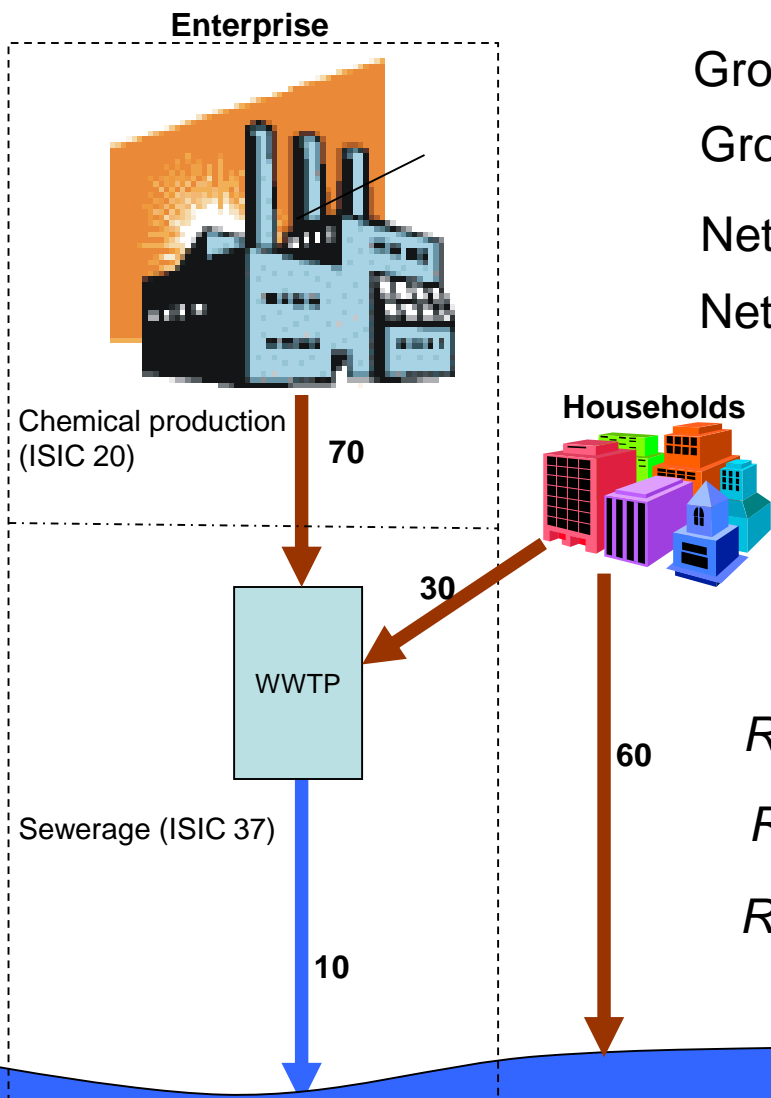


SEEAW Emission Accounts Calculation Examples and Supplementary Information

Technical Workshop on the
Preparation of Water Accounts in Latin America
Chile, 1-4 June, 2009

Jeremy Webb

CALCULATION EXAMPLE I



Gross emission ISIC 20: **70**

Gross emission Households: $30 + 60 = \mathbf{90}$

Net emissions ISIC 20: **7**

Net emissions Households: $3 + 60 = \mathbf{63}$

Calculation steps

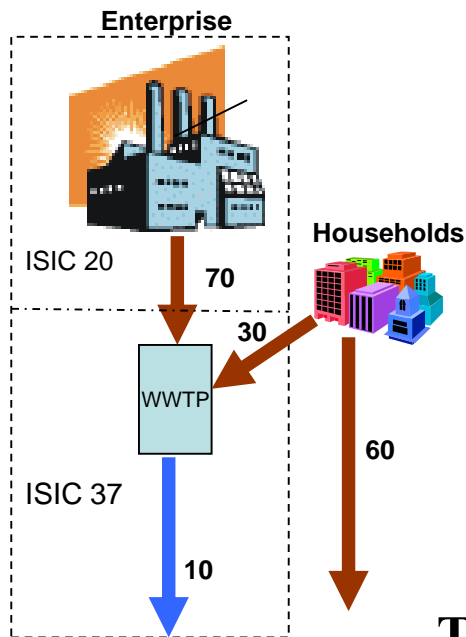
Removal rate WWTP: $1 - 10/(70+30) = \mathbf{90\%}$

