Submission to Energy Policy WA

Alternative Electricity Services Framework – Single Property Networks (SPNs)

Electrical Safety, Technical Standards, Inspection and Emergency Response Considerations

Submitted to: Energy Policy WA

Subject: Alternative Electricity Services Framework – Single Property Networks (SPNs): Electrical Safety, Technical Standards and Inspection Considerations

Submitted by (*in a personal capacity.*)**:**

Western Australia

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Executive Summary

I support the objective of establishing an appropriate regulatory framework for Single Property Networks (SPNs) and recognise the opportunities they may provide for innovative energy arrangements, distributed energy resources, customer choice, and improved utilisation of generation and storage technologies.

However, from an electrical safety and inspection perspective, there are several practical issues that may require clarification before widespread deployment of SPNs, particularly where they incorporate substantial photovoltaic (PV) generation, battery energy storage systems (BESS), standby or prime generators, common distribution infrastructure, and the capability to operate independently of the Southwest Interconnected System (SWIS).

The proposed framework appears principally focused on consumer protections, customer outcomes and SPN provider obligations. It is less clear how the framework is intended to interact with existing electrical safety, technical compliance, inspection and enforcement arrangements. It is less clear how SPNs are intended to interact with Western Australia's existing electrical safety framework, including:

- Electricity (Licensing) Regulations 1991
- WA Electrical Requirements (WAER)
- Western Australian Service and Installation Requirements (WASIR)
- Applicable Australian Standards
- Building and Energy requirements
- Western Power technical and embedded-generation requirements

I am not raising these issues as an objection to SPNs. The questions are being raised because electrical infrastructure remains in service for decades after initial installation. Once commissioned, these systems will require ongoing inspection, maintenance, modification and fault response. It is important that ownership, technical responsibility and safety obligations are clear from the outset rather than being determined after an incident occurs.

From an electrical safety perspective, my primary concern is that a person responding to a fault, outage or emergency should not need to determine the ownership structure, regulatory status or electrical architecture of an SPN before establishing whether the installation is safe to work on.

This submission seeks clarification regarding the classification, ownership, inspection, maintenance, modification and emergency operation of SPNs, and recommends that the technical, inspection and safety framework be developed alongside the broader AES regulatory framework to ensure responsibilities, compliance obligations and safe

operating requirements are clearly understood before these systems become commonplace.

The primary intent of this submission is not to propose additional regulation, but to ensure that existing electrical safety, compliance, inspection and emergency response responsibilities remain clear where electricity is generated, distributed and consumed through SPN arrangements.

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1. Practical Electrical Implications of SPNs

Modern developments increasingly incorporate shared electrical infrastructure serving multiple occupants and multiple lots.

An SPN may include:

- Common PV generation systems
- Battery energy storage systems
- Standby or prime generators
- Common switchboards
- Protection systems
- Private low-voltage distribution networks
- Common-property electrical infrastructure
- Energy management systems supplying multiple occupancies

Unlike traditional network-connected installations, SPNs may distribute electricity across multiple lots using infrastructure located on common property.

As a result, electrical infrastructure may not align neatly with property boundaries, ownership boundaries or customer supply arrangements.

Questions Requiring Clarification

The framework should clearly define:

- How SPN electrical infrastructure is classified under existing WA electrical legislation
- What constitutes consumer mains, submains and private distribution infrastructure within an SPN
- Who is responsible for design, installation, inspection, testing and maintenance

- Who is responsible for ensuring ongoing electrical safety following alterations
- How common-property electrical infrastructure is distinguished from lot-owned installations
- The requirements applicable where infrastructure crosses or supplies multiple lots
- Which entity has jurisdiction to inspect and enforce compliance with applicable technical requirements

These issues become increasingly important where an SPN contains generation and storage capable of supplying multiple premises.

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2. Interaction with Existing Technical Requirements

The final framework should explicitly clarify how SPNs interact with existing Western Australian electrical legislation and technical requirements.

Particular clarification is required regarding the application of:

- AS/NZS 3000 – Electrical Installations (Wiring Rules)
- AS/NZS 4777 Series – Grid Connection of Energy Systems via Inverters
- AS/NZS 5139 – Battery Energy Storage Systems
- Generator and alternative supply requirements
- WA Electrical Requirements (WAER)
- Western Australian Service and Installation Requirements (WASIR)
- Building and Energy requirements
- Western Power embedded-generation requirements

The issue is not simply whether individual standards apply.

Rather, clarity is required regarding which standards govern the overall electrical system where generation, storage, protection systems, distribution infrastructure and multiple customer installations operate together as part of an SPN.

Example

A development may contain:

- A central photovoltaic system
- A large battery energy storage system

- Private low-voltage reticulation
- Multiple separately occupied premises

Where that system is capable of supplying multiple customers independently of Western Power's network, it represents a substantially different electrical arrangement to a conventional customer installation containing a small grid-connected inverter.

