



## PhD presentation Day

October 24, 2014

**Location: M323**

### Program

9:00 – 9:15 Welcome and introduction

9:15 – 10:00 *Jeanne Andersen*

Title: Scenario generation for wind forecast errors in a model for short-term balancing of supply and demand in an electricity system

Discussant: Lars Relund Nielsen

10:00 – 10:15 Coffee break

10:15 – 11:00 Samira Mirzaei

Title: A Branch-and-Price Algorithm for Two Multi-Compartment Vehicle Routing Problems

Discussant: Kim Allan Andersen

11:00 – 11:45 Viktoryia Buhayenko

Title: Local search for determining the supplier's optimal discount schedule

Discussant: Sin C. Ho

11:45 – 12:30 Lunch

12:30 – 13:15 *Reza Pourmoayed*

Title: Optimization Methods in a Stochastic Production Environment

Discussant: Christian Larsen

13:15 – 13:30 Coffee break

13:30 – 14:15 *Maria Elbek Andersen*

Title: A Solution Approach for Multi-period Collection of Recyclable Materials in a Multi-compartment Vehicle under Uncertainty

Discussant: Anders Thorstenson

14:15 Presentation day ends

## Abstracts

**Jeanne Andersen:** Scenario generation for wind forecast errors in a model for short-term balancing of supply and demand in an electricity system

### Abstract

In this paper we present a two-stage stochastic mixed integer model for the intra-hour balancing problem faced by system operators in electricity systems with large penetration of wind power production in their control areas. Since wind power is uncontrollable and intermittent it is difficult to predict wind power production with a certain accuracy. Wind power forecast errors directly impact the balance between supply and demand of electricity. Therefore, it is of utmost importance for the system operators to understand and investigate these errors and plan accordingly when balancing the electricity system. In this model we capture the uncertainty in wind power forecasts by generating scenarios for the wind power forecast errors by a copula-based heuristic. We apply the model on a realistic Danish case study.

---

**Samira Mirzaei:** A Branch-and-Price Algorithm for Two Multi-Compartment Vehicle Routing Problems

### Abstract

In this project, we present two strategically different versions of the MCVRP in general settings. In the first version, a customer may receive different commodities from different vehicles. However, the full amount of each product must still be delivered by a single vehicle (semi-split MCVRP). In the second version, each customer may only be serviced by a single vehicle, which must deliver the full amount of all commodities demanded by that customer (no-semi-split MCVRP). The purpose of this project is twofold. Firstly, we develop a branch-and-price algorithm for solving the two versions of the MCVRP to optimality. Secondly, we analyze the effect of the strategic decision of whether or not to allow multiple visits to the same customer by comparing the costs of the semi-split and the no-semi-split versions of the MCVRP.

---

**Viktoryia Buhayenko:** Local search for determining the supplier's optimal discount schedule

### Abstract

This research suggests an efficient procedure to facilitate the supplier's decision on when and how much discounts to offer each of the customers. The primary goal is to maximize the supplier's profit. The customers get benefits from accepting discounts as well, since the resulting price reduction exceeds their increase in inventory and order costs.

The solution procedure is an adaptation of a local search heuristic. The algorithm includes two parts with a separate local search for the supplier and customers. The local search for the supplier determines the best production schedule. To calculate the objective value for the new production pattern of the supplier, the second neighborhood search is performed for each customer to determine the best order pattern that minimizes the discount offered and the inventory cost for the supplier. Computational studies show that the local search heuristic described can solve problems with up to 100 time periods within 5 seconds.

---

**Reza Pourmoayed:** Optimization Methods in a Stochastic Production Environment**Abstract**

In this note the research plan of my Ph.D. project is described. This project is a sub project of the PigIT1 project and its main purpose is on developing decision support models for fattening/growing pigs in Denmark. In this note, we explain the possible approaches for developing such models divided to three groups: Markov decision process in combination of feeding and marketing decisions; approximate dynamic programming in optimal slaughter pig marketing problem; and multi-objective models for diseases problems.

---

**Maria Elbek Andersen:** A Solution Approach for Multi-period Collection of Recyclable Materials in a Multi-compartment Vehicle under Uncertainty**Abstract**

We consider the scheduling procedure for the multi-period collection of recyclable materials. Citizens can deposit materials for reuse in cubes located at several collection points. To establish a high service level for the citizens the cubes must not be overfilled. The recyclable materials are collected jointly with multi-compartment vehicles, but must be handled separately, due to different procedures for reuse of the materials. Once the compartments are filled, they are transported to the treatment facilities, where the collected materials will be processed for reuse. These specifications give rise to interesting and new optimization problem. In addition, our problem is complicated by the stochastic accretion rate of material in the cubes. We present a formulation of the model. We examine two different policies for scheduling of emptying recycling cubes and related transportation to treatment facilities. The aim is to minimize the operation cost, while ensuring that cubes are not overfilled and capacity constraints of vehicles are not exceeded. Furthermore, we investigate if information systems could lead to better planning and minimization in the total cost.