Reallocated load ISIC 20: $70 * (1 - 0.90) = \mathbf{7}$

Reallocated load Househ.: $30 * (1 - 0.90) = \mathbf{3}$

Fresh surface water

CALCULATION EXAMPLE I



Gross emission ISIC 20: **70**

Gross emission Households: $30 + 60 = \mathbf{90}$

Net emissions ISIC 20: **7**

Net emissions Households: $3 + 60 = \mathbf{63}$

Table A. Gross and net emissions

Pollutant	Industries (by ISIC categories)							physical units		
	1-3	5-33, 41-43	35	36	37	38,39, 45-99	Total	Households	Rest of the world	Total
	1. Gross emissions (=1.a+1.b)		70			0		70	90	
1.a. Direct emissions to water (=1.a.1+1.a.2=1.a.i+1.a.ii)		0			0		0	60		60
1.a.1 Without treatment		0			0		0	60		60
1.a.2 After on-site treatment		0			0		0	0		0
1.a.i To water resources		0			0		0	60		60
1.a.ii To the sea		0			0		0	0		0
1.b. To Sewerage (ISIC 37)		70			0		70	30		100
2. Reallocation of emission by ISIC 37		7			0		7	3		10
3. Net emissions (=1.a+2)		7			0		7	63		70

CALCULATION EXAMPLE I

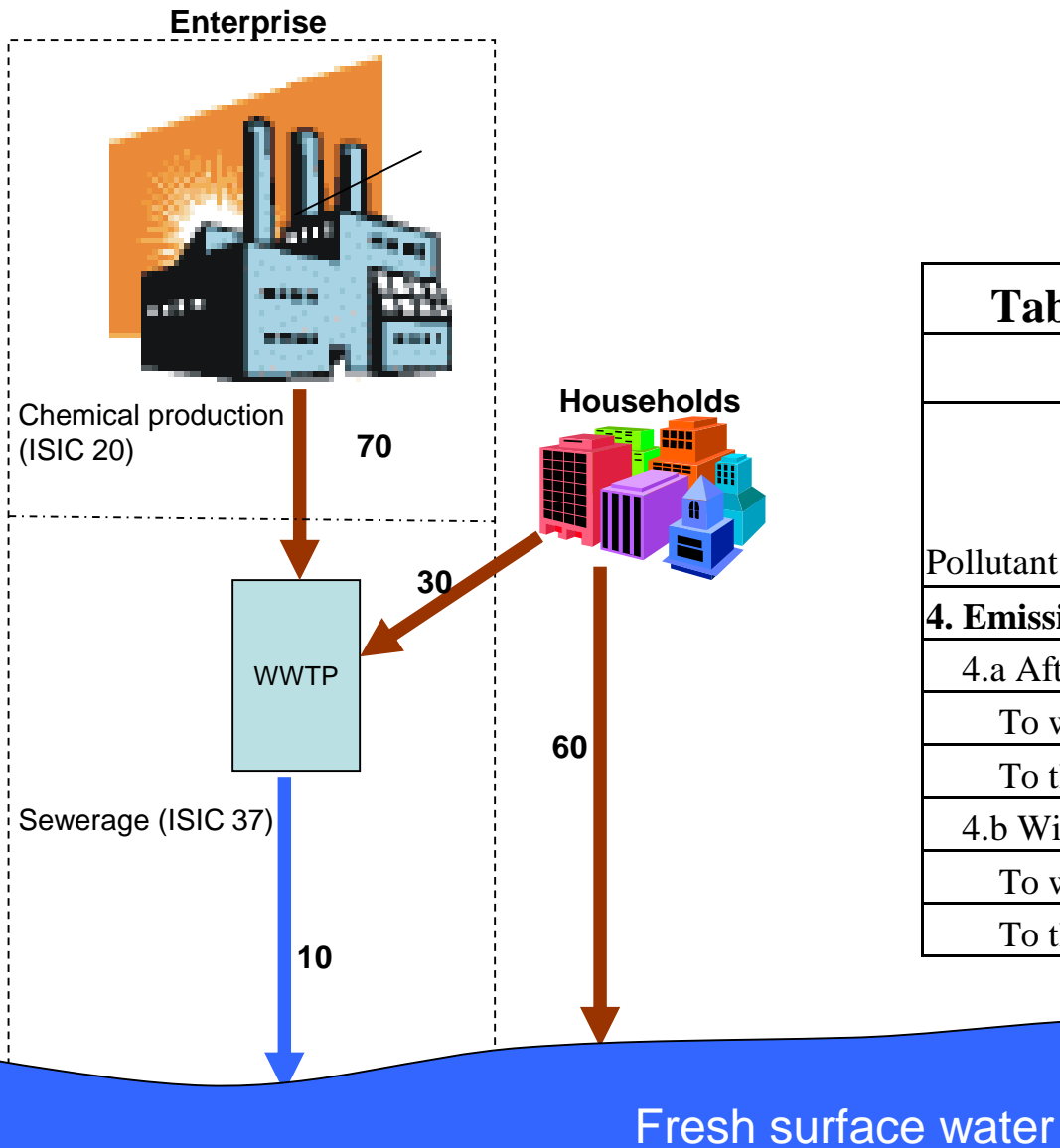
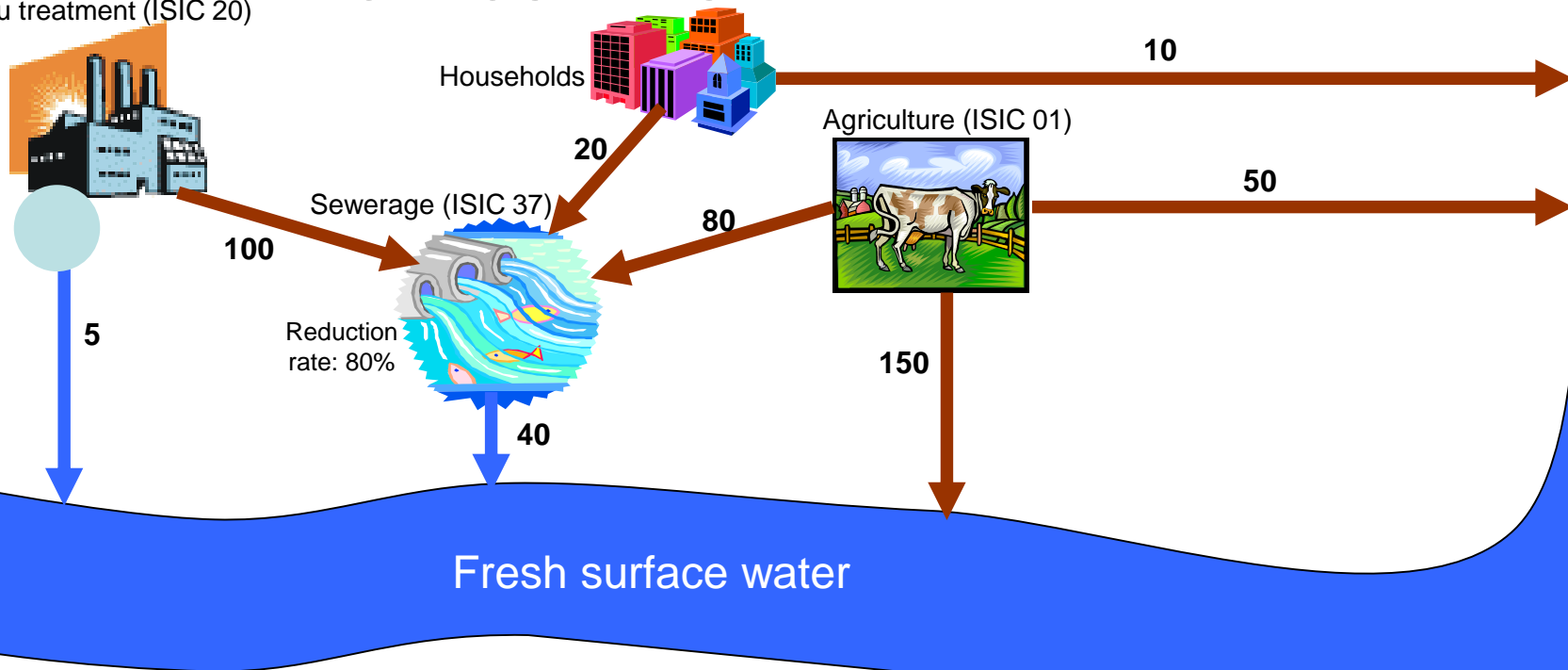


