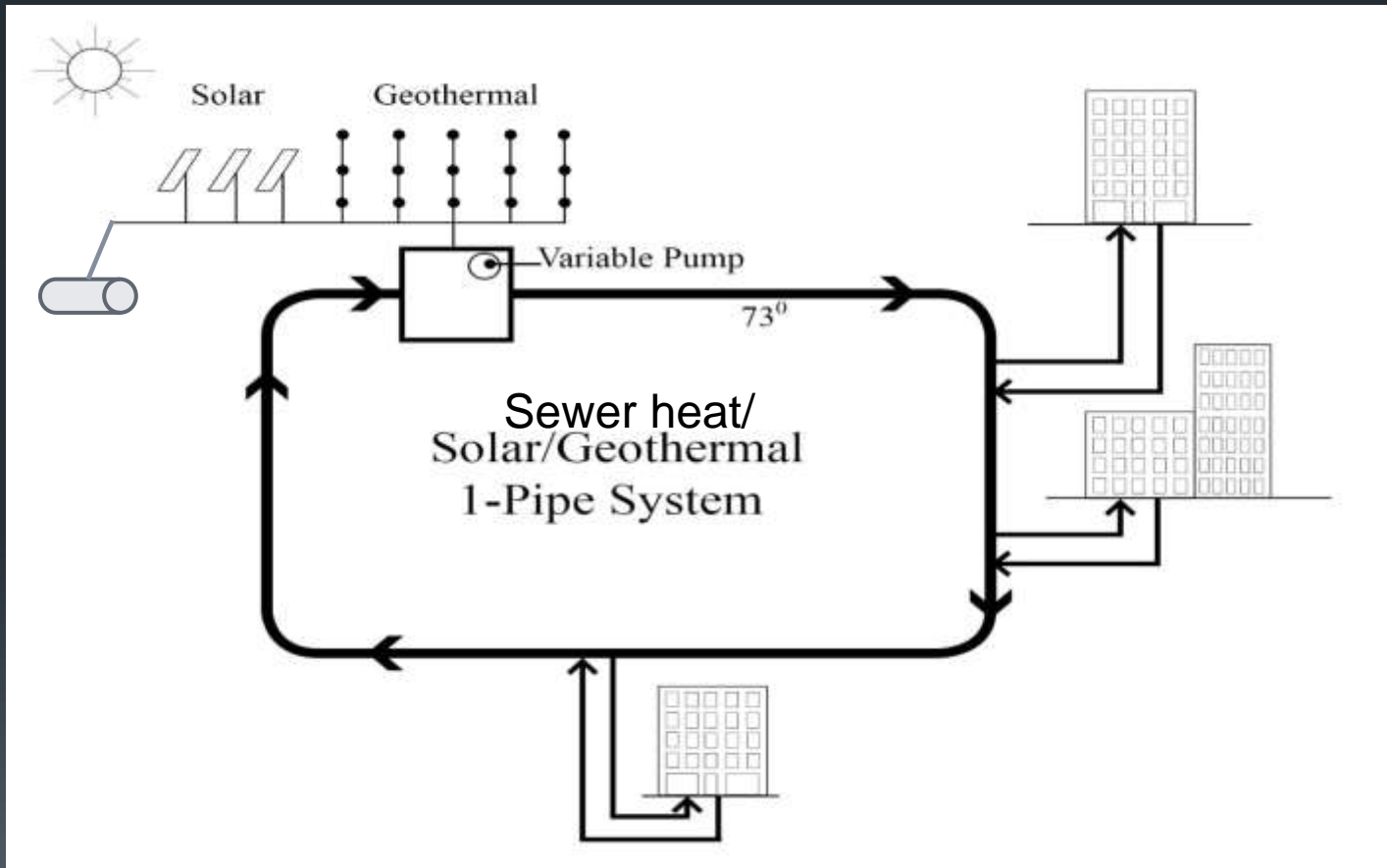
2. District/neighborhood scale

Drop in heat exchangers along larger sewer lines to create district energy thermal loops

3. Building scale

Provide 90% of domestic hot water for multi-family apartments with heat exchanger and heat pump in basement

All renewable district loop provides 90+% of all heating and cooling for 4,000 apartments



A THIRD EXAMPLE: Treat wastewater at district scale.

How?

1. Regional scale

Reduces flows to regional wastewater plants

1. District scale

Reduces contributions to combined sewer overflows for \$\$\$ savings

2. Building scale

Reduces water use 50% and wastewater flows 70% for less money than normal sewer and water rate.

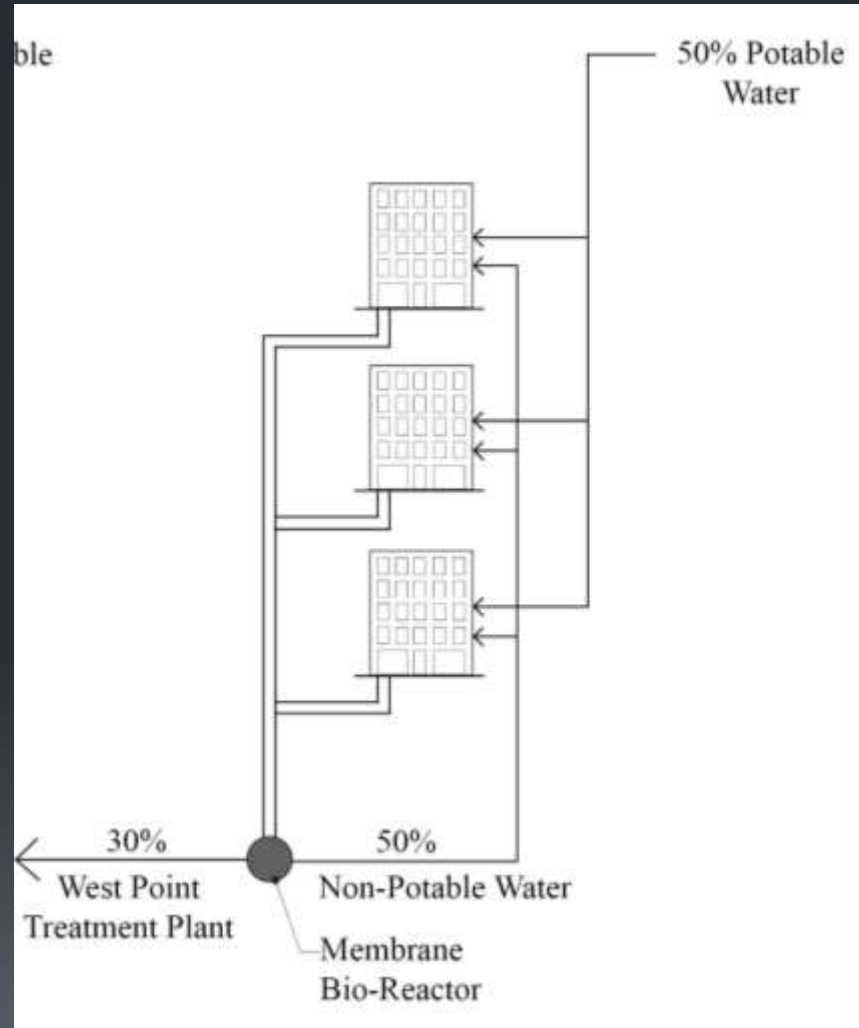
Costs less than normal sewer and water rates

Adaptable

Resilient

Green

Less expensive





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THANK YOU!

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