

ANALYSIS OF SOLID WASTE  
DISPOSAL ALTERNATIVES  
FOR CAMBRIDGE, MASSACHUSETTS

Prepared for Presentation  
in Cambridge

By  
Roy F. Weston, Inc.

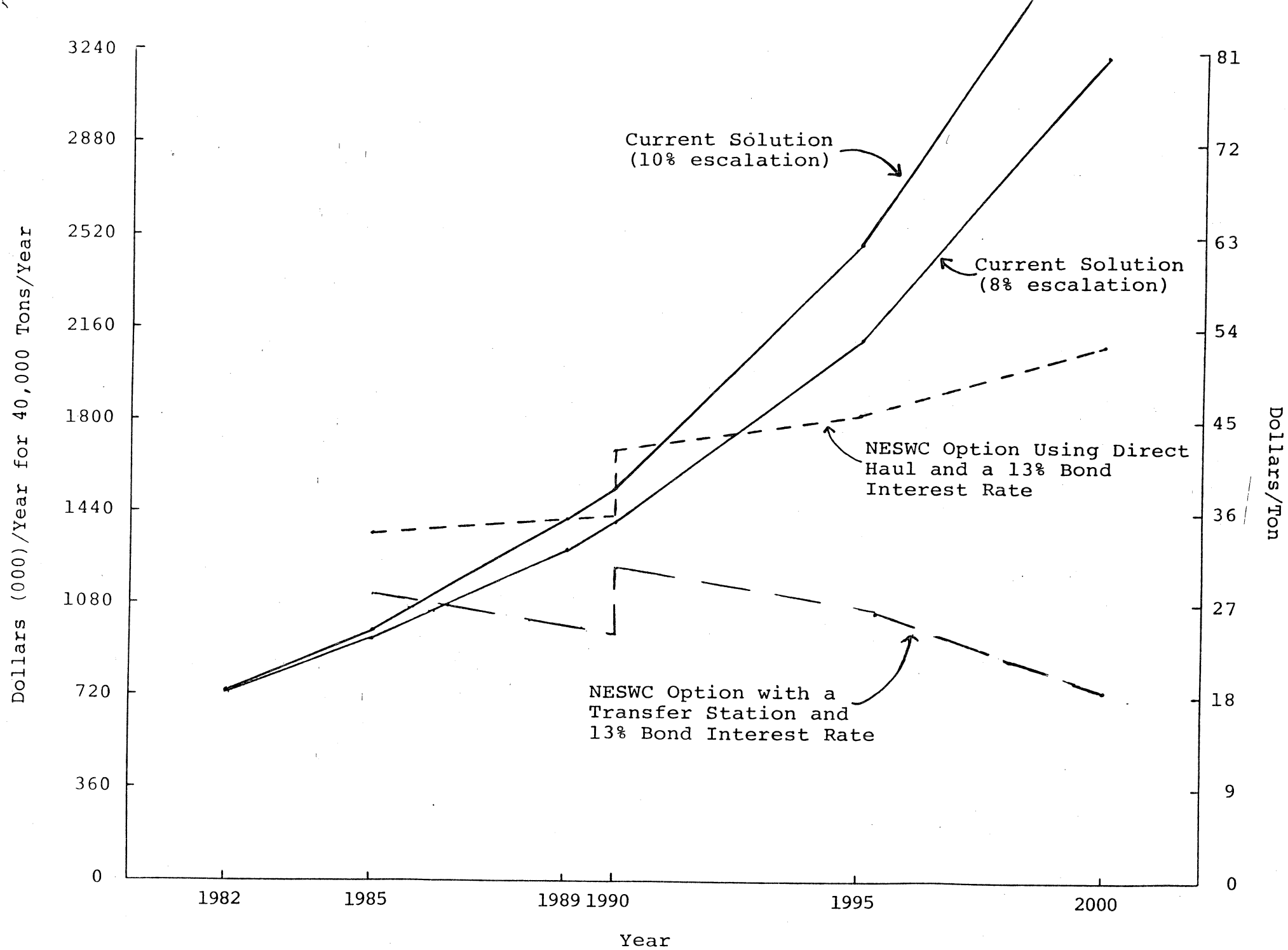


TABLE 1. CAMBRIDGE COST ANALYSIS  
(Dollars/Ton)

