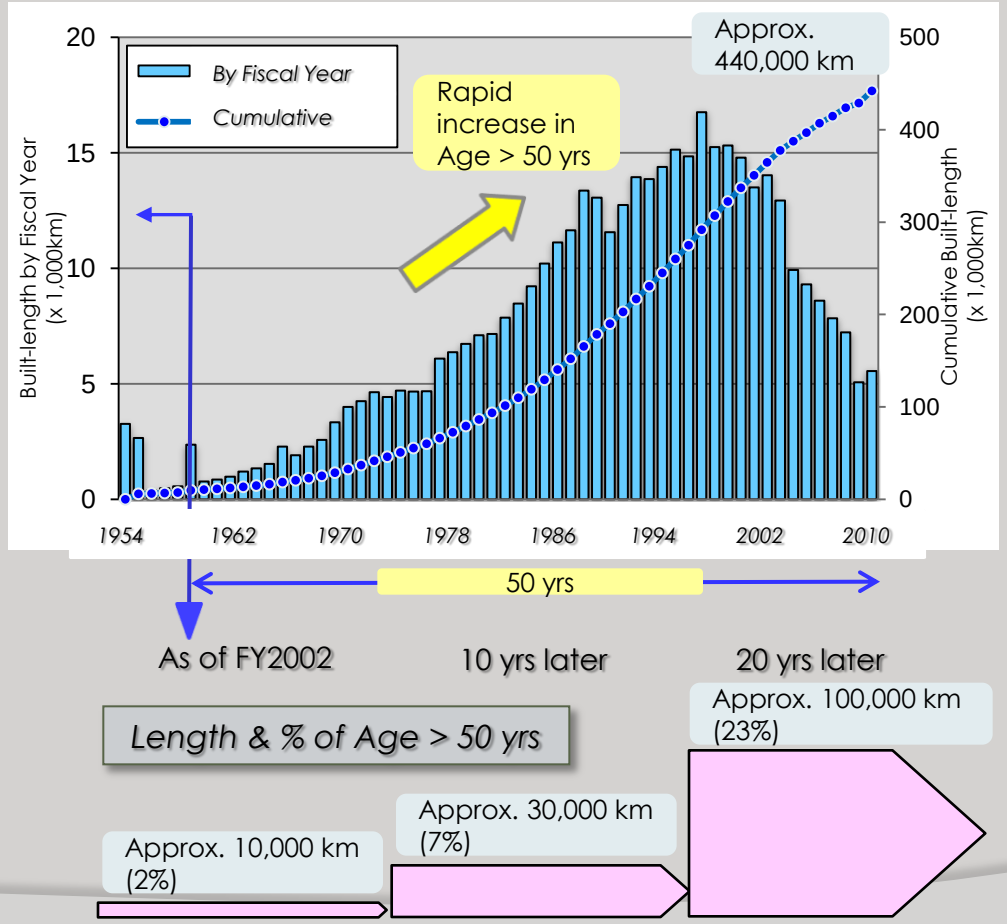
PRESENT AGING STATE OF SEWER SYSTEM – CONDUIT

While sewer system spread for its total conduit length to reach 440,000 kilometers, severe progressive aging appeared. Further accelerative increase is anticipated at ones of 50-year age or above.

Built-length by Fiscal Year (As of FY2002)



