

Illustration 1 is the presentation of the NRC funding problem of the Method section in the manner of the proposed method and its spreadsheet implementation. Figure 1.1 below is a partial image of the Evaluation sheet of Illustration1.xlsx that depicts the enumeration and evaluation of all possible funding scenarios that include Category 2 features $j = 1, \dots, 5$ addressed in this situation. The scenario references $v=0, 1, \dots, 31$ appear in cells F12-F43 and their conversions to strings of 0/1 characters are given in cells J12-J43. Although each string consists of eight 0/1 characters $e_8 e_7 e_6 e_5 e_4 e_3 e_2 e_1$, only the 0/1 characters $e_5 e_4 e_3 e_2 e_1$ apply to this illustration. In order to accommodate as many as $J=32$ Category 2 features, the binary conversion of v ($= 0, 1, \dots, 2^J-1$) for each funding scenario is given in terms of four strings of eight 0/1 characters each that appear in the rows of columns G-J of worksheet Illustration1.xlsx. In general, the exclusion/inclusion of feature j ($=1, \dots, 32$) in any funding scenario v is indicated by the e_j character in strings $e_{32} e_{31} \dots e_{25} e_{24} \dots e_{17} e_{16} \dots e_9 e_8 \dots e_1$ that appear respectively in the rows of columns G, H, I, and J corresponding to v .

To facilitate the evaluation of (1.1) for each scenario v , the 0/1 content of the strings in cells J12-J43 were decatenated to 0/1 decimal values according to the labels $j=1-5$ in cells K11-O11. The cell contents of K12-O43 are the 0/1 values indicating exclusion/inclusion of Category 2 feature $j(=1, \dots, 5)$ in funding scenarios $v=0, 1, \dots, 31$ according to the labels $j=1-5$ appearing in cells K11-O11. The Evaluation sheet of Illustration1.xlsx allows decatenations for as many as $j=1, \dots, 32$ labels noted in cells K11-AP11. Note that the labels are conveniently ordered by ascending j reading left to right. The scenario reference v , funded Category 2 features in v , the number of funded Category 2 features in v , and funding cost of scenario v appear in rows 12-43 of columns BX to CA respectively, some of which is shown in Figure 1.1 below. The calculated cost for each scenario includes the cost of the Category 1 features, the null funding scenario denoted as $v=0$. The contents of cells BX12-CA43 in the Evaluation sheet also appear in cells A12-D43 and F12-I43 of the Results sheet. The latter were changed to values and then sorted by r and funding cost in ascending order. The results populated the entries of Table 3 discussed in the Illustration section of the manuscript. The worksheet Illustration1.xlsx is a basic spreadsheet implementation of the solution method presented in Section 3.

Figure 1.1
Partial image of the evaluation sheet of illustration1.xlsx.

	F	J	K	L	M	N	O	BY	BZ	CA
10			Decatenated 0/1 characters of v and the 0/1 values of f2,j, j=1,...,5							
11	Scenario reference, v	Binary form of v	1	2	3	4	5	Funded Category 2 features, j	r	Funding cost ¹
12	0	00000000	0	0	0	0	0	-	r	11.069
13	1	00000001	1	0	0	0	0	1	1	11.349
14	2	00000010	0	1	0	0	0	2	1	11.421
15	3	00000011	1	1	0	0	0	1 2	2	11.701
16	4	00000100	0	0	1	0	0	3	1	11.444
17	5	00000101	1	0	1	0	0	1 3	2	11.724
18	6	00000110	0	1	1	0	0	2 3	2	11.796
19	7	00000111	1	1	1	0	0	1 2 3	3	12.076
20	8	00001000	0	0	0	1	0	4	1	11.467
21	9	00001001	1	0	0	1	0	1 4	2	11.747
22	10	00001010	0	1	0	1	0	2 4	2	11.819
23	11	00001011	1	1	0	1	0	1 2 4	3	12.099
24	12	00001100	0	0	1	1	0	3 4	2	11.842
25	13	00001101	1	0	1	1	0	1 3 4	3	12.122
26	14	00001110	0	1	1	1	0	2 3 4	3	12.194
27	15	00001111	1	1	1	1	0	1 2 3 4	4	12.474
28	16	00010000	0	0	0	0	1	5	1	11.476

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29	17	00010001	1	0	0	0	1	1 5	2	11.756
30	18	00010010	0	1	0	0	1	2 5	2	11.828
31	19	00010011	1	1	0	0	1	1 2 5	3	12.108
32	20	00010100	0	0	1	0	1	3 5	2	11.851
33	21	00010101	1	0	1	0	1	1 3 5	3	12.131
34	22	00010110	0	1	1	0	1	2 3 5	3	12.203
35	23	00010111	1	1	1	0	1	1 2 3 5	4	12.483
36	24	00011000	0	0	0	1	1	4 5	2	11.874
37	25	00011001	1	0	0	1	1	1 4 5	3	12.154
38	26	00011010	0	1	0	1	1	2 4 5	3	12.226
39	27	00011011	1	1	0	1	1	1 2 4 5	4	12.506
40	28	00011100	0	0	1	1	1	3 4 5	3	12.249
41	29	00011101	1	0	1	1	1	1 3 4 5	4	12.529
42	30	00011110	0	1	1	1	1	2 3 4 5	4	12.601
43	31	00011111	1	1	1	1	1	1 2 3 4 5	5	12.881

¹ SM.