Covering Total Cost of Operation in Council Trade Waste Charging Models

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Background

- Typically, councils charge based on flows and loads to cover operational costs
- This works well when there is little change in flows and loads

Background

- Once fixed, charges are adjusted based on cost of living indexes and only reviewed in detail every five to ten years

Flows and loads can change

But plants are built for peak capacity leaving council to bear the cost of capital and depreciation.

Example

a trade waste discharger reduces the BOD load they discharge by 50 kg BOD_5/d.

This results in a reduction in trade waste charges of $53/d.

But the reduction in cost to Council is only $20/d due to reduced aeration demand and a reduced sludge production

The fixed costs do not change and so there is a cost of $33/d which Council now bears.

Example

- A large discharger installs a DAF as pretreatment.
- The DAF reduces the BOD load by about 90%, TSS load by 95% and the TKN load about 60%.
- This reduced the dischargers trade waste charges by about $4,000/d.
- However, they have the right to discharge at the full original load.
- On these days they pays an extra $4000/d but on other days council is still paying for fixed costs of the larger plant

The Challenge

If inadequately set, the conventional unit charge system may result in substantial cost to the Council as it subsidises the treatment of trade waste.

The Solution

- A dynamic model that responds to changing circumstances
- Accounts for the customers' monthly usage
- Fairly distributes the capital and operating costs of the full plant amongst the trade waste customers and the rate payers.

How it Works

- The Excel based model is adjusted to reflect the particular unit operations of the relevant WWTP
- Separate charging for Capex based on the discharger's share of the maximum anticipated daily flows, also known as reserved capacity.
- Separate charging for Operating cost, based on the share of the average daily flows and loads, i.e. actual usage.

Determination of costs

- Capital costs are determined by the share of the customers reserved capacity. This is typically based on the consent conditions
- Alternatively reserved capacity can be set based the previous years discharge if it is significantly under the consent limits
- Operating costs determined by the share of the customers' monthly discharge.

Capital Costs

- Division based on the effect of a parameter on a particular process unit such as
  - Sewer network
  - Screening
  - ponds
  - Aerators
  - Discharge (outfall, irrigation, rapid infiltration etc)
  - General (e.g. fencing, roading, automation and telemetry, mowing etc)
- Tanks and basin capacity primarily dependent on flow
- Grit removal and screening mostly assigned to TSS and Flow
- Aeration equipment mostly assigned to BOD
- WAS dewater mostly assigned to BOD and TSS
- Chemical dosing assigned to phosphorus content
- Division of Capital costs are then divided based on customers reserved capacity

Capital cost division example (simplified)

A discharger reserves capacity of 5000 m^3 flow per day. This makes up 10% of the reserved capacity flow of the all contributors combined

A unit operation, e.g Aeration basin is valued at $2 million over 25 years. 50% of the cost of that unit basin is assigned to flow.

For one year the cost assigned to flow for the aeration basin is $2,000,000/25 x 50% = $40,000 for flow

The dischargers capital charge for flow through the aeration basin would then be 10% of that ($4,000 per annum)

Operating Costs

- Division based on the operating cost of a particular process unit
- BOD affects the power consumption of aerators and chemical requirements for dewatering
- TKN affects the amount of carbon dosing required
- Phosphorus affects the amount of alum needed
- TSS affects maintenance requirements of screens and grit removal
- Flow affects power consumption and maintenance of pumps
- Division of operating costs are then divided based on customers actual usage

Operating cost division example (simplified)

A discharger has discharged 20,000 m3 over the month. This makes up 5% of the total flow to the plant

A unit operation, e.g screening, has been allocated operating costs of $25,000 per month. 50% of the cost of screening is assigned to flow.

For that month the cost assigned to flow for screening is $25,000 x 50% = $12,500 for flow

The dischargers operating charge for flow through the aeration basin would then be 5% of that ($625 for that month)