Conduit Aging Examples

Concrete Corrosion/Aggregate Exposure

Concrete Corrosion/Rebar Exposure

Collapsed Conduit

Underground Water Leak-in

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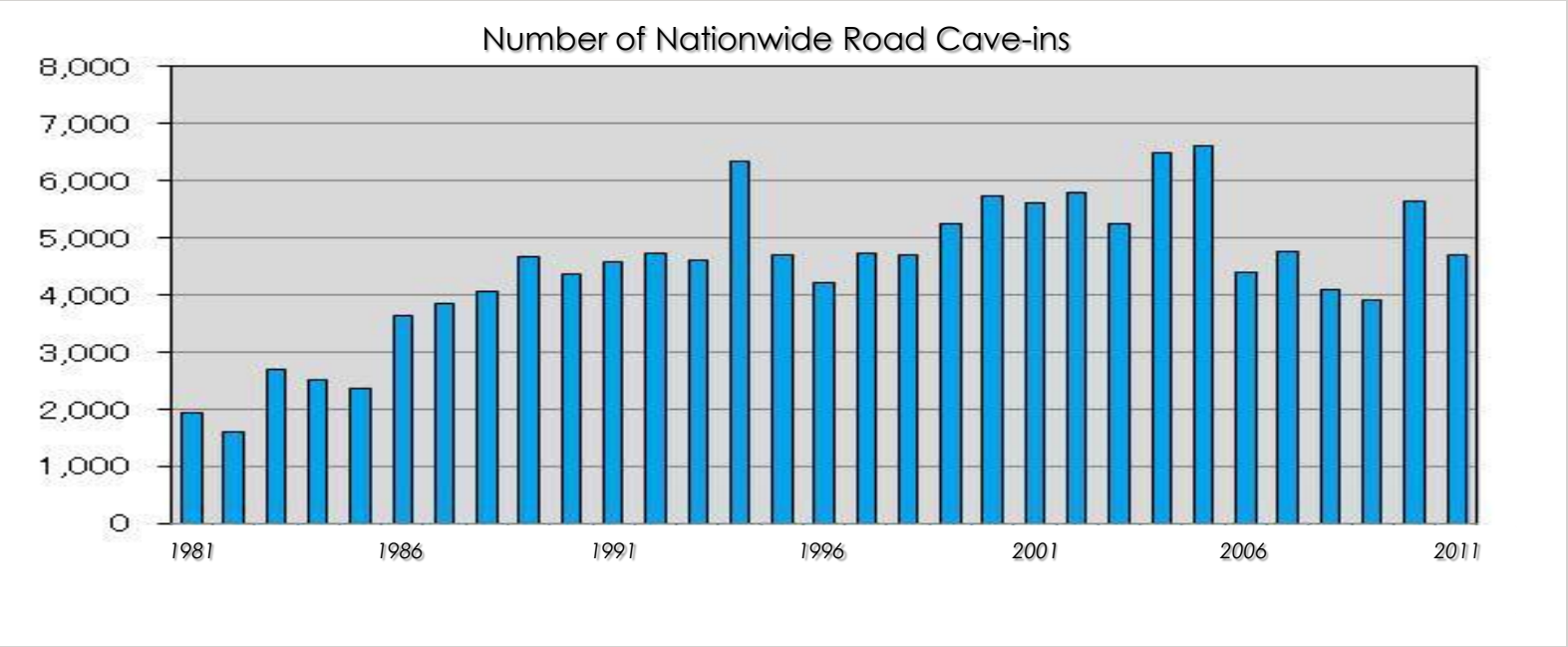
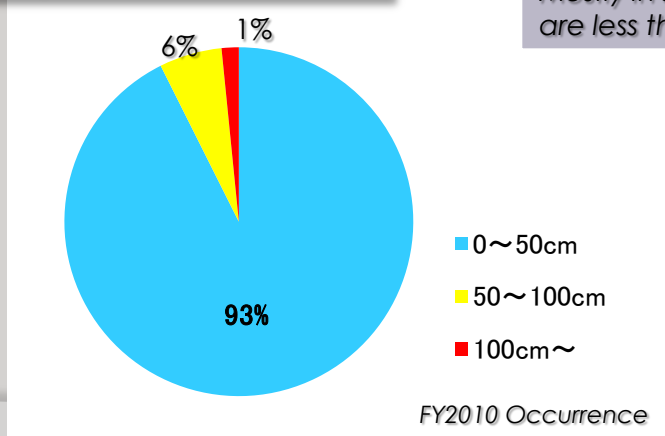
CONDUIT AGING PROBLEMS

Conduit aging causes 4,000 to 5,000 road cave-ins annually.



