NGTL Restriction Protocol 101

Educational Material

Agenda

1. Guiding Principles
2. Local and broad area restrictions
3. Conceptual assessment process for broad area restrictions
4. Outage management in typical broad area restriction scenarios
5. NGTL - a complex and evolving system
6. Operations communications

Guiding Principles for System Operations

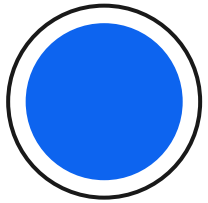
System managed in accordance with NGTL guiding principles:

1. Prioritize availability of firm service – reduce IT availability first reducing flow to align with system capability
2. Optimize throughput – maximize system capability without incremental impact to FT availability

Managing system constraints

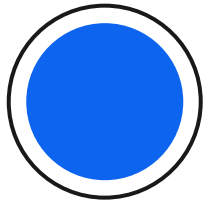
- Outages are necessary to facilitate safe execution of maintenanceprogram to ensure safety and reliability of the system
- When restrictions are required, NGTL consistently applies the guiding principles to manage system flow and align the flow with throughput capability at the constraint
- Each system constraint is unique and assessed specifically based on the location and facilities involved in the outage, system load factor, linepack, supply and demand distribution, and other applicable factors
- The same facility outage at different times may result in different restrictions (services, areas, magnitude or duration)

Local and Broad Area Restrictions: Definitions



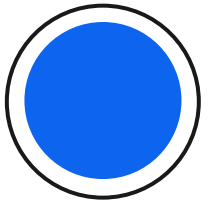
RESTRICTION

A reduction in service for a period of time in order to reduce flow through a constraint as part of maintaining safe operations



LOCAL AREA RESTRICTION

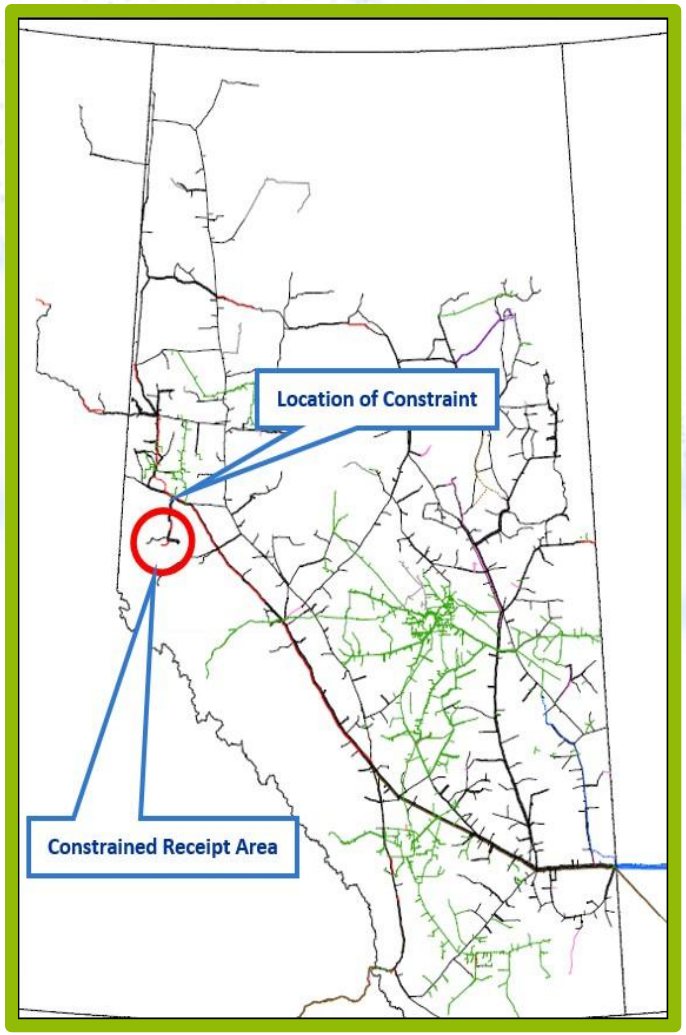
Restrictions which are imposed on services relying on a narrow set of facilities that can impact flows through a constraint (e.g., receipt or deliveries on a lateral on which maintenance is performed)



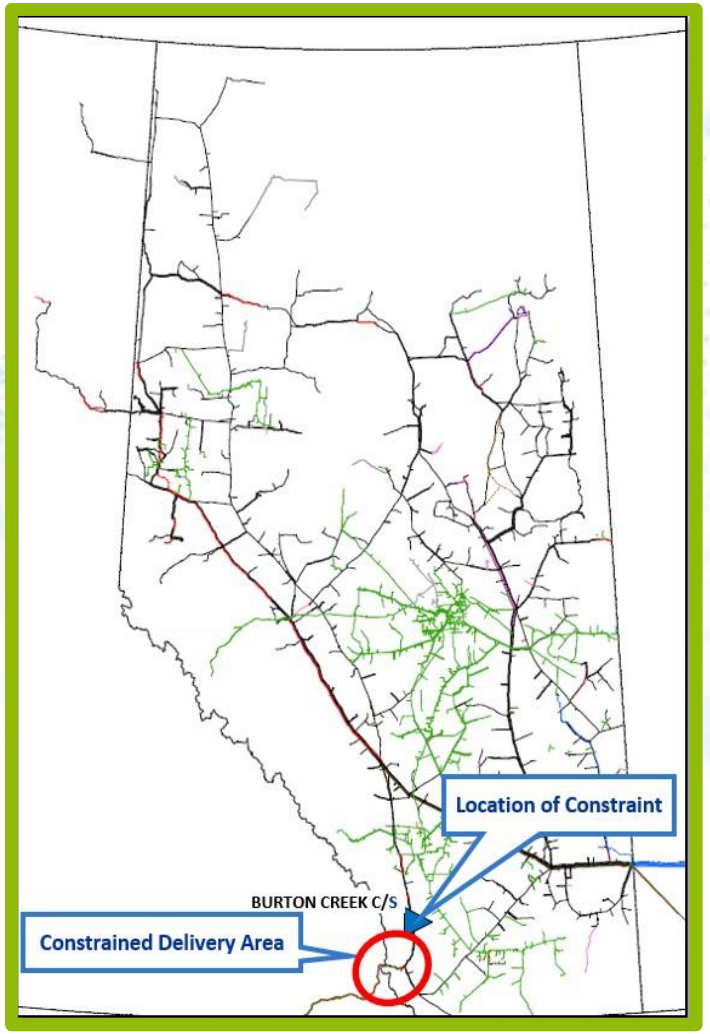
BROAD AREA RESTRICTION

Restrictions which are imposed on services located in large upstream and/or downstream areas that impact flows through a constraint (e.g., maintenance on a compressor station located downstream of a broad area of receipt and upstream of a broad area of deliveries)

