

# Planning Tools for Mass Depop Events

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# Problem Statement

- Engineering solutions can be tested and evaluated on a small scale
- Implementation effectiveness requires taking into account system interaction.
- Simulation can estimate the resources required to scale-up process to disaster response proportions.

# Goals

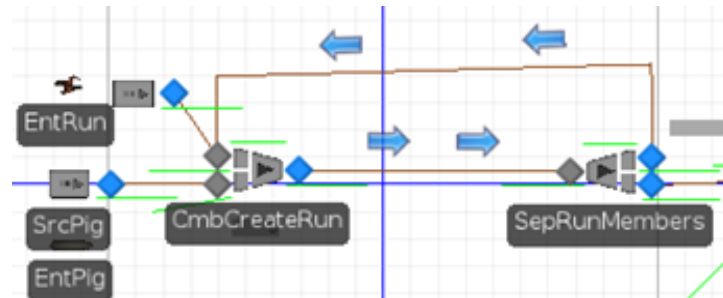
- Strategic(Before)
  - Develop basic estimates of resource requirements before disaster.
- Tactical(During)
  - Assist in identifying resource savings/need during event.
- Delivery via Web application

# System Overview

- 4 Distinct Stages
  - Moving pigs from house to loading chute
  - Loading pigs onto available farm truck
  - Preparing trucks and gasification
  - Disposal of carcasses
- METRIC: Time to complete process.

# Moving Pigs from house to truck

- Influenced by following user inputs
  - Pigs: Number, Weight class
  - Houses: Number, Size, Loading Slot length
  - Workers: Number available
- Variables affect **Travel Time** of run.
- Calculated travel time parameterized travel time distribution(stochastic travel time).



# Load Truck

- Pigs Loaded onto truck
- Capacity of trucks from pig weight class

Class Name	Space Requirement(sq. ft./pig)
Nursing (<50lbs)	1.09
Weaning (50-100lbs)	2.635
Finishing (100+lbs)	3.48
Breeding Boar/Sows	5.55

- Details
  - One or more loading chutes available

# Preparing Trucks for Gas

- Before each application of gas some preparation (check tarp, attach hose etc.)
- Assumed to take between 5 and 10 mins
- May physically take place at gas location.



# Administer Gas

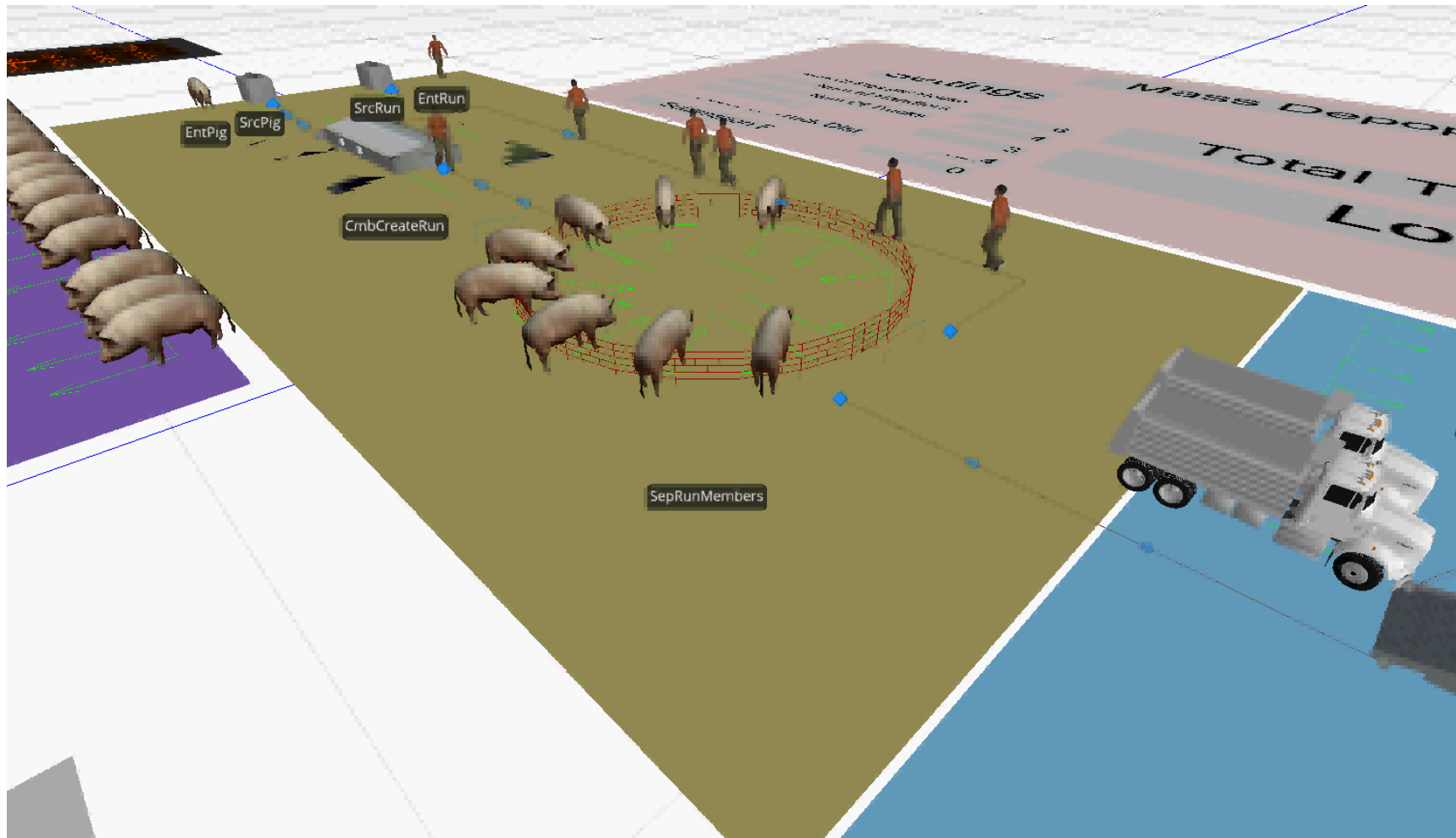
- Correct Flow rate(20-30% of volume of container/min) applied for minimum of 5 minutes.
- Applying gas consumes available stock.
  - Process halted when no more gas
  - Gas can be delivered on intervals.
  - Sublimation a way to extend gas stock



