



# PJM Fuel Security Phase III Scenario Planning

July 11<sup>th</sup>, 2019

## Phase I

- Winter weather, load, forced outage rates
- Generation retirements
- Non-firm gas availability
- Pipeline disruptions
  - Fixed duration
  - High vs. medium impact
  - “Looped” vs. “non-looped”
- Oil refueling rate
- Dispatch procedure

## Phase III

- Availability of SCADA
- Pipeline repair/bypass time
- Supply disruption/reductions
- Pipeline transfer capacity constraints
- Weather
- Duration of events



## Large-scale SCADA Compromise

(Nation-State)

The production environment and source code of a SCADA vendor with substantial market share is compromised, resulting in an extended period of unavailability. Asset owners are required to function in “local” operation for a period of multiple days to multiple weeks.



## Physical Attack

(Non-State Actors)

A coordinated attack is executed at double-digit number of sites within the gas delivery network (pipelines, compressor stations, etc.), resulting in multiple disruptions. Time requirements for partial or complete service restoration ranges from days to weeks depending on location.



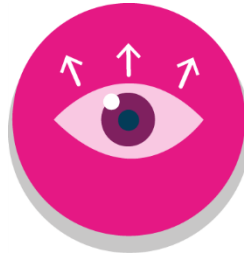
## Company Targeting

(Nation-State)

An Advanced Persistent Threat (APT) actor targets 1-2 large owner/operators for the purpose of creating maximum cyber effects to SCADA systems and underlying IT infrastructure.

## Loss of SCADA Resulting in “Local Operations”

Pipeline operations are executed manually at compressor stations without remote visibility. Variable sensitivities tied to duration and operating (demand) conditions.



## Gas Pipeline Transfer Capacity

Constraints associated with back-feed or transfer pipe size/location relative to disruptions. Variable sensitivities tied to duration and operating (demand) conditions.



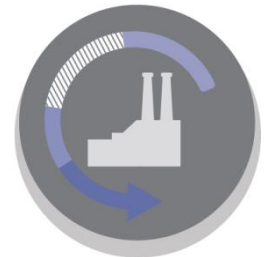
## Mean Time to Recover for Pipeline Damage

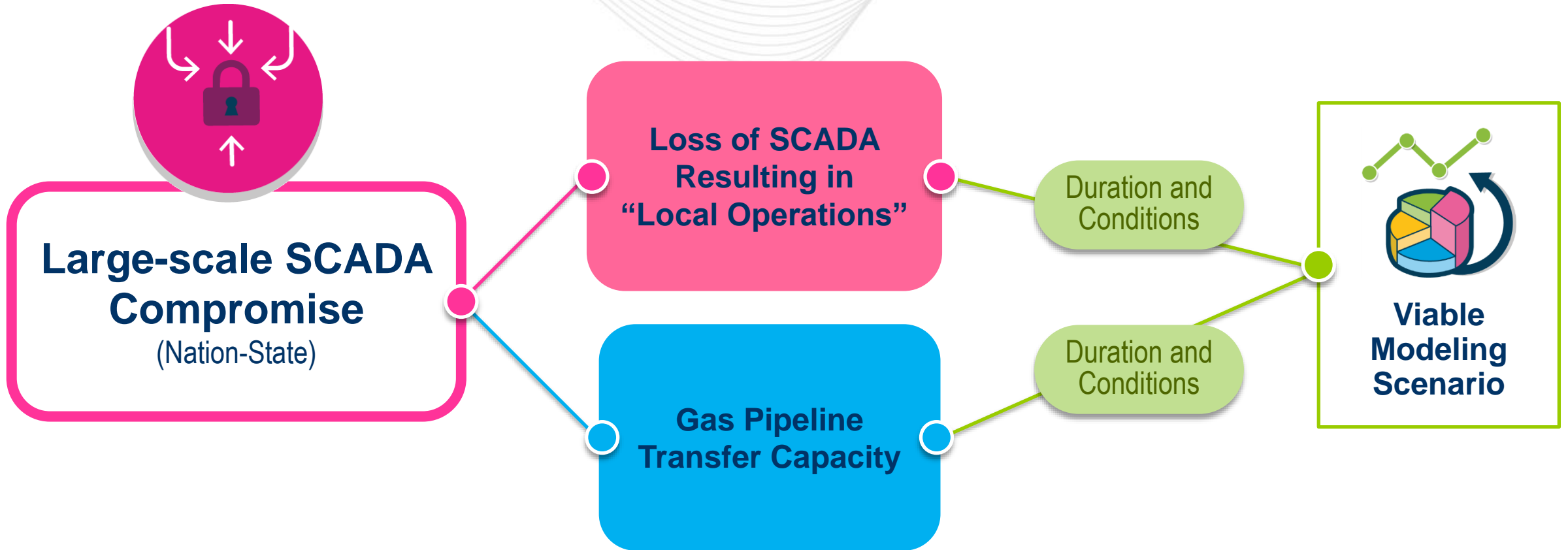
The time needed to repair or bypass a damaged segment of pipeline (or compressor) based on location, availability of personnel and equipment, and inspection.