Depth of Road Cave-ins



FY2010 Occurrence

Mostly in small-scale, more than 90% of cave-ins are less than 50 cm in depth.

Car Accident induced by Road Cave-in

Nagoya City in 2009

Chiba City in 2009

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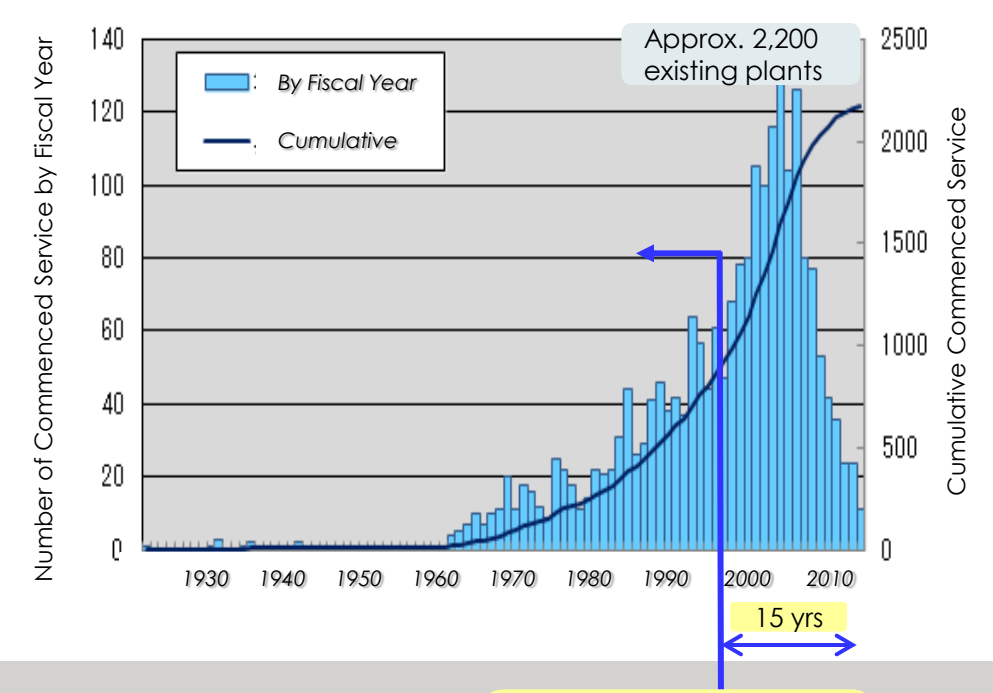
PRESENT AGING STATE OF SEWER SYSTEM – TREATMENT PLANT

About a half of mechanical/electrical equipment at nationwide treatment plants already went beyond their service lives. The number of treatment plants implementing renewal will continue to increase.

Treatment Plants in Service by Fiscal Year (As of FY2002)



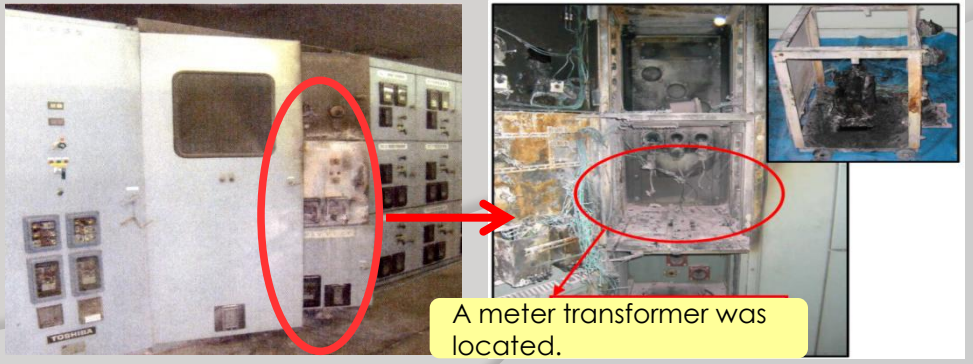
Approx. 1,100 plants have serviced longer than 15 yrs and commenced or are scheduled to commence equipment renewal.

