

September 9, 2010

## Background

The World Federation of Engineering Organizations (WFEO) is an international body that is comprised of national engineering organizations and individuals from over 90 countries representing more than 15 million engineers. Engineers Canada is a member of the WFEO, representing the Canadian engineering profession. Engineers Canada currently chairs the WFEO Standing Committee on Engineering and the Environment (WFEO-CEE).

It is fundamentally clear that climate change represents a profound risk to the safety of engineered systems and to public safety in Canada and around the world. As such, professional engineers must address climate change adaptation as part of their primary mandate – protection of the public interest, which includes life, health, property, economic interest and the environment. Climate change results in significant changes in statistical weather patterns resulting in a shifting foundation of fundamental design data. Physical infrastructure systems designed using this older criteria are vulnerable to failure, compromising public safety.

Engineers Canada has developed a procedure to assess the engineering vulnerability of physical infrastructure to the impacts of climate change. Known as the PIEVC Engineering Protocol (the Protocol), this risk assessment procedure systematically reviews historical climate information and projects the nature, severity and probability of future climate changes and events with the adaptive capacity of an individual infrastructure as determined by its design, operation and maintenance. It includes an estimate of the severity of climate impacts on the components of the infrastructure (i.e. deterioration, damage or destruction) to enable the identification of higher risk components and the nature of the threat from the climate change impact.

This information can be used to make informed engineering judgments on what components are at risk and require adaptation, as well as how to adapt them e.g. design adjustments, physical interventions, or changes to operational or maintenance procedures.

The application of the Protocol towards the adaptation of infrastructure to climate change is one of six knowledge development and capacity-building themes within the strategic plan of the WFEO-CEE. The Protocol and the results of numerous case studies completed of Canadian infrastructure have been presented at numerous climate change and infrastructure asset management conferences and meetings in Canada and the United States. It has been presented internationally at side events organized by WFEO at the United Nations Framework Convention on Climate Change meetings in Bonn, Germany in June 2008 and June 2009. Another workshop was successfully delivered at the UNFCCC Bonn Climate Change Talks in June 2010.

The long-term goal of the WFEO-CEE is to successfully transfer the application of the protocol to newly-developed and developing countries to provide a relatively low cost assessment tool to

plan cost-effective adaptation of existing and planned infrastructure to address the impacts of future climate change. The emphasis is to train engineers, planners, climatologists and scientists as well as other related professional and technical personnel within the country to build its capacity to define and to understand the risks climate change poses on the country's infrastructure and to propose locally generated, engineering-based solutions that mitigate the impacts within the resources available. Costa Rica has been selected as the first country to receive this form of training through the Colegio, the national association of engineers in that country.

### **Costa Rica Case Study**

The overall goal of this project is to build the capacity for Costa Rican engineers to lead engineering vulnerability assessments of the country's civil infrastructure to the impacts of future climate change. Risk assessment of civil infrastructure to climate change requires a multi-disciplinary approach. Thus another important outcome is to build capacity in other supporting disciplines and stakeholders including meteorologists, climate change scientists, engineering and technology professionals as well as management, operations and maintenance personnel administering and operating the infrastructure.

This goal and outcome is achieved through a case study approach that includes, as a first step, a hands-on, qualitative climate change risk assessment of the City of Limon Costa Rica sewage treatment system using the Protocol. The case study includes the delivery of several hands-on workshops at the beginning, middle and end stages of the project as well as continuing advice and consultation as the assessment progresses. It will conclude with a final workshop that develops the conclusions on engineering vulnerabilities with engineering-based recommendations to address these vulnerabilities.

The project will conclude with the preparation of a final report that includes the results of the engineering vulnerability assessment of the Limon sewage treatment system. It will also include engineering recommendations on actions to address the identified vulnerabilities. To the extent that is practical, it will follow the format similar to case study reports produced for infrastructure case studies in Canada. This report will be written primarily by the Costa Rican engineers with advice and review from the Canadian project team.

The Canadian Project Team traveled to Costa Rica the week of August 16, 2010 to deliver the first training workshops to the Costa Rican Project Team as well as conduct a site visit to the Limon facility. Work is now underway to collect climate and infrastructure information. The next visit of the Canadian Project Team will be in late November. The project will be completed by March 31, 2011.