Xatech **International Ptd Ltd**
ABN 14 065 203 581

11th August 2024

Transgrid
180 Thomas Street
SYDNEY NSW 2000

Attn: regulatory.consultation@transgrid.com.au

Dear Sir/Maam

Re: Managing Risk on Line 94M (Beryl-Crudine Ridge)

We refer to RIT-T Project Specification Consultation Report for Managing Risk on Line 94M issued 26 May 2025 and would like to take this opportunity to propose an alternative conductor for potential future upgrade of the line as per the attached submission.

This response to the PSCR has been prepared by Xatech International Pty Ltd/Epsilon Cable who are the manufacturer of High Voltage Composite Core Conductors. Epsilon Cable, a division of Epsilon Composite, has headquarters and composite core manufacturing facilities located at 5 rue de Hourtin 33340 Gaillan en Medoc (Bordeaux) in France.

This proposal is based on the installation of HVCRC® Lisbon/Hawk (HVCRC® 320-40) as an alternative to the indicated ACSR/GZ Lemon. HVCRC® Lisbon/Hawk has a similar size and mass to ACSR/GZ Lemon but provides a significant increase in transmission capacity together with a reduction on transmission losses on a "like for like" basis. The benefits are

- ability to provide increased transmission capacity whilst using existing or standard replacement structure.
- future proofing of the investment to accommodate increased transmission requirements with flexibility to accommodate fluctuating demand/ transmission requirements
- increased line safety in both adverse weather conditions and bushfire events with the composite core not subject to thermal expansion (low sag high temperature characteristics)
- improved conductor life with the composite core not subject to corrosion
- improved financial performance and efficiency with lower transmission losses.

Please be advised that Xatech International have been registered on the Transgrid Supplier Database for the supply of HVCRC® conductors. We advise that we would be pleased to provide any additional information or organise an online meeting with the Epsilon Technical Team to provide further details of their technology should this be of assistance.

Yours faithfully
Xatech International Pty Ltd

[redacted]

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This introduction provides details of an alternative for the future replacement of conductor for Transgrid Line 94M (Beryl-Crudine Ridge) and Epsilon Cable/ HVCRC® Conductor technology.

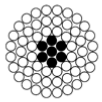
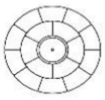
Whilst it is acknowledged that the current preferred immediate option for Managing risks on Line 94M is the replacement of 29 wooden pole structures (option 1) based on benefit from capital cost, it is noted that consideration has been given to replace the existing conductor with ACSR/GZ Lemon as part of a major upgrade.

The alternative proposed is to substitute HVCRC® Lisbon/Hawk (HVCRC® 320-40) that has a similar size and mass to ACSR/GZ Lemon but provides a significant increase in transmission capacity together with a reduction on transmission losses on a “like for like” basis. The benefits available from the HVCRC® conductor include:

- ability to provide increased transmission capacity whilst using existing or standard replacement structure.
- future proofing of the investment to accommodate increased transmission requirements with flexibility to accommodate fluctuating demand/ transmission requirements
- increased line safety in both adverse weather conditions and bushfire events with the composite core not subject to thermal expansion (low sag high temperature characteristics)
- improved conductor life with the composite core not subject to corrosion
- improved financial performance and efficiency with lower transmission losses.

It is acknowledged that the initial conductor cost of **HVCRC®** Lisbon/Hawk would be higher when compared to past traditional technologies such as ACSR/GZ Lemon, however the additional cost of the conductor can be offset by design of the transmission line and a reduction in transmission losses.

Xatech International Pty Ltd – Epsilon Cable Representative
Web: www.xatech/com.au Tel: +61 [redacted] Email: [redacted]

		Lemon ACSR/GZ	HVCRC® LISBON/HAWK HVCRC® 320-40	Diff (%)
Dimensional/ mechanical specs	Schematics	 Al: 30/Ø3.00 St: 7/Ø3.00	 Ø7.11 core 6 + 10 TW	
	Ø conductor (mm)	21.00	21.79	4%
	Linear mass (kg/km)	973	949	-2%
	Aluminium section (mm²)	212	317	+50%
	Rated Stregnth (kN)	90.4	108	+19%
Electrical specs - capacity	Max Operating Temp (°C)	90	180	+100%
	Comparative Ampacity at 90°C[1]	573	716	+25%
	Max ampacity at max temp[1]		1183	+106%
Electrical specs - losses reduction	DC resistance at 20°C (ohm/km)	0.0577	0.0884	53%
	AC resistance @ 90°C (ohm/km)	0.0725	0.1141	57%
	Mean ampacity (*~100% ACSR load*)	570A (hypothesis for calculation)		
	T° conductor @ 570A	89.6	73.7	
	AC resistance @ T°	0.1746	0.1083	
	Losses per year (kWh/km)[2]	496933	308235	
	Yearly savings (kWh/km)	/	188698	
Large CO_2 emission reduction	Yearly savings (tonsCO2/km)[3]	/	95	
	Yealy savings - example for single circuit 100km	/	28418	
	40 years total savings (tonsCO2)	/	1140000	
Financials - rapid ROI[4]	Yearly savings (AU$/km)[4]	/	18870	
	Price difference gap (AU$/km)	/	14000	
	ROI (Return of Investment, years)	/	0.7	
Financials - long term benefits	Yearly savings, example for single circuit 100km project (MAU$)	/	5.66	
	Estimated savings for a 40years lifetime after ROI achieved (MAU$)	/	222.2	

