

Best Practices on Implementation of the planned Transmission Systems

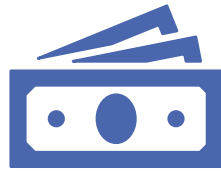
NATIONAL SYSTEM OPERATOR
SRI LANKA



Introduction



Transmission systems are critical for reliable power delivery



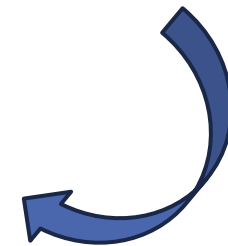
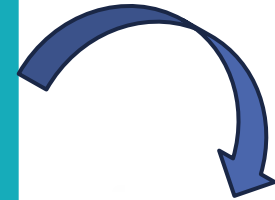
Effective implementation reduces delays and cost overruns



Focus on safety, quality, and long-term reliability

Comprehensive Planning and Assessment

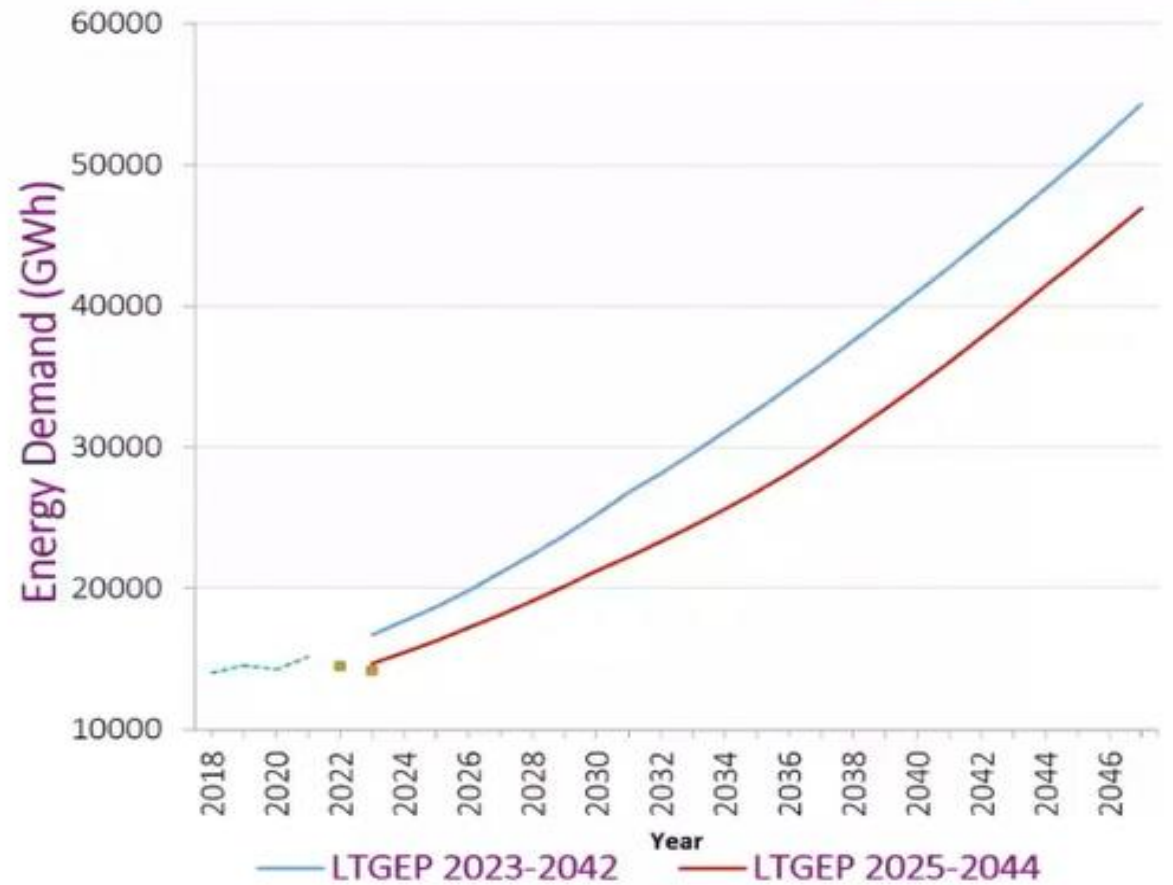
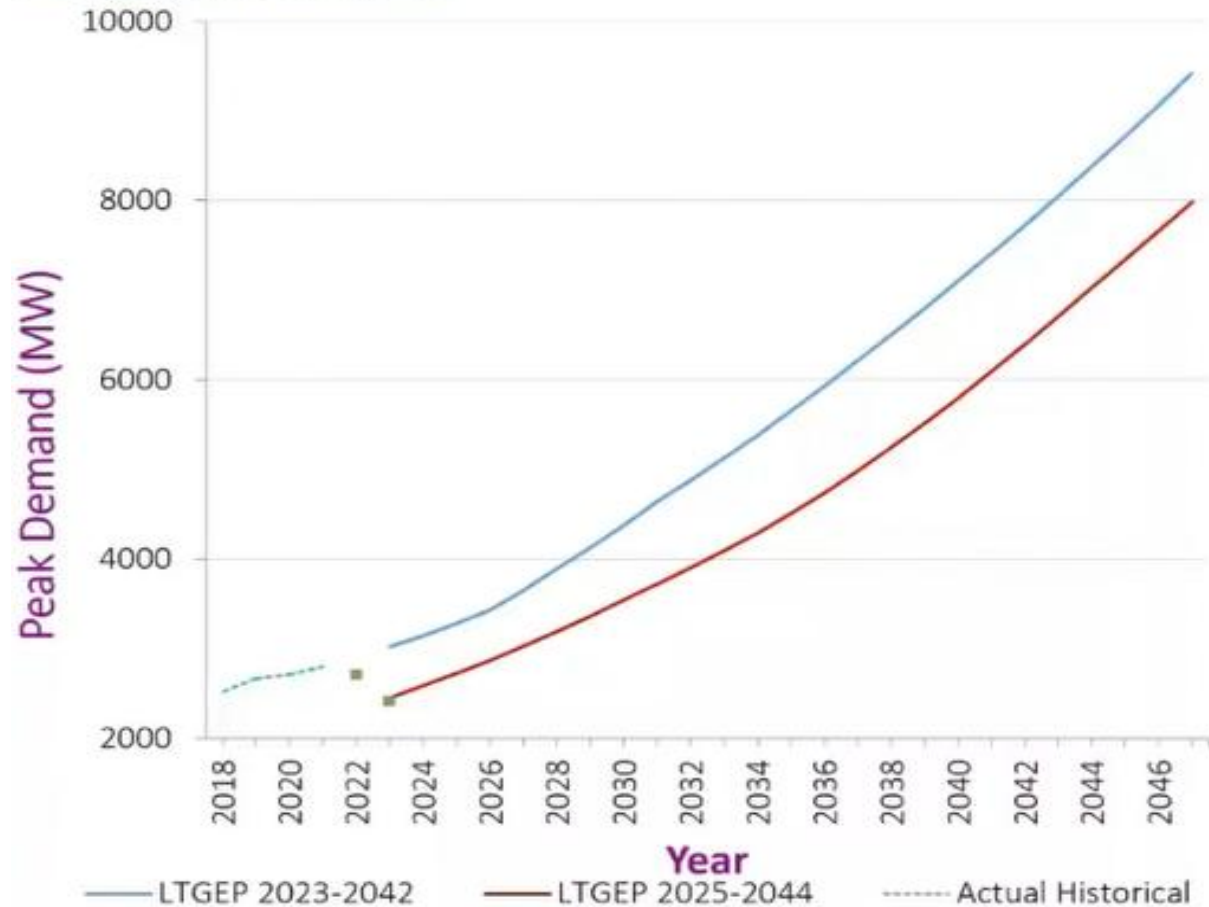
- ▶ Conduct detailed load forecasting and demand analysis.
- ▶ Align transmission development with generation expansion and future network requirements.
- ▶ Perform technical, economic, and environmental feasibility studies before project initiation.



General Policy Guidelines on the Electricity Industry - 2022

- ▶ Achieve 70% of electricity generation by 2030 from renewable energy Sources
- ▶ Achieve carbon neutrality in power generation by 2050
- ▶ Cease building of new coal-fired power plants
- ▶ New addition of firm capacity will be from clean energy sources such as re-gasified
 - ▶ liquefied natural gas (RLNG)
- ▶ Energy storage options such as Pumped Hydroelectric Energy Storage (PHES) and Battery
- ▶ Energy Storage Systems (BESS) will be introduced to ensure reliability and quality of electricity supply

Reduction in Forecasted Demand



After the economic crisis, approximately a **4 year** lag in demand Increase



Detailed Technical Assessments



Carry out load flow, short-circuit, stability, and contingency analyses.