|                                                         | <u>1982</u> | <u>1985</u> | <u>1989</u> | <u>1990</u> | <u>1995</u> | <u>2000</u> |
|---------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <u>Present Solution (Contract with BFI)<sup>1</sup></u> |             |             |             |             |             |             |
| Transfer Station <sup>1</sup>                           | 4           | 5.5         | 7.5         | 8           | 12.5        | 19.5        |
| Transfer Haul <sup>3</sup>                              | 2.5         | 3           | 4.5         | 5           | 8           | 13          |
| Disposal (8% escalation) <sup>4</sup>                   | 12          | 15          | 20.5        | 22          | 32.5        | 48          |
| (10% escalation)                                        | <u>12</u>   | <u>16</u>   | <u>23.5</u> | <u>25.5</u> | <u>41.5</u> | <u>66.5</u> |
| Total (8% landfill escalation)                          | 18.5        | 23.5        | 32.5        | 35          | 53          | 80.5        |
| (10% landfill escalation)                               | 18.5        | 24.5        | 35.5        | 38.5        | 62          | 99          |
| <u>NESWC Solution (Direct Haul)<sup>5</sup></u>         |             |             |             |             |             |             |
| Haul <sup>6</sup>                                       | 14.5        | 19          | 28          | 30.5        | 49.5        | 79.5        |
| Transportation Rebate <sup>7</sup>                      |             | (1)         | (1.5)       | (1.5)       | (2.5)       | (4)         |
| Disposal (13% interest rate) <sup>8</sup>               |             | <u>16</u>   | <u>9</u>    | <u>13</u>   | <u>(1)</u>  | <u>(23)</u> |
| Total (13% interest rate)                               |             | 34          | 35.5        | 42          | 46          | 52.5        |
| <u>NESWC Solution (Municipal Transfer Station)</u>      |             |             |             |             |             |             |
| Transfer Station <sup>10</sup>                          |             | 7           | 9           | 9.5         | 14          | 21          |
| Transfer Haul <sup>11</sup>                             |             | 6           | 8.5         | 9.5         | 15.5        | 24.5        |
| Transportation Rebate <sup>7</sup>                      |             | (1)         | (1.5)       | (1.5)       | (2.5)       | (4)         |
| Disposal (13% interest rate) <sup>8</sup>               |             | <u>16</u>   | <u>9</u>    | <u>13</u>   | <u>(1)</u>  | <u>(23)</u> |
| Total (13% interest rate)                               |             | 28          | 25          | 30.5        | 26          | 18.5        |

TABLE 2. CAMBRIDGE COST ANALYSIS  
(Dollars/Year for 40,000 Tons/Year)

