

**Title of the project activity:**

&gt;&gt;

Project for the reduction of greenhouse gas emissions of Hidroelectrica La Confluencia S.A.

Registret number: 4229

**B.7 Application of the monitoring methodology and description of the monitoring plan:****B.7.1 Data and parameters monitored:**

|                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                      |     |                                                       |                                                                                 |    |                                      |     |                                                       |                                                                                 |    |                                                             |     |                                                       |                                                                                       |    |                                                             |     |                                                       |                                                                                       |
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| <b>Data / Parameter:</b>                                                                         | $EG_{PJ,y} = EG_{facility,y}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                      |     |                                                       |                                                                                 |    |                                      |     |                                                       |                                                                                 |    |                                                             |     |                                                       |                                                                                       |    |                                                             |     |                                                       |                                                                                       |
| Data unit:                                                                                       | MWh/yr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                      |     |                                                       |                                                                                 |    |                                      |     |                                                       |                                                                                 |    |                                                             |     |                                                       |                                                                                       |    |                                                             |     |                                                       |                                                                                       |
| Description:                                                                                     | Quantity of net electricity generation supplied by the project plant/unit to the grid in year y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                      |     |                                                       |                                                                                 |    |                                      |     |                                                       |                                                                                 |    |                                                             |     |                                                       |                                                                                       |    |                                                             |     |                                                       |                                                                                       |
| Source of data to be used:                                                                       | Project activity site                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                      |     |                                                       |                                                                                 |    |                                      |     |                                                       |                                                                                 |    |                                                             |     |                                                       |                                                                                       |    |                                                             |     |                                                       |                                                                                       |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | 656,000 MWh/yr. Based on hydrological and generation model for the project. The project's average generation is 656,000 GWh per year.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                      |     |                                                       |                                                                                 |    |                                      |     |                                                       |                                                                                 |    |                                                             |     |                                                       |                                                                                       |    |                                                             |     |                                                       |                                                                                       |
| Description of measurement methods and procedures to be applied:                                 | <p>Electricity meters with continuous measurement and at least monthly recording (monitoring frequency). <math>EG_{facility,y}</math> is obtained using equation 1 and 2, respectively, of the monitoring plan in Section B 7.2, which are based on continuous measurements of net electricity generation quantities measured at meters <math>M_i</math> in year y (see Figure 9).</p> <table border="1"> <tr> <td>M3</td><td>Electricity net supplied by the La Higuera project</td><td>MWh</td><td>Continuous measurement and at least monthly recording</td><td>M3, meter that records energy from La Higuera hydro power plant in La Higuera substation</td></tr> <tr> <td>M4</td><td>Electricity net supplied by the La Higuera project</td><td>MWh</td><td>Continuous measurement and at least monthly recording</td><td>M4, meter that records energy from La Higuera hydro power plant in La Higuera substation</td></tr> <tr> <td>M5</td><td>Electricity net supplied to the grid</td><td>MWh</td><td>Continuous measurement and at least monthly recording</td><td>M5, meter that records energy supplied to the grid from Tinguiririca substation</td></tr> <tr> <td>M6</td><td>Electricity net supplied to the grid</td><td>MWh</td><td>Continuous measurement and at least monthly recording</td><td>M6, meter that records energy supplied to the grid from Tinguiririca substation</td></tr> <tr> <td>M7</td><td>Electricity net supplied from the La Confluencia substation</td><td>MWh</td><td>Continuous measurement and at least monthly recording</td><td>M7, meter that records energy from La Confluencia substation in La Higuera substation</td></tr> <tr> <td>M8</td><td>Electricity net supplied from the La Confluencia substation</td><td>MWh</td><td>Continuous measurement and at least monthly recording</td><td>M8, meter that records energy from La Confluencia substation in La Higuera substation</td></tr> </table> <p>Only applicable for monitoring procedure B (as outlined in Section B 7.2):</p> |     |                                                       |                                                                                          | M3 | Electricity net supplied by the La Higuera project | MWh | Continuous measurement and at least monthly recording | M3, meter that records energy from La Higuera hydro power plant in La Higuera substation | M4 | Electricity net supplied by the La Higuera project | MWh | Continuous measurement and at least monthly recording | M4, meter that records energy from La Higuera hydro power plant in La Higuera substation | M5 | Electricity net supplied to the grid | MWh | Continuous measurement and at least monthly recording | M5, meter that records energy supplied to the grid from Tinguiririca substation | M6 | Electricity net supplied to the grid | MWh | Continuous measurement and at least monthly recording | M6, meter that records energy supplied to the grid from Tinguiririca substation | M7 | Electricity net supplied from the La Confluencia substation | MWh | Continuous measurement and at least monthly recording | M7, meter that records energy from La Confluencia substation in La Higuera substation | M8 | Electricity net supplied from the La Confluencia substation | MWh | Continuous measurement and at least monthly recording | M8, meter that records energy from La Confluencia substation in La Higuera substation |
| M3                                                                                               | Electricity net supplied by the La Higuera project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | MWh | Continuous measurement and at least monthly recording | M3, meter that records energy from La Higuera hydro power plant in La Higuera substation |    |                                                    |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                      |     |                                                       |                                                                                 |    |                                      |     |                                                       |                                                                                 |    |                                                             |     |                                                       |                                                                                       |    |                                                             |     |                                                       |                                                                                       |
| M4                                                                                               | Electricity net supplied by the La Higuera project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | MWh | Continuous measurement and at least monthly recording | M4, meter that records energy from La Higuera hydro power plant in La Higuera substation |    |                                                    |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                      |     |                                                       |                                                                                 |    |                                      |     |                                                       |                                                                                 |    |                                                             |     |                                                       |                                                                                       |    |                                                             |     |                                                       |                                                                                       |
| M5                                                                                               | Electricity net supplied to the grid                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | MWh | Continuous measurement and at least monthly recording | M5, meter that records energy supplied to the grid from Tinguiririca substation          |    |                                                    |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                      |     |                                                       |                                                                                 |    |                                      |     |                                                       |                                                                                 |    |                                                             |     |                                                       |                                                                                       |    |                                                             |     |                                                       |                                                                                       |
| M6                                                                                               | Electricity net supplied to the grid                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | MWh | Continuous measurement and at least monthly recording | M6, meter that records energy supplied to the grid from Tinguiririca substation          |    |                                                    |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                      |     |                                                       |                                                                                 |    |                                      |     |                                                       |                                                                                 |    |                                                             |     |                                                       |                                                                                       |    |                                                             |     |                                                       |                                                                                       |
| M7                                                                                               | Electricity net supplied from the La Confluencia substation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | MWh | Continuous measurement and at least monthly recording | M7, meter that records energy from La Confluencia substation in La Higuera substation    |    |                                                    |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                      |     |                                                       |                                                                                 |    |                                      |     |                                                       |                                                                                 |    |                                                             |     |                                                       |                                                                                       |    |                                                             |     |                                                       |                                                                                       |
| M8                                                                                               | Electricity net supplied from the La Confluencia substation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | MWh | Continuous measurement and at least monthly recording | M8, meter that records energy from La Confluencia substation in La Higuera substation    |    |                                                    |     |                                                       |                                                                                          |    |                                                    |     |                                                       |                                                                                          |    |                                      |     |                                                       |                                                                                 |    |                                      |     |                                                       |                                                                                 |    |                                                             |     |                                                       |                                                                                       |    |                                                             |     |                                                       |                                                                                       |