Verify compliance with grid codes and reliability standards.



Evaluate future operating conditions and system expansion scenarios

VOLTAGE CRITERIA **THERMAL CRITERIA**
RELIABILITY **SECURITY CRITERIA**
STABILITY CRITERIA **SHORT CIRCUIT CRITERIA**

REDUNDANCY **CONTINGENCY MEASURES**
SYSTEM SECURITY 
 **CLIMATE RESILIENCE** **LONG-TERM ASSET DURABILITY** 



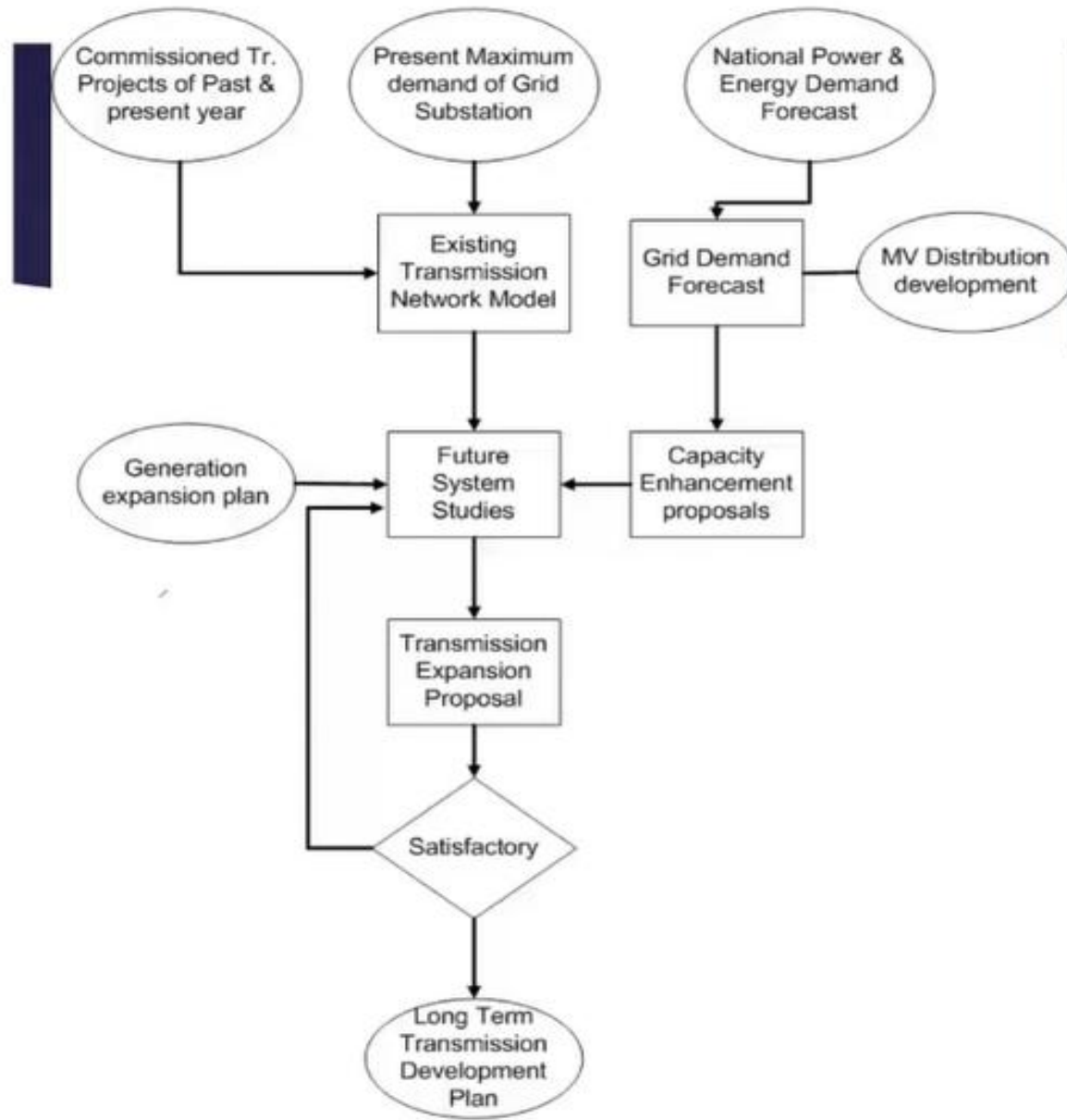
Incorporate redundancy and contingency measures to maintain system security.