|                                                    | <u>1982</u>    | <u>1985</u>    | <u>1989</u>    | <u>1990</u>      | <u>1995</u>      | <u>2000</u>      |
|----------------------------------------------------|----------------|----------------|----------------|------------------|------------------|------------------|
| <u>Present Solution</u>                            |                |                |                |                  |                  |                  |
| Transfer Station                                   | 160,000        | 220,000        | 300,000        | 320,000          | 500,000          | 780,000          |
| Transfer Haul                                      | 100,000        | 120,000        | 180,000        | 200,000          | 320,000          | 520,000          |
| Disposal (8% escalation)                           | 480,000        | 600,000        | 820,000        | 880,000          | 1,300,000        | 1,920,000        |
| (10% escalation)                                   | <u>480,000</u> | <u>640,000</u> | <u>940,000</u> | <u>1,020,000</u> | <u>1,660,000</u> | <u>2,660,000</u> |
| Total (8% landfill escalation)                     | 740,000        | 940,000        | 1,300,000      | 1,409,000        | 2,120,000        | 3,220,000        |
| (10% landfill escalation)                          | 740,000        | 900,000        | 1,420,000      | 1,540,000        | 2,480,000        | 3,960,000        |
| <u>NESWC Solution (Direct Haul)</u>                |                |                |                |                  |                  |                  |
| Haul                                               | 580,000        | 720,000        | 1,120,000      | 1,220,000        | 1,980,000        | 3,180,000        |
| Transportation Rebate                              |                | (40,000)       | (60,000)       | (60,000)         | (100,000)        | (120,000)        |
| Disposal (13% interest rate)                       |                | <u>640,000</u> | <u>360,000</u> | <u>520,000</u>   | <u>(40,000)</u>  | <u>(920,000)</u> |
| Total (13% interest rate)                          |                | 1,320,000      | 1,420,000      | 1,680,000        | 1,840,000        | 2,140,000        |
| <u>NESWC Solution (Municipal Transfer Station)</u> |                |                |                |                  |                  |                  |
| Transfer Station                                   |                | 280,000        | 360,000        | 380,000          | 560,000          | 840,000          |
| Transfer Haul                                      |                | 240,000        | 340,000        | 380,000          | 620,000          | 980,000          |
| Transportation Rebate                              |                | (40,000)       | (60,000)       | (60,000)         | (100,000)        | (120,000)        |
| Disposal (13% interest rate)                       |                | <u>640,000</u> | <u>360,000</u> | <u>520,000</u>   | <u>(40,000)</u>  | <u>(920,000)</u> |
| Total (13% interest rate)                          |                | 1,120,000      | 1,020,000      | 1,220,000        | 1,040,000        | 780,000          |

## NOTES

1. According to a local official, the City of Cambridge presently has a contract with the waste disposal company BFI, to bring its municipal solid waste to a BFI-owned transfer station in Cambridge where it is transferred to large transfer-haul vehicles and taken to a private landfill. The cost in this contract is approximately \$18.50/ton for 1982 and can be renewed four times for one year periods with a price increase based on the CPI. WESTON broke down the \$18.50 (1982 \$) into the following cost components:

|             |                                          |
|-------------|------------------------------------------|
| \$ 4.0      | (transfer station cost)                  |
| 2.5         | (haul from transfer station to landfill) |
| <u>12.0</u> | (landfill disposal)                      |
| \$18.5      |                                          |

2. In an analysis done by Roy F. Weston, Inc., the transfer station cost for a 300 TPD transfer station in 1982 was approximately \$4/ton. O&M costs were estimated to be \$3/ton and assumed to escalate at 10 percent annually. Capital and equipment costs were estimated to be \$1/ton (this assumes that the transfer station was built several years ago at a lower interest rate than presently available) and remain constant over the 20 years.
3. In this analysis it is assumed that the MSW is hauled from the transfer station to a BFI-owned landfill in Randolph. The landfill is approximately 18 miles from the transfer station (16 miles of highway, average speed of 45 mph, and 2 miles on local roads, average speed of 20 mph). The round trip transportation haul cost was estimated to be:

$$2 \left( \frac{16 \text{ miles}}{45 \text{ mph}} \times \frac{60 \text{ min}}{\text{hr}} \right) + 2 \left( \frac{2 \text{ miles}}{20 \text{ mph}} \times \frac{60 \text{ min}}{\text{hr}} \right) + 10 \text{ min} = 65 \text{ min}$$

↑  
Turnaround Time at Landfill

$$65 \text{ minutes} \times ($.040/\text{ton-min}) = \$2.59/\text{ton} \text{ (1982 \$)}$$

The factor \$.040/ton-min was obtained from an analysis done by WESTON. It is based on the use of 75 cubic yards, efficient haul transfer vehicles. Transfer haul costs are assumed to rise at 10% annually.

4. In this analysis, \$12.00/ton was assumed to be the disposal fee at the landfill. Area landfills are presently charging between \$11 and \$16 per ton. The analysis looks at two possible annual escalation rates for landfill costs - 8 percent and 10 percent.

