

# Climate Enterprises Pension Summary

AOFF Consulting, Inc.

Roy Kim, Daniel He, Joan Dai, Annie Chen

## - 2018 Funding Target -

### I. Background

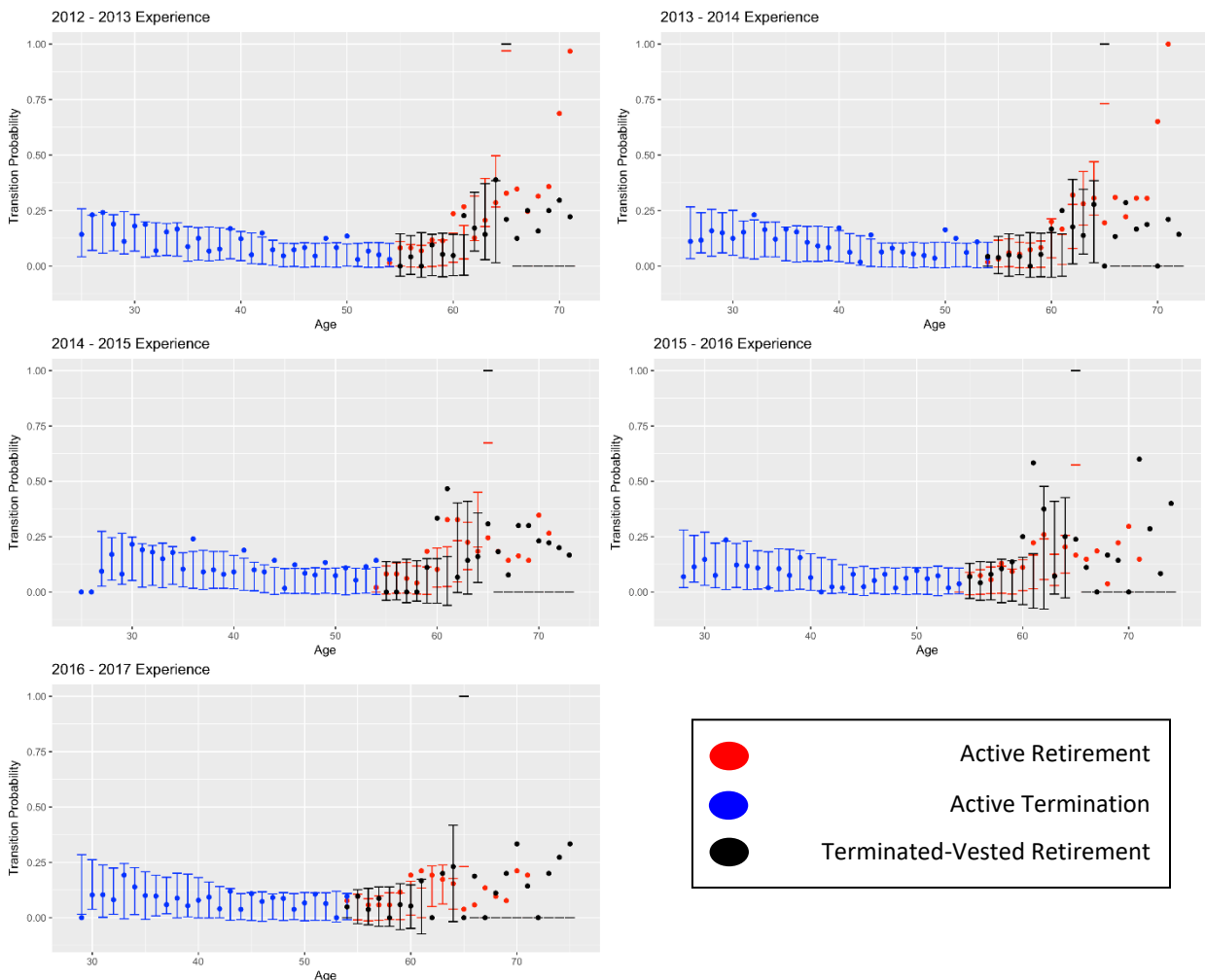
In recent years, Climate Enterprises' pension plan has deviated from expected demographic movement. To accommodate the ultimate deviation from expected pension payouts, in the following, AOFF Consulting has conducted an analysis of previous expectations to 2012 – 2017 demographic movements.

### II. Analysis

This analysis addresses previously unseen demographic movement (e.g. retirement for active employees after age 65) as well as now inaccurate transition probabilities from active status to retirement and termination status, or termination status to retirement status.

The following graphics show a 95% confidence interval derived from the previously held assumptions concerning the binomially distributed retirement and termination rates for employees. Each dot, one for each age and transition, shows the actual observed transition proportion of employees. In the instance that a dot lies outside of the interval denoted by the bars, AOFF Consulting has determined that the previous actuarial assumptions for that sub-population age are no longer valid with statistical confidence of  $\alpha = 0.05$ .