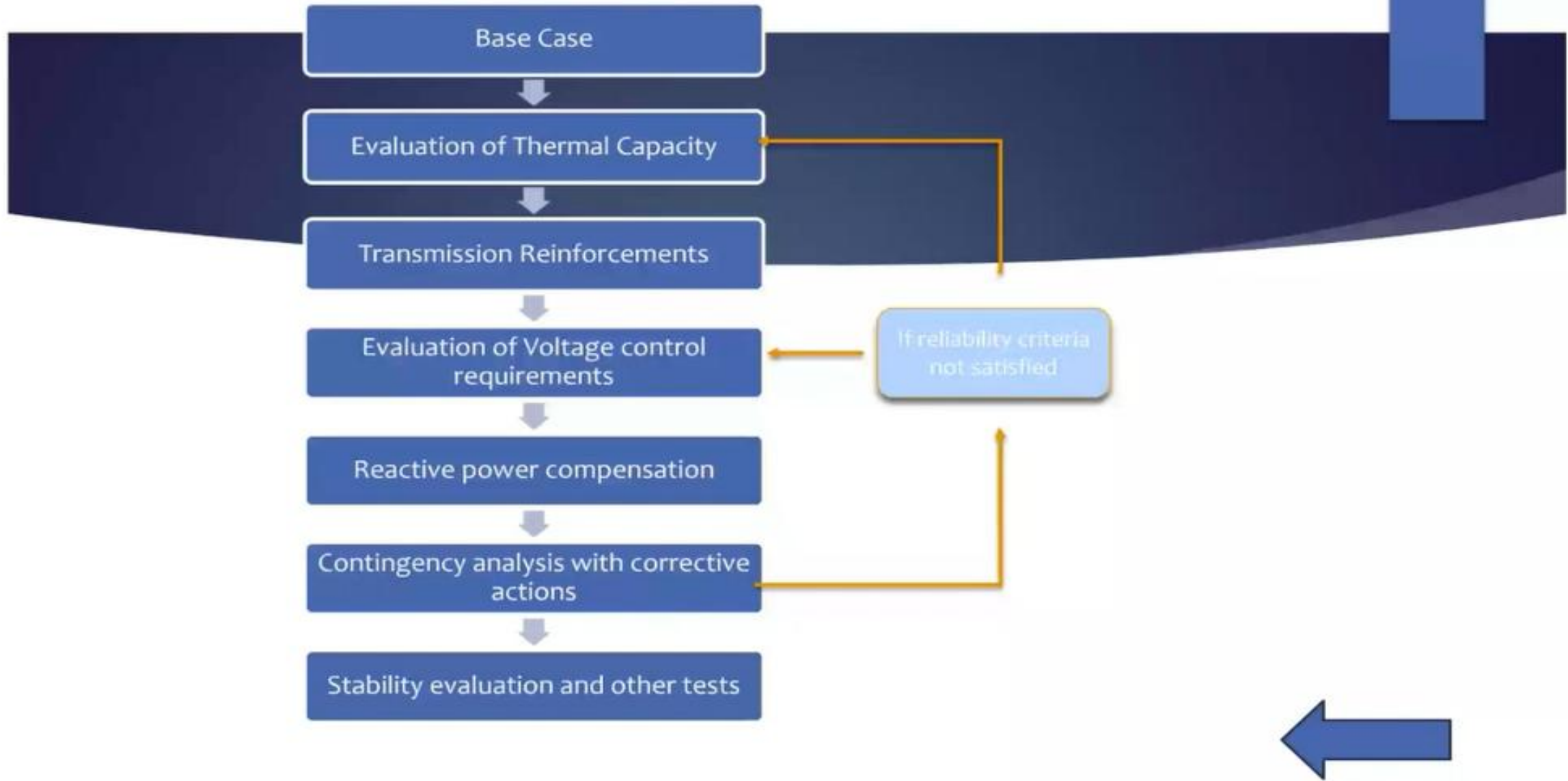
Design infrastructure to withstand extreme weather conditions and natural disasters.



Consider climate resilience and long-term asset durability.



