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Sector	Waste		
Category	Domestic Wastewater Treatment and Discharge		
Category Code	4D1		
Sheet	1 of 8 Estimation of Total Organically Degradable Material in Domestic Wastewater (Updated)		
STEP 1			
Region or City	A	B	C
	Population	Degradable organic component	Organically degradable material in wastewater
	(P)	(BOD)	(TOW)
	cap	(kg BOD/cap/yr) ¹	(kg BOD/yr)
			C = A x B
Total			

¹ g BOD/cap/day x 0.001 x 365 = kg BOD/cap/yr

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Sector		Waste				
Category		Domestic Wastewater Treatment and Discharge				
Category Code		4D1				
Sheet		2 of 8 Estimation of Total Organics in Domestic Wastewater by Income Group and Treatment Discharge Pathway or System (New)				
STEP 1						
Type of treatment or discharge pathway	Income group	A	B	C	D	E
		Organically degradable material in wastewater	Fraction of population income group <i>i</i> in inventory year	Degree of utilization of treatment/ discharge pathway or system, <i>j</i> , for each income group <i>i</i>	Correction factor for industrial BOD discharged in sewers	Total organics in wasteater by income group and pathway
		(TOW) (kg BOD/yr)	(U _i) (fraction)	(T _{ij}) (fraction)	(I) ¹	(TOW _{ij}) (kg BOD/yr)
		Sheet 1 of 8				E = A x B x C x D
	Rural					
	Urban high income					
	Urban low income					
	Rural					
	Urban high income					
	Urban low income					
	Rural					
	Urban high income					
	Urban low income					
Add as needed						
Total						

¹ Correction factor for additional industrial BOD discharged into sewers (for collected the default is 1.25, for uncollected the default is 1.00) (see page 6.14 of the 2006 IPCC Guidelines).

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Sector	Waste			
Category	Domestic Wastewater Treatment and Discharge			
Category Code	4D1			
Sheet	3 of 8 Estimation of Organic Component Removed as Sludge from Aerobic Treatment Plants (New)			
STEP 1A				
Type of treatment or discharge	A	B	C	D
	Amount of sludge removed from wastewater treatment	Sludge factor ¹	Conversion factor of tonnes into kg	Organic component removed as sludge
	(S _{mass}) (tonnes sludge/yr)	(K _{rem}) (kg BOD/kg sludge)	1000	(S _{aerobic}) (kg BOD/yr)
				D = A x B x C
Add as needed				
Total				
¹ See Table 6.6a for default values.				

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Sector	Waste			
Category	Domestic Wastewater Treatment and Discharge			
Category Code	4D1			
Sheet	4 of 8 Estimation of Organic Component Removed as Sludge from Septic Systems (New)			
STEP 1A				
Type of treatment or discharge	A	B	C	D
	Total organics in septic systems	Fraction of population managing their septic tank in compliance ¹	Faction of organics removed in sludge ²	Organic component removed as sludge
	(TOW _{septic}) (kg BOD/yr)	(F) (fraction)	(0.5) (fraction)	(S _{septic}) (kg BOD/yr)
	Sheet 2 of 8			D = A x B x C
Add as needed				
Total				
¹ Default value is 0.5.				
² Default value is 0.5.				

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Sector	Waste			
Category	Domestic Wastewater Treatment and Discharge			
Category Code	4D1			
Sheet	5 of 8 Estimation of Total Organics in Treated Domestic Wastewater Effluent (New)			
STEP 1B				
Type of treatment or discharge	A	B	C	D
	Organically degradable material in wastewater	Fraction of wastewater treated exclusively by each wastewater treatment type k^1	Faction of organics removed in sludge ²	Total organics in treated domestic wastewater effluent
	(TOW) (kg BOD/yr)	(FWT _k) (fraction)	(TOW _{REM,k}) (fraction)	(TOW _{EFFtreat}) (kg BOD/yr)
	Sheet 1 of 8			$D = A \times B \times (1 - C)$
Add as needed				
Total				
¹ See Table 6.5.				
² See Table 6.6b.				

