

REVIEWER'S REPORT

Manuscript No.: **IJAR-54543**

Title: Comparative Modeling of Electricity Tariff Schemes in Senegal and Implications for the Energy Transition by 2050

Recommendation:

Accept as it is

Accept after minor revision.....

Accept after major revision

Do not accept (*Reasons below*)

Rating	Excel.	Good	Fair	Poor
Originality		✓		
Techn. Quality			✓	
Clarity		✓		
Significance			✓	

Reviewer Name: Dr.P.Manochithra

Detailed Reviewer's Report

Manuscript Title: *Comparative Modeling of Electricity Tariff Schemes in Senegal and Implications for the Energy Transition by 2050*

1. Overall Assessment

The manuscript presents a **comparative modeling analysis of six electricity tariff schemes** in Senegal, focusing on balancing equity, financial viability, and renewable energy transition. The research leverages **SENELEC 2020–22 observations**, techno-economic data, and **Python-based scenario modeling** to forecast sector outcomes by 2050.

The topic is **relevant, timely, and aligned with SDG-7 goals**. The manuscript offers valuable insights into tariff reform pathways supporting decarbonization and utility sustainability.

Tone of Writing: Academic and well-structured

Contribution: Policy-relevant evidence to support renewable-based tariff transition

2. Novelty and Significance

The originality lies in its **hybrid-scenario modeling approach** that combines **progressive tariffing, FIT incentives, and PAYG access models**, projecting their effects up to 2050.

Significant because:

- Supports Senegal's **Plan Sénégal Émergent (PSE)** goals
- Provides tariff-based strategic levers for 75 percent RE penetration by 2050
- Frames actionable pathways such as **IPP one-stop shop** and “Losses & Storage” programme

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This makes the study a practical resource for policymakers and regulatory authorities.

3. Structure and Content Evaluation

✓ Strong Points

- Comprehensive literature grounding and justification of tariff choices
- Clear methodological pipeline using **Python simulations** with replicability principles
- Well-defined indicators: revenues, marginal net gains, RE share, avg. cost/kWh
- Results well illustrated, highlighting hybrid tariff superiority
- Forward-looking analysis integrating hydrogen and storage economics

4. Methodology Review

The study adopts a **scenario-based economic simulation**, anchored on

- SENELEC 2020 & 2022 financials

- IRENA & IEA cost projections
- World Bank macro assumptions

Validation includes calibration and sensitivity testing ensuring <5 percent variance from observed data. These steps enhance **credibility and reproducibility** of projections.

Recommendation: Incorporate *dynamic tariff optimization* to capture peak-hour costs and behavioral change.

5. Results and Policy Implications

Clear interpretation of scenarios:

- **Progressive and PAYG** improve access but depress margins
- **FIT** attracts private capital but pressures fiscal budgets
- **Hybrid 2050** yields highest net margin (~250K M CFA) and **~75 percent RE share** with declining costs

Policy Significance:

→ Hybrid tariff is viable only with **regulatory reforms + grid modernization + targeted subsidies**

6. Conclusion Strength

Conclusion aligns with results and provides **practical roadmaps**:

- Multi-year tariff doctrine
- Renewable rollout milestones
- Storage expansion
- Climate finance mobilization (GCF/AfDB)

Suggested Enhancement:

Include explicit quantification of **avoided CO₂ emissions** and **consumer affordability metrics**.

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7. Technical & Language Quality

Writing is clear and professional. Minor stylistic revisions to improve flow recommended.

8. Ethical and Citation Compliance

Proper institutional source acknowledgment (SENELEC, IEA, IRENA, WB). Citations appear complete.