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Project Developer input on AM0025 methodology

Practitioners Workshop on CDM
Standards Session IV: Waste Sector

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Monitoring of Anaerobic Digester

1- WHEN ?

2- HOW MANY CERs ?

Question 1: WHEN ?

Monitoring of AM0025 project

Time variables in Tool for SWDS

- „Year of crediting period“ ?
- „Year of project activity“ ?
- „Year of calendar“ ?
- „Year of waste disposal“ ?

→ Project developers need flexibility
(monitoring period length)

Principle of the Tool

$$BE_{CH_4, SWDS, y} = \varphi \cdot (1-f) \cdot G_{CH_4} \cdot (1-O_X) \cdot \frac{1}{2} \cdot F_{DOC} \cdot D_{OC} \cdot f_{CF} \cdot M_{CF} \cdot \sum_{x=1}^y \sum_j W_{jx} \cdot DOC_j \cdot e^{-k_j(y-x)} \cdot (1-e^{-k_j})$$

$$BE_{CH_4, SWDS, y} = C \sum_{x=1}^y W_{jx} \cdot e^{-k_j(y-x)} \cdot (1-e^{-k_j})$$

time of inventory of emissions

	y1	y2	y3	y4
x1	e^0	e^{-k}	e^{-2k}	e^{-3k}
x2		e^0	e^{-k}	e^{-2k}
x3			e^0	e^{-k}
x4				e^0

time of disposal

Emissions:

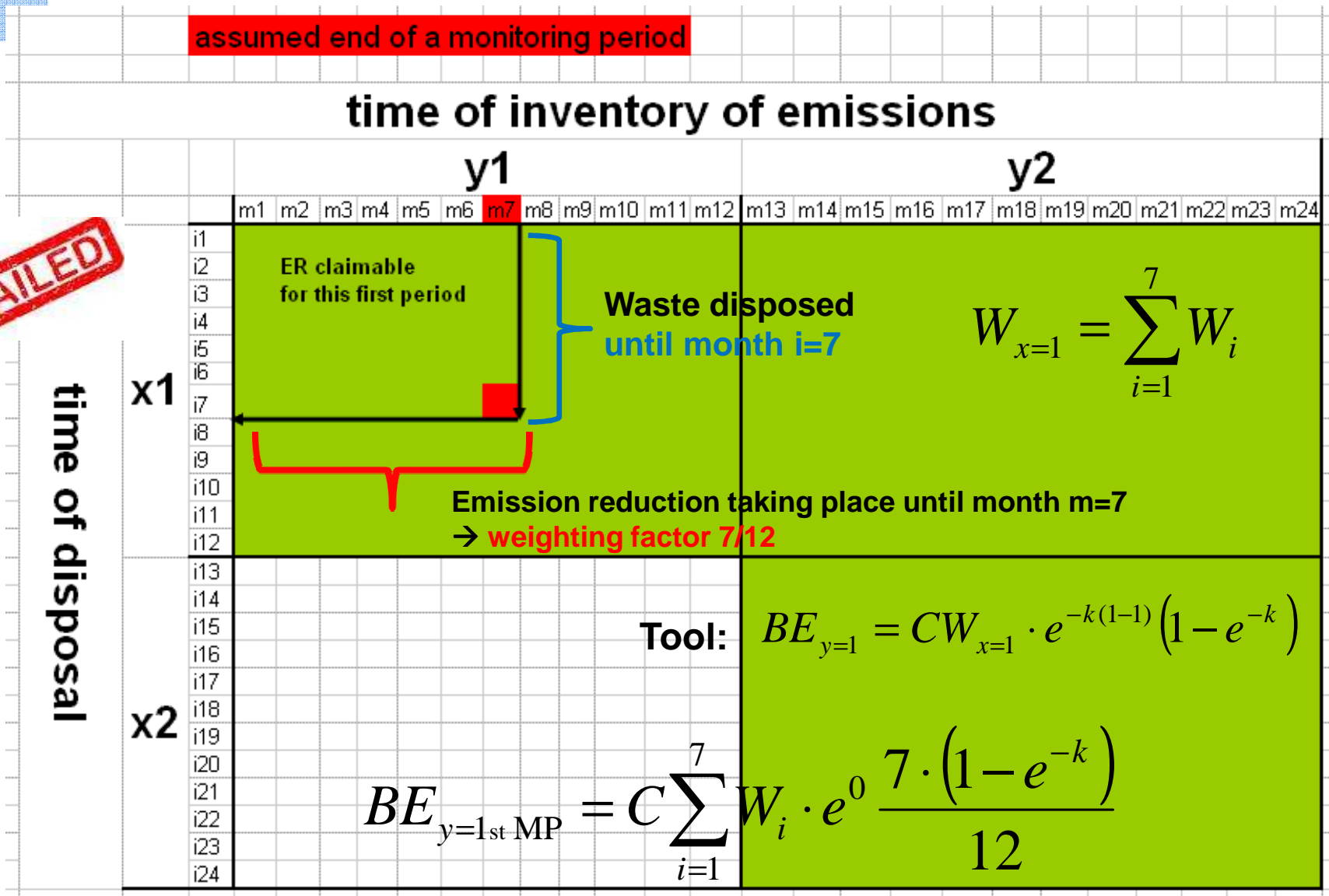
- of waste disposed in year 1

- until the time horizon of year 4

Monitored and verified during year 3

Is a yearly monitoring compulsory?

FAILED



Alternative: „monthly model“

From the First Order Decay (FOD) model ...

k: half –life (years)

time until half of the waste has reacted

Change of variable “y=12 m”

$$\rightarrow k_m = \frac{k}{12}$$

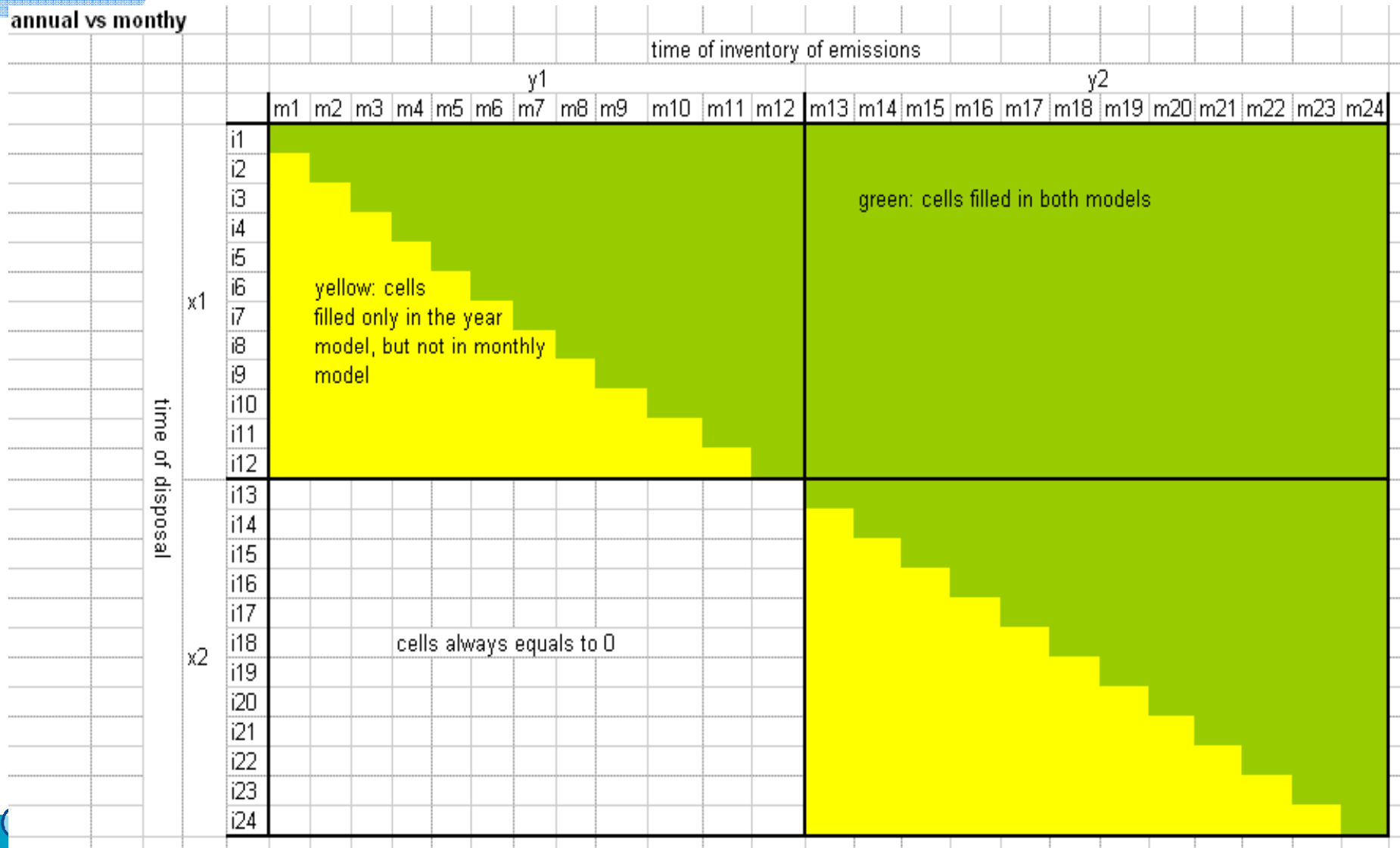
“decay rate on monthly basis”

