2023 TPP Projects – SDG&E

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Valley Center System Improvement

Project Proposal

Project Driver:

Category P0 and P1 NERC Violation in 2025, 2028, and 2035 TPP cases, as well as current operation

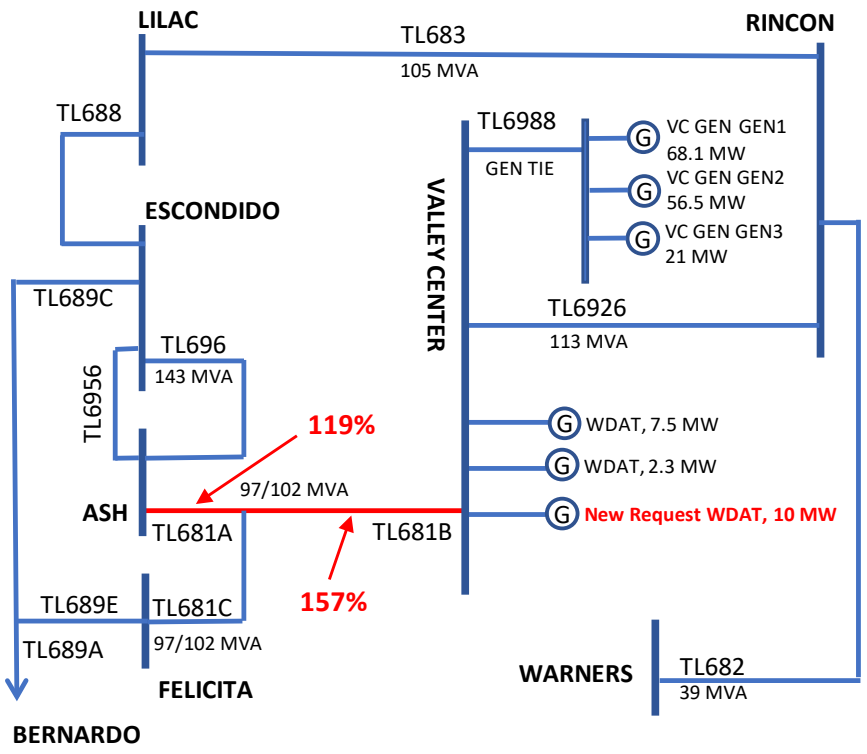
- **VC GEN Charging Scenario**
  - **Base Case (P0):** Overload TL681A and TL681B, triggers P0 RAS results in dropping all the VC charging load
  - **N-1 Contingency (P1):** Overload TL681A,TL681B, TL689E, TL6956, TL683, TL6926, TL682
- **VC GEN Discharging Scenario**
  - **N-1 Contingency (P1):** Overload TL681A,TL681B, TL6926, TL682

Project Scope:

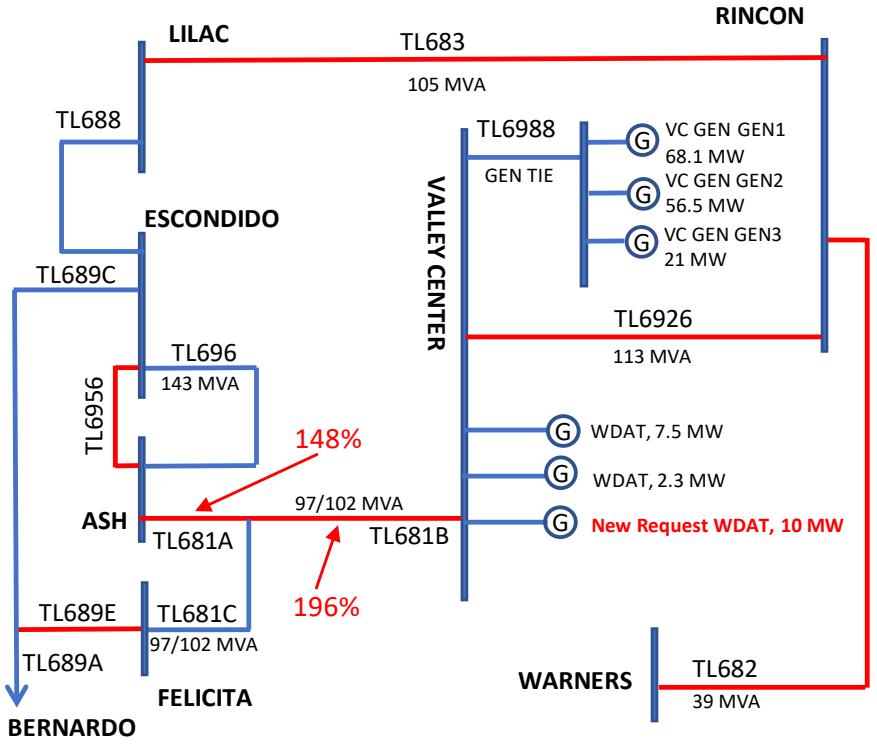
- Construct new 5 miles double circuit 69kV lines (one pole structure) to create two new lines to VC (ISD 2028)
  - One line will connect to a de-energized line TL99901 (Valley Center – Escondido)
  - One line will tap into TL688 to create a 3-terminal line (Valley Center – Escondido – Lilac)
- This project needs to de-energize TL681A
- This project needs to reconductor 0.1 miles TL698E.
- Re-conductor the UG section of the existing TL99901.