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|                                 | M9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Electricity net supplied by the La Confluencia project | MWh                                                   | Continuous measurement and at least monthly recording                                        | M9, meter that records energy from La Confluencia hydro power project in La Confluencia substation  |                   |                                                             |     |                                                       |                                                                                              |                   |                                                             |     |                                                       |                                                                                              |
|                                 | M10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Electricity net supplied by the La Confluencia project | MWh                                                   | Continuous measurement and at least monthly recording                                        | M10, meter that records energy from La Confluencia hydro power project in La Confluencia substation |                   |                                                             |     |                                                       |                                                                                              |                   |                                                             |     |                                                       |                                                                                              |
|                                 | M11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Electricity net supplied by external power plant       | MWh                                                   | Continuous measurement and at least monthly recording                                        | M11, meter that records energy from external power plant(s) in La Confluencia substation            |                   |                                                             |     |                                                       |                                                                                              |                   |                                                             |     |                                                       |                                                                                              |
|                                 | M12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Electricity net supplied by external power plant       | MWh                                                   | Continuous measurement and at least monthly recording                                        | M10, meter that records energy from external power plant(s) in La Confluencia substation            |                   |                                                             |     |                                                       |                                                                                              |                   |                                                             |     |                                                       |                                                                                              |
| QA/QC procedures to be applied: | <p>The <i>Normas Tecnicas</i> establish the minimum requirements for Information Systems and Communications, mentioning that an accuracy of only 2% error is required on equipment of data acquisition,yet more specifivally billing meters are government by “Manual of Procedures for Metering systems and supervision systems in the CDEC-SIC”, from July 2000, which establishes that the accuracy class required for equipment to the measurement of active and reactive energy is 0.2s (according to norm IEC 687).</p> <p>Meters are calibrated periodically according to local standards for electricity transactions in CDEC-SIC. The data is utilised by CDEC-SIC for determining the energy balance between generators.</p> <p>Generation data of the Project will be cross checked versus CDEC-SIC records to ensure data reliability.</p> <p>For additional back-up and potential cross-checking M1<sub>HLC</sub> and M2<sub>HLC</sub> at the La Confluencia project site are monitored.</p> <table><tr><td>M1<sub>HLC</sub></td><td>Electricity net generated at the La Confluencia power house</td><td>MWh</td><td>Continuous measurement and at least monthly recording</td><td>M1<sub>HLC</sub>, meter that records energy from La Confluencia Project at the power house</td></tr><tr><td>M2<sub>HLC</sub></td><td>Electricity net generated at the La Confluencia power house</td><td>MWh</td><td>Continuous measurement and at least monthly recording</td><td>M2<sub>HLC</sub>, meter that records energy from La Confluencia Project at the power house</td></tr></table> |                                                        |                                                       |                                                                                              |                                                                                                     | M1 <sub>HLC</sub> | Electricity net generated at the La Confluencia power house | MWh | Continuous measurement and at least monthly recording | M1 <sub>HLC</sub> , meter that records energy from La Confluencia Project at the power house | M2 <sub>HLC</sub> | Electricity net generated at the La Confluencia power house | MWh | Continuous measurement and at least monthly recording | M2 <sub>HLC</sub> , meter that records energy from La Confluencia Project at the power house |
| M1 <sub>HLC</sub>               | Electricity net generated at the La Confluencia power house                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | MWh                                                    | Continuous measurement and at least monthly recording | M1 <sub>HLC</sub> , meter that records energy from La Confluencia Project at the power house |                                                                                                     |                   |                                                             |     |                                                       |                                                                                              |                   |                                                             |     |                                                       |                                                                                              |
| M2 <sub>HLC</sub>               | Electricity net generated at the La Confluencia power house                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | MWh                                                    | Continuous measurement and at least monthly recording | M2 <sub>HLC</sub> , meter that records energy from La Confluencia Project at the power house |                                                                                                     |                   |                                                             |     |                                                       |                                                                                              |                   |                                                             |     |                                                       |                                                                                              |
| Any comment:                    | Meters M9, M10, M11 and M12 will only be monitored if monitoring procedure B applies.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                        |                                                       |                                                                                              |                                                                                                     |                   |                                                             |     |                                                       |                                                                                              |                   |                                                             |     |                                                       |                                                                                              |

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| <b>Data / Parameter:</b>                                      | $FC_{gen-set,i,y}$                                                   |
| Data unit:                                                    | tonnes/yr                                                            |
| Description:                                                  | Fuel consumption of each diesel emergency generators $i$ in year $y$ |
| Source of data to be used:                                    | Project activity site                                                |
| Value of data applied for the purpose of calculating expected | 0                                                                    |