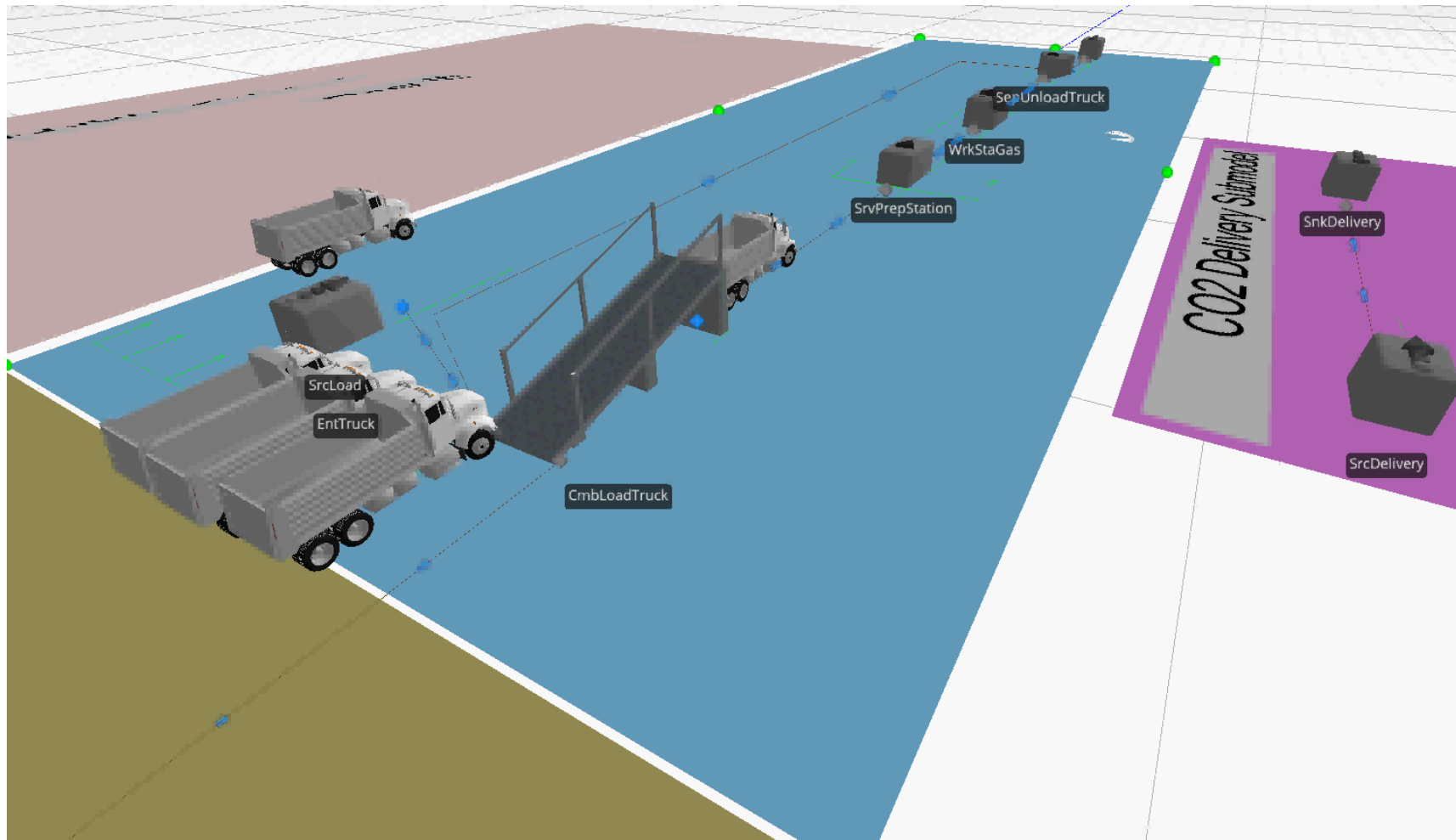
# Dispose of Carcasses

- “Dwell Time” of 10 minutes accounted for in minimum travel time to Disposal Site.
  - Ability to travel immediately after gas
- Trucks take time to return to loading slot

# Computer Animation of process



# Computer Animation(2)



# Parameters and Control Variables

- Farm Parameters
  - Size of House
  - Size of Pin
  - Number/Length of Load Slots
- Truck Controls
  - Truck Size
  - Number of Trucks
- Handler Controls
  - Number of Handler
  - Handler Efficiency
- Special Process Parameters
  - Dry Ice recovery process option

# Planning Tools using Simulation



# Web App Solution

- Best resource solution form a large array of scenarios batch run in simulation model.
- Results stored in database.
- Web application exposes relevant controls to decsionmaker and calculates resource requirements based on stored simulation results.
- Web app runs fast (seconds) and requires no specialized software.



# Web App Screen Shot

## Mass Depopulation Resource Requirement Calculator

### Description

This program uses the inputs entered in to this form to calculate an estimate the resources required to complete depopulation on a single farm described by the inputs entered below within the fixed time window given. This program may be extended to analyzing multiple farms by changing the number of houses that must be covered. We hope this information is useful !

Goal Maximum Time :24  (hours)

### Farm Description

Number of Houses :6

House Size (in Number of Pigs):

800  
1224  
1600

Pig Type (Select One):

Nursing(<50 lbs)  
Growing (50 - 100 lbs)  
Market (100+ lbs)  