Examples of Local Area Restrictions

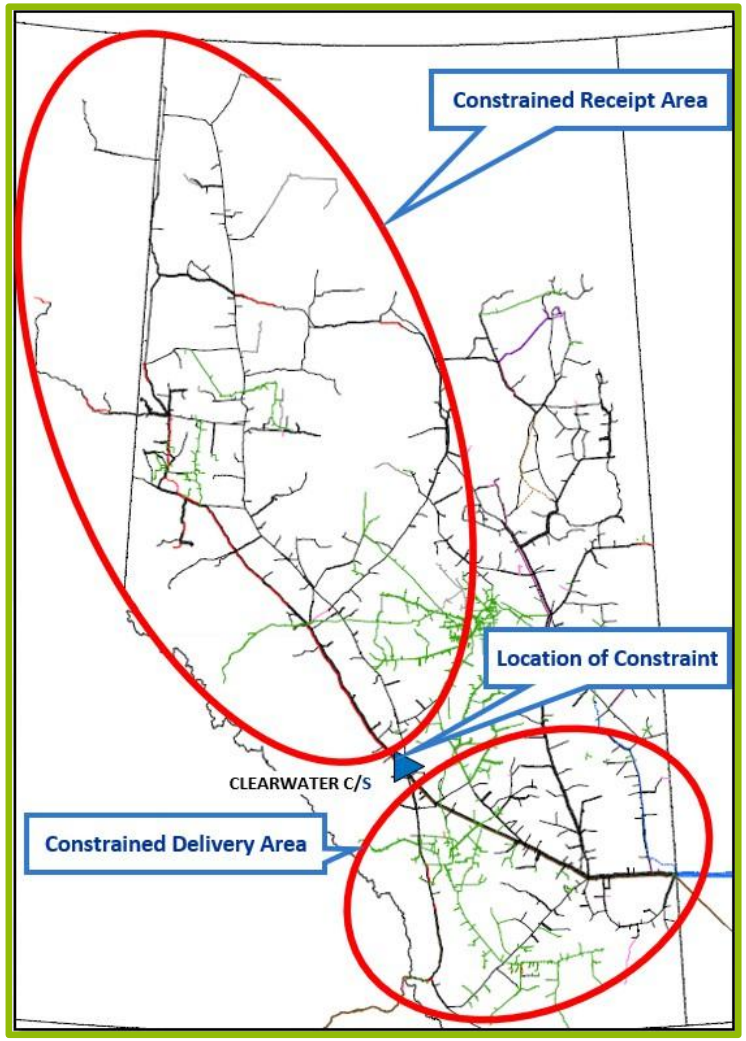


- Local area restrictions may impact a local receipt or delivery area
- Impact area would typically be upstream of a local receipt area constraint or downstream of a local delivery area constraint
- Restrictions outside of impacted area are not effective to manage the flow through the constraint
- Guiding principles will be applied to the impacted area
- Restriction will be applied to IT first and then FT if needed within the impacted area



Example of a Broad Area Restriction

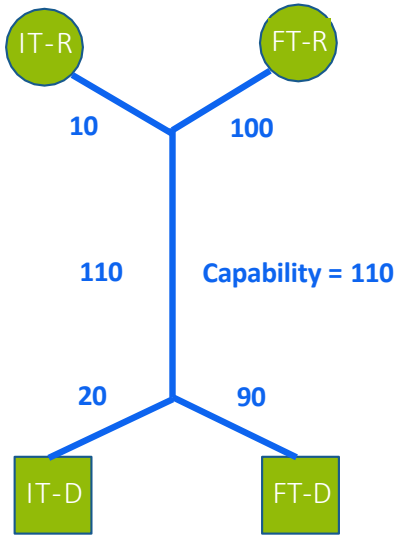
- The constraint substantially impacts the overall system throughput through the constraint
- Both receipt and delivery services contribute to system flow through the constraint and may potentially be reduced
- Restrictions on upstream receipt services and downstream delivery services can effectively contribute to manage flow to align with capability at the constraint
- The guiding principles are applied to both upstream receipt services and downstream delivery services to determine the appropriate restrictions
- The restrictions may be on upstream and downstream services



Broad Area Restriction | Base Case Scenario - No Restrictions

- Slides 9 to 13 depict a set of highly simplified diagrams to conceptually demonstrate the typical assessment process for broad area restrictions
- The purpose of restrictions is to reduce the flow to the capability at the constraint
- The base case represents normal operations without any restriction

Base case
- All facilities available
- No restrictions
- Capability 110



100% FT-R, 100% IT-R

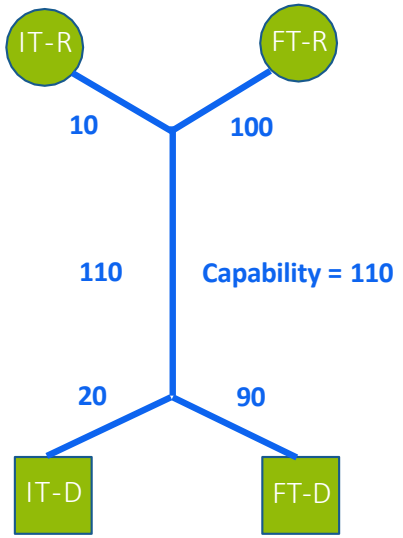
100% FT-D, 100% IT-D

Note:
- IT-R includes receipt IT-S and IT-D includes delivery IT-S
- Simplified examples on slides 9 to 13 illustrate impact of operational capability only. They represent specific selected flow scenarios.