Transmission Planning Procedure



Effective Stakeholder Engagement



- ▶ Engage regulators, local communities, landowners, and other stakeholders early in the project.
- ▶ Address concerns transparently and ensure regulatory compliance throughout implementation.
- ▶ Maintain clear communication to facilitate project acceptance and timely approvals.

Optimal Corridor Identification and Route Planning

- ▶ Minimize environmental and social impacts.
- ▶ Avoid densely populated areas where possible.
- ▶ Utilize existing utility corridors to reduce land acquisition costs.
- ▶ Consider future expansion possibilities during corridor selection.



Solar 1700 MW
Wind 1400 MW
OS Wind 2500 MW

Northern



North Eastern
Solar 1850 MW
Wind 10 MW

North Western



Solar 50 MW
Wind 200 MW
OS Wind 500 MW

North Central

Solar 670 MW
Wind 200 MW



Eastern
Solar 1230 MW

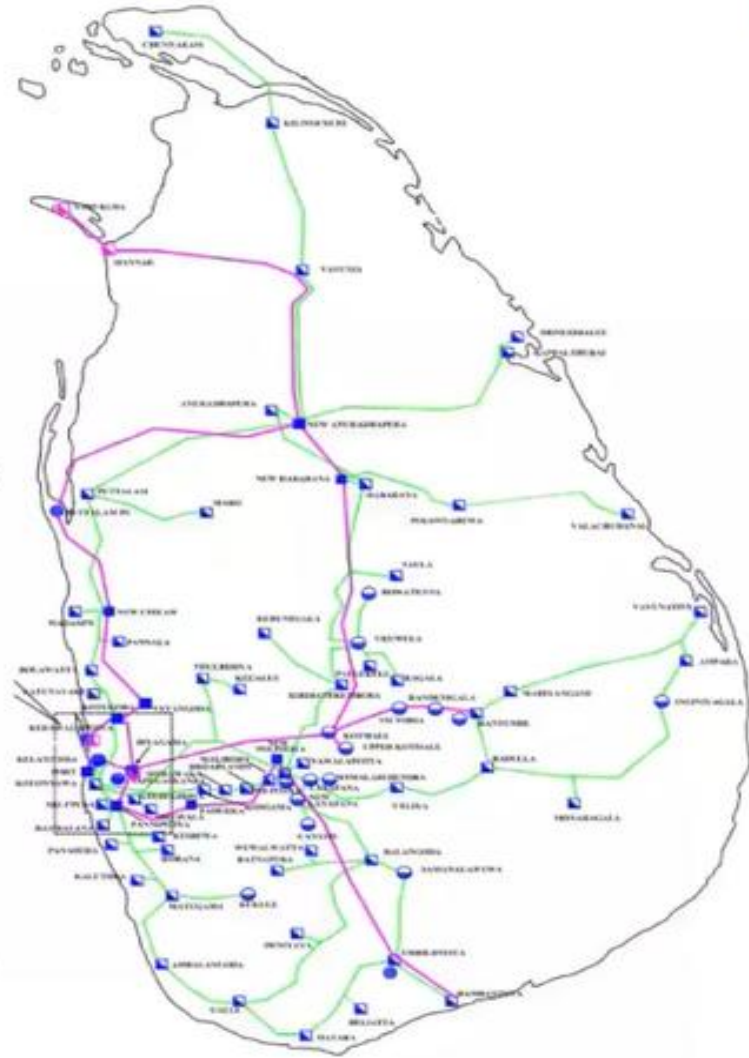
Central

Solar 700 MW



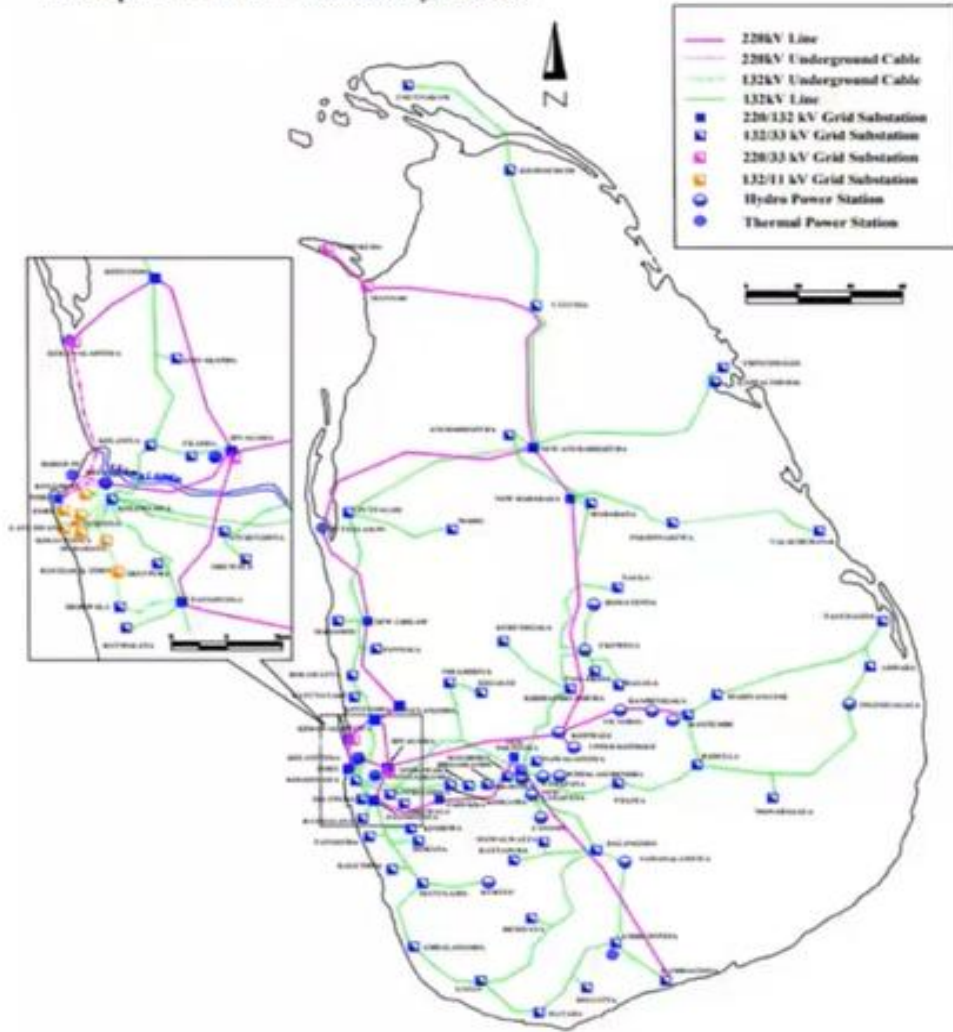
Southern

Solar 500 MW
OS Wind 1000 MW

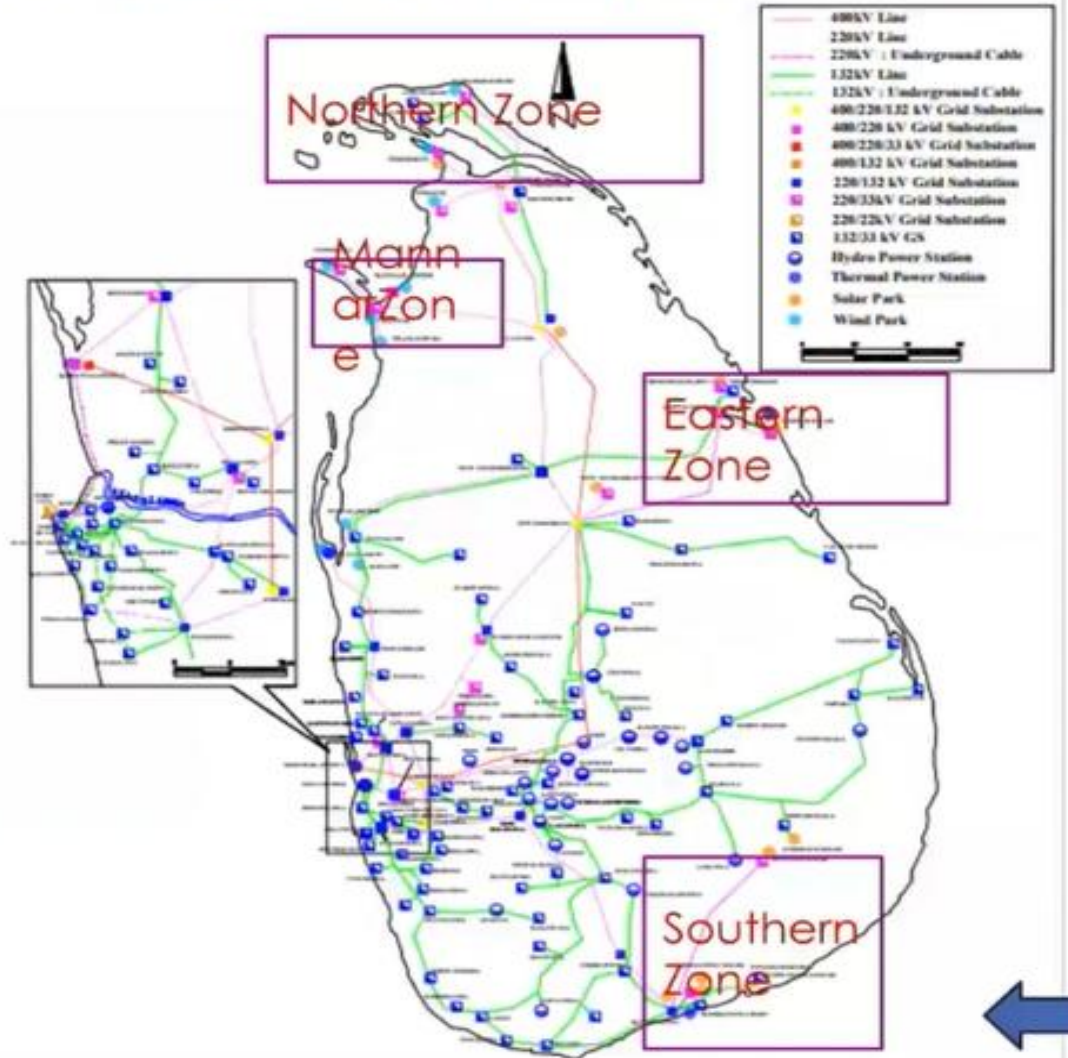


