Project Summary

Project title:
Scour protection study

Mini summary:
Assessing the impact of scour at monopile foundations and investigation of alternative methods and materials.

Preface:
The execution of this proposal is linked to implementation at the Q10 wind farm. Within Q10 a number of innovations will be applied, however which innovations will be applied will only be known in May 2012. Eneco will only participate in this project in the event “Scour Protection Study” is selected as one of the innovations in Q10. In that case it is likely that one or more other FLOW partners will participate as well. In the event Scour Protection Study is not selected Eneco will withdraw this proposal.

Management Summary:
Within the offshore wind industry there is a need for a more thorough understanding of the development of scour pits and methods to prevent excessive scour. The scour protection that is currently applied around monopiles is based on certification guidelines. These guidelines appear to be too conservative but further study and field testing is required to adjust the guidelines.

It is the intention to install two monopiles in an early stage at the Q10 wind farm location. One monopile will not have any scour protection in order to be able to monitor the development of the scour pit. The other monopile will have an alternative scour protection (for instance artificial seaweed) and will also be equipped with monitoring equipment. Ideally these monopiles are installed approximately one year before construction of the conventional wind farm starts. The two monopiles will be full scale (1:1) and will become part of the Q10 wind farm. This proposal consists of the following phases:

Phase 1
- Investigation of methods and sensors to measure the development of the erosion pit;
- Setting up of a Scour Prediction Model for the two Q10-sites;
- Investigation of methods and sensors to monitor the loads on the foundation with or without scour protection;
- Investigation of alternative scour protection materials and techniques;
- Making conceptual designs of alternative protections by Alternative Scour Protection Model calculations;
- Scale model testing of the proposed alternative(s);
- Developing alternative scour protections on field scale with third parties

Phase 2
- Field measurement campaign of the scour development around the unprotected monopile and of the performance of the proposed alternative scour protection
- Evaluation of the measurements at both monopiles
Phase 3

- Calibrating Scour Prediction Model for the two Q10-sites based on the measurements
- Make scour predictions for the lifetime of the Q10-wind farm for all pile locations to assess whether scour protection is necessary in the Dutch North Sea sector.
- Distribute Scour Prediction Model under FLOW-partners as a design tool for future wind farms
- Assessment of the guidelines proposed by the certifying bodies and—if applicable—adjustment of the guidelines;
- Analyse behaviour of alternative scour protection and calibrate Alternative Scour Protection Model in order to prove the applicability under design conditions
- Approval of the alternative scour protection by the certifying body;
- Distribute Alternative Scour Protection Model under FLOW-partners as a design tool for future wind farms

The cost and requested budget in this proposal only applies to Phase 1 of this proposal. Subject to the outcome of the European Tender for Q10 Phase 2 and 3 may be submitted as a separate proposal in a later stage.