How Cities Work: A Behind-the-Scenes Look at Cities of Today and Tomorrow

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Urban Infrastructure

- Water
- Wastewater
- Transport
- Electricity
- Gas
- Solid Waste
- Telecom
- Future
Water
Water

Three Elements:

1. Water Collection
2. Water Treatment
3. Water Distribution
Water Collection
Surface Water
Groundwater

RECHARGE AREA

PUMPED WELL

DISCHARGE AREA

Water table

Days

Years

Unconfined aquifer

Confined aquifer

Confining bed

Centuries

Millennia

Stream
The Sea
Water Treatment
Remove large stuff first

1. intake
2. screen debris
3. coagulation
4. flocculation
5. sedimentation
6. filtration
7. disinfection
8. distribution and/or storage
Water Distribution
Wastewater
Wastewater

Two Types

1. Sanitary
2. Stormwater
Combined Sewer System

LEGEND:
- Combined Sewerage
- Stormwater
- Stormwater Runoff
Separate Sewer System

household wastewater (toilet, sink, etc)

2 Underground Systems
How do you ease traffic congestion?
Is the answer to build more roads?
Two solutions

- Increase the supply
- Reduce the demand
What is demanded?
What is demanded?
Shared Space
Always say ‘yes’ to more investment in transit
Electricity
Electricity

Two Elements:

1. Generation

2. Distribution
Generation

Non-Renewable
- Thermal
  - Coal
  - Oil
  - Natural Gas

Renewable
- Geothermal
- Biomass
- Solar (thermal)

Kinetic
- Hydroelectric
- Wind
- Tide
- Wave

Other
- Solar (PV)

Flexible

Intermittent
Distribution

Extra High Voltage
265 to 275 kV
(mostly AC, some HVDC)

High Voltage
110kV and up

Low Voltage
50 kV

Transmission Grid
Distribution Grid

Coal Plant
600 MW

Nuclear Plant
600 - 1700 MW

Hydro-Electric Plant
200 MW

Medium Sized
Power Plant
150 MW

Industrial Power Plant
30 MW

Factory

City Network
3 MW substations

City Power Plant

Industrial Customers

Solar Farm

Wind Farm

Farm
400 kW
Substation
Distribution
Electric Panel
Gas
Gas

Better to burn gas directly than to transform it into electricity and then use electricity for heating.

In Illinois: preferable to use gas at the moment than electricity.
Solid Waste
Source Reduction & Reuse
Recycling / Composting
Energy Recovery
Treatment & Disposal
PAPER
CLEAN & DRY PAPER PRODUCTS
BROKEN-DOWN CARDBOARD

GLASS METAL PLASTIC
EMPTY CONTAINERS & CARTONS
Aluminum Foil
Plastics #1-5, #7

LANDFILL
Plastic #6
Wet and Soiled Paper Products
Food Wrappers
Styrofoam and Plastic Lined Cups
Aerobic Composting
Anaerobic Digestion
Land Reclamation
Waste to Energy Recovery
Telecommunications
Telecommunications

• Analog

• Digital
Future
Cities are shaped by the challenges they have to face
Sustainability

Resilience
Sustainability
Low energy

Resilience
Interdependencies
Main Trends
Thank You

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