Initial Carbon Balance Methodology

To establish a carbon balance for a utility, Roland Liemberger, has shared with us a basic order of operations to help us estimate how much carbon a given utility is emitting with their leakage. Using a combination of data inputs and default emissions values, we can approximately identify how much we can improve carbon emissions through proper leakage management.

Data input:

Data input starts by establishing the percentage mix of water sources used for each utility. Sources include surface water acquired via gravity, surface water acquired via pumping, groundwater sources, and desalination of sea water. Future additionally required water will be identified and come from the same sources. Volume of water required in m^3/month to better supply existing customers and additional customers will be identified. These values can then be multiplied by the default CO_2 values identified below:

Present mix of water sources used (% Total m^3)

- Surface water (gravity)
- Surface water (pumped)
- Groundwater
- Desalinated sea water

Future additionally required water will come from the following sources (% Total m^3)

- Surface water (gravity)
- Surface water (pumped)
- Groundwater
- Desalinated sea water

Volume of water required to (m^3/month)

- Better supply existing customers
- Additional customers (system expansion)

Estimated gCO_2/m^3 (use default values or own estimates if available), default values:

- Surface water (gravity) 30
- Surface water (pumped) 200
- Groundwater 300
- Desalinated sea water 4,000

Results:

These variables will allow us to present an estimated carbon footprint in gCO_2/ m^3 for a given utility. Consider an example situation below:

An average CO_2/ m^3 is calculated based on the above formula that factors current and future additional water mix. If they are presently an intermittent water supply, the future target supply time will be calculated in hours per week. Average target pressures will be factored in as well as target Infrastructure Leakage Index.

Present a calculated carbon footprint:

- Average gCO_2/m^3 calculated based on the above information
- All water balance components multiplied by this number
- Result: Initial Carbon Balance Methodology

Future gCO_2/m^3:

- Average gCO_2/m^3 calculated based on the above (future additional) water mix

Data entry:

- If at present intermittent supply (IWS) what is the future target supply time (hours/week)?
- Average target pressure
- Target ILI

Result:

- Future volume of physical losses (PL)
- Difference between present and future:
    - No additional consumption = CO_2 reduction = volume PL reduced x Average gCO_2/m^3 Additional consumption < PL reduction: CO_2 reduction = (volume PL reduced – additional consumption) x Average gCO_2/m^3
    - Additional consumption > PL reduction: CO_2 INCREASE = (volume additional consumption - PL reduction) x FUTURE Average gCO_2/m^3
    - Comparison – DO NOTHING – Additional water demand (for additional consumption) @ present level of service and present ILI x FUTURE Average gCO_2/m^3

We can compare these calculations to if nothing is done. Additional water demand at the present ILI x Future Average gCO_2/m^3. This comparison will allow us to identify a future carbon balance based on the choices made for a given utility.