

Renewable Integration Impact Forecast

Overview

This document forecasts the operational and economic impacts of integrating new renewable energy capacity into the regional power grid over the next five years. Forecasts are based on projected deployment schedules, grid characteristics, and historic generation profiles.

Key Assumptions

- All projects reach commercial operation as scheduled.
- No major policy shifts impacting renewable deployment.
- Energy demand grows at a steady rate of 1.5% per year.
- Storage and demand response capabilities increase moderately.

Forecast Table (2024-2028)

Year	New RES Capacity (MW)	RES Share of Total Supply (%)	CO ₂ Reduction (%)	Estimated Curtailment (GWh)
2024	500	18	4.5	22
2025	650	21	6.1	39
2026	800	25	7.8	62
2027	900	28	9.0	88
2028	950	31	10.2	112

Operational Impacts

1. **Grid Stability:** Increased renewable penetration may require enhanced frequency and voltage control systems.
2. **Flexibility Needs:** Flexible generation and storage resources become more critical to maintain reliability.
3. **Interconnection Constraints:** Upgrade of transmission infrastructure needed in high integration scenarios.

Economic Impacts

- Progressive reduction in operational costs due to lower fuel consumption.
- Upfront investment required for grid modernization and storage systems.
- Potential for short-term market volatility during transition phases.

Important Notes

- The forecast is subject to uncertainties in technology, policy, and market trends.
- Periodic updates are recommended to reflect actual project progress.
- Integration impact studies should be coordinated with ongoing grid planning activities.
- This document should be used as a reference for preliminary planning purposes only.