The six charts correspond to seven years of data from 2012 to 2017. Each color denotes a particular transition probability.



### III. Final Proposal

The following charts for future pension plan management address the invalid rates—bolded rates are new.

Table 1: Active Retirement Rates		
Age	Current	Proposed
54	NA	<b>0.05</b>
55	0.05	0.05
56	0.05	0.05
57	0.05	0.05
58	0.05	<b>0.07</b>
59	0.05	<b>0.10</b>
60	0.10	<b>0.18</b>
61	0.10	<b>0.28</b>
62	0.20	<b>0.28</b>
63	0.30	0.30
64	0.40	<b>0.38</b>
65	1.00	<b>0.23</b>
66	NA	<b>0.24</b>
67	NA	<b>0.44</b>
68	NA	<b>0.27</b>
69	NA	<b>0.28</b>
70	NA	<b>0.69</b>
71	NA	<b>0.98</b>

Table 2: Terminated-Vested Retirement Rates		
Age	Current	Proposed Rate
54	NA	<b>0.03</b>
55	0.05	0.05
56	0.05	0.05
57	0.05	0.05
58	0.05	0.05
59	0.05	<b>0.07</b>
60	0.10	<b>0.14</b>
61	0.10	<b>0.32</b>
62	0.20	0.20
63	0.30	<b>0.20</b>
64	0.40	<b>0.21</b>
65	1.00	<b>0.11</b>
66	NA	<b>0.16</b>
67	NA	<b>0.04</b>
68	NA	<b>0.16</b>
69	NA	<b>0.20</b>
70	NA	<b>0.21</b>
71	NA	<b>0.27</b>

Table 3: Active Termination Rates		
Age	Current	Proposed
25 - 29	0.15	NA
30	0.15	0.15
31	0.12	0.12
32	0.12	<b>0.16</b>
33	0.12	0.12
34	0.12	0.12
35	0.10	0.10
36	0.10	<b>0.12</b>
37	0.10	0.10
38	0.10	0.10
39	0.10	0.10
40	0.09	<b>0.10</b>
41	0.08	<b>0.07</b>
42	0.07	0.07
43	0.06	<b>0.07</b>
44	0.05	<b>0.06</b>
45	0.05	0.05
46	0.05	<b>0.06</b>
47	0.05	0.05
48	0.05	0.05
49	0.05	<b>0.06</b>
50	0.05	<b>0.06</b>
51	0.05	0.05
52	0.05	0.05
53	0.05	<b>0.06</b>
54	0.05	<b>0.06</b>
55 - 63	NA	<b>0.00</b>
64	NA	<b>0.01</b>
65 - 69	NA	<b>0.00</b>
70	NA	<b>0.01</b>
71	NA	<b>0.01</b>

Rather than using an average of actual observed rates, which have noise and randomness for a given year and demographic, AOFF Consulting has instead provided an exponentially-smoothed ( $\alpha' = 0.5$ ), moving average of five one-year transition rates. AOFF Consulting predicts that more recent behavior will resemble future demographic movement, as behavior is usually smoothly transitioned and continuous, thus weights recent behavior more heavily.

The earlier graphs show the validity of the previous actuarial assumptions. In the event that a particular rate for an age in a year was no longer valid, AOFF Consulting executed a bootstrap of 500 resamples of size 750 from active and terminated vested groups per year to verify assumptions and generate a continuous distribution and rate. Note that some new entries have been made, such as early retirement at age 54—something not provided in the plan provisions. In future years, because the plan was closed in 2012, there will be no people ages 25 – 29. Also, for rates past 65 have been provided because people get older with time.

General movement shows an increase in retirement rates. Some possible explanations of increased early retirement rates might reflect ongoing trends of emphasis in work-life balance and a shift in cultural and social values that define success beyond the workplace and one’s finances. The increased frequency of people that retire past age 65 may be explained by inadequacy in retirement preparations, requiring employees to work past the normal retirement age.

Minimal increases in the active termination rate may suggest a quicker turnover of Climate Enterprises employees. It might be that employee satisfaction and morale within the company is dropping, or the company’s corporate ladder experiences slow growth and movement; better competition in the industry might encourage active employees to terminate. Any financial hardships that the company has faced may also reflect creeping termination rates.

To conclude the annual analysis, a valuation of the assets and liabilities of the pension plan shows that the market value of assets must increase to balance the expected increase in liability from increased retirement rates. In the normal retirement population alone in 2018, AOFF Consulting has determined that from an expected liability lump-sum of \$326K, the new rates now expect \$798K—a \$473K deficit. In order to maintain a stable funding status for the pension plan, Climate Enterprises must increase their funding target to match the defined benefit obligations of plan beneficiaries. While this means less pension payouts in the long-run, Climate Enterprises must have the proper preparations for each year.