

compost distribution

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i : Index of county $(1, \dots, n)$

j : Index of facilities $(1, \dots, m)$

$$CO_2e = \sum_{i=1}^n TC_i S_i + \sum_{i=1}^n (1 - \sum_{j=1}^m s_{ij}) W_i \cdot f + \sum_{j=1}^m (1 - \sum_{i=1}^n d_{ij}) TC_i \cdot g + \sum_{i=1}^n \sum_{j=1}^m h \cdot D_{ij} s_{ij} W_i + \sum_{i=1}^n \sum_{j=1}^m h \cdot L_{ji} d_{ji} TC_i + \sum_{j=1}^m p \cdot s_{ij} W_i$$

$$Cost = \sum_{i=1}^n \sum_{j=1}^m d \cdot D_{ij} s_{ij} W_i + \sum_{i=1}^n \sum_{j=1}^m e \cdot L_{ji} d_{ji} TC_i + \sum_{i=1}^n k \cdot TC_i$$

subject to:

$$I_j \leq F_j$$

$$TC_i \leq C_i$$

$$\sum_{j=1}^m s_{ij} \leq 1$$

$$\sum_{i=1}^n d_{ij} \leq 1$$

$$0 \leq s_{ij} \leq 1$$

$$0 \leq d_{ij} \leq 1$$

where

D_{ij} : distance to haul to facility j (f_j) from county i (c_i) (km)

L_{ji} : distance from f_j to c_i working land (km)

W_i : Waste available in county i

F_j : Intake capacity of facility j

C_i : Amount of output county i can take in (based on amount of land)

s_{ij} : proportion of W_i to send to f_j

d_{ji} : proportion of facility f_j output to send to c_i working land

and

S_i : sequestration potential per ton (?) compost applied in county c_i

c : conversion factor of waste into compost (%)

f : emission factor for waste left in county ($\frac{CO_2e}{ton}$)

g : emission factor for compost stranded at facility ($\frac{CO_2e}{ton}$)

h : transportation emission factor ($\frac{CO_2e}{ton \cdot km}$) (separate??)

p : emission factor for compost production ($\frac{CO_2e}{ton}$)

e : cost to haul away from facility to land ($\frac{\$}{ton \cdot km}$)

d : cost to haul to facility from county ($\frac{\$}{ton \cdot km}$)

k : cost to apply compost to fields ($\frac{\$}{ton}$)

Intake for each facility is sum of the proportion taken in from c_i for $i = 1, \dots, n$

$$I_j = \sum_{i=1}^n s_{ij} W_i$$

Output of each facility is equal to intake converted into compost

$$O_j = c \cdot I_j$$

Total compost applied in each county is the sum of the proportion of output from f_j for $j = 1, \dots, m$

$$TC_i = \sum_{j=1}^m d_{ij} O_j$$