| emission reductions in section B.5                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                        |          |                   |       |               |    |       |   |                            |                        |        |         |       |       |   |                        |               |        |                   |      |      |   |                            |               |        |                   |      |      |   |                      |               |        |                   |      |      |   |                          |          |         |                   |       |
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| Description of measurement methods and procedures to be applied: | Calculated based on hours of operation and default diesel consumption at full load (according to the manufacturer).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                        |          |                   |       |               |    |       |   |                            |                        |        |         |       |       |   |                        |               |        |                   |      |      |   |                            |               |        |                   |      |      |   |                      |               |        |                   |      |      |   |                          |          |         |                   |       |
|                                                                  | $FC_{gen-set,i,y}$ = Hours of operation of gen-set $i$ in year $y$ * specific diesel consumption at full load of gen-set $i$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                        |          |                   |       |               |    |       |   |                            |                        |        |         |       |       |   |                        |               |        |                   |      |      |   |                            |               |        |                   |      |      |   |                      |               |        |                   |      |      |   |                          |          |         |                   |       |
|                                                                  | Specific diesel consumption at full load of each diesel generator $i$ in litre diesel per hour is obtained from manufacturer information, as follows:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                        |          |                   |       |               |    |       |   |                            |                        |        |         |       |       |   |                        |               |        |                   |      |      |   |                            |               |        |                   |      |      |   |                      |               |        |                   |      |      |   |                          |          |         |                   |       |
|                                                                  | <table><tr><th>ID</th><th>Location</th><th>Brand</th><th>Model</th><th>Serial number</th><th>MW</th><th>Lt/hr</th></tr><tr><td>1</td><td>La Confluencia Power House</td><td>Stemac generators sets</td><td>PA1888</td><td>1022585</td><td>0.954</td><td>188.7</td></tr><tr><td>2</td><td>Portillo Intake Center</td><td>FG Wilson Ltd</td><td>P150E2</td><td>FGWPEP10AGRB00981</td><td>0.15</td><td>33.2</td></tr><tr><td>3</td><td>Tinguiririca Intake Center</td><td>FG Wilson Ltd</td><td>P150E2</td><td>FGWPEP10LGRB00982</td><td>0.15</td><td>33.2</td></tr><tr><td>4</td><td>Azufre Intake Center</td><td>FG Wilson Ltd</td><td>P150E2</td><td>FGWPEP10LGRB00979</td><td>0.15</td><td>33.2</td></tr><tr><td>5</td><td>Mobile emergency gen-set</td><td>Olympian</td><td>GEP22-4</td><td>OLY00000KD4J04648</td><td>0.022</td><td>14</td></tr></table> | ID                     | Location | Brand             | Model | Serial number | MW | Lt/hr | 1 | La Confluencia Power House | Stemac generators sets | PA1888 | 1022585 | 0.954 | 188.7 | 2 | Portillo Intake Center | FG Wilson Ltd | P150E2 | FGWPEP10AGRB00981 | 0.15 | 33.2 | 3 | Tinguiririca Intake Center | FG Wilson Ltd | P150E2 | FGWPEP10LGRB00982 | 0.15 | 33.2 | 4 | Azufre Intake Center | FG Wilson Ltd | P150E2 | FGWPEP10LGRB00979 | 0.15 | 33.2 | 5 | Mobile emergency gen-set | Olympian | GEP22-4 | OLY00000KD4J04648 | 0.022 |
| ID                                                               | Location                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Brand                  | Model    | Serial number     | MW    | Lt/hr         |    |       |   |                            |                        |        |         |       |       |   |                        |               |        |                   |      |      |   |                            |               |        |                   |      |      |   |                      |               |        |                   |      |      |   |                          |          |         |                   |       |
| 1                                                                | La Confluencia Power House                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Stemac generators sets | PA1888   | 1022585           | 0.954 | 188.7         |    |       |   |                            |                        |        |         |       |       |   |                        |               |        |                   |      |      |   |                            |               |        |                   |      |      |   |                      |               |        |                   |      |      |   |                          |          |         |                   |       |
| 2                                                                | Portillo Intake Center                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | FG Wilson Ltd          | P150E2   | FGWPEP10AGRB00981 | 0.15  | 33.2          |    |       |   |                            |                        |        |         |       |       |   |                        |               |        |                   |      |      |   |                            |               |        |                   |      |      |   |                      |               |        |                   |      |      |   |                          |          |         |                   |       |
| 3                                                                | Tinguiririca Intake Center                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | FG Wilson Ltd          | P150E2   | FGWPEP10LGRB00982 | 0.15  | 33.2          |    |       |   |                            |                        |        |         |       |       |   |                        |               |        |                   |      |      |   |                            |               |        |                   |      |      |   |                      |               |        |                   |      |      |   |                          |          |         |                   |       |
| 4                                                                | Azufre Intake Center                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | FG Wilson Ltd          | P150E2   | FGWPEP10LGRB00979 | 0.15  | 33.2          |    |       |   |                            |                        |        |         |       |       |   |                        |               |        |                   |      |      |   |                            |               |        |                   |      |      |   |                      |               |        |                   |      |      |   |                          |          |         |                   |       |
| 5                                                                | Mobile emergency gen-set                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Olympian               | GEP22-4  | OLY00000KD4J04648 | 0.022 | 14            |    |       |   |                            |                        |        |         |       |       |   |                        |               |        |                   |      |      |   |                            |               |        |                   |      |      |   |                      |               |        |                   |      |      |   |                          |          |         |                   |       |
|                                                                  | The data will be recorded on a monthly basis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |          |                   |       |               |    |       |   |                            |                        |        |         |       |       |   |                        |               |        |                   |      |      |   |                            |               |        |                   |      |      |   |                      |               |        |                   |      |      |   |                          |          |         |                   |       |
| QA/QC procedures to be applied:                                  | The specific fuel consumption data are obtained from manufacturer information and can be deemed very accurate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        |          |                   |       |               |    |       |   |                            |                        |        |         |       |       |   |                        |               |        |                   |      |      |   |                            |               |        |                   |      |      |   |                      |               |        |                   |      |      |   |                          |          |         |                   |       |
| Any comment:                                                     | The gen-sets will not supply power to the grid, but used only in emergencies. It is estimated that their emissions in normal operation of the power plant will be well below 1% of the average emission reduction of the project activity. This value is obtained ex-post by multiplying the hours of operation with the diesel consumption at full load (manufacturer information). Please find more information on the diesel emergency generators in Annex 4.                                                                                                                                                                                                                                                                                                                                                                                           |                        |          |                   |       |               |    |       |   |                            |                        |        |         |       |       |   |                        |               |        |                   |      |      |   |                            |               |        |                   |      |      |   |                      |               |        |                   |      |      |   |                          |          |         |                   |       |

|                                                                                                  |                                                                                                                                   |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b>                                                                         | $T_{gen-set,i,y}$                                                                                                                 |
| Data unit:                                                                                       | Hr/yr                                                                                                                             |
| Description:                                                                                     | Hours of operation of each diesel emergency generator $i$ in year $y$                                                             |
| Source of data to be used:                                                                       | Project activity site                                                                                                             |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | 0                                                                                                                                 |
| Description of measurement methods and procedures to be applied:                                 | <p>Measured and obtained from hour-meter of each gen-set <math>i</math>.</p> <p>The data will be recorded on a monthly basis.</p> |
| QA/QC procedures to                                                                              | This data is obtained directly from the meters at each gen-set and can be                                                         |