$$BE_m = C \cdot \sum_{i=1}^m W_i \cdot e^{-\frac{k}{12}(m-i)} \left(1 - e^{-\frac{k}{12}} \right)$$

One phenomena: the decay

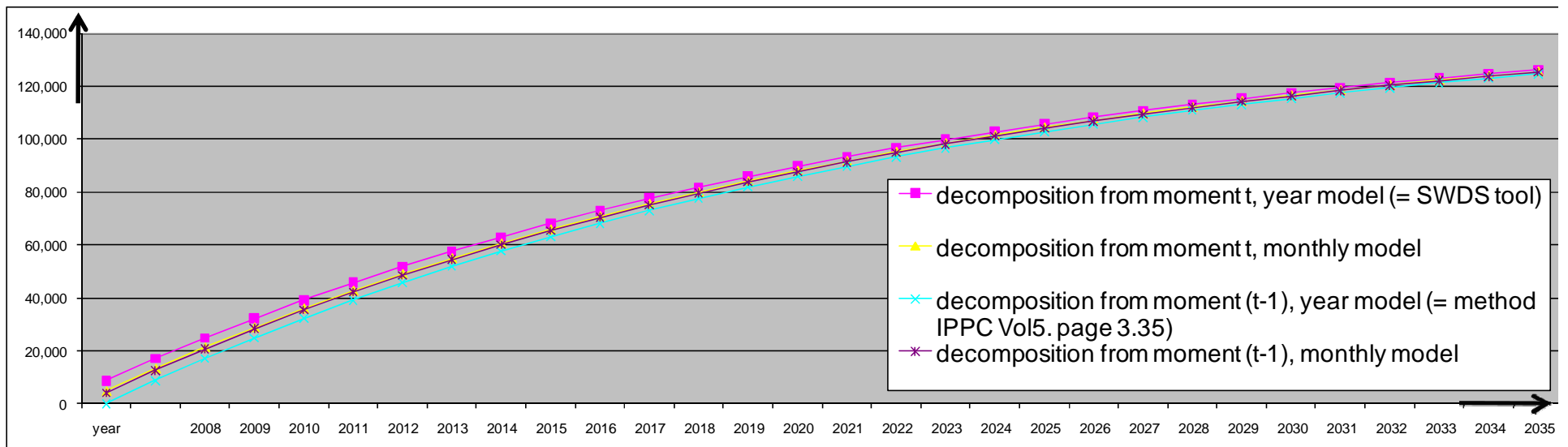
Two „points“ of view

annual vs monthly



Consistency check!

Cumulative sums



Models are:

- different
- but convergent to the same cumulative values

All are „First Order Decay“ models

Summary part 1: WHEN?

- Currently: **only yearly** monitoring possible.
- Suggestion: alternative models with more **flexible monitoring period length**
→ further elaboration with your inputs ...?
- Bonus: Increase **consistency** in definition of time variables („x“ and „y“)!

Question 2:

| HOW MANY CERs ?