Broad Area Restriction | Scenario A – Only upstream IT-R restriction required

Base case

- All facilities available
- No restrictions
- Capability 110



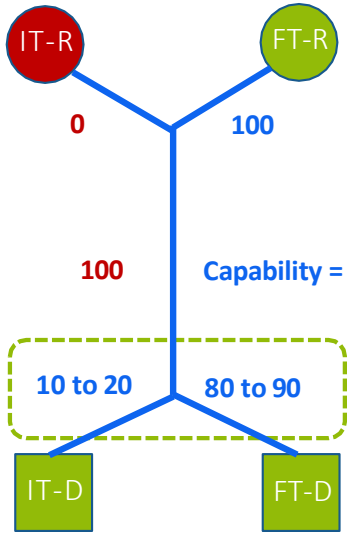
100% FT-R, 100% IT-R

100% FT-D, 100% IT-D

Outage reduces system capability through constraint to 100

Scenario A

- Only upstream IT-R restriction is required



Market drives split between IT-D & FT-D. Split can be any combination that adds up to the capability number. In this case, 100.

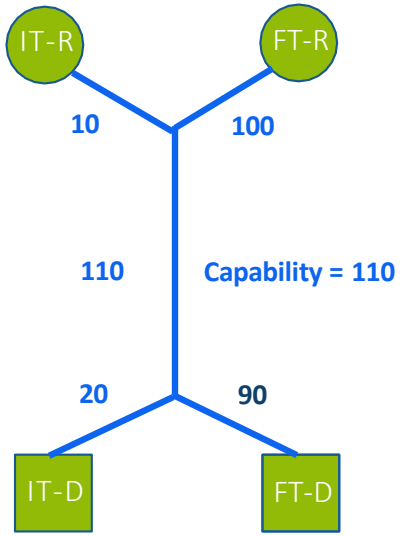
100% FT-R, 0% IT-R

100% FT-D, 100% IT-D

Broad area restriction | Scenario B – upstream IT-R & downstream IT-D restriction required

Base case

- All facilities available
- No restrictions
- Capability 110



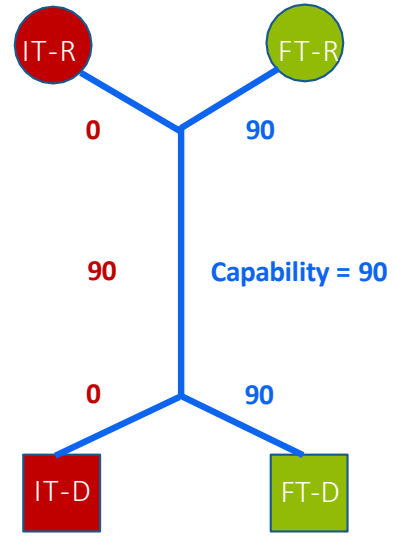
100% FT-R, 100% IT-R

100% FT-D, 100% IT-D

Scenario B

- Upstream IT-R restriction alone is not sufficient
- Adding downstream IT-D restriction is sufficient to reduce flow to align with the capability at the constraint
- Upstream IT-R & downstream IT-D restriction required
- While FT-R is not restricted, it can only flow 90 limited by daily supply demand balancing

Outage reduces system capability through constraint to 90



100% FT-R, 0% IT-R

100% FT-D, 0% IT-D

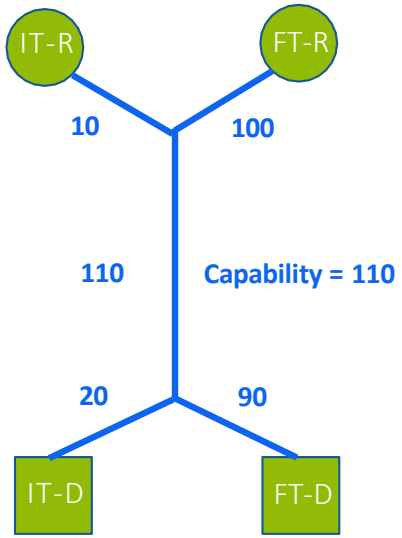
Broad area restriction | Scenario C – FT restriction required

Base case

- All facilities available
- No restrictions
- Capability 110

Scenario C

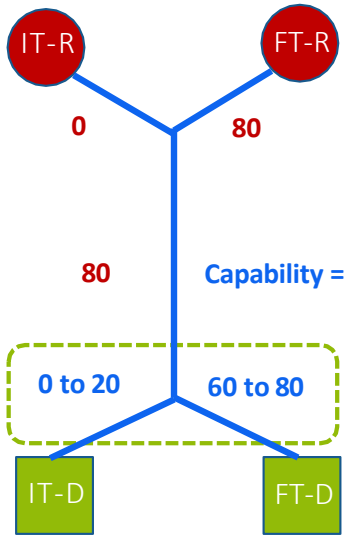
- Upstream FT-R restriction is only applicable when IT restriction is insufficient
- Upstream IT-R restriction remains in effect to minimize impact to FT-R