|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| be applied:  | deemed very accurate.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Any comment: | The gen-sets will not supply power to the grid, but used only in emergencies. It is estimated that their emissions in normal operation of the power plant will be well below 1% of the average emission reduction of the project activity. This value will be used to calculate the fuel consumption of each diesel emergency generator <i>i</i> in years <i>y</i> . Please find more information on the diesel emergency generators in Annex 4. |

|                                                                                                  |                                                                                                                                                                                                                                                                                     |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b>                                                                         | $EF_{CO_2,diesel}$                                                                                                                                                                                                                                                                  |
| Data unit:                                                                                       | tCO <sub>2</sub> /TJ                                                                                                                                                                                                                                                                |
| Description:                                                                                     | CO <sub>2</sub> emission factor of diesel used in emergency diesel generators                                                                                                                                                                                                       |
| Source of data used:                                                                             | IPCC default values at the <u>upper</u> limit of the 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories. In case of a future revision of the IPCC guidelines the latest version will be used. |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | 74.8 tCO <sub>2</sub> /TJ                                                                                                                                                                                                                                                           |
| Description of measurement methods and procedures to be applied:                                 | -                                                                                                                                                                                                                                                                                   |
| QA/QC procedures to be applied:                                                                  | No official/specific information available, thus default values are applied.                                                                                                                                                                                                        |
| Any comment:                                                                                     | Please find more information on the diesel emergency generators in Annex 4.                                                                                                                                                                                                         |

|                                                                                                  |                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter:</b>                                                                         | $NCV_{diesel}$                                                                                                                                                                                                                                                           |
| Data unit:                                                                                       | GJ/mass or volume unit                                                                                                                                                                                                                                                   |
| Description:                                                                                     | Net calorific value (energy content) of diesel used in emergency diesel generators                                                                                                                                                                                       |
| Source of data used:                                                                             | IPCC default values at the upper limit of the 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of 2006 IPCC Guidelines on National GHG Inventories. In case of a future revision of the IPCC guidelines the latest version will be used. |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | 43.3 TJ/Gg                                                                                                                                                                                                                                                               |
| Description of measurement methods and procedures to be applied:                                 | -                                                                                                                                                                                                                                                                        |
| QA/QC procedures to be applied:                                                                  | No official/specific information available, thus default values are applied.                                                                                                                                                                                             |
| Any comment:                                                                                     | Please find more information on the diesel emergency generators in Annex 4.                                                                                                                                                                                              |

**B.7.2 Description of the monitoring plan:**

&gt;&gt;

Referring to the monitoring methodology of the approved consolidated methodology ACM0002 Version 12.1 “**Consolidated baseline methodology for grid-connected electricity generation from renewable sources**” and “Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion” Version 2”:

The monitoring methodology involves the monitoring of the following:

- Quantity of net electricity generation supplied by the project plant/unit to the grid in year y

Proven and qualified monitoring equipment (electricity meter) will be installed meeting relevant local standards at the time of installation. The meters will be installed in accordance with Chilean standards. Records of the meters (type, brand, model and calibration documentation) will be retained for documentation. The systems will allow automated and continuous recording and data will be registered accordingly.

The readings from the meters will be checked for any anomalies before being filed for future reference. All data collected as part of the monitoring will be archived electronically and be kept at least for 2 years after the end of the crediting period. Receipts of electricity sales will be obtained and used for cross checking.

A monitoring report will be prepared at least once a year, including electricity quantity monitoring files, receipts files and, if applicable, repairs record files and emergency situation files as well as corrective actions performed in case of faulty meters.

**Measurement of EG<sub>y</sub>**

The electricity produced by La Confluencia hydro power project is transmitted to La Confluencia Substation, which is located next to the power plant. This substation may also receive electricity from other hydro power projects not under control of the project participants.

Due to the “open access principle” applicable under the Chilean Electrical Regulation, third parties have the right to use existing transmission facilities to connect to the grid. The commissioning of at least one external hydro power plant is envisaged during the crediting period of the Project.

La Confluencia Substation is connected via double circuit transmission line of approximately 18 km length to La Higuera Substation from where the electricity is fed into the Tinguiririca Substation. There is a double circuit transmission line (of approximately 38 km in length) between La Higuera substation and the Tinguiririca substation (SIC’s injection substation). The external projects will use both the existing transmission line between La Confluencia substation and La Higuera substation, as well as the transmission line between La Higuera substation and Tinguiririca substation to connect to the SIC.

In order to account only for the electricity that is produced by the La Confluencia hydro power project the following monitoring procedure has been implemented. The procedure ensures correct and accurate allocation of the net electricity fed into the grid by the different hydro power plants.

As shown in Figure 9, the system has 12 energy meters relevant for the CDM monitoring, located at different stages. First, an energy meter is placed at the terminals of each generator of La Confluencia

hydro power plant (meters  $M1_{HLC}$  and  $M2_{HLC}$ ). These meters are used as back-up and for potential cross-check only. Second, two energy meters (M3 and M4) are located in La Higuera Substation measuring electricity supplied from the La Higuera power house, and another two energy meters (M7 and M8) measuring electricity submitted from La Confluencia substation. A set of two meters are placed in the Tinguiririca Substation (M5 and M6) in order to measure the energy generated by all connected hydro power plants. As the electricity produced by La Confluencia hydro power project is injected to the grid through the Tinguiririca Substation, main meters are considered to be M5 and M6. Furthermore, La Confluencia substation will be equipped with meters for the electricity submission of La Confluencia hydro power plant (meters M9 and M10) and for the electricity submission of the external power plants that are not yet in operation (meters M11 and M12). These four meters have not yet been installed, as they are part of Monitoring procedure B (see below). The meters at La Confluencia substation will only be activated once one of the external power plants start operation and inject electricity into the La Confluencia substation. Accordingly, monitoring of these meters will not start before the commissioning of one of the external power plants. The commissioning date of the external power plant will be reported in the relevant monitoring report.