Table B. Emissions by ISIC 37	
physical units	
Pollutant	ISIC 37
4. Emissions to water (=4.a+4.b)	10
4.a After treatment	10
To water resources	10
To the sea	0
4.b Without treatment	0
To water resources	0
To the sea	0

Chemical production with in situ treatment (ISIC 20)

CALCULATION EXAMPLE II



Pollutant	Industries (by ISIC categories)							Households	Rest of the world	Total
	physical units									
	1-3	5-33, 41-43	35	36	37	38,39, 45-99	Total			
1. Gross emissions (=1.a+1.b)	280	105			0		385	30		415
1.a. Direct emissions to water (=1.a.1+1.a.2=1.a.i+1.a.ii)	200	5			0		205	10		215
1.a.1 Without treatment	200	0			0		200	10		210
1.a.2 After on-site treatment	0	5			0		5	0		5
1.a.i To water resources	150	5			0		155	0		155
1.a.ii To the sea	50	0			0		50	10		60
1.b. To Sewerage (ISIC 37)	80	100			0		180	20		200
2. Reallocation of emission by ISIC 37	16	20			0		36	4		40
3. Net emissions (=1.a+2)	216	25			0		241	14		255

Chemical production with in situ treatment (ISIC 20)

CALCULATION EXAMPLE II

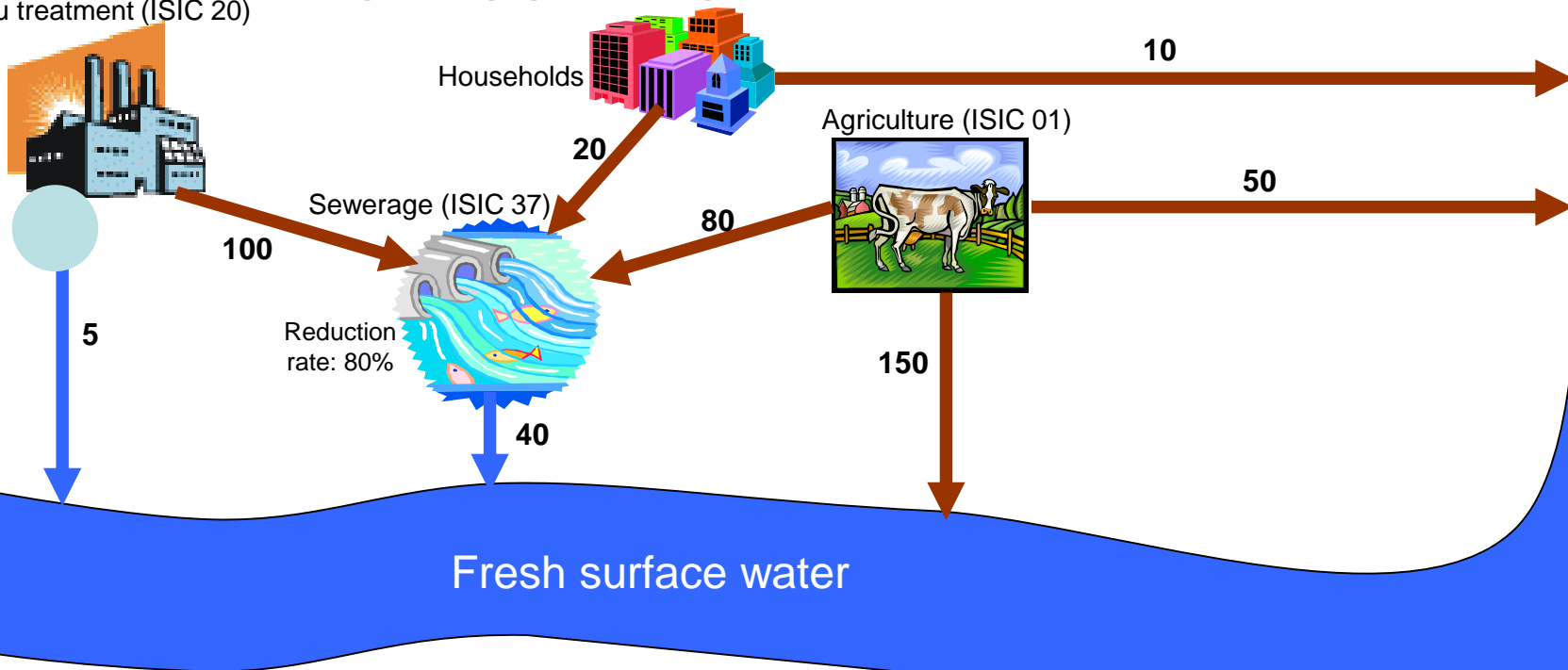


Table B. Emissions by ISIC 37

physical units	
Pollutant	ISIC 37
4. Emissions to water (=4.a+4.b)	40
4.a After treatment	40
To water resources	40
To the sea	0
4.b Without treatment	0
To water resources	0
To the sea	0

CALCULATION EXAMPLE III

Including urban runoff collected by sewerage. See also Table 4.2 SEEAW, Final Draft (slightly changed)

Table A. Gross and net emissions

Pollutant COD	Industries (by ISIC categories)							Households	Rest of the world	Total
	tonnes									
	1-3	5-33, 41-43	35	36	37	38,39, 45-99	Total			
1. Gross emissions (=1.a+1.b)	3150.2	5047.4	7405.1	1851.0	498.5*	1973.8	19925.9	11663.6		31589.5
1.a. Direct emissions to water (=1.a.1+1.a.2=1.a.i+1.a.ii)	2470.0	390.1	7313.2	1797.8	0.0	27.7	11998.7	2712.7		14711.5
1.a.1 Without treatment	2470.0	257.4	7313.2	1797.8		7.9	11846.2	1865.0		13711.3
1.a.2 After on-site treatment		132.7	0.0	0.0		19.8	152.5	847.7		1000.2
1.a.i To water resources	2470.0	311.8	5484.9	1797.8		27.7	10092.2	2599.7		12691.9