Equipment Aging Examples

Damaged Bearings at Heavy-duty Pump

Ingress Gate difficult to open/close

Fire induced by Electric Leak at Aged Transformer



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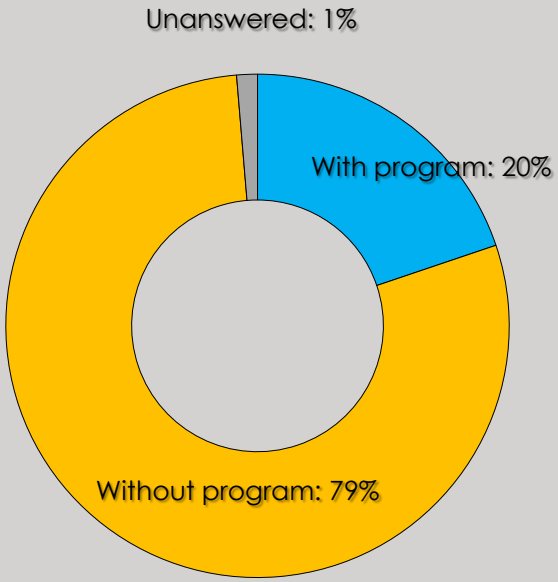
PRESENT AGING STATE OF SEWER SYSTEM – TREATMENT PLANT

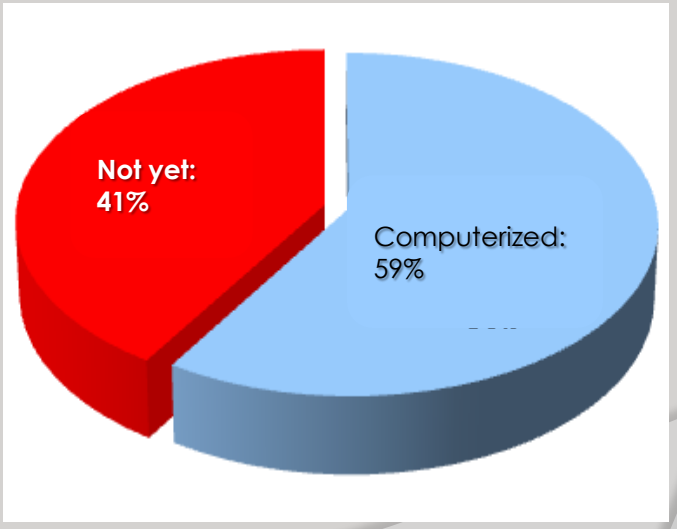
- *Local government offices with set-out programs of survey and inspection for conduits account for only 20% of all.*
- *About 40% of sewer data books have not been yet computerized.*

Local Government's Programs set out for Survey and Inspection on Conduits



1,504 sewer operators were surveyed at the end of FY2010.

Maintenance of Sewer Data Book



1,496 sewer operators were surveyed at the end of FY2011.