100% FT-R, 100% IT-R

100% FT-D, 100% IT-D

Outage reduces system capability through constraint to 80

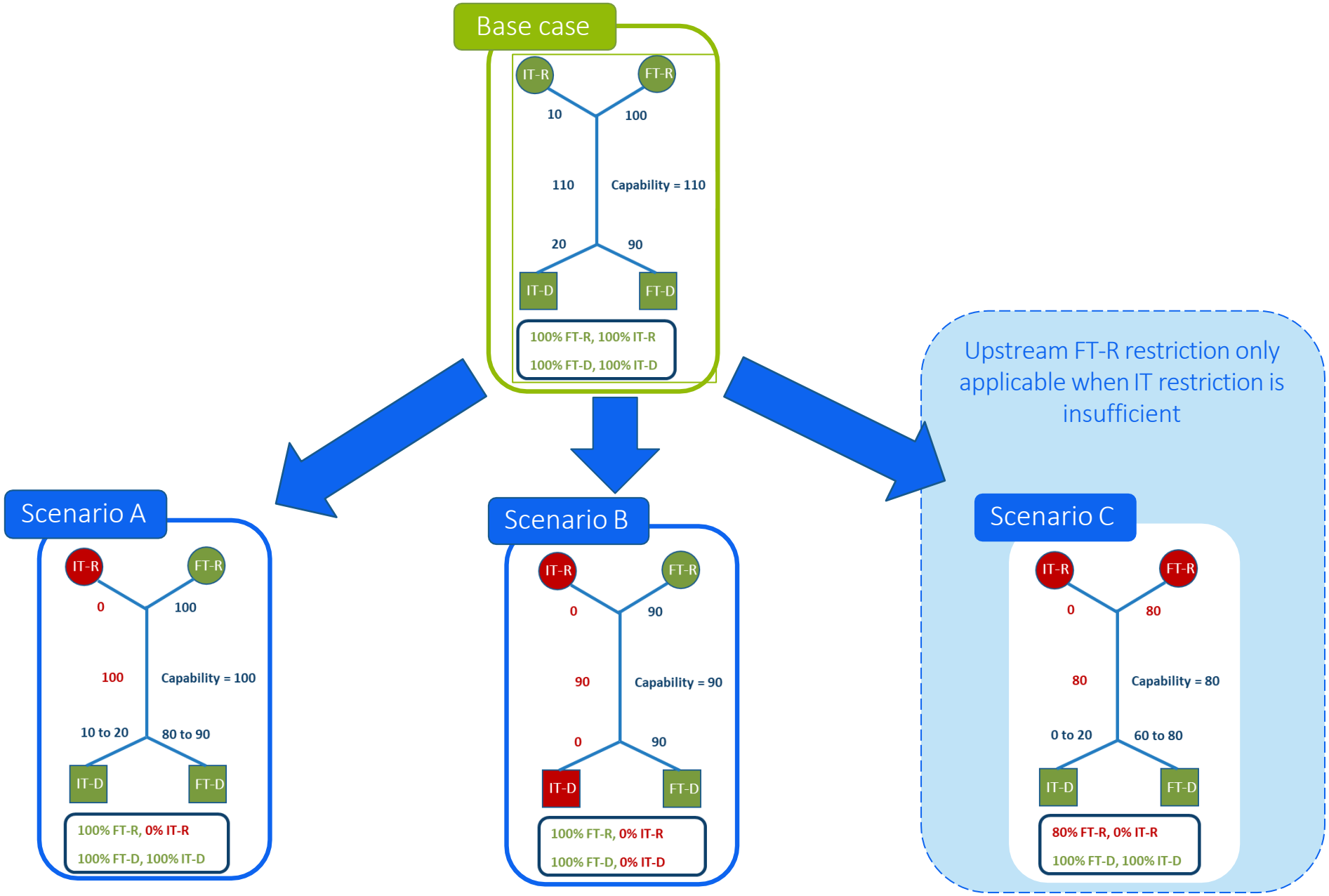


Market drives split between IT-D & FT-D. Split can be any combination that adds up to the capability number. In this case, 80.

80% FT-R, 0% IT-R

100% FT-D, 100% IT-D

Broad area restriction | Summary of simplified scenarios



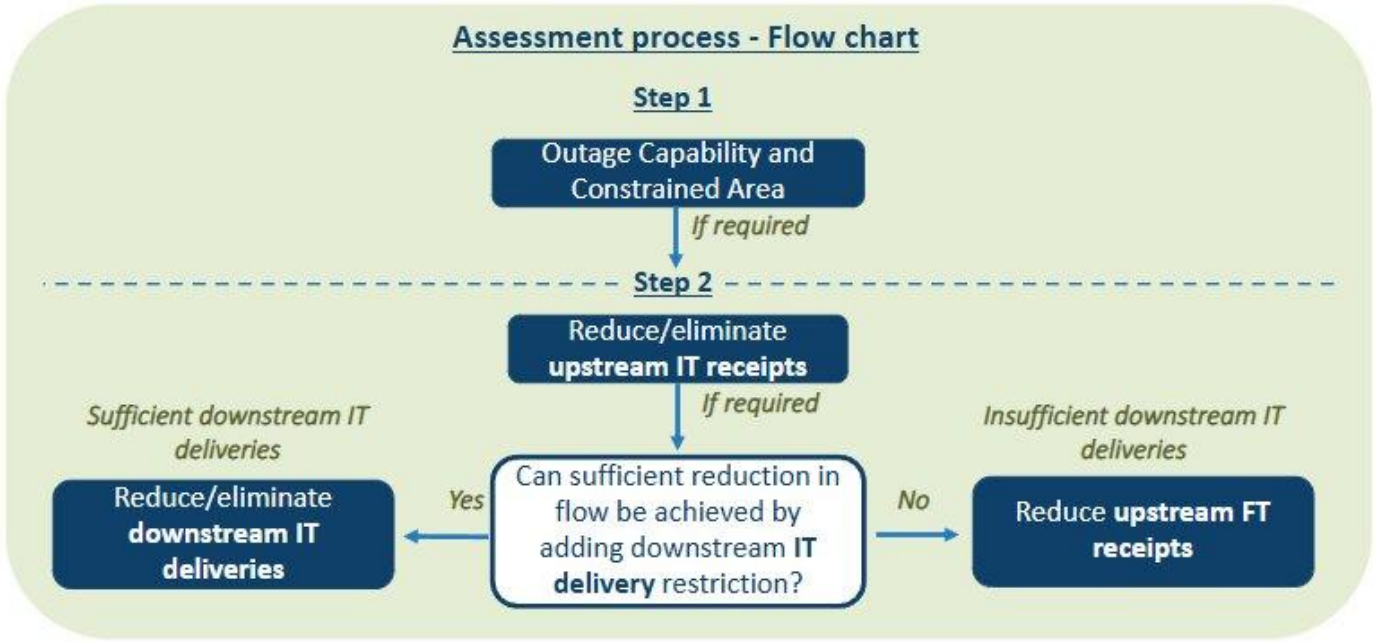
Broad area Restriction | Assessment Process