A diagram of the location of these meters is presented in the following figure:

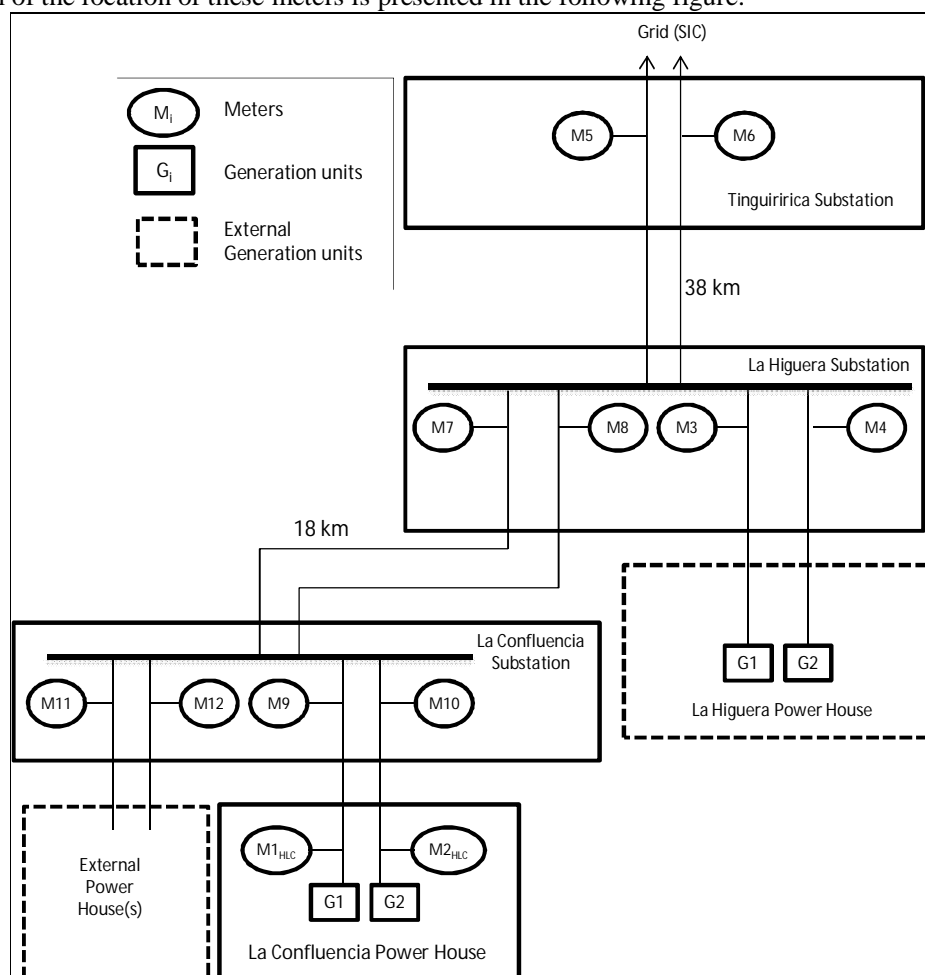


Figure 9: Diagram of monitoring points



The amount of electricity supplied to the grid by La Confluencia hydro power project is measured along with the electricity supplied by La Higuera hydro power project at the injection point located at the Tinguiririca substation owned by Transelec<sup>1</sup> (meters M5 and M6). After the commissioning of one of the external power plants, electricity generated by these projects are also fed into the grid via the Tinguiririca substation. In order to determine the amount of electricity supplied to the grid by La Confluencia hydro power project at the injection point, the electricity injected by La Higuera hydro power project is deducted from the measurements of meters M5 and M6 (Monitoring procedure A). Once the external project is in operation, related electricity generation of this external power plant has also to be deducted (Monitoring procedure B).

The meters located at Tinguiririca substation (M5 and M6), the meters located at La Higuera substation (M3, M4, M7 and M8) and the meters that will be placed at the La Confluencia Substation (M9, M10, M11 and M12) are bi-directional meters. This means that for every pulse the raw data from each meter contains a value associated to electricity injected and electricity retired. The net electricity value for each meter is the difference between the raw data of electricity injected and electricity retired.

#### **Monitoring procedure A**

The monitoring procedure A (i.e. before the start of operation of the external power plant) is as follows:

Using the net electricity values from each meter, **the net electricity injected by La Confluencia hydro power project at Tinguiririca substation** is calculated by the Commercial Analyst using the following equation:

$$\text{Energy for invoicing HLC} = \text{EG}_{\text{facility},y} = (M5 + M6) \cdot \frac{(M7 + M8)}{(M3 + M4) + (M7 + M8)} \quad (1)$$

Where,

$M_i$  Amount of electricity generation measured at energy meter number  $i$  (according to Figure 9).

$\text{EG}_{\text{facility},y}$  Quantity of net electricity generation supplied by the Project to the grid in year  $y$ .

This calculation assumes the proportional distribution of transmission losses in the transmission line from La Higuera substation to Tinguiririca substation in function of the hourly energy injected by each power plant to La Higuera substation.

#### **Monitoring procedure B**

The monitoring procedure B (i.e. after the start of operation of the external power plant) is as follows:

Using the net electricity values from each meter, **the net electricity injected by La Confluencia hydro power project at Tinguiririca substation** is calculated by the Commercial Analyst using the following equation:

---

<sup>1</sup> Main transmission company in Chile



$$\text{Energy for invoicing HLC} = \text{EG}_{\text{facility},y} = (M5 + M6) \cdot \frac{(M7 + M8) \cdot \frac{M9 + M10}{(M9 + M10) + (M11 + M12)}}{(M3 + M4) + (M7 + M8)} \quad (2)$$

Where,

$M_i$  Amount of electricity generation measured at energy meter number  $i$  (according to Figure 9).

$\text{EG}_{\text{facility},y}$  Quantity of net electricity generation supplied by the Project to the grid in year  $y$

This calculation assumes the proportional distribution of transmission losses in the transmission line from La Higuera substation to Tinguiririca substation in function of the hourly energy injected by each power plant to La Higuera substation and as well proportional distribution of transmission losses in the transmission line from La Confluencia substation to La Higuera substation.

#### **Procedures in case of meter failures**

In case of emergencies and/or faulty meters, corresponding corrective actions will take place by restoring and/or replacing erroneous measurements with data not affected, i.e. in the unlikely case meter M5 and M6 accounting the net generation will fail data from meters M3, M4, M7 and M8 or from  $M1_{\text{HLC}}$  and  $M2_{\text{HLC}}$  could be used to estimate the net electricity fed into the grid. If the restoring of data will not be possible, erroneous measurements will not be considered for calculating CERs.

