



Progress Report
WFEO Action Pledge for Nairobi Work Program
Date: September 9, 2010

Name of Organization: World Federation of Engineering Organizations

Date: September 9, 2010

Title of Initiative:

Adaptation of Sustainable Infrastructure to Climate Change Impacts

Elements of Action Pledge on which progress is reported here:

Element #1: To develop and implement engineering tools, policies and practices for risk assessment and adaptation of existing and new civil infrastructure to climate change.

Element #2: To build knowledge, experience and appropriate techniques to enhance the technical capacity of engineers to adapt civil infrastructure to climate change, particularly within developing and least developed countries

NWP work areas to which the updates are relevant:

Methods and tools, climate change risks and extreme events, adaptation planning and practices

Activities Undertaken and Key Outputs

Action Pledge Element #1

Activity #1: Development of the PIEVC Engineering Protocol

This protocol is the intellectual property of Engineers Canada, which is a member of the WFEO. It is available for use through a license agreement with Engineers Canada at no financial charge. Contact David Lapp, P.Eng., Manager, Professional Practice (david.lapp@engineerscanada.ca)

Activity #2: Engineering Vulnerability Assessment Case Studies of Individual Infrastructure

Three new case studies of infrastructure engineering vulnerability assessment in Canada have been completed since September 2009 using the PIEVC Engineering Protocol:

1. Toronto and Region Conservation Authority – assessment of two water retention dams
2. British Columbia Ministry of Transportation and Infrastructure – Coquihalla Highway road infrastructure assessment

3. Metro Vancouver, BC – Fraser Vancouver sewerage area collection and treatment infrastructure

These reports are available through Engineers Canada.

Action Pledge Element #2

Activity #1: PIEVC Engineering Protocol Training Workshops - Canada

Since November 2009, Engineers Canada has held six workshops for engineers and other professionals on the theory and application of the PIEVC Engineering Protocol for infrastructure climate risk assessment. The one-day workshop includes presentations on the principles of risk assessment, the PIEVC Engineering Protocol and up to several Canadian case studies. It includes two small group exercises to define infrastructure components and climate elements as well as estimating risks. Copies of slide presentations are available upon request to Engineers Canada. (david.lapp@engineerscanada.ca)

Activity #2: PIEVC Engineering Protocol Training Workshops - International

The WFEO Committee on Engineering and the Environment, chaired by Engineers Canada, held a one-day hands-on workshop in March 2010 in Recife, Brazil on infrastructure climate risk assessment through the application of the PIEVC Engineering Protocol. The format is similar to the Canadian workshops except that the hands-on exercises use a power supply infrastructure project in Brazil .

Activity #3: Costa Rica Knowledge Development and Capacity Building Project

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.

This goal and outcome is being executed through a case study approach that is underway and includes, as a first step, a hands-on, qualitative climate change risk assessment of the Costa Rican City of Limon sewage treatment system using the PIEVC Engineering 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. This work was started in August 2010 and will be completed by April 2011. As of September 2010, the first training workshops had been delivered in Costa Rica.

The long-term goal is to successfully transfer the application of the PIEVC Engineering Protocol to newly developed and developing countries to provide a low cost assessment tool to plan cost-effective adaptation of existing and planned infrastructure to the impacts of future climate change.

Potential application/implication for the adaptation community under the NWP

Academics

The PIEVC Engineering Protocol could be applied to research vulnerabilities of other types of infrastructure not covered by the project in Canada. It could also be used as a teaching tool for the principles of risk assessment as it relates to infrastructure and climate change impacts.

Practitioners

Development of a tool and applications that enable engineers, planners and decision-makers to assess the engineering vulnerabilities and account for climate change impacts on civil infrastructure in design, operations and maintenance

Enable practitioners to demonstrate due diligence in considering climate change for infrastructure needed for insurance and liability concerns

Enable procurers to specify requirements to consider climate change risks in the design or retrofitting of infrastructure.

Policy-makers

Results will lead to recommendations on adjustments or reviews of selected infrastructure codes, standards and practices.

Results will lead to recommendations and implementation of policies and procedures to conduct climate risk assessment as part of any procurement or operational review of civil infrastructure

Educators

Case study results can be used to develop presentations, workshops and course materials in climate change risk assessment as it relates to civil infrastructure

Journalists

Plans for the Next Steps

Planned Activity #1 – Addition of an Triple Bottom Line Cost Estimation Tool for Infrastructure Adaptation Remedial Actions

Description:

The Protocol will be enhanced to enable Order of Magnitude estimates of the economic, social and environmental (“triple bottom line”) costs to implement design, operations and/or maintenance options for recommended remedial actions to address the engineering vulnerabilities identified in the assessment, including the costs of “no action”.

The scoping study for this module will be completed in November 2010. Following a design specification stage, this additional tool will be constructed and tested in 2011.

Outputs:

The expected outcome is a series of Microsoft Excel spreadsheets with instructions on use and application. It will be made available as part of the PIEVC Engineering Protocol under a license agreement with Engineers Canada.

Planned Activity #2 – Development of a Knowledge Base of Infrastructure Climate Change Engineering Vulnerabilities

Description:

The results of case studies of individual infrastructures will be consolidated into an electronic knowledge base, likely in Microsoft Access to enable more automated compilation of results and analysis of particular climate or infrastructure parameters of interest. The knowledge base will be populated with results of Canadian case studies and used to compile or analyse combined results.

If there is interest in the knowledge base framework it could be customized for use internationally or by other countries.

Outputs:

A library of data on climate change vulnerabilities for each of the four infrastructure categories being assessed through the PIEVC Engineering Protocol,

Planned Activity #3 – Engineering Vulnerability Assessment Case Studies of Individual Infrastructure

Description:

There are currently eight case studies that are in progress and will be reported within the next six months. It is anticipated that another 6 to 8 case studies of individual infrastructures across Canada will be completed by the summer of 2011.

Outputs:

Case study reports will be placed on the website www.engineerscanada.ca and www.wfeo.net as they become available. Results will also be entered on the national knowledge base (Planned Activity #2)

Planned Activity #4 - PIEVC Infrastructure Engineering Vulnerability Assessment Training Workshop Development and Delivery - Canada

Description:

Four, one day workshops for engineers on the science and local knowledge on climate change, principles of risk assessment and the PIEVC Engineering Protocol and its application are scheduled in four Canadian provinces in the fall of 2010. Additional workshops will be organized in the first quarter of 2011.

The audiences for these workshops will be expanded to all staff in cities and municipalities that are involved in the planning, design, management, operation and maintenance of public infrastructure.

Outputs:

Workshop materials developed that could be re-used with limited revisions for other provinces and territories in Canada.

Workshop materials developed that could be re-used with revisions for other countries.

Planned Activity #5 – Knowledge Development and Capacity Building for Infrastructure Vulnerability Assessment in Newly Developed and Developing Countries

Description:

The overall goal is to build the capacity for engineers to lead engineering vulnerability assessments of their civil infrastructure to the impacts of future climate change. Each country will complete a vulnerability assessment for one of their key infrastructures that can be used as an example for follow-on assessments.

These projects will be undertaken on an opportunity basis subject to the availability of funding and qualified personnel and will be pursued more vigorously once the Costa Rica case study is completed.

Outputs:

Training workshops will be delivered in the newly developed and developing countries.

Reports on engineering vulnerability assessments of individual infrastructures will be completed in newly developed and developing countries.

Workshop materials developed that could be re-used with some revisions for similar projects in other countries.

A panel session addressing the state of development of adaptation tools is scheduled for October 18th at the Engineering Conference being held Buenos Aires Argentina.