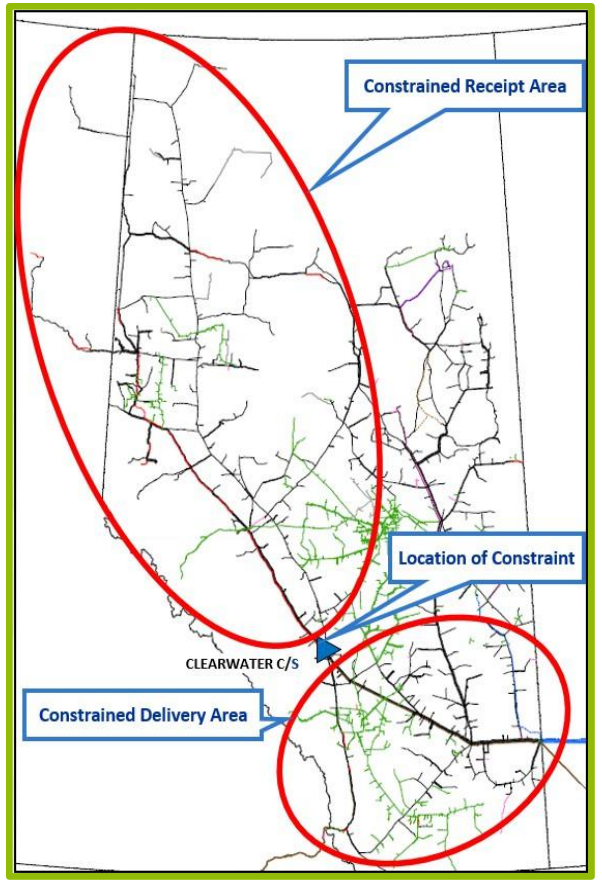
Step 1 - Outage Assessment

- Constrained area is determined based on hydraulic analysis
- Restriction is required if flow is expected to exceed capability in the constrained area

Step 2 – Restriction assessment process for supply constrainedoutage

- Applicable under the current system operations
- Applicable to broad area restrictions for most of outages in USJR