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Sector	Waste		
Category	Domestic Wastewater Treatment and Discharge		
Category Code	4D1		
Sheet	6 of 8 Estimation of CH ₄ Emission Factor for Domestic Wastewater		
STEP 2			
Type of treatment or discharge	A	B	C
	Maximum methane producing capacity	Methane correction factor for each treatment system	Emission factor
	(B _o)	(MCF _j)	(EF _j)
	(kg CH ₄ /kgBOD)		(kg CH ₄ /kg BOD)
			C = A x B
Add as needed			

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Sector		Waste				
Category		Domestic Wastewater Treatment and Discharge				
Category Code		4D1				
Sheet		7 of 8 Estimation of CH ₄ Emissions from Domestic Wastewater for Each Income Group and Treatment Discharge Pathway (Updated)				
STEP 3						
Type of treatment or discharge pathway	Income group	A	B	C	D	E
		Total organics in wastewater by income group and pathway	Sludge removed	Emission Factor	Methane recovered and flared	Net methane emissions
		(TOW _i) (kg BOD/yr)	(S _i) ¹ (kg BOD/yr)	(EF _i) (kg CH ₄ /kg BOD)	(R _i) (kg CH ₄ /yr)	(CH ₄) (kg CH ₄ /yr)
		Sheet 2 of 8	Sheet 3 and 4 of 8	Sheet 6 of 8		E = [(A - B) x C - D]
	Rural					
	Urban high income					
	Urban low income					
	Rural					
	Urban high income					
	Urban low income					
	Rural					
	Urban high income					
	Urban low income					
Add as needed						
Total						

¹ Default value is zero for systems other than centralized aerobic treatment systems or septic systems.

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Sector		Waste			
Category		Domestic Wastewater Treatment and Discharge			
Category Code		4D1			
Sheet		8 of 8 Estimation of Total CH ₄ Emissions from Domestic Wastewater Treatment and Discharge (New)			
STEP 3					
A	B	C	D	E	F
Total organics in treated domestic wastewater effluent (TOW _{EFFtreat}) (kg BOD/yr)	% wastewater discharged to locations other than reservoirs, lakes, and estuaries (%Tier 1) (fraction)	Emission Factor (EF) (kg CH ₄ /kg BOD)	% wastewater discharged to reservoirs, lakes, and estuaries (%Tier 1A) (fraction)	Net methane emissions	Total methane emissions (CH ₄) (kg CH ₄ /yr)
Sheet 5 of 8		See Table 6.3 (Updated)		Sheet 7 of 8	E = [(A x B x C) + (A x D x C)] + E

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Sector	Waste			
Category	Industrial Wastewater Treatment and Discharge			
Category Code	4D2			
Sheet	1 of 3 Total Organic Degradable Material in Wastewater for each Industry Sector			
STEP 1				
	A	B	C	D
Industry Sectors	Total industry product (P _i) (t _{product} /yr)	Wastewater generated (W _i) (m ³ /t _{product})	Chemical Oxygen Demand (COD _i) (kg COD/m ³)	Total organic degradable material in wastewater for each industry sector (TOW _i) (kg COD/yr)
				D = A x B x C
Industrial sector 1				
Industrial sector 2				
Industrial sector 3				
add as needed				
Total				

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Sector	Waste		
Category	Industrial Wastewater Treatment and Discharge		
Category Code	4D2		
Sheet	2 of 3 Estimation of CH ₄ Emission Factor for Industrial Wastewater		
STEP 2			
Type of treatment or discharge	A	B	C
	Maximum Methane Producing Capacity (B ₀) (kg CH ₄ /kg COD)	Methane Correction Factor for the Treatment System (MCF _j)	Emission Factor (EF _j) (kg CH ₄ /kg COD)
			C = A x B
add as needed			