Cost of Capital	1.50%	Rate of return for land		1.50%
Interest Rate	1.50%			

Trade Waste Cost Allocation Model

(Plant Section)		Allocation Proportions										
		Average Flow	Peak Flow	BOD	COD	SS	TKN	NH4-N	TP	FOG	Zn	Total
Network 1												
	Capital	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
	O&M	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
Network 2												
	Capital	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
	O&M	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
Domestic Sewerage												
	Capital	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
	O&M	0.86	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	1.00
Industrial Screening & Grit Removal												
	Capital	0.50	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	1.00
	O&M	0.33	0.00	0.08	0.00	0.50	0.00	0.00	0.00	0.00	0.08	1.00
Aeration basin												
	Capital	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
	O&M	0.42	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.08	1.00
Aerators												
	Capital	0.00	0.00	0.60	0.00	0.10	0.20	0.00	0.10	0.00	0.00	1.00
	O&M	0.20	0.00	0.50	0.00	0.10	0.10	0.10	0.00	0.00	0.00	1.00
Dewatering												
	Capital	0.43	0.00	0.43	0.00	0.14	0.00	0.00	0.00	0.00	0.00	1.00
	O&M	0.20	0.00	0.60	0.00	0.20	0.00	0.00	0.00	0.00	0.00	1.00
Discharge Pumping & Outfall												
	Capital	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
	O&M	0.40	0.00	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.20	1.00
Odour Control												
	Capital	0.20	0.00	0.60	0.00	0.20	0.00	0.00	0.00	0.00	0.00	1.00
	O&M	0.00	0.00	0.75	0.00	0.25	0.00	0.00	0.00	0.00	0.00	1.00

Trade Waste Cost Alloca

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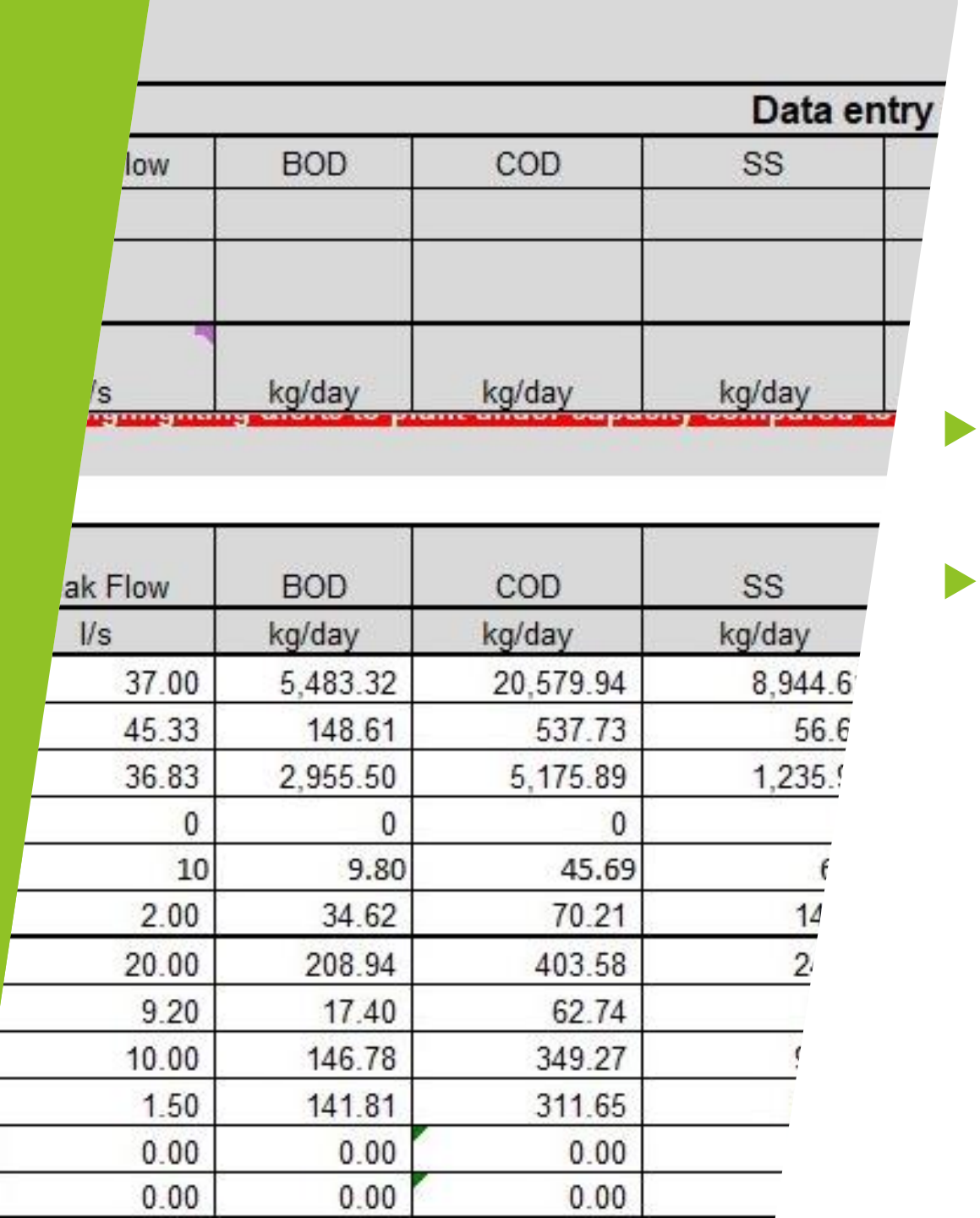
						Networ			
					Acme Processors		Joe's Meatworks		Frank's Jam	
(Plant Section)		ODRV	Depr	Annual O&M Costs	Share	Cost	Share	Cost	Share	Cost
Network 1										
	Capital	$812,583	$10,723		0.6602	$15,127	0.114	$2,623	0.170	$3,891
	O&M			$5,000	0.693	$3,463	0.108	$539	0.156	$780
Network 2										
	Capital	$7,475,328	$110,245							
	O&M			$80,004						
Domestic Sewerage										
	Capital	$163,075,900	$5,280,047		0.000000	$0	0.000000	$0	0.000000	$0
	O&M			$1,500,000	0.000	$0	0.000	$0	0.000	$0
ndustrial Screening & Grit Removal										
	Capital	$619,165	$23,471		0.740	$24,253	0.064	$2,084	0.167	$5,479
	O&M			$120,930	0.758	$91,657	0.041	$5,004	0.142	$17,142
Domestic Screening & Grit Removal										
	Capital	$3,519,672	$58,428		0.000	$0	0.000	$0	0.000	$0
	O&M			$240,000	0.000	$0	0.000	$0	0.000	$0
Aeration										
	Capital	$5,693,069	$144,848		0.000	$0	0.000	$0	0.000	$0
	O&M			$0	0.000	$0	0.000	$0	0.000	$0
BTFs										
	Capital	$16,597,535	$281,777		0.000	$0	0.000	$0	0.000	$0
	O&M			$600,000	0.000	$0	0.000	$0	0.000	$0
Discharge Pumping & Outfall										
	Capital	$3,652,084	$322,324		0.121	$45,660.19	0.021	$7,916	0.031	$11,743
	O&M			$654,800	0.261	$170,623	0.011	$7,477	0.070	$45,848
Odour Control										
	Capital	$2,047,377	$50,488		0.391	$31,735.84	0.015	$1,178	0.261	$21,167
	O&M			$55,104	0.424	$23,366	0.009	$483	0.176	$9,699