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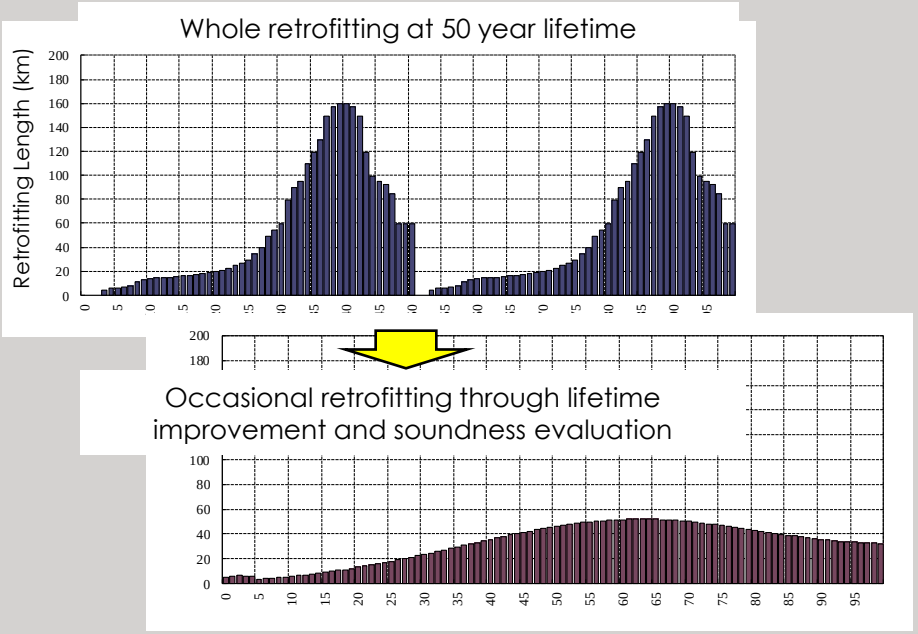
COPE WITH AGING SERWER SYSTEM – (1) PROMOTE ASSET MANAGEMENT PRINCIPLE

Implement asset management based preventive maintenance to seek for reducing;
1) Risks of accidents and breakdowns from increasing aged system
2) Future retrofitting costs through system's lifetime improvement

Leveling retrofitting works by lifetime improvement



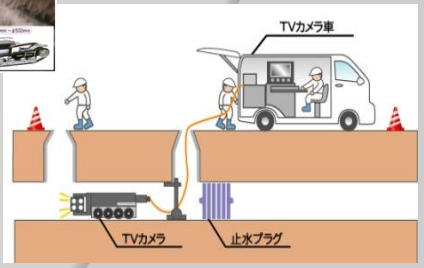
Maintenance methods for sewer conduits

Inspection

Cleaning

Inside Visual Inspection

Remote-operated camera survey



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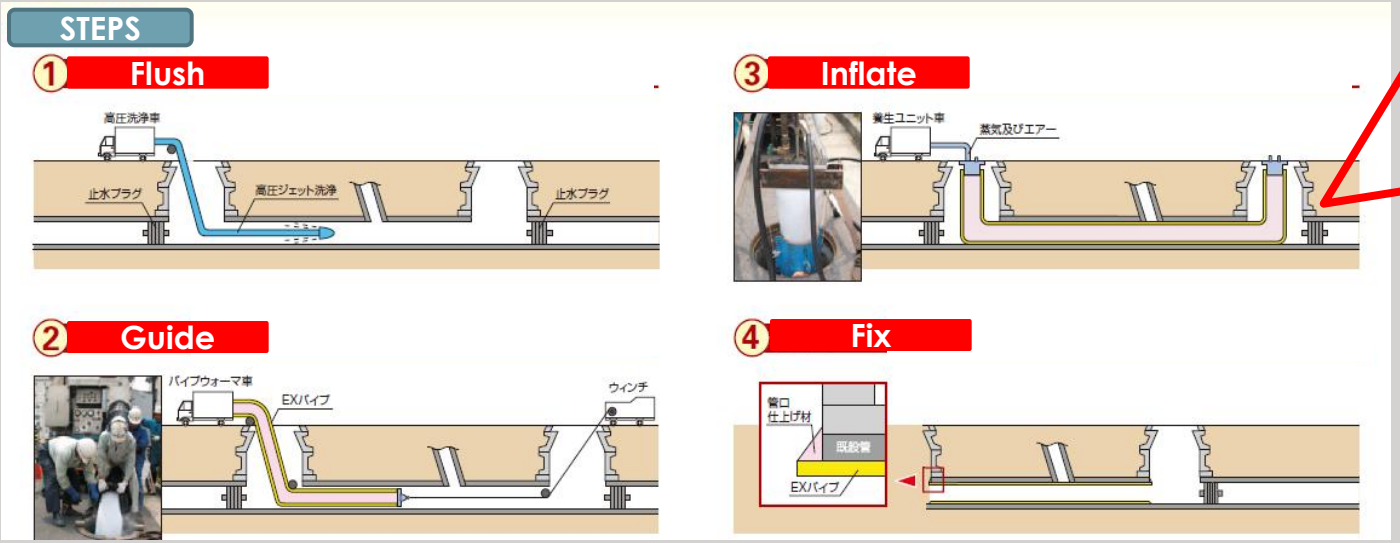
COPE WITH AGING SERWER SYSTEM – (2) IMPLEMENT ECONOMICAL RETROFITTING