Project Driver

VC GEN CHARGING: BASE CASE (N-0)



VC GEN CHARGING: N-1 Overload

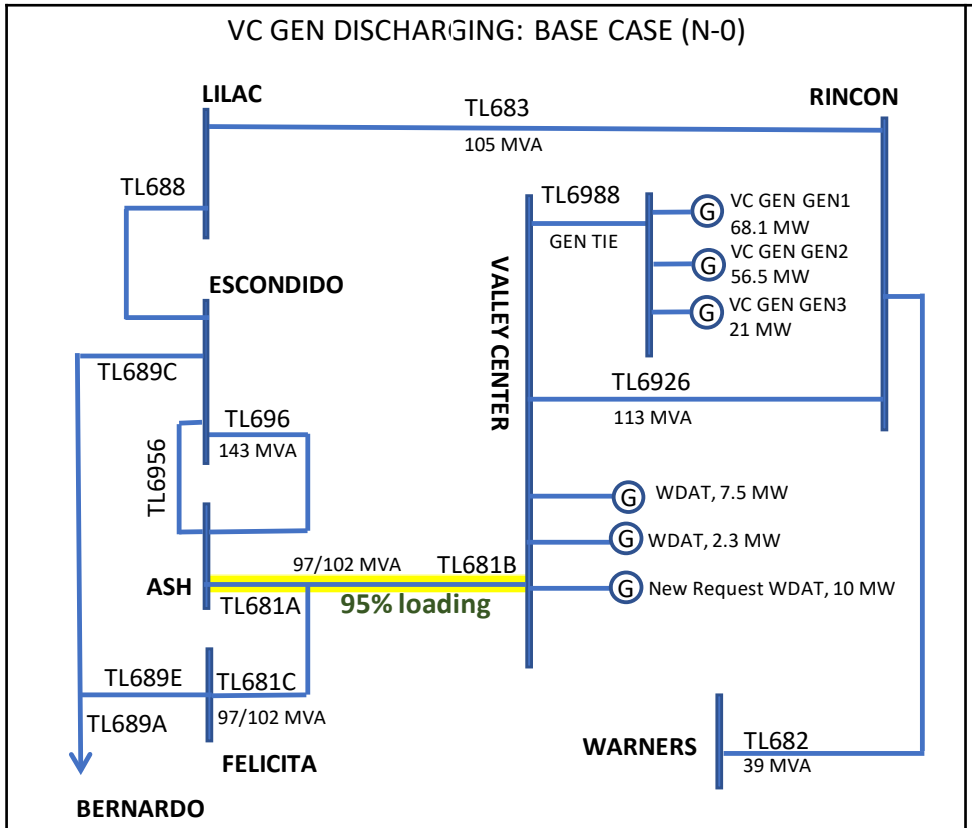


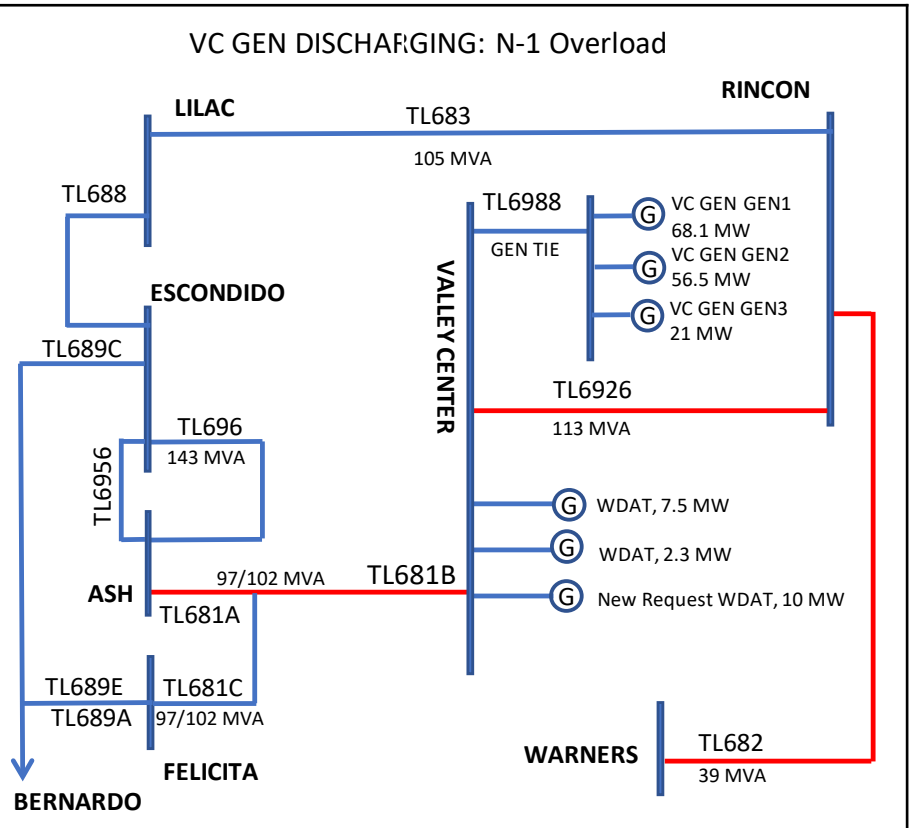
Reliability Issues:

- Requires a complicated RAS to maintain system reliability.
- Overload will trigger P0 RAS action dropping all the VC charging load.
- Operator had experienced a few instance of P0 RAS action.
- Violates CAISO Planning Standard ISO S-RAS2 "*The RAS should not be proposed for mitigating reliability concerns under normal conditions (i.e., Category P0)*"

- Requires complicated RAS to maintain system reliability. There are 9 contingencies (TL683, TL688, TL689, TL6926, TL6956, TL696, TL681, TL682 and TL698) require RAS action to drop VC energy storage charging load.
- Low Voltage issues in TL681
- Violates CAISO Planning Standard Category P1 (Single contingency) "*CAISO applies NERC Transmission Planning (TPL) standard TPL-001-4 categories P0, P1 and P3 contingencies taken on the non-BES equipment*"

Project Driver (cont.)