Notes:

(1) Calculation based on IEEE Standard 738-2023 with following parameters: 40^{0}C ambient temperature, 0.5m/sec wind transverse to conductor, clear atmosphere, 0.5 coefficients of emissivity and absorption, solar radiation 1000MW/m^2, latitude 34^{0}S, 50 Hz

(2) Calculation based on CIGRE Technical Brochure TB265

(3) Based on emission at 502gCO_2/kWh

(4) Based on generation cost at 0.1AU$/kWh.

Epsilon Composite/ Epsilon Cable Company Background

Epsilon Cable is a leader in advanced conductor technology with a strong commitment to sustainability and innovation.

- Epsilon Cable is a division of Epsilon Composite based in Gaillan Medoc France.
- Epsilon Composite, established in 1987, specializes in carbon fibre pultrusion and exports over 80% of its production worldwide.
- The company invests 10% of its turnover in R&D and holds over 100 patents.
- Epsilon has received multiple certifications for quality and sustainability, including ISO 9001 and a gold medal from EcoVadis.

Epsilon Cable proven **HVCRC®** technology has been at the forefront of transmission grid modernisation for the past two decades with **HVCRC®** conductors selected for both reconductoring and new transmission projects worldwide.

Epsilon HVCRC® Technology Overview

Epsilon Cable's HVCRC® technology offers advanced conductor solutions that enhance transmission capacity and efficiency while reducing community and environmental impact. Epsilon Cable manufactures the composite cores at their facility in France with stranding undertaken by selected manufacturing partners who meet strict quality and manufacturing expertise.

HVCRC® conductors provide flexibility, resilience, and future-proofing for investment in new and upgraded transmission lines.

Benefits of HVCRC® Conductors

HVCRC® conductors present significant advantages over traditional conductor technologies.

- HVCRC® conductors increase amperage capacity by up to 100% compared to traditional ACSR conductors.
- They offer improved flexibility and resilience, accommodating surges in renewable energy generation and improved resilience in adverse weather conditions.
- The composite core eliminates thermal expansion and corrosion, extending the conductor's lifespan.
- Reduced investment costs for new transmission lines are achieved through smaller/reduced number of transmission towers with lower ROW requirements, minimizing community and environmental impact.

HVCRC® Conductor Specifications

HVCRC® conductors are designed to enhance performance and reduce losses in high voltage transmission and distribution lines.

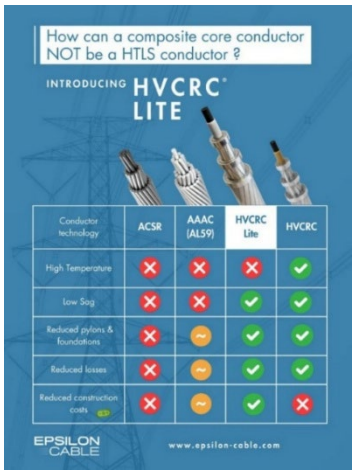
Also available: HVCRC ULS and Encapsulated Carbon

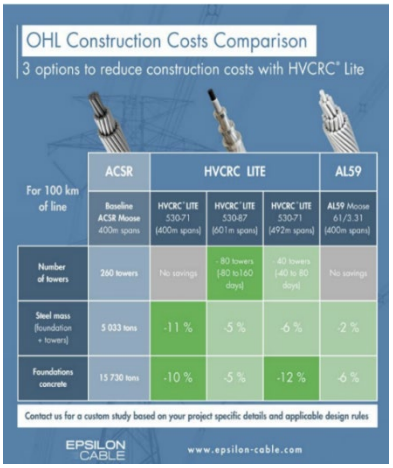
- The composite core is lightweight and strong, manufactured in France, and complies with ASTM B987-20 standards.

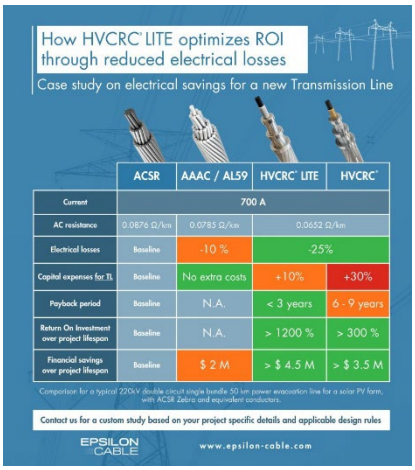
- HVCRC® and HVCRC®ULS conductors are classified as full specification HTLS conductors, providing up to 30% reduction in transmission losses.
- HVCRC® Lite is a unique specification that offers a cost-effective solution for new projects with standard 90^{0}C temperature ratings and reduced thermal expansion.