1.a.ii To the sea	0.0	78.3	1828.3	0.0		0.0	1906.6	113.0		2019.6
1.b. To Sewerage (ISIC 37)	680.2	4657.3	92.0	53.2	498.5	1946.0	7927.2	8950.9		16878.0
2. Reallocation of emission by ISIC 37	213.6	1403.3	66.8	16.7	498.5	585.9	2784.7	2810.1		5594.8
3. Net emissions (=1.a+2)	2683.6	1793.3	7380.0	1814.5	498.5	613.6	14783.5	5522.8		20306.3

Note: * this corresponds to the pollutant content of the urban runoff collected by Sewerage. In this numerical example, urban runoff is collected and discharged without treatment, thus gross and net emissions coincide for ISIC 37.

Table B. Emissions by ISIC 37

	tonnes
	ISIC 37
Pollutant COD	
4. Emissions to water (=4.a+4.b)	5,594.8
4.a After treatment	5,096.3
To water resources	2,396.4
To the sea	2,699.9
4.b Without treatment	498.5
To water resources	234.4
To the sea	264.1

Source: SEEAW-land.

Table A: Supplementary Information

Table A. Gross and net emissions

Pollutant	Industries (by ISIC categories)							physical units		
	1-3	5-33, 41-43	35	36	37	38,39, 45-99	Total	Households	Rest of the world	Total
	1. Gross emissions (=1.a+1.b)									
1.a. Direct emissions to water (=1.a.1+1.a.2=1.a.i+1.a.ii)										
1.a.1 Without treatment										
1.a.2 After on-site treatment										
1.a.i To water resources										
<i>Surface water</i>										
<i>Groundwater</i>										
1.a.ii To the sea										
1.b. To Sewerage (ISIC 37)										
2. Reallocation of emission by ISIC 37										
3. Net emissions (=1a+2)										

Table B. Emissions by ISIC 37

physical units

Pollutant	ISIC 37
<p>4. Emissions to water (=4.a+4.b)</p> <p>4.a After treatment</p> <p>To water resources</p> <p><i>Surface water</i></p> <p><i>Groundwater</i></p> <p>To the sea</p> <p>4.b Without treatment</p> <p>To water resources</p> <p><i>Surface water</i></p> <p><i>Groundwater</i></p> <p>To the sea</p>	

Supplementary Information on Sewage Sludge

Sludge indicators

	ISIC 37
Total sewage sludge produced (vol.) Load in total sewage sludge	