Reliability Issues:

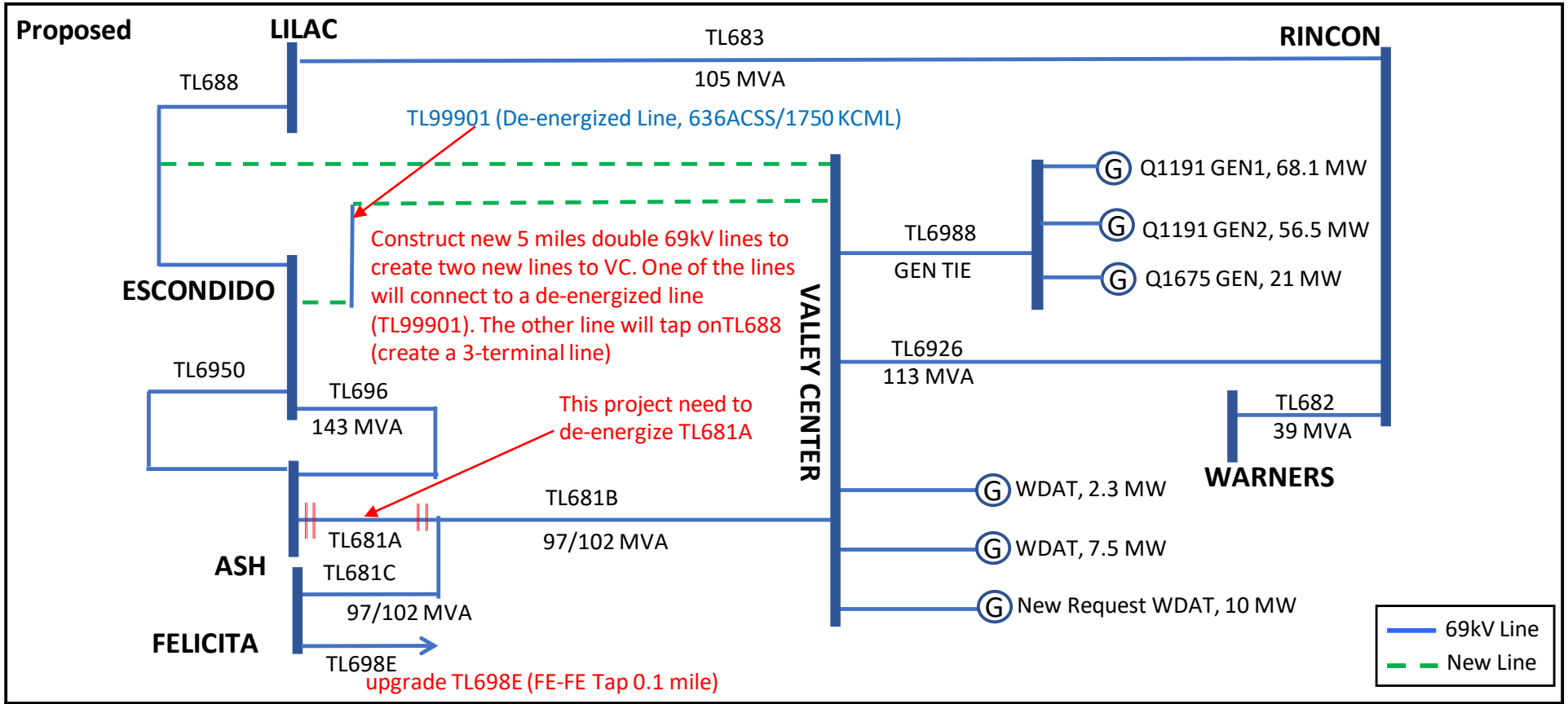
- Total Generation at VC 165.4MW
- TL681B loaded at 95% with all line in-service

Contingency P1:

- Outage of TL681 (ASH-VC-FE) overloads TL6926 (VC-RIN) at 140% and TL682 (WR-RIN) at 110% of their emergency ratings

- Outage of TL6926 (VC-RIN) overloads TL681A at 102% and TL681B (VC-ASH TAP) at 140% of their emergency ratings
- Outage of TL682 (WR-RIN) overloads TL681B (VC-ASH TAP) at 100%
- Outage of TL683 (LI-RIN) overloads TL681B (VC-ASH TAP) at 106%
- Outage of TL698 (AV-MIN-PA) overloads TL681B (VC-ASH TAP) at 107%

Preferred Project



- Construct a new 5 miles double circuit 69 kV lines to create two new lines to VC
  - One line will connect to a de-energized line TL99901 (Valley Center – Escondido)
  - One line will tap into TL688 to create a 3-terminal line
- De-energize TL681A, reconductor 0.1 miles TL698E, and reconductor UG section of the existing TL99901.
- Total Cost of the project $51M

TL600 Clairemont Loop-in

Project Proposal

Project Driver:

Category P1 NERC Violation

- **N-1 Contingency (P1):**
  - Contingency N-1 in TL670 (Mission - Clairemont) results in the overload of TL600B (Clairemont - Clairemont Tap)

Project Scope:

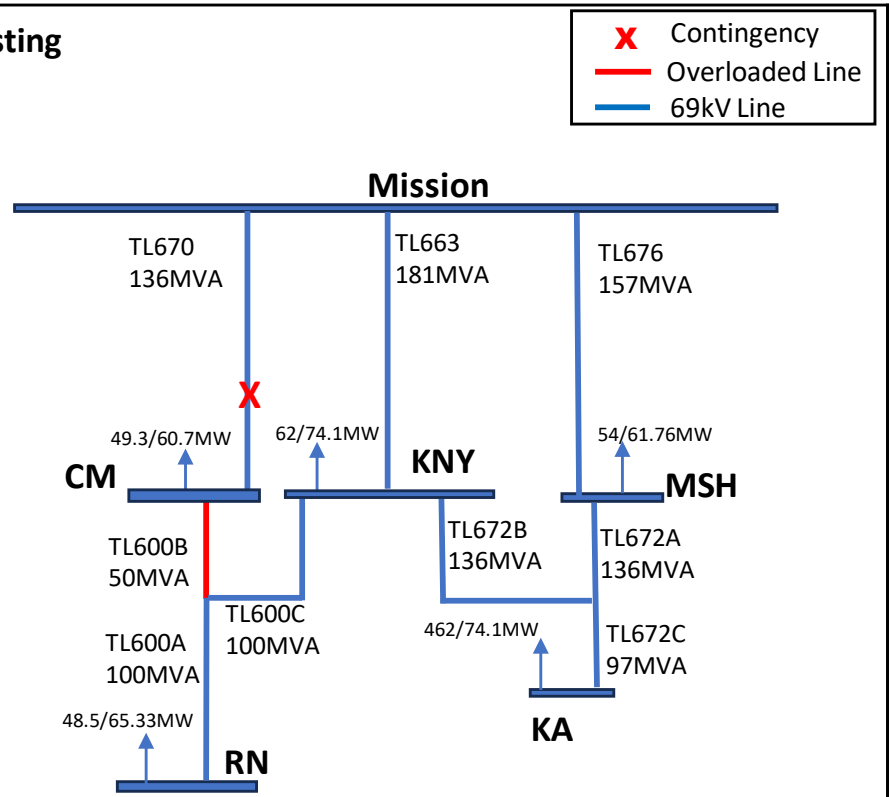
- Rebuild 0.7 mile of TL600B double circuit (same pole structure) to loop-in into Clairemont 69kV, which forms
  - One 69 kV line Clairemont – Kearny
  - One 69 kV line Clairemont – Rose Canyon
- In-service date of 2032.
- Total Cost of the project $10M

Alternative Project

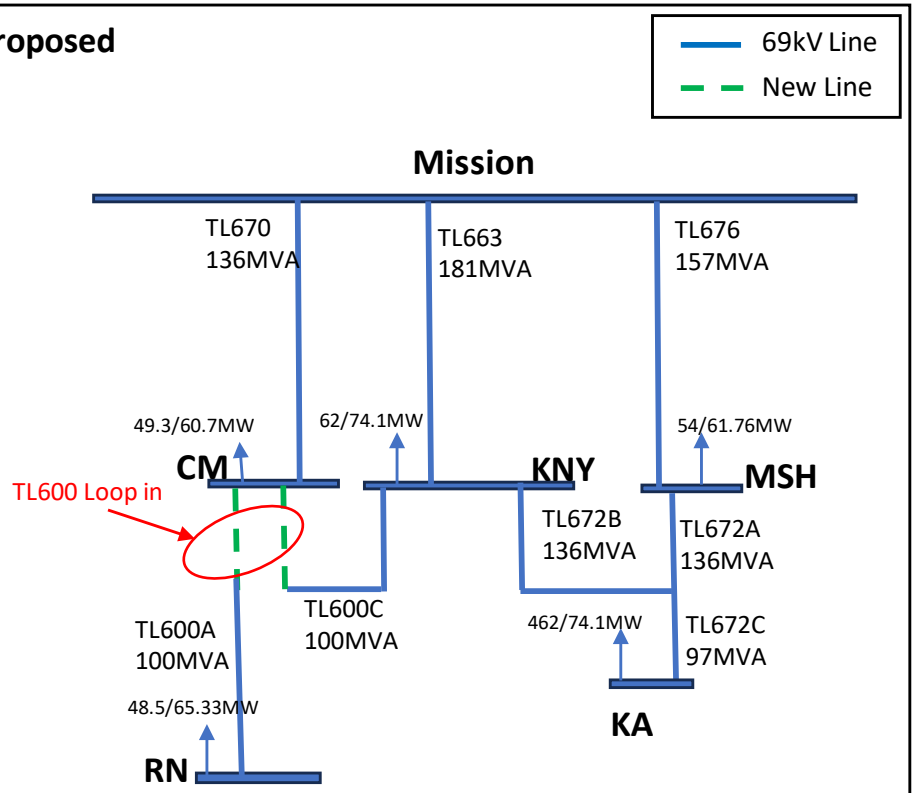
- Reconductor 0.7 miles of TL600B to 1033 ACSS which requires new pole structure

Project Driver and Preferred Project

Existing



Proposed



Drivers:

- Category P1 NERC Violation
- Contingency N-1 TL670 (MS-CM) overload TL600B (CM-CM Tap).

Scope:

- Rebuild 0.7 miles of TL600B to loop it into CM to form two new 69kV lines (CM-KNY and CM-RN)

Benefits:

- Mitigation of P1 violation
- Support area load growth
- Improve reliability in the area

Alternatives:

- Reconductor 0.7 miles of TL600B

New Penasquitos – Mira Sorrento Line

Project Proposal

Project Driver:

Category P0 and P7 NERC Violation

- **Base Case (P0):**
  - Considering area peak load, TL6959 (PQ-MTO) will be overloaded under normal condition starting in 2030.
- **N-2 Contingency (P7):**
  - Overloads TL6959, TL666A, TL666B, TL666C, and TL666G due to N-2 in PQ-GE and PQ-TP (common structure) in 2025, 2028, and 2035 TPP cases.
  - Overloads are more than %125 which could result in cascading and loss of the entire load center with total a 250 MW of load.