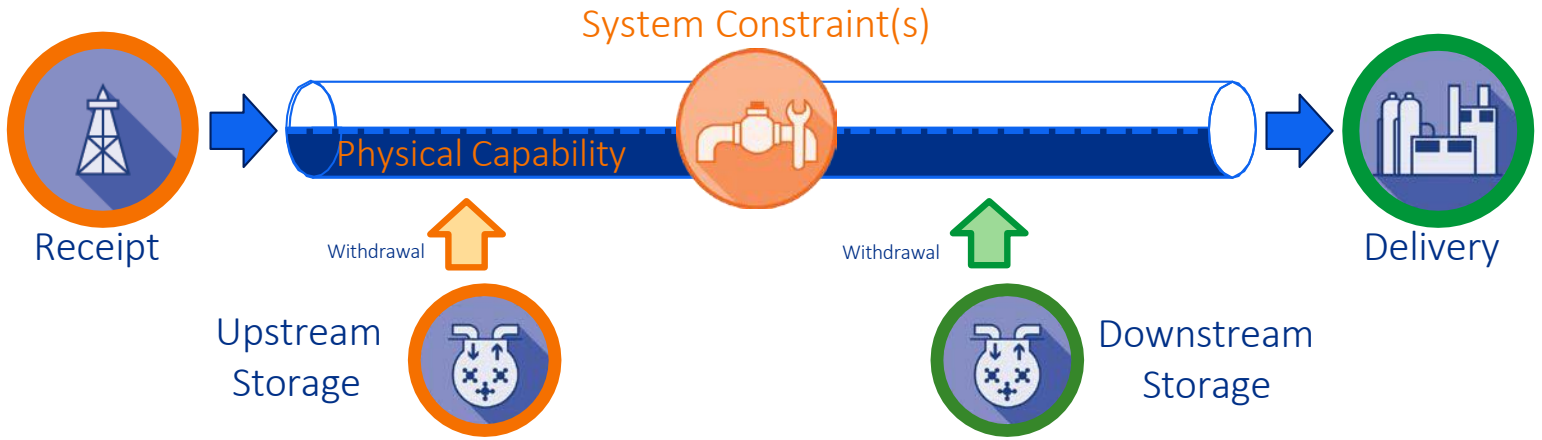


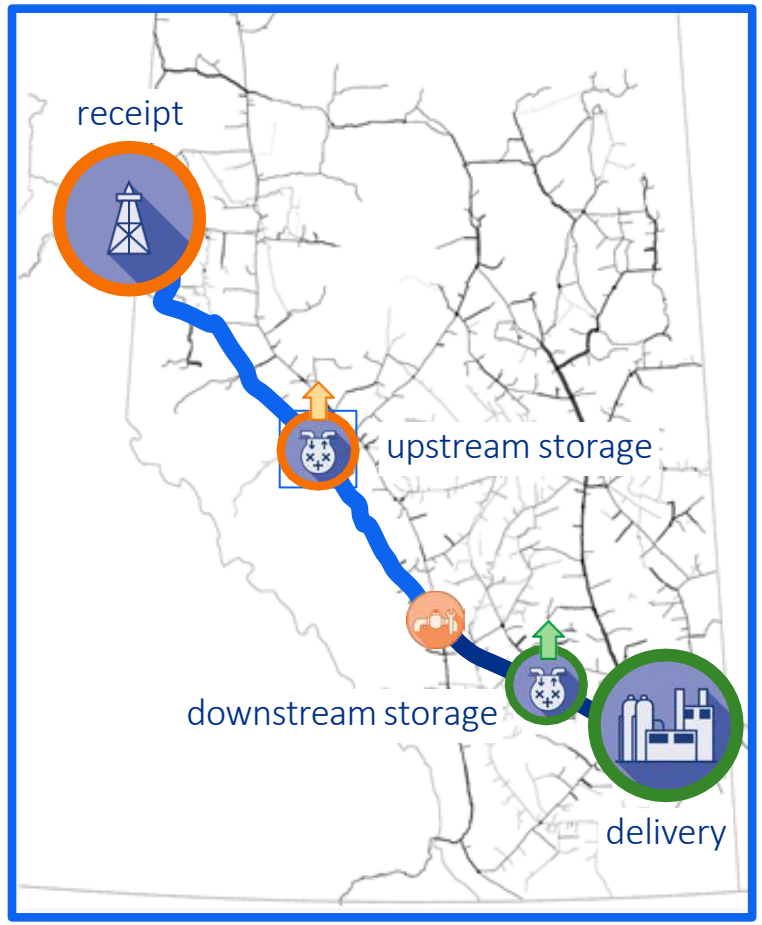


Outage Management | Scenario A – Only upstream IT-R restriction required

Guiding Principle
Linepack at Target
Supply Demand in Balance

A Restricting interruptible receipt service availability - typical during periods of upstream and downstream storage withdrawal





firm receipt - FT-R
all services available

upstream injection - IT-S
all services available

Interruptible receipt - IT-R
upstream withdrawal - IT-S

FT-D - firm delivery
all services available

IT-S - downstream withdrawal
all services available

IT-D - interruptible delivery
IT-S - downstream injection
all services available

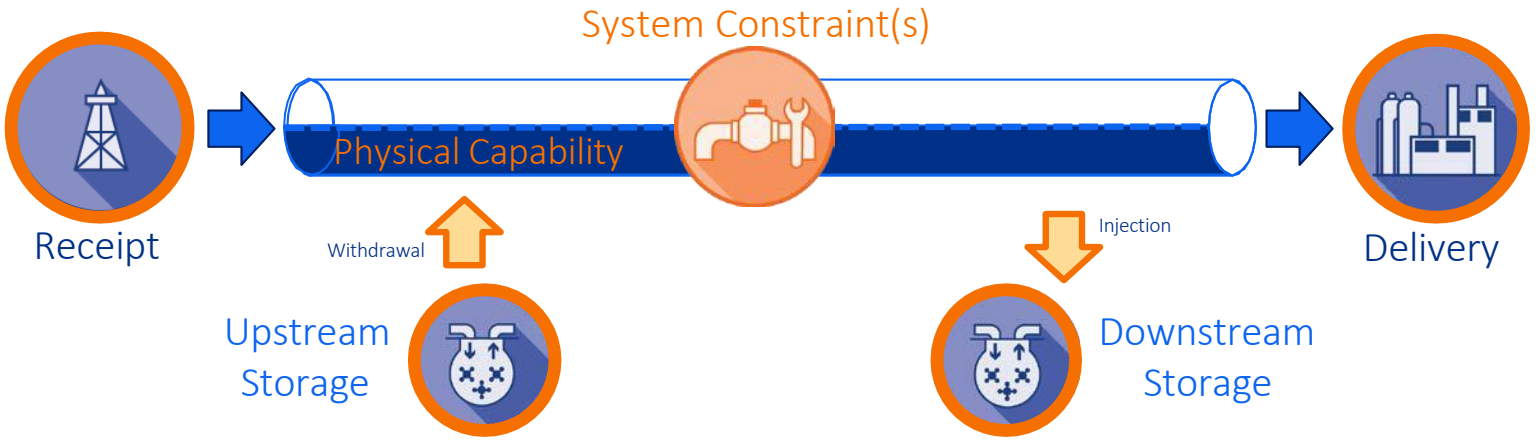
Restricting upstream IT-R is sufficient to reduce flow to align with capability at the constraint

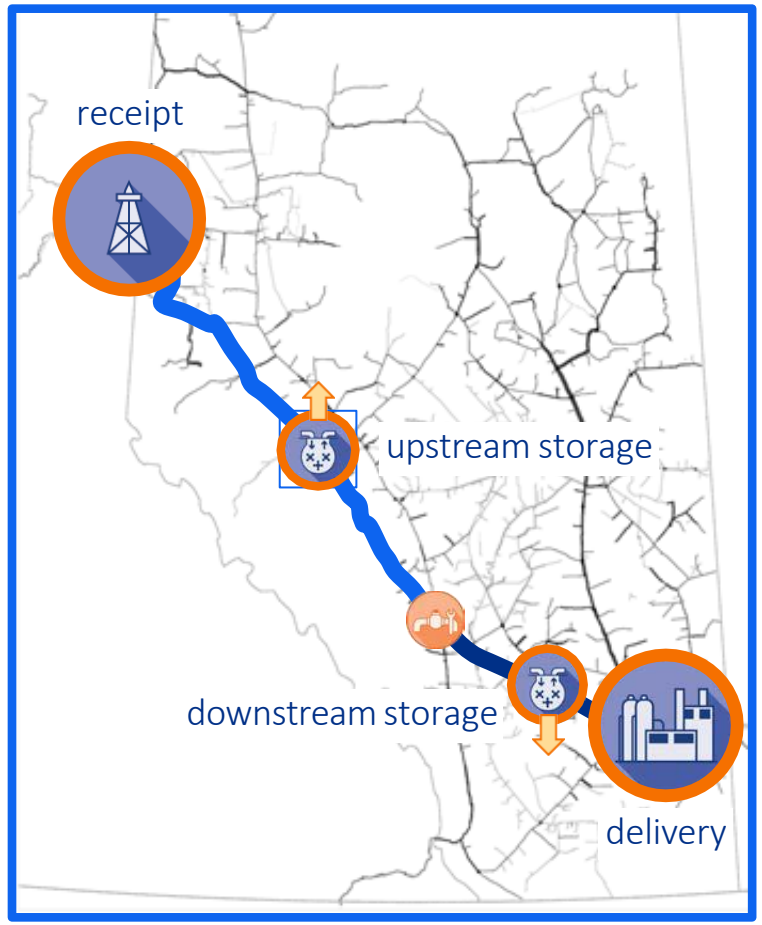
**Actual service authorizations will depend on several factors*