Transmission System Development

The Map of Sri Lanka Transmission System 2023



The Map of Sri Lanka Transmission System in Year 2032 With 70% NCRE



Project Management Best Practices



ACTION PLAN



STRATEGY



OBJECTIVE



SCHEDULE



TEAM



GOAL



COLLABORATION



STEPS



ANALYSIS



DEVELOPMENT



ACT



IMPLEMENTATION



CHECK



RESOURCES



ASSIGN



MONITOR



TASKS



IMPROVEMENT



TIMELINE



PLANNING



SOLUTION



ASSESSMENT



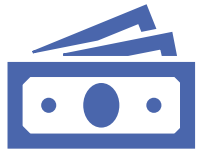
REFINE



ACHIEVE

- ▶ Define clear governance structures
- ▶ Track milestones and critical paths
- ▶ Apply change-management procedures

Risk Management



Identify technical, financial, and environmental risks



Develop mitigation plans



Review risks throughout the project lifecycle



Mandatory Grid Interventions

Battery Energy Storage Systems

1. 100 MW / 100 MWh BESS at Kolonnawa in 2026 (✓)
2. 100 MW / 400 MWh BESS at Southern Region in 2028
3. 100 MW / 400 MWh BESS in 2029
4. 50 MW / 50 MWh BESS in 2030
5. 100 MW / 400 MWh BESS in 2031
6. 200 MW / 800 MWh BESS in 2032

~ 750 Million USD

Primary Frequency Regulation
Fast Frequency Response
Energy Shifting
System Restoration

Pumped Hydro Storage Systems

1. 3x 200 MW PSPP at Maha in 2034

~ 800 Million USD

(Energy Shifting , Inertia support)

Synchronous Condensers

1. 300 Mvar STATCOM at Padukka 220kV GSS in 2026
2. 200 Mvar STATCOM at New Kolonnawa 132kV GSS in 2028
3. 70 MVA Synchronous Condensers at Mannar in 2028
4. 70 MVA Synchronous Condensers at Habarana in 2028
5. 125 MVA Synchronous Condenser Unit at N Collector in 2030

~ 175 Million USD

Inertia Support
Fault Current Requirements



Conclusion

- ▶ Successful transmission system implementation depends on comprehensive planning, robust engineering practices, the adoption of advanced technologies, strong stakeholder collaboration, and efficient project management.
- ▶ Adhering to these best practices ensures the development of reliable, resilient, and cost-effective transmission infrastructure that can meet both current and future electricity demands.



THANK YOU