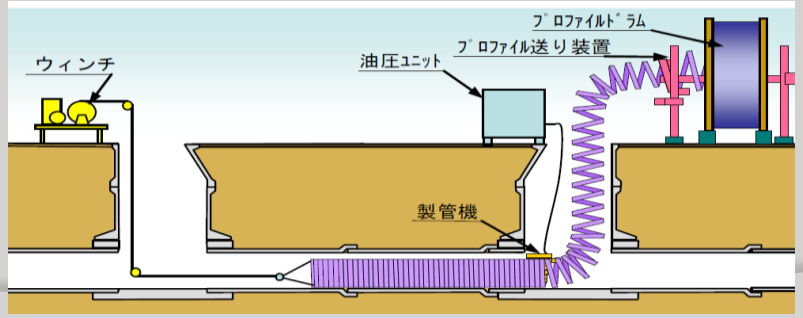
Execute retrofitting without open-cut to minimize cost and adverse effect to traffic. Many specialist contractors have 20 to 30 methods and are actively developing more technology.

Examples of conduit retrofitting

【EX 1: Inflatable Inner Tube】



【EX 2: Spiral Inner Tube】



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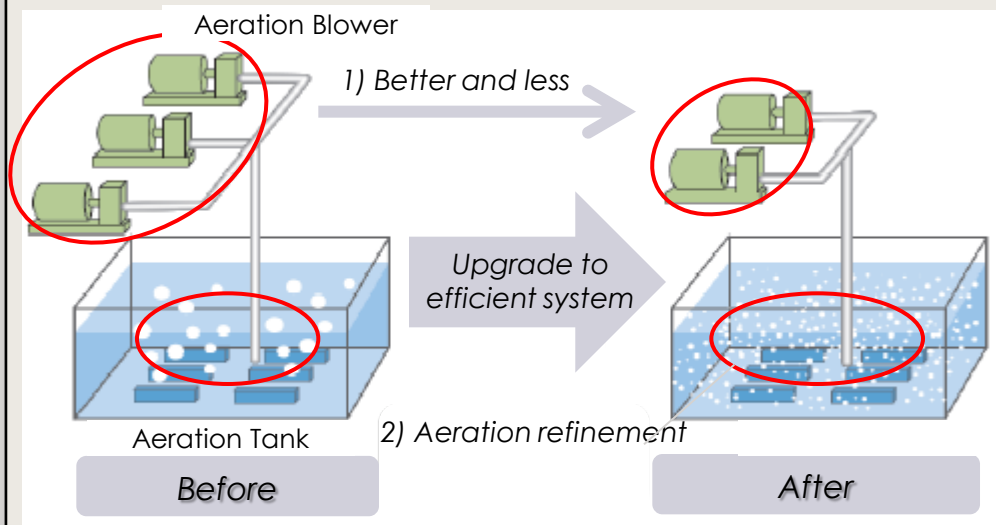
UPGRADING AT PLANT RENEWAL

Promote upgrading of treatment plants at renewal besides lifetime improvement.