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Sector	Waste					
Category	Industrial Wastewater Treatment and Discharge					
Category Code	4D2					
Sheet	3 of 3 Estimation of CH ₄ Emissions from Industrial Wastewater					
STEP 3						
		A	B	C	D	E
Industrial sector	Type of treatment or discharge pathway	Total organic degradable material in wastewater for each industry sector (TOW _i) (kg COD/yr)	Sludge removed in each industry sector (S _i) (kg COD/yr)	Emission factor for each treatment system (EF _i) (kg CH ₄ /kg COD)	Recovered CH ₄ in each industry sector (R _i) (kg CH ₄ /yr)	Net methane emissions (CH ₄) (kg CH ₄ /yr)
		Sheet 1 of 3		Sheet 2 of 3		E = [(A – B) x C] – D
Industrial sector 1						
Industrial sector 2						
Industrial sector 3						
add as needed						
Total						

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Sector	Waste						
Category	Domestic Wastewater Treatment and Discharge						
Category Code	4D1						
Sheet	1 of 5 Estimation of Nitrogen in Domestic Wastewater (New)						
STEP 1							
Type of treatment or discharge pathway	A	B	C	D	E	F	G
	Population served by the treatment pathway, <i>k</i>	Per capita protein consumption	Fraction of nitrogen in protein	Additional nitrogen from household products ¹	Fraction of non-consumed protein and additional nitrogen from household products	Fraction of industrial and commercial co-discharged protein	Total nitrogen in domestic wastewater (treated) by treatment pathway
	(<i>P_{treatment}</i>) (people/year)	(Protein) (kg/person/year)	(<i>F_{NPR}</i>) (kg N/kg protein)	<i>N_{HH}</i> (fraction)	(<i>F_{NON-CON}</i>) (-)	(<i>F_{IND-COM}</i>) (-)	(<i>TN_{DOM_k}</i>) (kg N/year)
							$F = (A \times B \times C \times D \times E \times F)$
Add as needed							
Total							
¹ Default value is 1.1.							

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Sector	Waste	
Category	Domestic Wastewater Treatment and Discharge	
Category Code	4D1	
Sheet	2 of 5 Estimation of Protein Consumed (New)	
STEP 1		
A	B	C
Annual per capita protein supply	Fraction of protein consumed	Protein consumed
(Protein _{SUPPLY})	(FPC)	(Protein)
(kg protein/person/year)	(fraction)	(kg protein/person/year)
		C = (A x B)
Total		

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Sector	Waste			
Category	Domestic Wastewater Treatment and Discharge			
Category Code	4D1			
Sheet	3 of 5 Estimation of Nitrogen in Effluent from Domestic Wastewater (New)			
STEP 1				
Type of treatment or discharge pathway	A	B	C	D
	Total nitrogen in domestic wastewater (TN _{DOM}) (kg N/year)	Fraction of wastewater treated exclusively by each wastewater treatment type <i>k</i> (FWT _{<i>k</i>}) (fraction)	Fraction of total wastewater nitrogen removed during wastewater treatment per treatment type <i>k</i> (N _{REM,<i>k</i>}) (-)	Total nitrogen in effluent (N _{EFFLUENT,DOM}) (kg N/year)
	Sheet 1 of 4			D = [A x (B x (1 - C))]
Add as needed				
Total				

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Sector		Waste					
Category		Domestic Wastewater Treatment and Discharge					
Category Code		4D1					
Sheet		4 of 5 Estimation of N ₂ O Emissions from Domestic Wastewater Treatment Plants for each Income Group and Treatment Discharge Pathway or System (New)					
STEP 3							
Income group	Type of treatment or discharge pathway	A	B	C	D	E	F
		Fraction of population in income group <i>i</i> in inventory year	Degree of utilisation of treatment/ discharge pathway or system, <i>j</i> , for each income group, <i>i</i>	Emission factor for treatment/discharge pathway or system, <i>j</i>	Total nitrogen in domestic wastewater (treated)	Conversion factor of kg N ₂ O-N into kg N ₂ O	N ₂ O emissions from domestic wastewater treatment plants in inventory year
		(U _i) (fraction)	(T _{ij}) (fraction)	(EF _j) (kg N ₂ O-N/kg N)	(TN _{DOM}) (kg N/year)	44/28	(N ₂ O Plants _{DOM}) (kg N ₂ O/yr)
					Sheet 1 of 4		F = A x B x C x D x E
Rural							
Urban high income							
Urban low income							
Total							