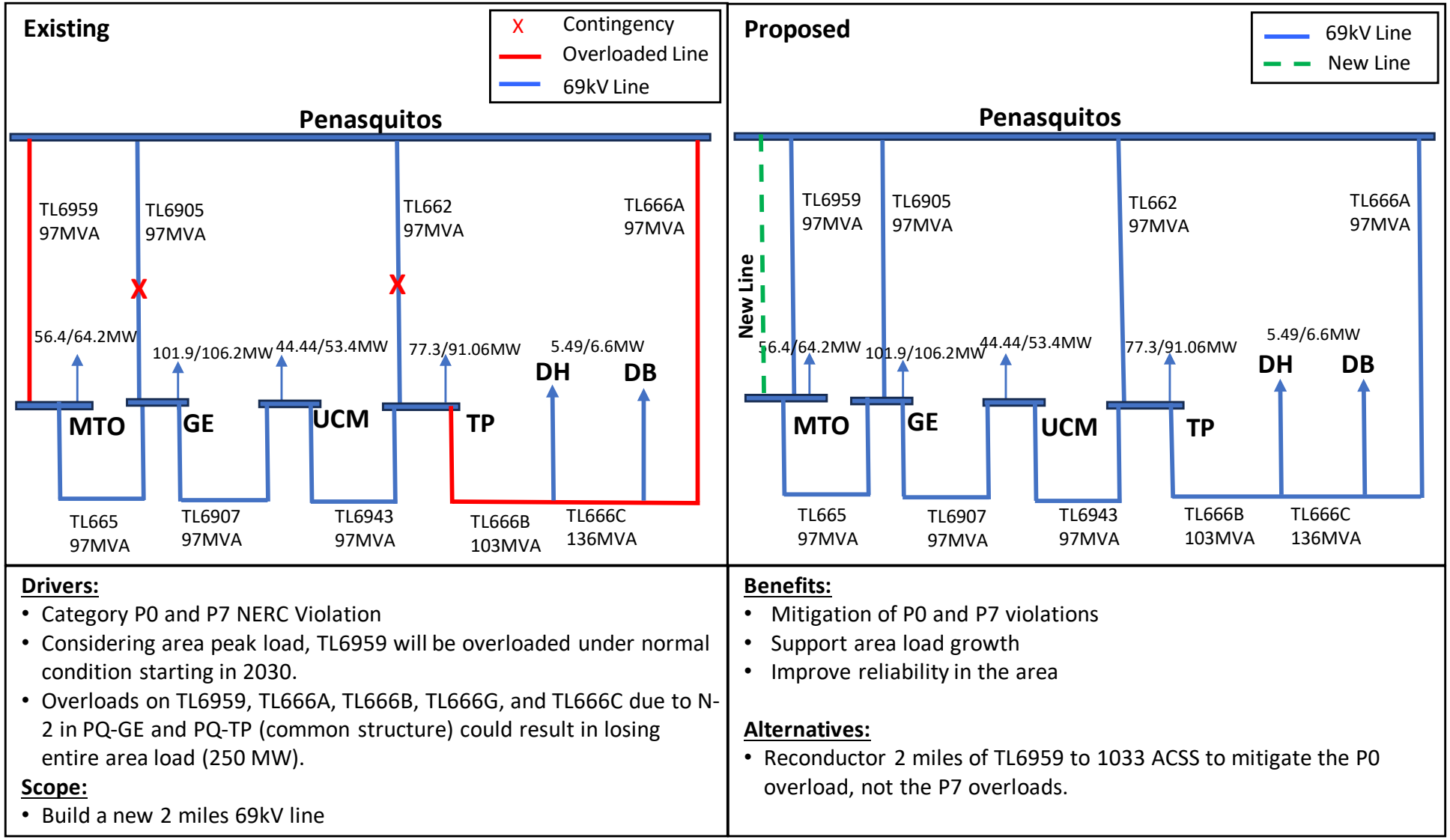
Project Scope:

- Construct a new 2 miles 69kV line from Penasquitos to Mira Sorrento (PQ-MTO #2)
- In-service date of 2030.
- Total Cost of the project $26M

Alternative Project

- Reconductor 2 miles of TL6959 to 1033 ACSS, only mitigates the P0 overload not the P7 overloads

Project Driver and Preferred Project



Drivers:

- Category P0 and P7 NERC Violation
- Considering area peak load, TL6959 will be overloaded under normal condition starting in 2030.
- Overloads on TL6959, TL666A, TL666B, TL666G, and TL666C due to N-2 in PQ-GE and PQ-TP (common structure) could result in losing entire area load (250 MW).

Scope:

- Build a new 2 miles 69kV line

Benefits:

- Mitigation of P0 and P7 violations
- Support area load growth
- Improve reliability in the area

Alternatives:

- Reconductor 2 miles of TL6959 to 1033 ACSS to mitigate the P0 overload, not the P7 overloads.