In case of any failure on the data recording of Tinguiririca substation electricity meters (owned by Transelec) the generation data of the project at the injection point ( $M5+M6$ ) should be obtained by using the electricity measured at La Higuera substation with meters  $M7 + M8$  (as in Figure 9 of the MP) and deducting the typical average value of transmission losses between La Higuera substation and Tinguiririca substation. The typical average value for transmission losses will be obtained based on previous records of the measurements at Tinguiririca substation and La Higuera substation, as follows:

#### **Transmission loss factor**

Determination of the transmission losses going through the 38 km transmission line linking La Higuera substation with Tinguiririca substation:

$$tl_{\text{HLC,avg}} = \text{AVG} \left\{ \frac{(M3 + M4) + (M7 + M8) - (M5 + M6)}{(M3 + M4) + (M7 + M8)} \right\} \quad (3)$$

The historical average would be calculated using the latest available 2-year period.

This average historical transmission loss factor represents the transmission losses as a share of energy injected in La Higuera substation.

#### **Monitoring procedure A (i.e. before the start of operation of external power plants):**

The equation (3) can be transposed to estimate  $\text{EG}_{\text{facility},y}$  in case M5 and M6 fail by using the average historical transmission losses and the result of the remaining meters, as follows:

$$\text{EG}_{\text{facility},y} = (M7 + M8) \cdot (1 - tl_{\text{HLC,avg}}) \quad (4)$$





By applying the average historical transmission losses factor to the meters M7 and M8 related to La Confluencia, a proportional distribution of transmission losses between La Higuera and La Confluencia hydropowerplants is assumed.

**Monitoring procedure B** (i.e. after the start of operation of external power plants):

The equation 3 can be transposed to estimate  $EG_{\text{facility},y}$  in case M5 and M6 fail by using the average historical transmission losses and the result of the remaining meters, as follows:

$$EG_{\text{facility},y} = (M7 + M8) \cdot \frac{(M9 + M10)}{(M9 + M10) + (M11 + M12)} \cdot (1 - t_{\text{HLCavg}}) \quad (5)$$

For Monitoring Procedure A & B, the calculation of net energy generation of La Confluencia assumes the proportional distribution of transmission losses between all hydropower plants involved, in function of the hourly energy injected by each plant to La Higuera substation.

### Data collection, recording, calculation

Electricity generated by La Confluencia hydro power project and supplied to the grid is measured in the injection point at Tinguiririca Substation (meters M5 and M6). As mentioned above, meters located at this point are owned by Transelec.

A Field Technician from La Confluencia hydro power project collects the data (electricity measurements every 15 minutes recorded in the memory of the meter) from the meters located in the Tinguiririca substation once a month, and delivers the data to the Operator of the power plant. The Operator is responsible for verifying the data collected is accurate and complete for every day of the month, in order to detect and inform any failure in the meters that needs to be repaired. Afterwards, the processed data is sent by the Operator to the Controller to cross check it with the meters of La Confluencia substation/power house. After his approval the data is uploaded in the server, where it is electronically stored.

The Controller sends the processed data to the Commercial Analyst. Equation 1 and equation 2, respectively, are applied by the Commercial Analyst in order to calculate the electricity generated by La Confluencia hydro power project by deducting electricity from La Higuera hydro power project and accordingly electricity from the external power plant(s).

Once the analysis is ready, the Commercial Analyst sends the hourly data on a monthly basis to the CDEC-SIC (Economic Load Dispatch Centre of the SIC) for invoicing purposes and to the CDM Coordinator for emissions reduction calculations.

Accuracy class of all meters ( $M1_{\text{HLC}}$ ,  $M2_{\text{HLC}}$  and M3 to M12) will be 0.2s.

### Data Quality Control

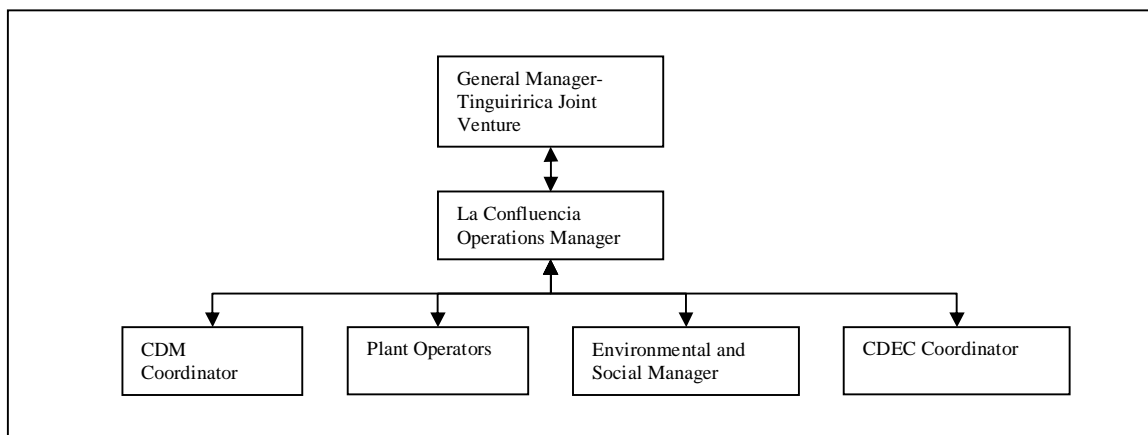
As a quality control procedure of the monitored data in the meters of Tinguiririca Substation (M5 and M6 in the Figure 9, which represents the electricity injection point to the grid where electricity from La Higuera hydro power project and La Confluencia hydro power project are provided), the monitored data is cross checked against the total of the data measured at the meters installed at the La Higuera Substation

(M3+M4+M7+M8). Accordingly data from the meters at the La Confluencia Substation is used for cross-checking once the external power plant starts operation. In case of any inconsistency detected in the monitored data, wrong data or missing data will be completed as described in the same procedure.

For additional back-up and potential cross-checking M1<sub>HLC</sub> and M2<sub>HLC</sub> at the La Confluencia project site are monitored.