Breeding Boar/Sows

Loading Chute: One for ALL houses  One for EACH house

### Resource Information

#### Truck Information

Truck Size :

8'6" x 18' (Dump style truck)  
8'6" x 50' (Double deck Semi)  
8'6" x 53' (Double deck Semi)

#### Handler Efficiency

Percentage Efficiency of Handlers: 90  %

#### Advanced Options:

Estimate Time with Sublimation Process Enabled: yes  no

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Last updated: 8 February 2014

# Web App (1)

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# Web App(2)

## Resource Information

### Truck Information

Truck Size :

- 8'6" x 18' (Dump style truck)
- 8'6" x 50' (Double deck Semi)
- 8'6" x 53' (Double deck Semi)

### Handler Efficiency

Percentage Efficiency of Handlers:  %

### Advanced Options:

Estimate Time with Sublimation Process Enabled: yes  no

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# Web App Output Page

## Resources Required to Complete Operation in Goal Time of 24 (hours)

1 House takes 1 team of 8.0 handlers and 4.0 trucks 1.9886 hours to complete process

6 Houses takes 1 teams of 8.0 handlers and 4.0 (8' 6"x 18 ' ) trucks

## Total Resources

8.0 Pig Handlers

4.0 Trucks/Truck Drivers

Depopulation Phase Resources Requirements

Gas/ Gas Preparation Station: 2 dedicated workers

Burial Site: 1 Excavator, 2 dedicated workers

## Input Data

Number of Houses: 6

House Size: 1224 (given in house head capacity)

Pig Type: Nursing(up to 50 lbs)

Loading Chute: 1

Truck Size: 8' 6" x 18'

Percentage efficiency of handlers: 90 pct

Sublimation Enabled: NO

# Questions?

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