Outage Management | Scenario B – Upstream IT-R & downstream IT-D restriction required

- Guiding Principle
- Linepack at Target
- Supply Demand in Balance

B Preservation of firm receipt service availability – typical during periods of downstream storage injection





firm receipt - FT-R all services available	FT-D - firm delivery all services available
upstream injection - IT-S all services available	IT-S - downstream withdrawal all services available
Interruptible receipt - IT-R upstream withdrawal - IT-S	IT-D - interruptible delivery IT-S - downstream injection

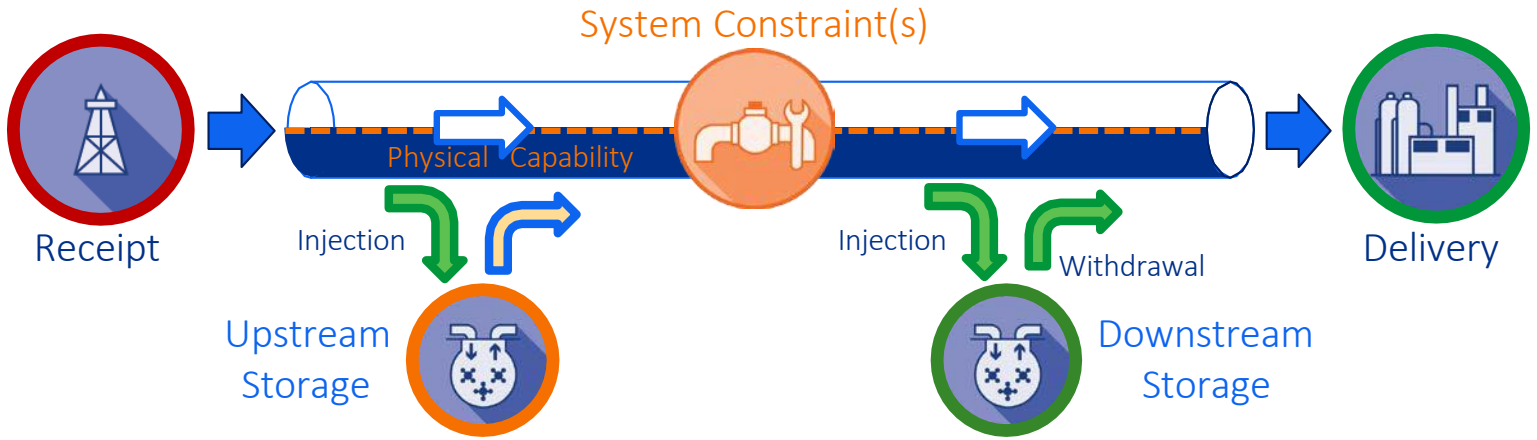
Restricting upstream IT-R and downstream IT-D is sufficient to reduce the flow to align with capability at the constraint

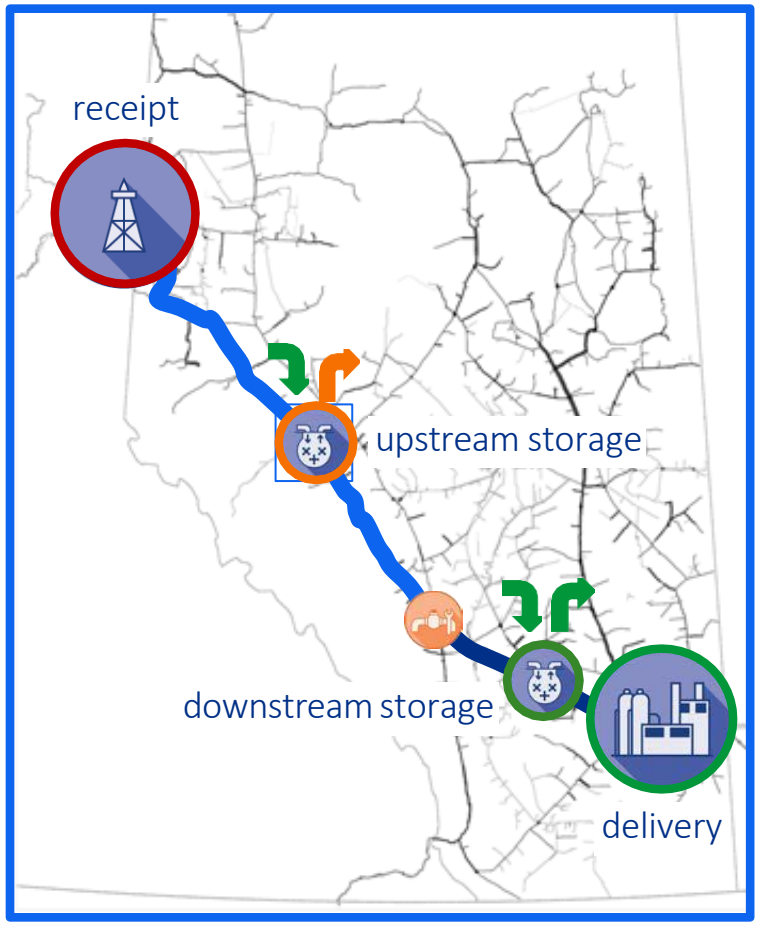
**Actual service authorizations will depend on several factors*

Outage Management | Scenario C – FT restriction required

- Guiding Principle
- Linepack at Target
- Supply Demand in Balance

C Firm receipt service availability reduced - required when flow reduction through limitation of IT is insufficient





firm receipt - FT-R reduced availability

upstream injection - IT-S all services available

Interruptible receipt - IT-R upstream withdrawal - IT-S

FT-D - firm delivery all services available

IT-S - downstream withdrawal all services available

IT-D - interruptible delivery IT-S - downstream injection all services available

Restricting IT is not sufficient and additional restriction on FT is necessary to reduce the flow to align with capability at the constraint

**Actual service authorizations will depend on several factors*

A Complex and Evolving System

NGTL is a **complex** and **dynamic** system with **multi-flow paths**. The restriction scenarios described above are intended to represent typical scenarios.