### Operational and Management Structure

The management structure of HLC will take direct responsibility for the collection, verification and processing of information for the quantification of emission reductions to ensure quality and accuracy of all data utilised and results obtained. The organisational structure that is envisioned to manage and undertake the processes identified in steps 1, 2 and 3 is shown below;



**Figure 10** - Organisational structure of monitoring

### Activities and Responsibilities

- The CDM Coordinator will be responsible for the overall process of calculating emission reductions from the Project. He/she will also be responsible for all obligations entered into under ERPAs executed with third parties and communications with off-takers under these agreements. He/she will coordinate the activities of the Plant Operators and CDEC Coordinator to ensure that all data is verified, stored safely and processed as per this document. This includes the appointment of a DOE and managing of the CER verification process for issuance requests to the Executive Board.
- The CDEC coordinator will be responsible for verification of monthly generation notices received from CDEC and verification of these with Project output. They will coordinate any queries arising from data verifications with the Operations Manager, who maintains all responsibility for output and performance of the Project. The CDEC coordinator will undertake the emission reduction calculations as outlined in this document, reporting to the CDM Coordinator, Operations Manager and General Manager on performance of Project regarding emission reductions.
- Plant Operators will be responsible for monitoring plant output, monitoring energy metre performance vs. expected generation and ensuring all communication links and data storage from



the control system is correctly stored and backed up. All data will be stored electronically off site for the duration of the project's useful life, which is expected to be fifty years.

- The Environmental and Social Manager will be responsible for the performance of the Project and ensuring all processes are developed to comply with both Authorities' requirements and Chilean Standards and the implementation of corporate policies with respect to both the environment and community. They will oversee the environmental audits the Project is subject to as a result of obtaining financing from the IFC.

### **Training**

The Plant Operator, La Confluencia Operations Manager and other persons in charges will be trained by HLC CDM team. Furthermore, SN Power will hold an internal training workshop for its Global CDM Team with participation from Chile. Enclosed is the agenda for the monitoring and verification course which the Global SN Power CDM Team will go through on May 18th in Oslo. It will be held by Mari Groos Viddal, who currently works in the carbon team at Statkraft, and who previously worked in the climate change team at DNV (with validation and verification of CDM/JI projects).

Additionally, CDM related presentations will be provided to involved staff including the details and importance of the monitoring for the CDM and the project. People in charge for monitoring, metering and billing will be instructed and trained by HLC CDM team about the CDM and its importance for the validity of the project.

The PP will include in the O&M manuals and QA/QC procedures, the necessary specifications that describe 1) that all new personnel will receive the corresponding training in the project activity and relevant CDM requirements, and, 2) any changes to the equipment or procedures within the project activity will be followed by the corresponding training of the personnel involved.

### **Diesel emergency generators**

There are four diesel gen-sets located at the Project site and one mobile diesel gen-set as a backup system which will provide electricity to the essential consumption and auxiliary services. The largest gen-set is located in the powerhouse. The other gen-set are located in the intake centres and are mainly used for the management of the gates of the intakes.

The diesel gen-set at the powerhouse is a backup system, which will provide electricity to the essential consumption and auxiliary services. It will only operate in case the power system is undergoing maintenance and in case energy from the SIC (grid) is not available. Additionally, the gen-set can provide enough energy for a black start of one unit allowing the start-up of the other one and then recover the sub-system. This capability is called autonomous start-up.

It is expected that both cases are going to occur in very specific situations and only sporadic, since maintenance is carefully scheduled in advance and the external grid is very stable; hence black starts (after a black out) are uncommon.

The diesel generators at the intakes are backup generators in case there are flaws in the power supply to the intakes. The intakes will be connected to a medium voltage line to supply the energy needed for the gate.

Additionally, there is one mobile emergency gen-set that can be used by the La Confluencia Project, which is stored at the Los Helados Intake Center of the La Higuera hydro power plant.



The mobile gen-set will be used by both HLC and HLH, but for conservativeness 100% of the GHG emissions from this gen-set will be accounted in both projects. The emissions generated by these diesel generators, if any, will be included in the monitoring report of the corresponding monitoring period.

Further details are provided in Annex 4.

## Annex 4

### MONITORING INFORMATION

#### **Purpose**

##### **A.**

#### **1. Metering**

Energy meters installed at each generator and at the Tinguiririca Substation will provide information on the injection of energy from the Project into the SIC grid. The installation of the meters is shown in Figure 9 in Section B 7.2. The gross generation of La Confluencia Project is collected by meters M1<sub>HLC</sub> and M2<sub>HLC</sub>. The gross generation of the La Higuera Project is collected at the La Higuera project site. Net generation from all projects injected into the SIC grid is measured by meters M5 and M6. All data is collected by the SCADA control systems every 15 minutes and stored as a summed hourly total. This information is automatically transmitted to the CDEC-SIC Dispatch Centre and the respective powerhouses, where it is electronically stored.

Given that some transmission assets and the connection point to the SIC are shared among different projects, the net energy fed into the grid by La Confluencia project is determined on the basis of an algorithm that allocates the energy delivered by the project at the Tinguiririca Substation, after sharing transmission lines losses between the users, in proportion to their transmitted energy.

CDEC-SIC sends the net generation injected into the SIC from the Project at the end of each month. This report summarises the hourly generation in the month for which the Project receives revenues. This generation and electricity invoice is checked against internal records for integrity.

#### **2. Standards and Calibration of Meters**

Grid connected generation projects are obliged under the *Normas Técnicas* which establishes the minimum requirements for Information Systems and Communications, mentions that an accuracy of only 2% error is required on equipment of data acquisition. The billing meters are governed by “Manual of Procedures for Metering systems and supervision systems in the CDEC-SIC”, from July 2000, which establishes that the accuracy class required for equipment to the measurement of active and reactive energy is 0.2s (according to norm IEC 687). This equipment is tested at Project Completion prior to the Owner Taking-Over the Project for commercial operation. Meters will be tested according to requirements of the system operator, but at least once every two years according to the Project’s maintenance procedures.

#### **3. Data Collection Method**

The energy meters are interconnected with the SCADA control system of the project and have remote access connection with CDEC-SIC. The SCADA collects the relevant information from these meters, as per CDEC-SIC specifications and automatically transmits this information via telecommunication network. SCADA information is electronically stored at the powerhouse, thus two data sets are maintained for recording Project output.

#### **4. Data Storage**

Data from the metering and SCADA system is stored at the powerhouse on hard disks. This is backed up on a weekly basis, with weekly magnetic tapes being stored off site (in the Santiago Office).