- Baseline

$$BE_y = (MB_y + MD_{reg,y}) + BE_{EN,y}$$

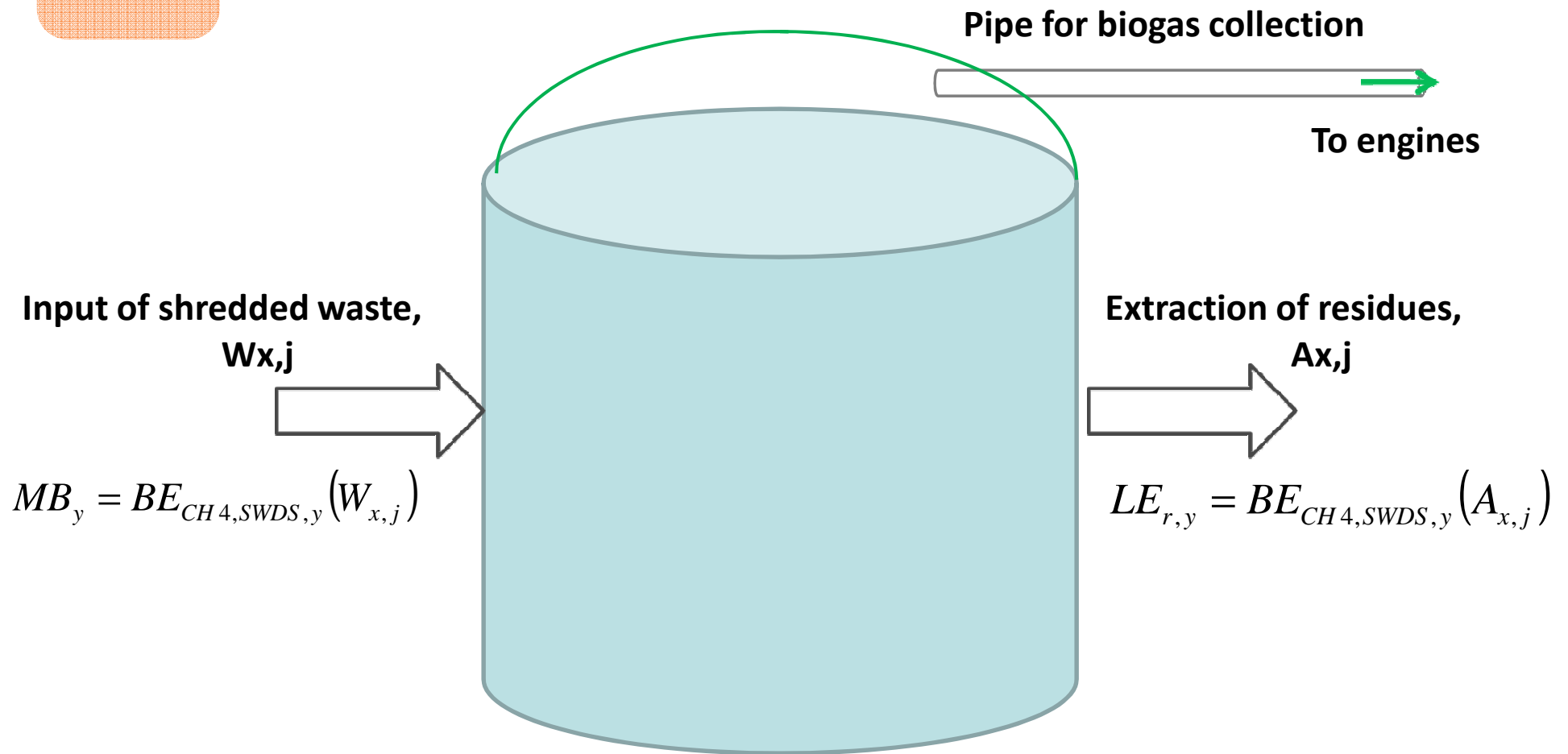
- Project

$$PE_y = PE_{elec,y} + PE_{fuel, on-site,y} + PE_{c,y} + PE_{a,y} + PE_{g,y} + PE_{r,y} + PE_{i,y} + PE_{w,y} + PE_{co-firing,y}$$