Short Circuit Mitigation for Imperial Valley 230 kV Circuit Breakers

Enrique Romero

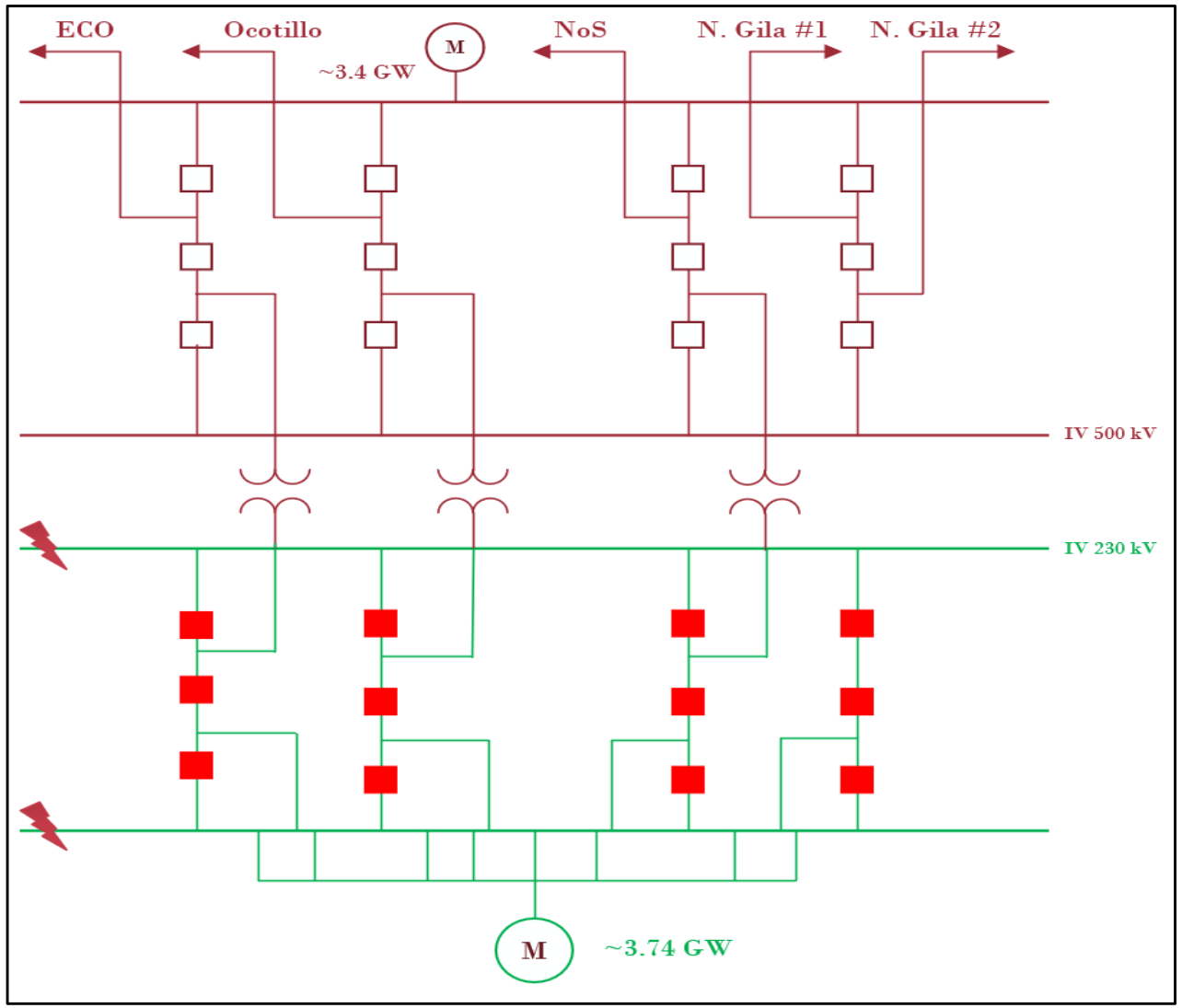
Imperial Valley Substation

Assumptions

- 2023-2024 TPP (2035 Case)
- North Gila – Imperial Valley 2nd 500 kV Line
- NoS – Imperial Valley 500 kV Line
- 2022-2023 TPP Approved Projects
- Includes ISO's additional Generic Portfolio ~3060 MW

Results

- Overstressed 230 kV Circuit Breakers
- 103.5% on 63 kA CBs



Project Proposal

Project Driver:

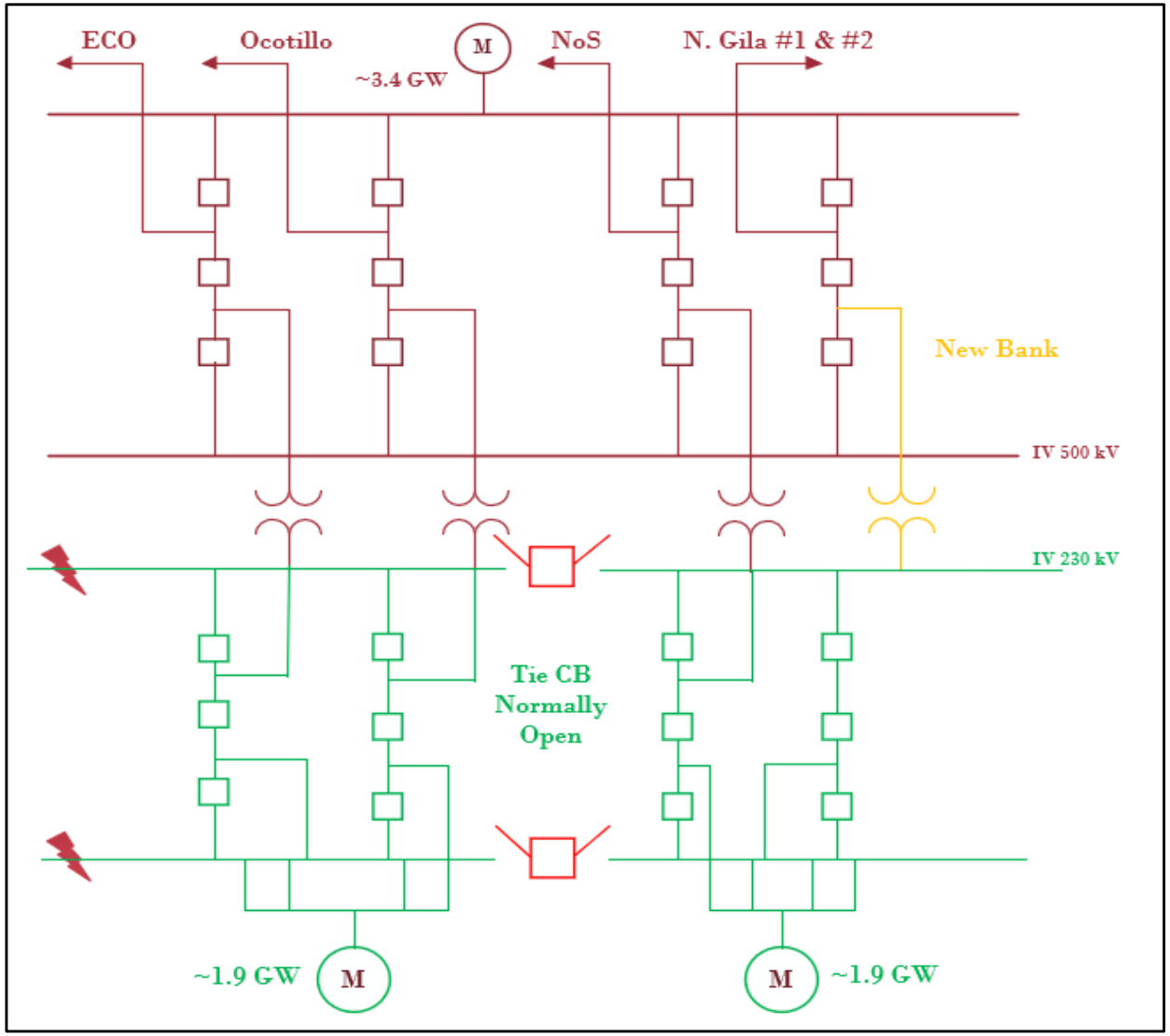
- Overstressed 230 kV Circuit Breakers at IV

