Simply stated, sustainability is about meeting human needs within the limits of nature. Carollo Engineers strives to employ practices and technologies that ‘fit’ into the natural ecosystems on which life depends.

Incorporating sustainability occurs when project planning is driven by sustainable vision and objectives. Sustainable project planning requires an integrated approach which considers ‘holistic’ solutions to challenges or problems at the ‘systems’ level rather than ‘component’ level.

Carollo incorporates a whole systems approach to sustainability organized around four central principles:

1. **Use Resources Efficiently.** Minimize and re-use our resources: water (drinking, waste and storm), carbon (materials), energy and wastes (residuals).
2. **Integrate for Resiliency.** Eliminate the ‘silo’ effect (thinking of each resource as independent of the others) by considering integrated solutions that lead to greater flexibility/resiliency and mitigate potential risk.
3. **Provide Multiple Benefits.** Solutions that provide benefit across environmental, economic and social realms are key.
4. **Diversity.** One size does NOT fit all. Evaluate a mix of traditional and innovative solutions, including gray and green infrastructure, structural and nonstructural solutions, and centralized and decentralized/distributed treatment.

These principles work together, not independently, to create truly sustainable projects. With these central principles in mind, Carollo applies six key steps to sustainable planning (see sidebar). Our breadth of traditional experience along with our in-depth knowledge of various sustainable frameworks, planning strategies and analysis tools gives us the unique opportunity to tailor the planning process to each client’s unique needs and circumstances.

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**Sustainable Decision Making Tools**

More and more tools are becoming available to assist in Sustainable Decision Making. Carollo has evaluated and used many but the ones that we find most helpful for our clients are highlighted below.

- **Triple Bottom Line.** (qualitative/quantitative) Assesses environmental, economic and social impacts of alternatives.
- **Greenhouse Gas Emissions.** (quantitative) Compares the greenhouse gas emissions of alternatives relative to each other.
- **Ecological Footprint.** (quantitative) Evaluates the life cycle ecological impacts of alternatives by measuring the amount of land and water (area of the earth) required to produce all the resources consumed and to absorb all the wastes produced by a person, group, or process.
- **Life Cycle Analysis.** (quantitative) Quantifies material and energy inputs and outputs from a product, process, or system throughout all its stages of life.
- **Envision™ Rating System.** (qualitative) Planning level rating tool based on incorporating sustainability principles/practices into infrastructure related projects/systems.

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**Six Key Steps to Successful Sustainable Planning**

1. Establish a sustainable framework to guide your decision making.
2. Determine sustainable vision and goals that reflect utility and community values.
3. Decide upon measurable objectives and strategies for meeting those goals.
4. Identify alternatives and solutions that meet the objectives.
5. Evaluate alternatives using analysis tools that consider multiple benefits (economic, environmental and social) and consider sustainable financial strategies for preferred solutions.
Incorporating Sustainability into Projects for Carollo Clients

Post Point WWTP Facilities Plan
Case Study: City of Bellingham, Washington

The City of Bellingham has a long history with embracing sustainability. In 2008, the City was honored by ICLEI for their progressive climate action plan. In the same year, the City was selected by Washington CEO Magazine as Washington's greenest city. Carollo continued applying these values in the Post Point WWTP Facilities Plan. Working with City staff and stakeholders, Carollo applied the Triple Bottom Line Plus (TBL+) process to compare alternatives using environmental, social, economic and functional evaluation criteria. The figure below shows an example of the TBL+ comparison for primary clarification alternatives.

The application of the TBL+ process was important in the overall decision making process and acceptance by the Bellingham City Council.

Water Treatment Plant 4
Case Study: City of Austin, Texas

Carollo worked with the City of Austin to plan and design a new 50-mgd water treatment plant that met the City’s goals for sustainability. The City has adopted a Climate Protection Plan that outlines specific objectives including aggressive renewable energy goals and GHG emission reductions. To meet these objectives, Carollo took a multiple step approach by collaboratively setting goals, evaluating alternatives and incorporating elements into the design. Alternatives were evaluated for energy and GHG reduction.

Some of the key features of this project are highlighted below.

- Occupied buildings achieved a LEED™ rating of Silver.
- Rainwater harvesting reduces runoff and maximizes efficient water use.
- 50% construction waste diversion.
- 20% local materials used.
- Building water use reduced 30%.
- Open spaces preserved by minimizing footprint and paved areas.
- Storm water captured and treated onsite with biofiltration ponds.
- Fly-ash added to concrete reduces cement content by up to 15%.
- Excavated materials used for fill.
- Design includes fewer, larger filters to reduce footprint and materials.

Tanks collect rainfall from the rooftops of Austin’s new water treatment plant buildings to offset site water use and to reduce storm water runoff.