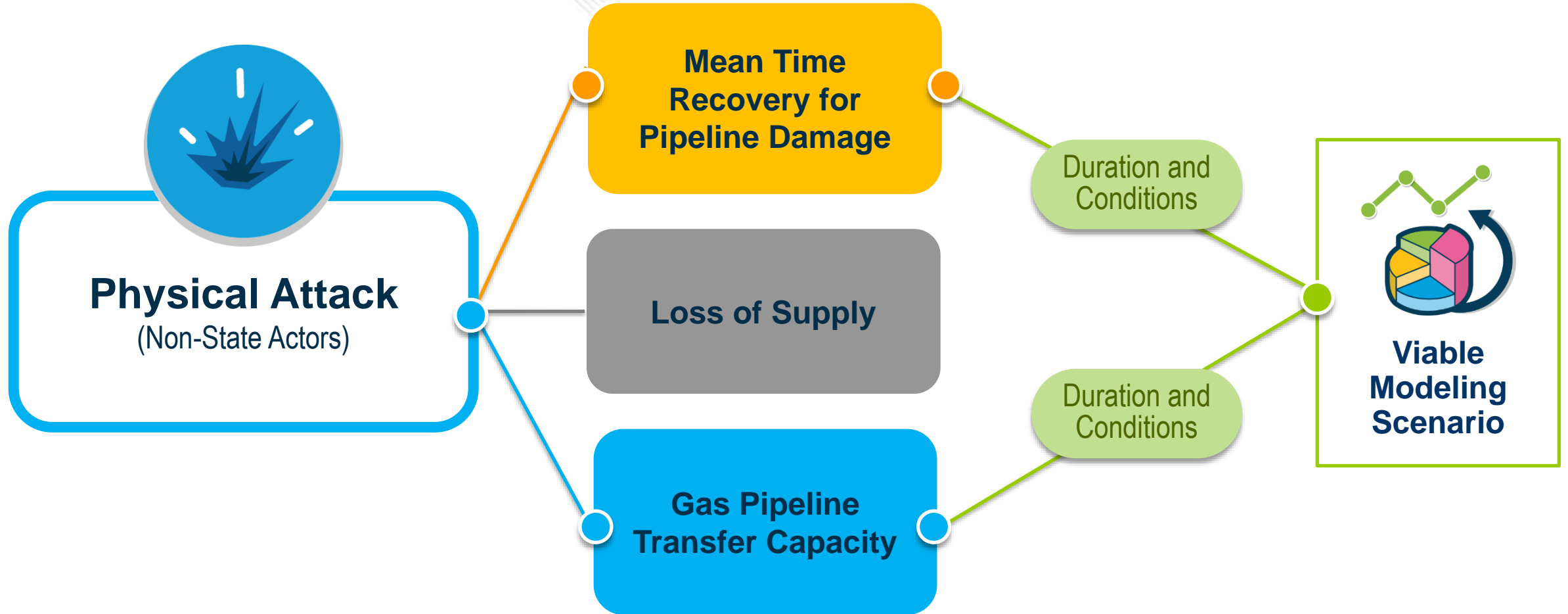


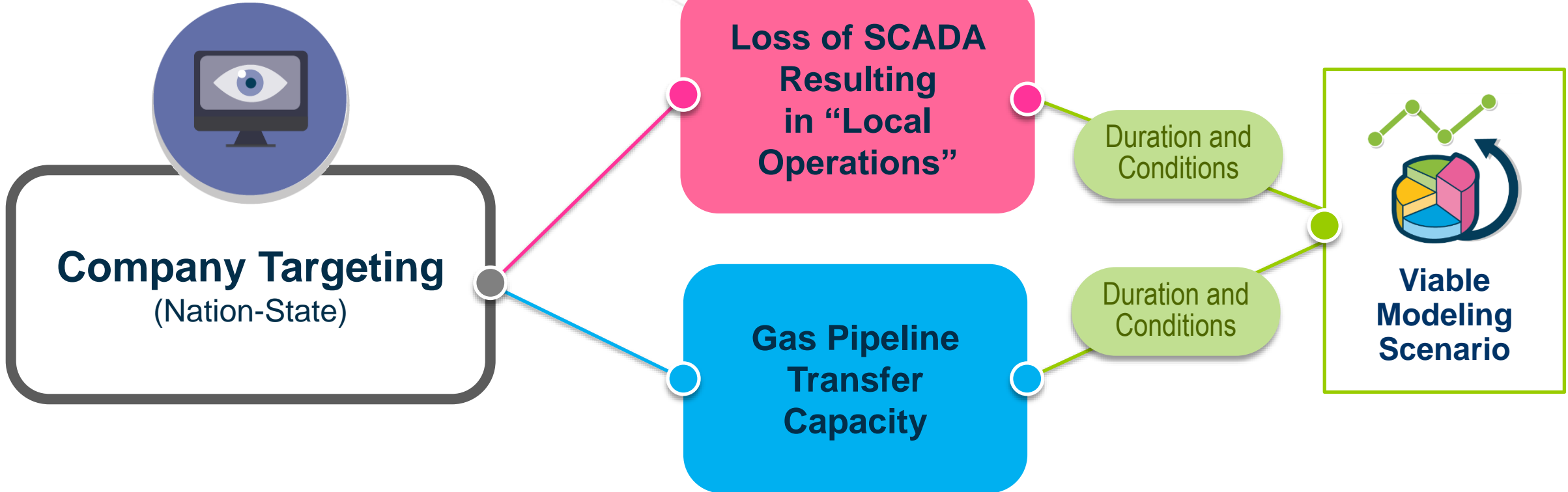
## High Impact Loss of Supply

Disruption or compromise of regional storage facilities or primary regional production facilities.









- Validation of potential credible scenarios
- Assistance with determination of realistic outage duration estimates
- Encouragement of pipelines to supply data to PJM and assist in scenario development and duration analysis
- Monitoring and review of preliminary results.