#### **5. Data Processing**

Generation by project is monitored on a daily basis by HLC. The CDEC Coordinator is responsible for the monitoring and processing of all information sent to the SIC and the Project, including generating daily, weekly and monthly generation summaries. Net generation of the Project is derived applying the algorithms to account for transmission losses to the CDEC-SIC at the Tinguiririca Substation and is checked against the monthly balance received from CDEC. Thus the Project will have two records of hourly project generation; one supplied by the official CDEC-SIC, and those maintained internally by the Project.

#### 6. Data Verification- QA/QC

Generation projects are obliged to have communications systems, with 100% redundancy, for transmittal of all information from the meters to the CDEC-SIC control room. As such all information will be sent and stored by both the CDEC-SIC and the Project.

CDEC-SIC review and send to each Energy Generation Company the net generation of each project connected to the grid at the end of each month for invoicing purposes. The Project will be paid by the other market participants on a monthly basis for the actual energy generated for each hour in the month for the corresponding marginal cost of the system at each hour. HLC will revise each invoice on a monthly basis to correlate Project generation with that billing information provided by CDEC-SIC. As such there is a thorough data verification process and method established to ensure accuracy. Receipts from the sell of energy and firm capacity will be kept for documentation. For the purposes of determining emission reductions as a result of the Project activity the Project will utilise the information from CDEC-SIC as the official source for all information about generating plants connected to the SIC Grid. In this manner internal information on Project output will be used to verify CDEC-SIC data, providing for improved data integrity and transparency. A monitoring report will be prepared at least once a year, including electricity quantity monitoring files, receipts files and, if applicable, repairs record files and emergency situation files as well as corrective actions performed in case of faulty meters.

In case of emergencies and/or faulty meters, corresponding corrective actions will take place by restoring and/or replacing erroneous measurements with data not affected, i.e. in the unlikely case meter M5 and M6 accounting the net generation will fail data from meters M3, M4, M7 and M8 or from M1<sub>HLC</sub> and M2<sub>HLC</sub> or M9, M10, M11 and M12 could be used to estimate the net electricity fed into the grid. If the restoring of data will not be possible erroneous measurements will not be considered for calculating CERs.

#### **Procedures**

The procedures and responsibilities are described in Section B 7.2 with respect to the monitoring and calculation of emission reductions for the Project.

#### **Diesel emergency generators**

As outlined before, there are four diesel gen-sets located at the Project site and one mobile diesel gen-set as a backup system which will provide electricity to the essential consumption and auxiliary services. The largest gen-set is located in the powerhouse. The other gen-set are located in the intake centres and are mainly used for the management of the gates of the intakes. There is one mobile emergency gen-set that will be used by both HLC and HLH, but for conservativeness, will be accounted 100% in both.

The gen-sets will operate in case of emergencies, when power system maintenance (lines and substations) is on-going and in case energy from the SIC (grid) is not available. The gen-set at the power house can

provide enough energy for a black start of one unit allowing the start-up of the other one and then to recover the sub-system. This capability is called autonomous start-up.

It is expected that the operational cases are going to be very specific and sporadic, since, maintenance are scheduled carefully in advance and the external grid is very stable; hence this black start (after a black out) are uncommon. The gen-sets will serve as backup only and run in case of emergencies only, if there is a total power outage in the plant.

It is a common practice of the O&M team to have records of maintenance and operation of all plant equipment including the gen-sets.

The features of each gen-set are:

| Name                    | Manufacturer           | Model   | Serial number     | Place                     | Power Stand-by | Power factor | Voltage   | Frequency | RP M     |
|-------------------------|------------------------|---------|-------------------|---------------------------|----------------|--------------|-----------|-----------|----------|
| Emergency mobile Genset | Olympian               | GEP22-4 | OLY00000KD4J04648 | Los Helados Intake Center | 22kVA          | 0.8          | 380/220 V | 50 Hz     | 1500 rpm |
| Main Emergency Genset   | Stemac generators sets | PA1888  | 1022585           | Confluencia Power House   | 954kVA         | 0.8          | 400V      | 50 Hz     | 1500 rpm |
| Emergency Genset        | FG Wilson Ltd          | P150E2  | FGWPEP10AGRB00982 | Tinguirica Intake Center  | 150kVA         | 0.8          | 380/220 V | 50 Hz     | 1500 rpm |
| Emergency Genset        | FG Wilson Ltd          | P150E2  | FGWPEP10LGRB00981 | Portillo Intake Center    | 150kVA         | 0.8          | 380/220 V | 50 Hz     | 1500 rpm |
| Emergency Genset        | FG Wilson Ltd          | P150E2  | FGWPEP10LGRB00979 | Azufre Intake Center      | 150kVA         | 0.8          | 380/220 V | 50 Hz     | 1500 rpm |

ACM0002, version 12.1, does not require the calculation of project emissions in case of hydro power projects. However, for reasons of conservativeness, project emissions from gen-sets that will be operated in case of grid failures are taken into consideration as follows:

The gen-sets will not supply power to the grid, but used only in emergencies. It is estimated that their emissions in normal operation of the power plant will be well below 1% of the average emission reduction of the project activity. Nevertheless, La Confluencia will use the hour meters of the gen-sets to monitor the use of the engines. Related emissions will be considered in the monitoring reports.

Emissions of each gen-set is obtained based on metering of the operating hours through the calculation of diesel consumption, the net calorific value (NCV) and the emission factor of the diesel. The default values of NCV and emission factor of diesel will be derived from the latest version of the IPCC Guidelines for National Greenhouse Gas Inventories, upper value at 95% confidence level.

$$PE_{\text{gen-set}} = \sum FC_{\text{gen-set } i, y} * NCV * EF_{\text{CO}_2, \text{diesel}}$$

Where:

$FC_{\text{gen-set}, i}$ : Diesel consumption of gen-set i

NCV: Net Calorific Value of diesel (default value of 43.4 TJ/Gg IPCC, upper value at 95% confidence level)  
EF<sub>CO<sub>2</sub>,diesel</sub>: Diesel emission factor, (default value of 74.8 tCO<sub>2</sub>/TJ of IPCC, i.e. upper value at 95% confidence level)

Where the fuel consumption is calculated as

$FC_{gen-set\ i,y}$  = Hours of operation of gen-set  $i$  in year  $y$  \* specific diesel consumption at full load of gen-set  $i$

In case of a failure of the hour meters and/or in the absence of sufficient data recording it is assumed for such periods that the gen-sets have been operated continuously at full load - as a conservative approach - but capped to the maximum possible operating hours according to available and proper meter readings.