Table S1. List of all treatments, strains and variables studied in this report. * Only tested for *Halothece* sp. and *Cobetia* sp.

<table>
<tr><th colspan="7">(I, II) Without the infusion of CO_2</th></tr>
<tr><th>Strains</th><th colspan="3">(I) pH experiment (at 24º C)</th><th colspan="2">(II) Temperature experiment (adjusted to pH 8)</th><th>Description</th></tr>
<tr><td rowspan="5">Halothece sp. PCC 7418, Pasteur Culture Collection

Fischerella muscicola PCC 73103, Pasteur Culture Collection

Cobetia sp. UIB 001, obtained: isolated directly from P. oceanica roots (Fernández-Juárez et al., unpublished data). GenBank: CP058244-CP058245

Pseudomonas azotifigens DSM 17556^T, German Collection of Microorganisms and Cell Cultures GmbH (DSMZ)</td><td colspan="3">pH 4</td><td colspan="2">12 ºC</td><td rowspan="2">Under nutrient-replete condition: 1.5 mM PO_4^{3-}, 1 µM Fe and 0.15 mM NH_3</td></tr>
<tr><td colspan="3">pH 5</td><td colspan="2">18 ºC</td></tr>
<tr><td colspan="3">pH 6</td><td colspan="2">24 ºC</td><td rowspan="2">Under nutrient limitation.: 0.1 µM PO_4^{3-}, 2 nM Fe and 0.15 mM NH_3</td></tr>
<tr><td colspan="2">pH 6.5*</td><td>pH 7*</td><td colspan="2" rowspan="2">30 ºC</td></tr>
<tr><td colspan="2">pH 7.5*</td><td>pH 8*</td><td>At 120 r.p.m 12:12 day: night photoperiod for 72 h</td></tr>
<tr><th colspan="8">(III) With the infusion of CO_2 (410 and 1000 ppm)</th></tr>
<tr><th>Strains</th><th colspan="3">(i) CO_2-Fe (at 24ºC, adjusted to pH 8)</th><th colspan="3">(ii) CO_2-temperature (adjusted to pH 8)</th><th>Description</th></tr>
<tr><td rowspan="3">Halothece sp. PCC 7418

Cobetia sp. UIB 001</td><td rowspan="3">(+) Fe, 1 µM (+) PO_4^{3-}, 1.5 mM</td><td rowspan="3">(-) Fe, 2 nM (+) PO_4^{3-}, 1.5 mM</td><td rowspan="3">(+ or -) Fe, (-) PO_4^{3-}, 0.1 µM</td><td rowspan="3">18 ºC (+) Fe, 1000 nM (+) PO_4^{3-}, 1.5 mM</td><td rowspan="3">30 ºC (+) Fe, 1000 nM (+) PO_4^{3-}, 1.5 mM</td><td rowspan="3">18 ºC or 30ºC (-) PO_4^{3-},0.1 µM</td><td>Control, no CO_2 influx:</td></tr>
<tr><td>aCO2: 410 ppm</td></tr>
<tr><td>eCO2: 1000 ppm</td></tr>
<tr><td colspan="8">Response variables</td></tr>
<tr><td colspan="2">(1) Growth</td><td colspan="2">(2) N_2-fixation rates</td><td colspan="2">(3) P-mechanisms (APA)*</td><td colspan="2">(4) Oxidative stress (ROS)</td></tr>
</table>

Figure S1. Experimental set-up of the CO_2 experiments, considering two different levels of CO_2, aCO_2: 410 ppm and elevated, eCO_2: 1000 ppm, and included a control with no CO_2 influx. The pH level was monitored for aCO_2 and eCO_2.

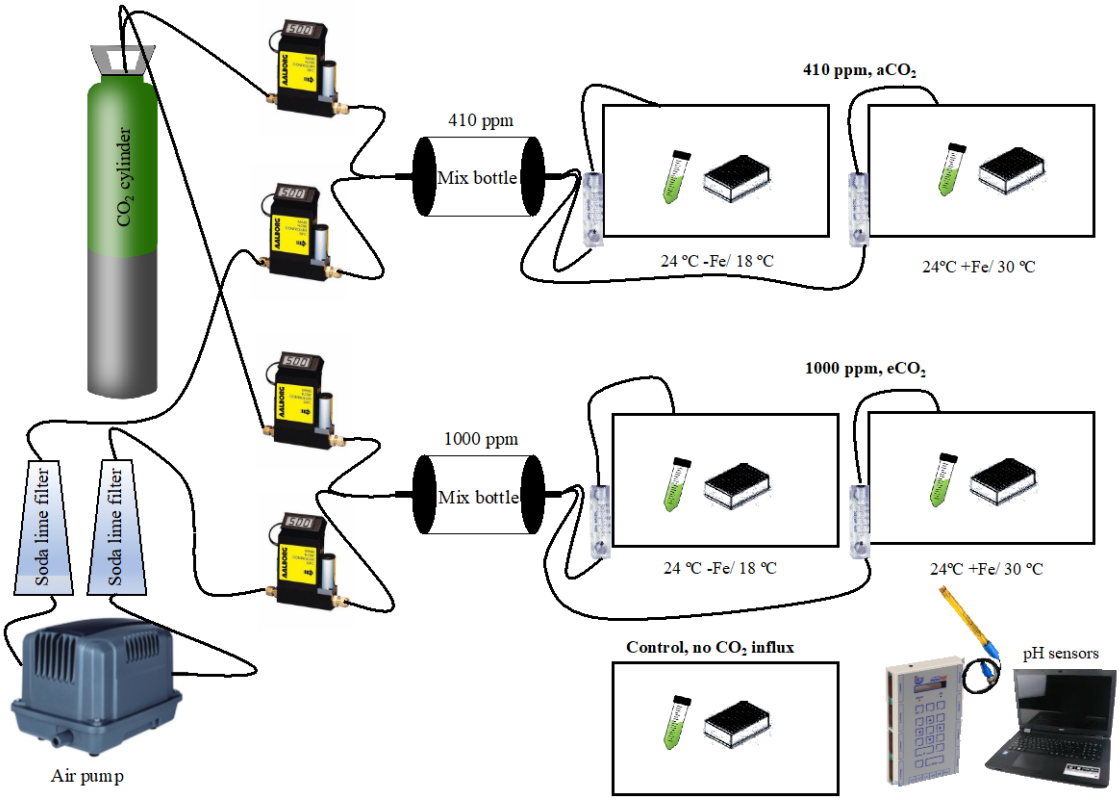

Figure S2. pH monitoring under a continuous influx of atmospheric CO_2 410 ppm (atmospheric CO_2, aCO_2) and elevated CO_2 1000 ppm (elevated CO_2, eCO_2) for *Halothece* sp. and *Cobetia* sp.