The framework should clarify the applicable technical requirements and identify how existing legislation, technical requirements and Australian Standards are intended to apply to such systems, rather than leaving interpretation to individual designers, contractors, inspectors and network operators.

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3. Existing Technical Requirements Potentially Applicable to SPNs

Depending upon the design and operating characteristics of the SPN, relevant technical documents may include:

General Electrical Installations

- AS/NZS 3000 Electrical Installations (Wiring Rules)
- WA Electrical Requirements (WAER)
- Electricity (Licensing) Regulations 1991

Distribution Infrastructure

- Western Australian Service and Installation Requirements (WASIR)
- Western Power technical requirements
- Service and metering requirements applicable to multiple occupancies

Embedded Generation

- AS/NZS 4777 Series
- Western Power Embedded Generation Technical Requirements
- Export and anti-islanding requirements

Battery Energy Storage Systems

- AS/NZS 5139 Electrical Installations Including Battery Energy Storage Systems

Standby and Alternative Supplies

- AS/NZS 3010 Electrical Installations Generating Sets
- Generator protection and changeover requirements

Verification and Testing

- AS/NZS 3000 verification requirements
- Commissioning procedures
- Protection testing and validation

Electrical Safety Management

- Applicable Building and Energy requirements
- Network operator requirements
- Electrical safety obligations applying to private networks

The framework should identify which of these requirements continue to apply unchanged and where additional requirements may be necessary due to the unique structure of SPNs.

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4. Inspection and Compliance

A significant practical issue is how SPNs interact with the existing inspection and compliance framework.

If a development is inspected and commissioned under the current regulatory framework and subsequently establishes an SPN, clarification is required regarding what changes from an inspection and compliance perspective.

Questions Requiring Clarification

1. Does the electrical installation continue to be assessed against existing WA electrical legislation and applicable standards?
2. How do existing inspection, compliance and enforcement arrangements apply to SPN infrastructure?
3. Is the SPN operator responsible for ongoing technical compliance of the private network?
4. Who is responsible for inspecting alterations after the initial installation?
5. What requirements apply when additional PV, BESS or generation systems are installed?
6. How are changes to protection, earthing, switching and islanding arrangements assessed?
7. What documentation must be maintained, including:

    - Single-line diagrams
    - Protection studies
    - Protection settings
    - Commissioning records
    - Test results
    - Operating manuals
8. How are alterations managed where modifications are undertaken by a different contractor to the original installer?

Electrical safety obligations continue throughout the operational life of an installation and should not cease at commissioning.

Large private networks require ongoing maintenance, modification and testing. There must be a clear regulatory pathway for these activities.

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5. Inspection, Defects and Enforcement

The proposed framework should also clarify how electrical defects are identified and managed within private SPN infrastructure.

In particular:

- Who is responsible for identifying defects?
- Who is responsible for maintaining common-property electrical infrastructure?
- What mechanism exists to require rectification of unsafe electrical infrastructure?
- Who is the legally responsible recipient of a defect notice or compliance order?
- What enforcement powers apply where an SPN operator fails to rectify identified hazards?

While the framework establishes obligations in relation to SPN service provision and customer protections, further clarification may be beneficial regarding the management of technical compliance, defect rectification and ongoing safety responsibilities for private network assets.

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6. Existing Developments and Legacy Strata Arrangements

Consideration should also be given to existing developments that may fall within the SPN definition despite having been designed under entirely different electrical supply arrangements.

Potential issues include:

- Incomplete asset ownership records
- Undocumented private electrical infrastructure
- Protection coordination
- Earthing arrangements
- Access to isolation equipment
- Incomplete drawings and records
- Historical maintenance practices

A transition framework may be required to prevent uncertainty regarding ownership, maintenance and compliance responsibilities.

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7. Western Power Interface

The interface between an SPN and the Western Power network requires specific clarification.

A clear boundary should be established between:

Western Power Network → Point of Supply → SPN Private Network → Individual Premises

Responsibilities on each side of this interface should be clearly defined, including:

- Ownership
- Operation
- Maintenance
- Protection
- Switching
- Fault response
- Energisation

- Embedded generation requirements

Special consideration should be given to:

- Export capability
- Anti-islanding requirements
- Fault levels
- Protection coordination
- Isolation arrangements
- Alternative supply systems

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8. Indicative Responsibility Matrix for SPNs

The framework would benefit from an explicit responsibility matrix clarifying ownership, operation and compliance obligations.

The following matrix is provided as an illustrative example only and is not intended to allocate responsibilities. The final framework should clearly identify responsibility for each function.

Function	Western Power	SPN Operator/Owner	Lot Owner	Electrical Contractor
Network connection point	✓			
Network supply isolation	✓			
Private SPN distribution network		✓		
Common-generation systems		✓		
Common-property switchboards		✓		
Network drawings and records		✓		

Protection coordination studies		✓		✓
Ongoing maintenance of SPN assets		✓		
Installation alterations				✓
Electrical compliance certification				✓
Lot electrical installations			✓	✓
Emergency response coordination	✓	✓	✓	
Defect rectification		✓	✓	✓

The final framework should clearly define responsibility for each function to avoid uncertainty during fault response, compliance inspections and emergency incidents.

