

## Weekly Status Report – Niles Guo Oct 29, 2017

### **This week's activity:**

1. Went through the MML exercise with Tim and filled out the MML1 and 2 sections of the rubric. I will walk through this with Jay this week.
2. Incorporating the feedback from you and Jay on the paper outline. I plan to have a new draft tomorrow uploaded onto Asana.
3. Read both of Linling's paper with Ignacio on her optimization models.

### **MML1/2 Rubric:**

<b>Level</b>	<b>Activities</b>	<b>Output</b>
<b>MML1</b>	<ul style="list-style-type: none"><li>- Problem statement</li><li>- System boundary defined</li><li>- Input/output parameters defined</li><li>- Key system constraints defined</li></ul>	<p>Problem statement: Overall objective is to design an efficient wastewater management system for shell gas production in the Marcellus region.</p> <p><u>System boundary:</u></p> <ul style="list-style-type: none"><li>- Gas production and gas revenue (through drilling and production schedules) are treated as constants and not modeled explicitly.</li><li>- Only air emission is used to model human health/environmental impact. Water contamination, noise pollution, or other community impacts are not modeled here.</li><li>- Both onsite and centralized water treatment options are considered.</li><li>- Water disposal is included in the analysis.</li><li>- Water transport, in terms of both volume and options, are modeled.</li><li>- Different onsite water storage options are modeled.</li><li>- Only considering the Marcellus region.</li></ul> <p><u>Global Parameters:</u></p> <ul style="list-style-type: none"><li>- Fracking schedule</li><li>- Case study setup (locations of well-pads, centralized treatment facility, storage options, freshwater sources etc.)</li><li>- Available waste water treatment technologies and their specifications</li></ul>

		<ul style="list-style-type: none"> <li>- Marginal human health impact parameters associated with each activity.</li> <li>- Freshwater demand</li> <li>- Waste water production</li> <li>- Transportation layout and options</li> </ul> <p><u>Key Input Parameters:</u></p> <ul style="list-style-type: none"> <li>- Selection of freshwater source</li> <li>- Selection and sizing of water storage</li> <li>- Variable cost parameters</li> <li>- Selection of waste water treatment options</li> <li>- Selection of transportation options</li> <li>- Amount of reuse of waste water</li> <li>- Objective weighting</li> </ul> <p><u>Key Output Parameters:</u></p> <ul style="list-style-type: none"> <li>- Water management financial cost</li> <li>- Human health impact cost</li> </ul> <p><u>Key Constraints:</u></p> <ul style="list-style-type: none"> <li>- Mass balance constraints (water volume)</li> <li>- Regulatory constraints (water disposal option? Water reuse?)</li> <li>- Operator constraints (quality of water for reuse?)</li> <li>- Transportation constraints (trucking rates, piping connection, pipe size)</li> </ul>
<b>MML2</b>	<ul style="list-style-type: none"> <li>- Key objective functions defined</li> <li>- Relevance and viability of the study</li> </ul>	<p><u>Key Objective Functions:</u></p> <ol style="list-style-type: none"> <li>1. For a set fracking schedule and set production schedule, the objective is to minimize waste water financial cost.</li> <li>2. For a set fracking schedule and set production schedule, the objective is to minimize human health and environment impact cost.</li> <li>3. For a set fracking schedule and set production schedule, the objective is to maximize re-use of waste water/minimize the use of freshwater.</li> </ol>

**Issues/Agenda for next meeting**

1. No meeting this week, but I will schedule some time with Jay to walk through the MML 1 and 2 rubric and get his feedback. Once that's done we can start moving to the MML3 activities and start building out some of the submodules.

**Next week's activity:**

1. Iterate through the paper outline.
2. Start working on the MML3 activities based on feedback from Jay.