Total Capital Inputs

- Depreciated replacement value for each specific unit operation of the WWTP
- Depreciation allowance for the same assets to the current year or next year
- Budgeted works for the current or next year

Total Operating Cost Inputs

- Operational costs for the current or next year in sufficient detail to assign them to a specific part of the plant.



Data entry

low	BOD	COD	SS	
/s	kg/day	kg/day	kg/day	

ak Flow	BOD	COD	SS
l/s	kg/day	kg/day	kg/day
37.00	5,483.32	20,579.94	8,944.6
45.33	148.61	537.73	56.6
36.83	2,955.50	5,175.89	1,235.9
0	0	0	
10	9.80	45.69	6
2.00	34.62	70.21	14
20.00	208.94	403.58	2
9.20	17.40	62.74	
10.00	146.78	349.27	
1.50	141.81	311.65	
0.00	0.00	0.00	
0.00	0.00	0.00	

Total Usage Inputs

- Historical data for each trade waste discharger
- Historical data for peak and average flows and loads to the plant.

Benefits of the TWCM

- Positive encouragement for industry to minimise their peak flows and loads.
- Costs are apportioned on a true user pays basis.
- Council is not seen to be increasing the unit charges each year.

Limitations of the TWCM

- $/kg or m3 charges for operating costs may vary from month to month depending on actual input to the plant.
- Councils that wish to charge fixed unit charges for operating can use the model to calculate these.

Benefits of the TWCM

- The charges cover the costs of owning and operating the WWTP.
- Encourages collaborative engagement by industry to minimise load peaking.
- The TWCM can be issued as a “black box” to each industry allowing them to determine the benefit of any spend on waste minimisation.

Thank you
Questions?

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