# Computing the price of water

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This PhD project is aimed at developing the next generation of hydro-electricity optimization tools. The project will involve the detailed estimation and calibration of reservoir inflows to New Zealand's main catchments (Waitaki and Taupo), with the aim of developing inflow models that can be used to drive the new optimization algorithms. These can be used to investigate risks and opportunities in the New Zealand hydro-dominated electricity system.

The core deliverable of the PhD will be DOASA 2.0, a new version of the DOASA approximate dynamic programming engine developed by Philpott and Pritchard over the last ten years. Many ideas for DOASA 2.0 have been gathered and await implementation and testing. DOASA 2.0 will form a core part of the expanding optimization toolbox developed by Philpott and coauthors as part of the Electric Power Optimization Centre (EPOC).
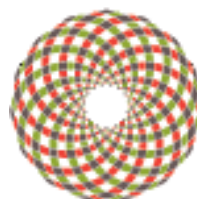
A reliable and fast stochastic dynamic programming engine has many applications. Its most common use is estimating a marginal cost of water storage under assumptions of perfect competition. In imperfectly competitive hydro-dominated electricity markets these price estimates enable economists to quantify the degree of competition. Models of risk aversion can be also used to calibrate risk premia in contract prices. In other water-resource settings, these models can be used to inform irrigation policies, and assist in the negotiation of water rights and the sizing and location of water reservoirs.
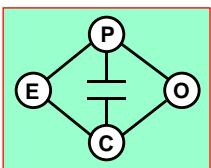
This PhD project is supported by a three-year full scholarship from Te Pūnaha Matatini the New Zealand Centre of Excellence in Networks and Complexity. Applications for this scholarship can be made by sending an application to Professor Andy Philpott (a.philpott@auckland.ac.nz) to reach him before 5pm on June 19, 2015. An application should consist of

- a covering letter
- a copy of the most recent academic record
- the name and email address of an academic referee who can be contacted

The successful applicant will be expected to take up the scholarship on July 20, 2015

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