HVCRC® Lite Independent Studies

HVCRC® Lite conductors are the lowest capital cost option for new transmission and distribution lines where maximum capacity requirements will meet foreseen demand. An independent study conducted by EFLA Consulting Engineers comparing HVCRC® Lite to ACSR and AAAC Equivalent conductors validated the cost-effectiveness efficiency of HVCRC® conductors in real-world applications.







The EFLA Consulting Engineers study

- Confirmed savings in material requirements for transmission towers including less foundation mass and reduced construction duration.
- Reduction in transmission losses by up to 25% when compared to ACSR and AAC traditional conductor technologies.
- Other benefits included reduced impact on the environment, local communities and shared land use.

Economic Assessment of Conductor Options

A comprehensive “whole of life” economic assessment reveals the long-term benefits of using HVCRC® conductors.

- Traditional assessments that focused on only capex fail to capture the full economic benefits of advanced conductors.
- Alternative assessments based on transmission capacity, transmission losses, environmental emissions, future proofing of investment and mitigation of impacts on communities and other land users supports the introduction of latest conductor technologies.
- Whilst HVCRC® conductors may have a higher conductor cost, these costs can be offset by design through potential lower kV rating, smaller/reduced number of

transmission towers and significant savings in operational costs due to reduced transmission losses.

Conductor Options for New Transmission Lines

Epsilon offers various conductor options tailored to specific project requirements and cost considerations.

- Options include
  - maintaining kV ratings with increased capacity to future proof investment,
  - reducing kV ratings whilst meeting capacity requirements at a lower costs,
  - using HVCRC® Lite for fixed capacity projects providing the lowest cost for construction of new transmission/ distribution infrastructure.
- Each option provides unique benefits including reduced ROW requirements and minimized environmental impacts.
- The choice of conductor can impact project costs, construction duration, and community acceptance.
- HVCRC® conductors reduce transmission losses by up to 30% when compared to traditional ACSR Conductors delivering more generated renewable energy to demand centres.

Conductor Options – Upgrading of Existing Transmission Infrastructure

Where congestion exists on existing transmission lines and/or curtailment of renewable energy is occurring due to lack of capacity on transmission lines then the cost-effective solution is reconductoring of the existing line with HVCRC® Conductors.

Reconductoring with HVCRC® Conductors provides:

- Immediate increase in transmission capacity, up to 100% increase, using existing tower infrastructure.
- Cost effective versus building duplicate infrastructure
- Shortest construction time using existing approved ROW.
- Improved transmission performance and resilience in adverse weather events.

Epsilon Cable's Support Services for Transmission Authorities

Epsilon Cable offers comprehensive support services for electrical transmission/ distribution projects, including installation supervision and technical assistance.

- Provides installation supervision specialists and onsite training for installation crews.
- Offers training videos to enhance crew skills.
- Assists in selecting appropriate conductors using industry-standard design software (PLS CADD).
- Ensures optimal project performance by analysing sag, ampacity, temperature, and catenary parameters.

CoreCheck® System for Monitoring Integrity

The CoreCheck® System enables real-time monitoring of composite core integrity throughout the project lifecycle.

- Monitors integrity before, during, and after installation.
- Detects potential defects or damages at various project stages.
- Utilizes breakdown voltage testing for effective assessment.
- Simple and fast setup in the field with clear operator signals (green light/red light).

Collaboration with Sicame Group and Tesmec

Epsilon collaborates with recognized suppliers for accessories and equipment to enhance installation processes.

- HVCRC® Advanced Conductors use proven accessories from Sicame Group with Sicame Australia providing local availability of components.
- Tesmec Stringing Equipment is utilized for installations and has been developed in collaboration with Epsilon. Tesmec has a strong presence in Australia with offices nationwide.

Summary of Operational, Economic and Environmental Advantages of Epsilon Conductors

Epsilon's advanced conductors present operational, economic and environmental benefits for new and upgraded transmission projects.

- Provides immediate capacity doubling with minimal costs for existing infrastructure.
- For new transmission and distribution lines future proofs investment through increased capacity and resilience.
- Offers the lowest cost option for new lines with fixed maximum capacity.
- Reduces visual impact and ROW requirements, enhancing community acceptance.
- Long-term efficiency improvements lead to reduced emissions over the installation's lifespan.

Upcoming Engagement at EN26 Conference

Epsilon Cable will participate in the Energy Networks Australia EN26 Conference and Exhibition in March 2026. We advise that a senior product specialist will be presenting at the Conference and there will be opportunities available for technical meetings with stakeholders at the conference and/or onsite meetings with client technical teams.

For meetings/visit arrangements please contact David Knight - Xatech International Pty Ltd Tel +61 [redacted] / Email [redacted]