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9. Emergency Response and Electrical Worker Safety

SPNs introduce additional complexity where multiple sources of generation may remain energised independently of the Western Power network.

For example:

- PV systems
- Battery energy storage systems
- Standby generators
- Intentionally islanded microgrids

A fault reported by a customer may originate within private network infrastructure rather than the Western Power network.

Similarly, Western Power personnel or emergency responders attending a site may need assurance that private generation sources cannot back feed or re-energise equipment before work commences.

The framework should therefore establish consistent requirements for:

- SPN identification

- Identification of generation and storage systems
- Isolation arrangements
- Switching and interlocking systems
- Emergency disconnection
- Signage and labelling
- Access to isolation equipment
- Identification of the party responsible for operating the private network

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10. Known Safe State

I recommend that the framework establish a consistent and documented method by which:

- Western Power personnel,
- Electrical workers,
- Emergency responders,
- First responders,

can place an SPN into a known safe electrical state.

An attending person should be able to immediately determine:

- What network am I dealing with?
- What sources can energise it?
- Where are the isolation points?
- Who controls those isolation points?
- Can the system automatically re-energise?
- Has all distributed generation and stored energy been positively isolated?
- What remains energised after Western Power supply is isolated?

These are fundamental electrical safety questions and should not depend upon prior knowledge of an individual SPN.

Recommended Minimum Requirements

Every SPN should maintain:

Network Identification

- SPN operator details
- Emergency contact details
- After-hours contact arrangements
- Responsible electrical contractor details

Current Single-Line Diagram

A maintained and readily available diagram showing:

- Supply sources
- Interconnection points
- Main switchboards
- PV systems
- BESS systems
- Protection devices
- Isolation points

Emergency Isolation Procedure

A documented procedure identifying:

- All energy sources
- Normal operating configuration
- Emergency switching sequence
- Lock-out requirements
- Restoration requirements

Lock-Out and Access Arrangements

The framework should define:

- Access requirements for emergency responders
- Access to common-property switchboards
- Access to battery isolation equipment
- Access to generator isolation equipment
- Authority to isolate in emergency situations

Site Signage

Consistent SPN signage should identify:

- Presence of an SPN
- PV systems
- BESS systems
- Generator systems
- Island-capable systems
- Emergency contact information

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11. Stand-Alone Operation

Additional clarity is required where SPNs incorporate sufficient generation and storage to support intentional island operation or extended operation independent of the SWIS.

The framework should distinguish between:

1. Conventional Western Power-connected installations
2. SPNs connected to Western Power
3. SPNs capable of intentional island operation
4. Private networks capable of extended operation independent of the SWIS

Each arrangement presents materially different technical, inspection and safety considerations.

Recommendations

I recommend that Energy Policy WA, in conjunction with Building and Energy and Western Power, develop specific technical guidance addressing the electrical safety aspects of SPNs.

At a minimum, this guidance should establish:

- Applicable legislation and standards
- Inspector roles and jurisdiction
- SPN operator responsibilities
- Ownership of private distribution infrastructure

- Infrastructure crossing multiple lots
- PV, BESS and generator integration
- Island operation requirements
- Interface requirements with WAER, WASIR and Western Power
- Commissioning and testing requirements
- Documentation requirements
- Ongoing inspection and maintenance responsibilities
- Emergency response requirements
- Processes for future alterations and upgrades

I further recommend that Energy Policy WA, Building and Energy and Western Power jointly review the WAER, WASIR and associated technical requirements to ensure the electrical safety framework evolves concurrently with the AES framework.

Conclusion

The proposed AES framework has the potential to support innovative energy solutions and increase deployment of distributed energy resources.

However, the technical and electrical safety framework must be developed concurrently with the commercial and consumer protection framework.

The objective should be to ensure that innovation in private electricity supply does not create uncertainty regarding:

- Ownership and responsibility
- Technical compliance
- Inspection authority
- Defect management
- Emergency response
- Safe isolation

Most importantly, any person responding to an electrical fault or emergency should be able to quickly, confidently and safely establish a known safe state without first needing to determine the regulatory status or electrical architecture of the site.

Similar issues relating to documentation, isolation arrangements, labelling, ongoing compliance and asset responsibility can already arise in installations incorporating distributed energy resources. As SPNs evolve to incorporate larger and more complex

combinations of generation, storage and private distribution infrastructure serving multiple customers, the importance of clearly defined technical requirements, ownership responsibilities, compliance obligations and emergency response arrangements is likely to increase.

As SPNs evolve to incorporate larger PV, battery storage and generation systems supplying multiple customers, the complexity of inspection, maintenance and emergency response arrangements is also likely to increase. This reinforces the importance of establishing clear technical requirements, ownership responsibilities, compliance obligations and emergency response arrangements before these systems become commonplace.