- Leakage

$$L_y = L_{t,y} + L_{r,y} + L_{i,y} + L_{s,y}$$

Comparison BE / LE

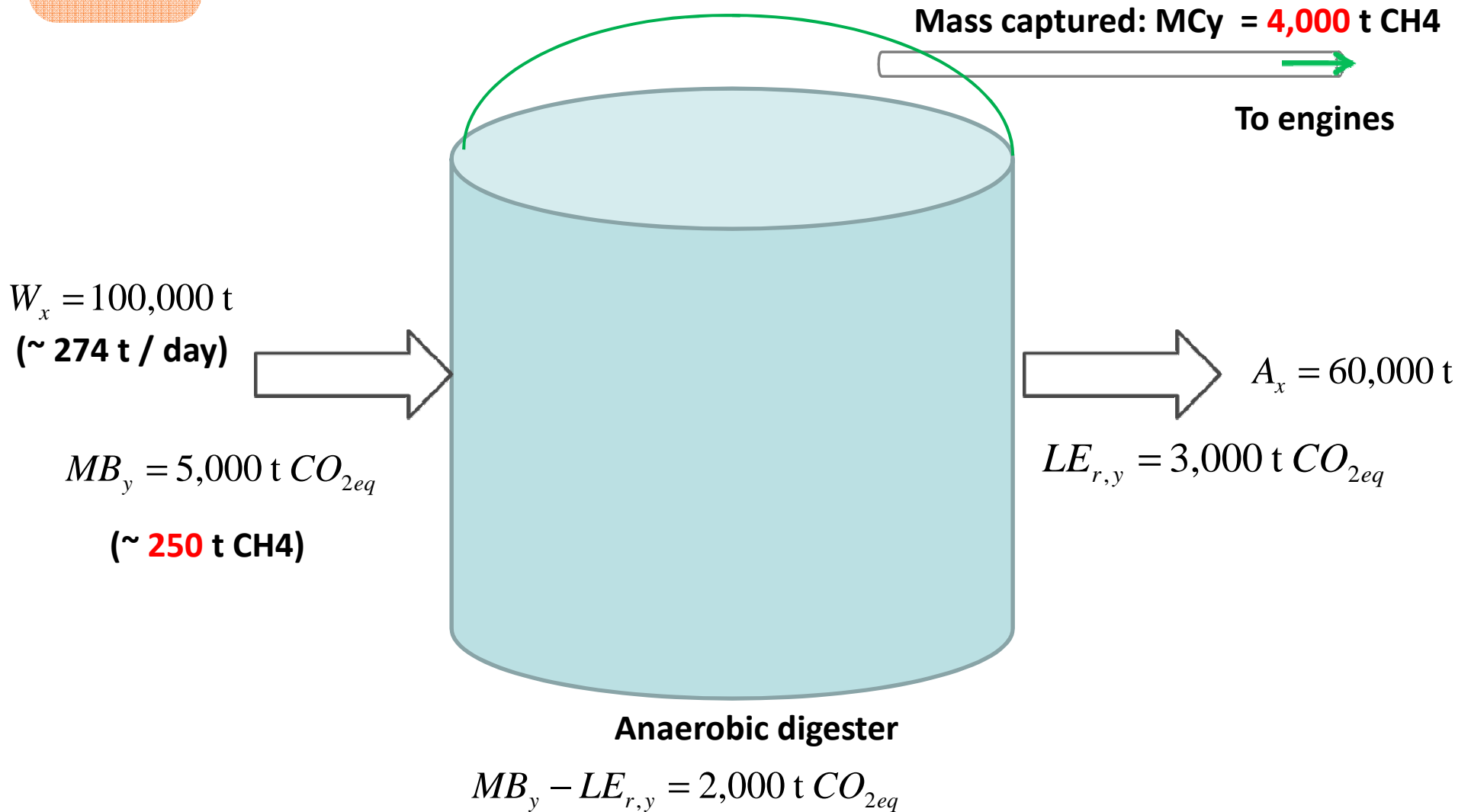


$$MB_y = BE_{CH_4,SWDS,y}(W_{x,j})$$

$$LE_{r,y} = BE_{CH_4,SWDS,y}(A_{x,j})$$

$$\begin{aligned} MB_y - LE_{r,y} &= BE_{CH_4,SWDS,y}(W_{x,j}) - BE_{CH_4,SWDS,y}(A_{x,j}) \\ &= BE_{CH_4,SWDS,y}(W_{x,j} - A_{x,j}) \end{aligned}$$

Quantitative Example





Alternative $LE_{r,y}$?

- M-DEV0261 (Sept 2009): $DOC_j = 0.1$ for residues → rejected
- **Monitoring** of DOC_j of residues ?
- Or over a **mass balance**
→ comparison $BE(Ax)$ and measured MC



Summary part 2: HOW MANY CERs?

- Digester: very **sustainable** technology for waste treatment
- **Leakage** Emissions for decomposition residues
 - Must be controlled anyway...
 - ... but **accounted for differently!**

Thank you for your attention !
And let's find some solutions ...



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