- Each outage is unique and its impact is assessed based on the specifics of the outage and operation condition at the time
- Other scenarios may drive different combinations of restrictions compared to scenarios included in this presentation
- The required restriction(s) are determined consistently based on the guiding principles

NGTL system continues to **expand** and **evolve**. The supply and demand distributions continue to change. As a result, the system **bottleneck will shift**

- Restrictions are influenced by the system bottleneck in addition to the operational factors such as supply and demand distribution at that time
- The restrictions required for an outage in the future may not be the same as the restrictions today for the same facility outage

Operational Communications

Long Term Outage Plan (Q3/Q4)

- Developed and communicated annually for known maintenance activity
- Longer lead time results in uncertainty

Daily Operating Plan

- Provides outage information - updated each business day
- New DOP tool to improve communication & customer experience

Monthly Customer Operations meetings

- Provide context on upcoming outages
- Q&A to improve customer understanding of operational topics

Bulletins

- Changes to service allowable communicated via bulletins
- Early notice of unplanned events that may affect firm service availability communicated via 'Advisory Bulletins'

NGTL is committed to continuously improve its timely and informative communication practices to minimize impact to customers

Daily Operating Plan (DOP)

DOP terminology

No impact to FT

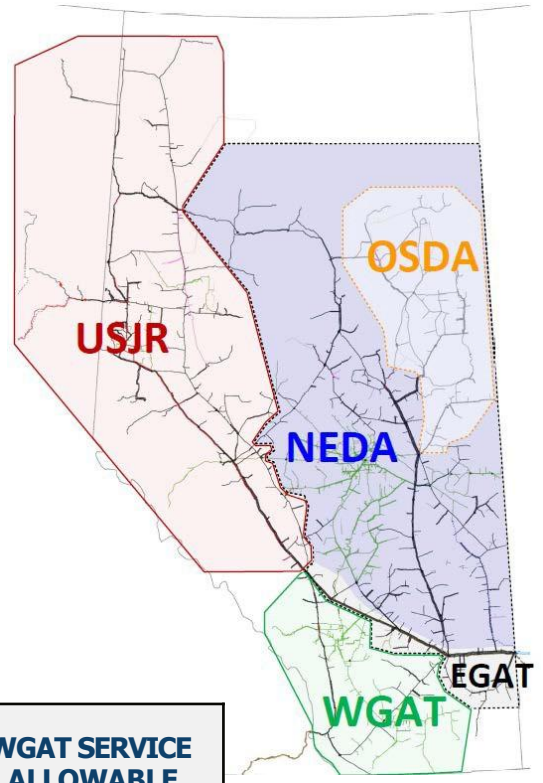
- Refers to outage periods where FT impact is not expected

Potential impact to FT

- Refers to outage periods where there is potential of FT impact

Partial impact to FT

- Refers to outage periods where FT impact is expected



Broad Area Outage in DOP

Outage Description	Start	End	Outage Impact ($10^6 m^3/d$)	Facility Location	USJR SERVICE ALLOWABLE	EGAT SERVICE ALLOWABLE	WGAT SERVICE ALLOWABLE
Berland River - Compressor Station Maintenance	9-Aug-21	11-Aug-21	16	USJR	Potential impact to FT-R USJR	No impact to FT-D anticipated	No impact to FT-D anticipated

Local Area Outage in DOP

Outage Description	Start	End	Outage Impact ($10^6 m^3/d$)	Facility Location	USJR SERVICE ALLOWABLE	EGAT SERVICE ALLOWABLE	WGAT SERVICE ALLOWABLE
Winchell Lake - Compressor Station Maintenance	3-Aug-21	7-Aug-21	15	WGAT	N/A	N/A	Potential impact to FT-D WGAT

Continuous Improvement

Customer Collaboration

Customer Operations Action Team (COAT)

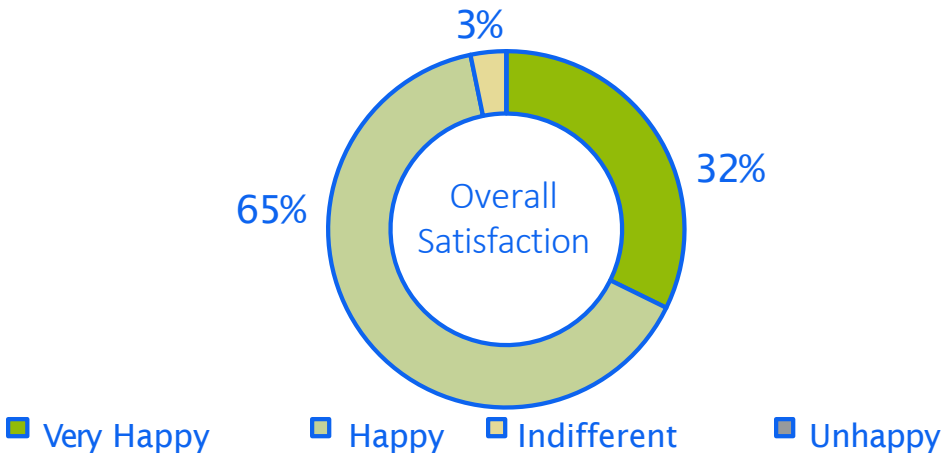
- 13 Enhancements (DOP, Bulletins, Customer Express)
- 550+ individual lines of feedback
- 370+ total customer hours

Big Bets

- 1 product, 1 retirement (NrG Bulletin)
- 90+ total customer hours

Committed to listening + continuous improvement

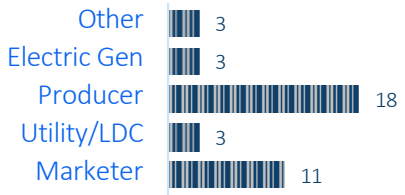
Customer Feedback: Improvements to Outage Planning



69%

Respondents feel they can better forecast + plan for maintenance on NGTL

Respondents



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