Modelling the fuel cycle as a system allows for the assessment of inconsistencies and identification of key facilities.

This can be used to support and guide verification efforts.

The operating parameters for each facility may not be known. To model this, input parameters from the fuel cycle can be estimated from open sources and assigned a credible uncertainty and suitable distribution. Uncertainties are often normally distributed. However, many of the model parameters nuclear fuel cycle are not.

As input parameters are varied, the facility throughput changes. Sensitivity is the study of how an output variable, or an outcome, is impacted by changing the input variables. For example, models for centrifuge enrichment will exhibit non-linear relationships between inputs and output. The graph above shows a quadratic relationship between the tails assay and output of an ideal centrifuge cascade.

\[
F = P + W
\]

\[
V(\mathrm{eff}) = (2N - 1) \ln \frac{N}{T} - T
\]

\[
\Delta U = PV(N_f) + \frac{WV(N_a)}{N_a} - PV(N_f)
\]

A few of the key equations that characterise the centrifuge are found below. Here, F is feed, P is product, W is waste, N is the respective fraction of U-235 in each stream, V is the value function and \(\Delta U\) is the separative power of an enrichment unit.

**System Level Effects:**

A baseline scenario can be built based from open source information. Some sets of input parameters may be distributed such that multiple scenarios with differing fuel cycle configurations become equally likely. For example, an addition of a clandestine enrichment facility to the baseline scenario is consistent with available material flows.