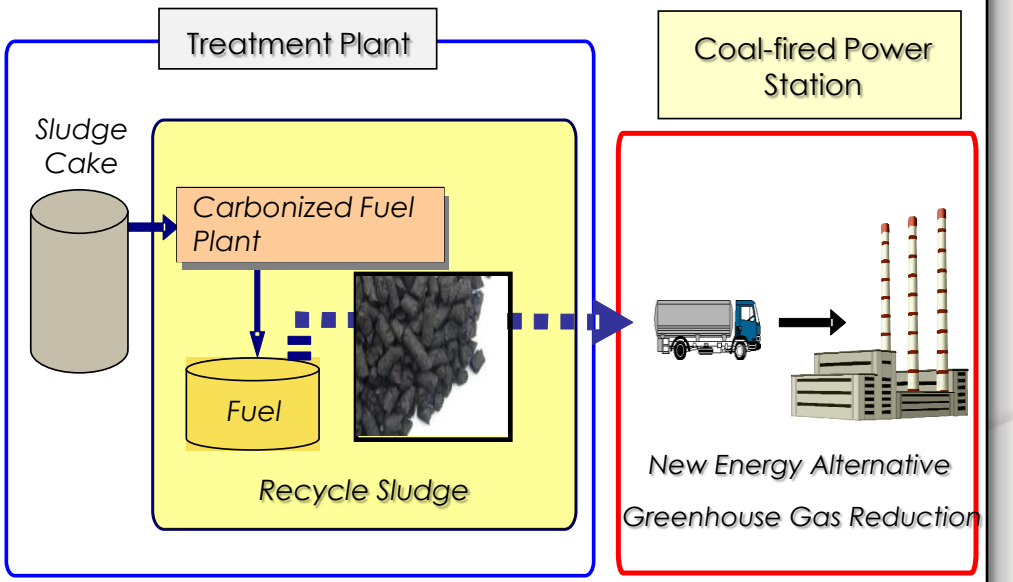
Electric Power Saving

Install energy saving equipment



20% Reduction at Power Consumption

Energy Recycle from Sewer Waste



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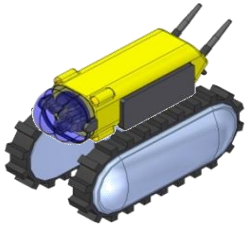
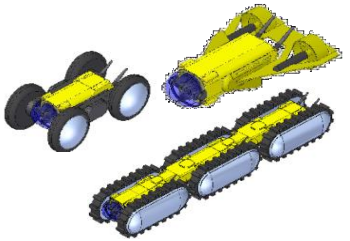
VERIFY CONDUIT MAINTENANCE TECHNOLOGY

- *Required preventive maintenance for sustainable sewer system needs effective inspection and survey technology.*
- *The Government takes initiative in verifying more effective screening technology than ever for promoting local governments' implementation.*
- *Public invitation is called to select three research groups.*

Verification project for effective conduit maintenance by advanced optic recognition technology



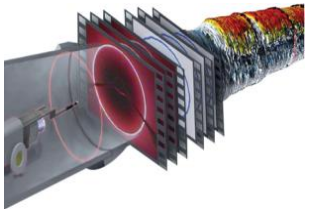
Multiple-lenses Camera



Attachments

Verification project for effective conduit maintenance by profiling technology

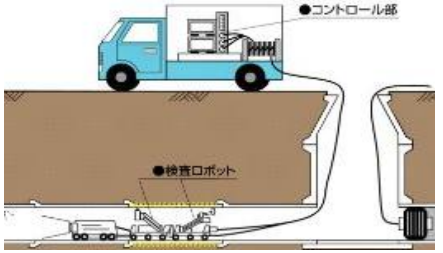
Conduit Portal Camera



Inner-conduit Profiling Camera

Verification project for effective conduit maintenance by wide-angle camera and impact elastic wave method

Wide-Angle Camera



Impact Elastic Wave Method

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