Project Scope:

- Split IV 230 kV Bus
- Add a 4th Bank 500/230 kV Bank
- Scope includes building out the 500kV Bay 5, 230kV Bay 19, and add three single-phase 500/230 kV transformers
- Keep the 63 kA Circuit Breakers
- Rearrange transmission lines
- Move TL23043, TL23066, TL230-S
- Estimated Cost $95 M

Alternative:

- Replace 63kA with 80 kA circuit breakers
- Cost Estimate: $15M
- Feasibility Assessment: This initial cost estimate includes only the replacement of the circuit breakers. However, this solution, also requires additional analysis of the existing IV 230kV yard including structural steel and bus supports, bus conductors, disconnects, ground grid, and circuit breakers to go beyond 63kA. The additional analysis is underway.



Short Circuit Mitigation for Miguel 230 kV Circuit Breakers

Enrique Romero

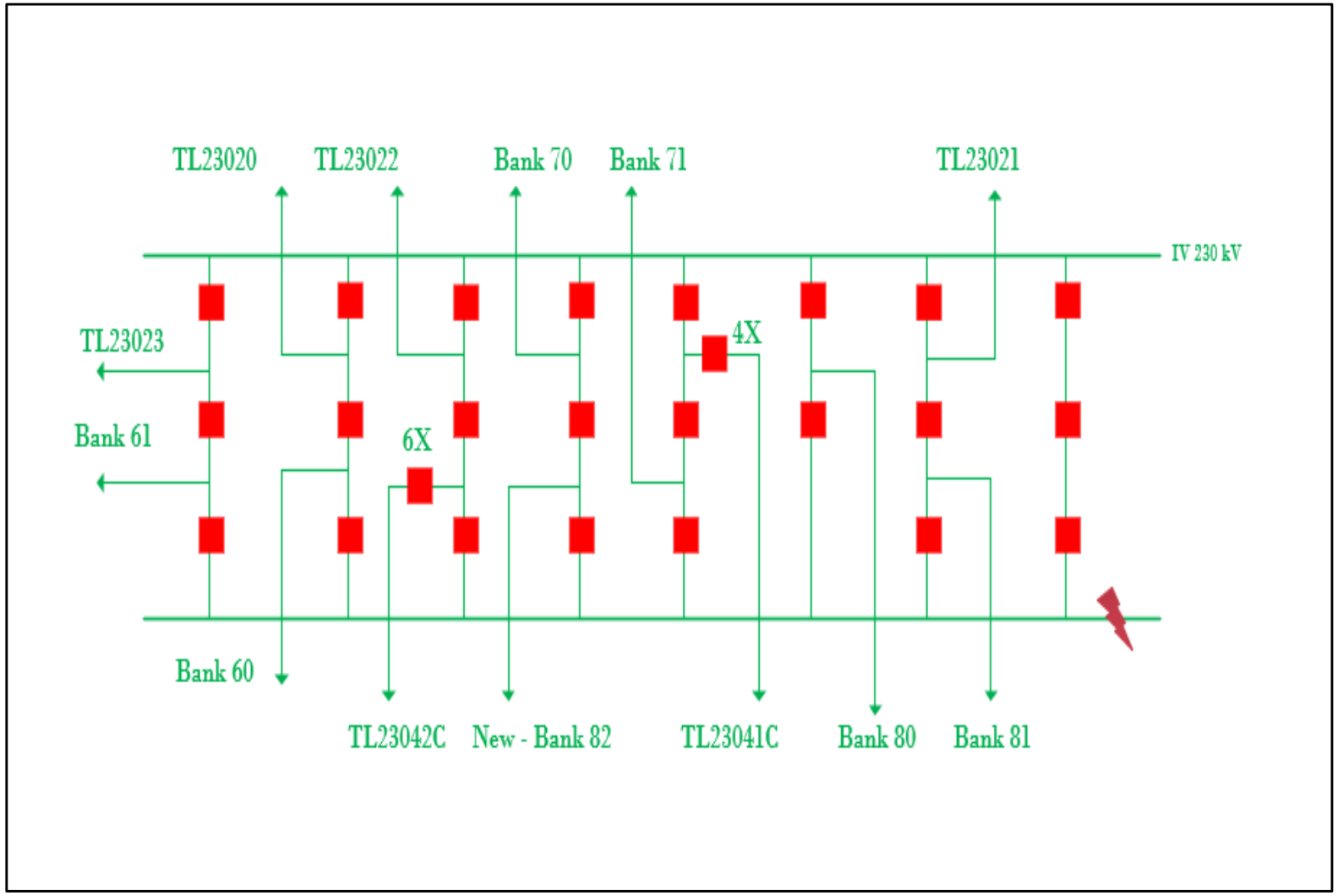
Miguel Substation

Assumptions