5. The NESWC direct haul solution looks at the possible situation of Cambridge hauling its municipal solid waste directly to the NESWC facility without using any transfer station.
6. The NESWC facility is approximately 35 miles from Cambridge at the site of the transfer station - 31 miles on highways and 4 miles on local roads. The round trip transportation haul cost is estimated at:

$$2 \left( \frac{31 \text{ miles}}{45 \text{ mph}} \times \frac{60 \text{ min}}{\text{hr}} \right) + 2 \left( \frac{4 \text{ miles}}{20 \text{ mph}} \times \frac{60 \text{ min}}{\text{hr}} \right) + 5 \text{ min} = 111 \text{ min}$$

$$111 \text{ min} \times (\$.129/\text{ton-min}) = \$14.41$$

The factor \$.129/ton-min is based on the assumption that the waste would be hauled from Cambridge to North Andover in 20 cu. yd. collection vehicles.

7. For the NESWC project, all participating municipalities pay \$3.00 per ton into a common escrow fund. A rebate is then given back based on "crow-fly" distance from the city or town hall to the facility site up to a maximum of 20 miles. Cambridge is further than 20 miles from the NESWC facility. It is estimated that a rebate of \$0.20/mile will be given. Hence, it is estimated that Cambridge will get a net transportation rebate of \$1.00/ton in 1985:

$$\$3.00/\text{ton} - (20 \text{ miles} \times \$0.20/\text{ton-mile}) = -\$1.00/\text{ton}$$

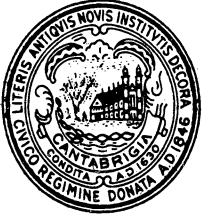
This figure escalates at the assumed rate of inflation of 10 percent per year. The actual rebate figure will vary depending on which communities join NESWC.

8. Net processing at the NESWC resource recovery facility includes amortized capital costs plus operating and maintenance (O&M) costs less revenues from the sale of electric power and ferrous metals. Costs for O&M and energy revenues are assumed to escalate at 10 percent per year, ferrous revenues are assumed not to escalate.

The processing fee, hence the total cost, potentially can be lower than the \$16/ton given in this analysis. For example, the sale of aluminum and other non-ferrous metals, the further productive utilization of the facility residue, and revenues from private haulers using the facility, can combine to reduce the net processing fee by \$3-\$6/ton below that projected. Also, a +1 percent change in the interest rate can change the net processing fee by approximately +\$3.50/ton (constant for the 20-year period).

A 13 percent interest rate is used in this analysis; it is the maximum rate which UOP can seek for the project's bond issue without getting approval from the NESWC communities via their representative.

9. The NESWC solution using a municipal transfer station assumes that Cambridge erects a municipal transfer station near the BFI transfer station where they are presently sending their waste.
10. In 1985 it is assumed the capital and equipment cost to build a municipal transfer station will be \$2.50/ton and O&M costs will be \$4.50/ton. O&M costs rise at 10 percent annually while capital and equipment remain constant for the 20 years.
11. The transfer haul cost from the proposed municipal transfer station is:  
  
$$111 \text{ minutes} \times (\$.040) = \$4.44 \text{ (1982 \$)}$$
12. Table 2 figures are the corresponding values from Table 1 multiplied by 40,000 tons per year, the annual quantity of Cambridge's municipal solid waste as given by a city official.



## CITY OF CAMBRIDGE

CAMBRIDGE, MASSACHUSETTS 02139  
Tel. 498-9011

EXECUTIVE DEPARTMENT  
ROBERT W. HEALY  
City Manager

October 18, 1982

To the Honorable, the City Council:

Secretary of Environmental Affairs, John Bewick, has requested me to give his office the opportunity to make a presentation regarding an analysis of solid waste disposal alternatives for Cambridge as related to the NESWEC proposal (Northeast Solid Waste Energy Conservation).

I respectfully request that the City Council listen to their presentation.

Very truly yours,

Robert W. Healy  
City Manager

RWH/mbf



Agenda Item Number Twelve

S-629

Re: request from Sec. of Environmental Affairs, John Bewick, to make a presentation of an analysis Re: solid waste disposal alternatives.

10/18/82

Motion of E. Duchay  
to Report

Comm. on Environment  
Copies sent to the Chairman of the  
Committee on Environment 10/19/82  
In City Council,

October 18, 1982

- Placed NOT  
ON

File -

- See ABOVE motion -