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Sector	Waste			
Category	Domestic Wastewater Treatment and Discharge			
Category Code	4D1			
Sheet	5 of 5 Estimation of N ₂ O Emissions from Domestic Wastewater Effluent (New)			
STEP 4				
Type of treatment or discharge pathway	A	B	C	D
	Nitrogen in effluent (N _{EFFLUENT,DOM})	Emission factor (EF _{EFFLUENT})	Conversion factor of kg N ₂ O-N into kg N ₂ O	Total N ₂ O emissions
	(kg N/year)	(kg N ₂ O-N/kg N)	44/28	(kg N ₂ O/year)
	Sheet 3 of 5	See Table 6.8a (New)		D = A x B x C
Total				

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Sector	Waste			
Category	Industrial Wastewater Treatment and Discharge			
Category Code	4D2			
Sheet	1 of 4 Estimation of Nitrogen in Industrial Wastewater (New)			
STEP 1				
	A	B	C	D
Industry Sectors	Total industry product	Wastewater generated	Total nitrogen	Total nitrogen in industrial wastewater (treated)
	(P _i)	(W _i)	(TN _i)	(TN _{INDi})
	(t _{product} /yr)	(m ³ /t _{product})	(kg N/m ³)	(kg N/year)
				D = (A x B x C)
Industrial sector 1				
Industrial sector 2				
Industrial sector 3				
Add as needed				
Total				

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Sector	Waste			
Category	Industrial Wastewater Treatment and Discharge			
Category Code	4D2			
Sheet	2 of 4 Estimation of Nitrogen in Effluent from Industrial Wastewater (New)			
STEP 1				
Type of treatment or discharge pathway	A	B	C	D
	Total nitrogen in industrial wastewater	Fraction of wastewater treated exclusively by each wastewater treatment type <i>k</i>	Fraction of total wastewater nitrogen removed during wastewater treatment per treatment type <i>k</i>	Total nitrogen in effluent
	(TN _{INDi}) (kg N/year)	(FWT _k) (fraction)	(N _{REM,k}) (-)	(N _{EFFLUENT,IND}) (kg N/year)
	Sheet 1 of 4			D = [A x (B x (1 - C))]
Add as needed				
Total				

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Sector	Waste				
Category	Industrial Wastewater Treatment and Discharge				
Category Code	4D2				
Sheet	3 of 4 Estimation of N ₂ O Emissions from Industrial Wastewater Treatment Plants (New)				
STEP 3					
Type of treatment	A	B	C	D	E
	Degree of utilisation of treatment/discharge pathway or system, <i>j</i> , for each industry, <i>i</i>	Emission factor for treatment/discharge pathway or system, <i>j</i>	Nitrogen in wastewater from industry, <i>i</i> (treated)	Conversion factor of kg N ₂ O-N into kg N ₂ O	N ₂ O emissions from industrial wastewater treatment plants in inventory year
	(T _{ij}) (fraction)	(EF _j) (kg N ₂ O-N/kg N)	(TN _{INDi}) (kg N/year)	44/28	(N ₂ O Plants _{IND}) (kg N ₂ O/year)
			Sheet 1 of 4		E = (A x B x C x D)
Industrial sector 1					
Industrial sector 2					
Industrial sector 3					
Add as needed					
Total					

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Sector	Waste			
Category	Industrial Wastewater Treatment and Discharge			
Category Code	4D2			
Sheet	4 of 4 Estimation of N ₂ O Emissions from Industrial Wastewater Effluent (New)			
STEP 4				
Type of treatment or discharge pathway	A	B	C	D
	Nitrogen in effluent	Emission factor	Conversion factor of kg N ₂ O-N into kg N ₂ O	Total N ₂ O emissions from industrial wastewater effluent
	(N _{EFFLUENT,IND}) (kg N/year)	(EF _{EFFLUENT}) (kg N ₂ O-N/kg N)	44/28	(N ₂ O _{EffluentIND}) (kg N ₂ O/year)
	Sheet 2 of 4	See Table 6.8a		D = A x B x C
Add as needed				
Total				

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