- 2023-2024 TPP (2035 Case)
- North Gila – Imperial Valley 2nd 500 kV Line
- NoS – Imperial Valley 500 kV Line
- 2022-2023 TPP Approved Projects
- Includes ISO's additional Generic Portfolio ~3060 MW

Results

- Overstressed 230 kV Circuit Breakers
- 102.1% on 63 kA CBs



Project Proposal

Project Driver:

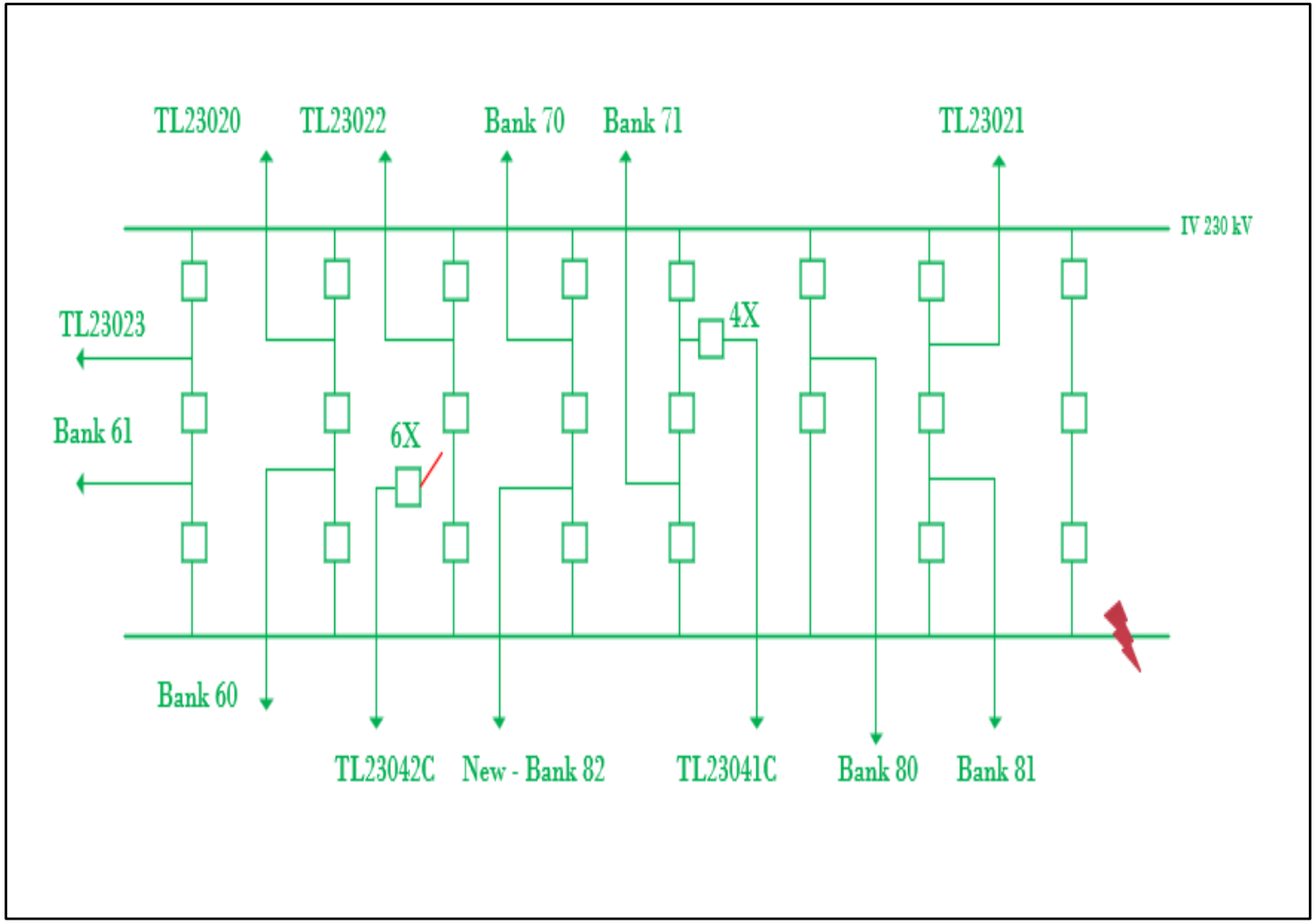
- Overstressed 230 kV Circuit Breakers at Miguel

Project Scope:

- Open Miguel 230 kV CB 6X
- Operate TL23042C Normally Open
- Modify TL23042 RAS (Add Miguel 6X breaker status to the RAS)
- Cost < $1M

Alternatives:

- Open Miguel 230 kV CB 4X
- Operate TL23041C Normally Open
- Cost Estimate: < $1M
- Feasibility Assessment: This alternative is feasible and effective in mitigating the overstressed circuit breakers but provides less transmission flexibility due to the capacity of the remaining legs of TL23041.



Question/Comments