Grid Modernization & Decarbonization

Get MORE from the Existing Grid with Advanced Conductors

David Townley
Director of Public Policy
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Grid Enhancing Technologies (GETs)

- GETs **rapidly** get **more capacity** from the **existing electric system** and makes the network more efficient, more resilient, and more reliable.

- GETs include software and sensor-based technologies as well as hardware technologies.

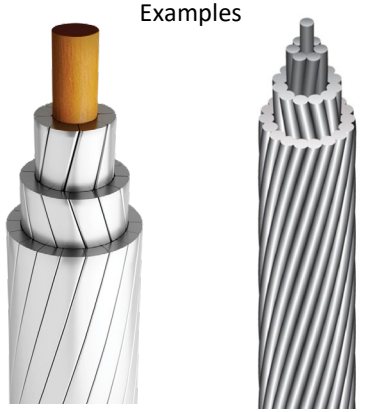
- The GETs technologies are not mutually exclusive; they can be used together!

What is an Advanced Conductor?

Advanced conductor is a modern design electric conductor that enables more current flow through a given diameter conductor with less sag than traditional conductor. Two types:

- Metal Core (introduced ~1970; aka HTLS)
- Composite Core (introduced ~2000)
- Superconductors (arriving soon commercially)

Examples



Composite core (ACCC)

Metal core (ACSS)

In this discussion, "Advanced Conductor" used for Reconductoring will mean only the composite core conductors

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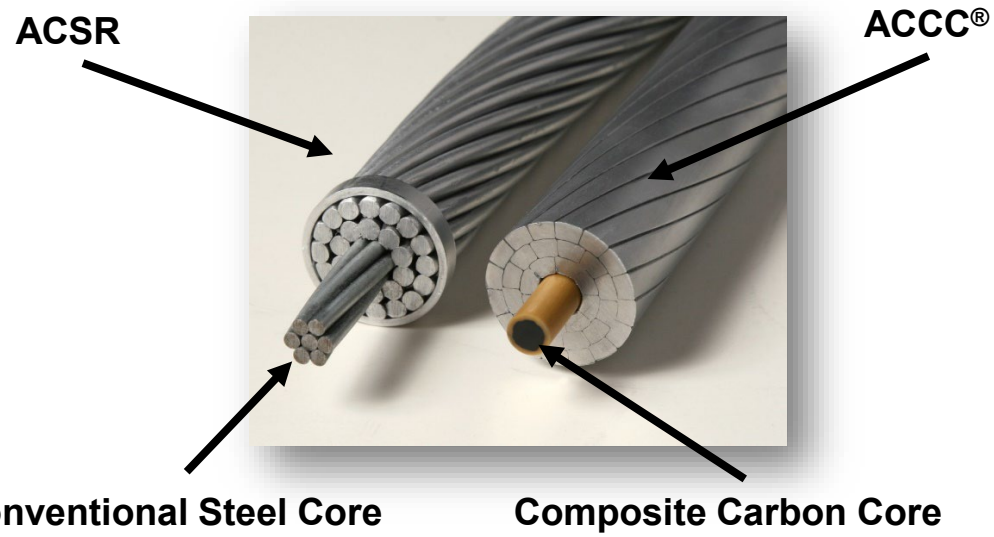
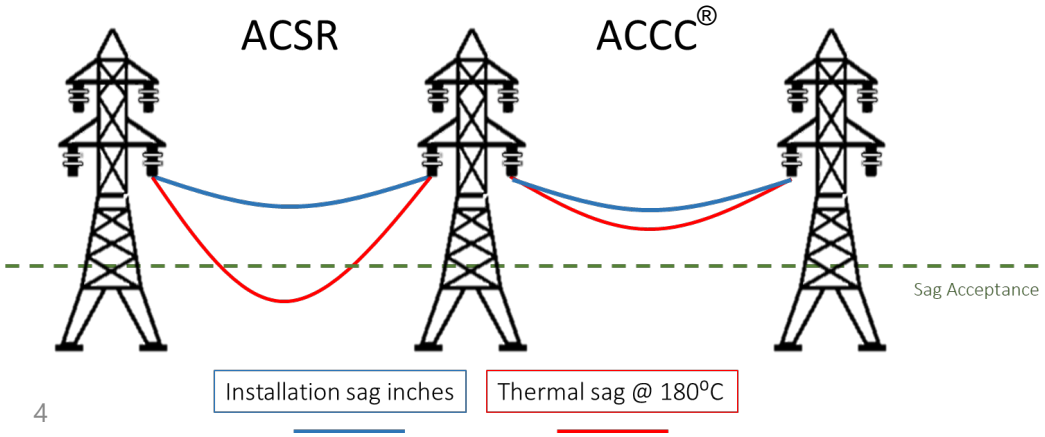
Advanced Conductors – Designed for Performance



Advanced vs. Conventional

- Replace steel and hard aluminum with carbon and annealed aluminum
- More aluminum that is more efficient =
  - 2x capacity
  - More efficient (30% lower losses)
- Lower thermal expansion means 50% less thermal sag



- Less sag means smaller towers or fewer towers
- **Less sag means wildfire risk mitigation**

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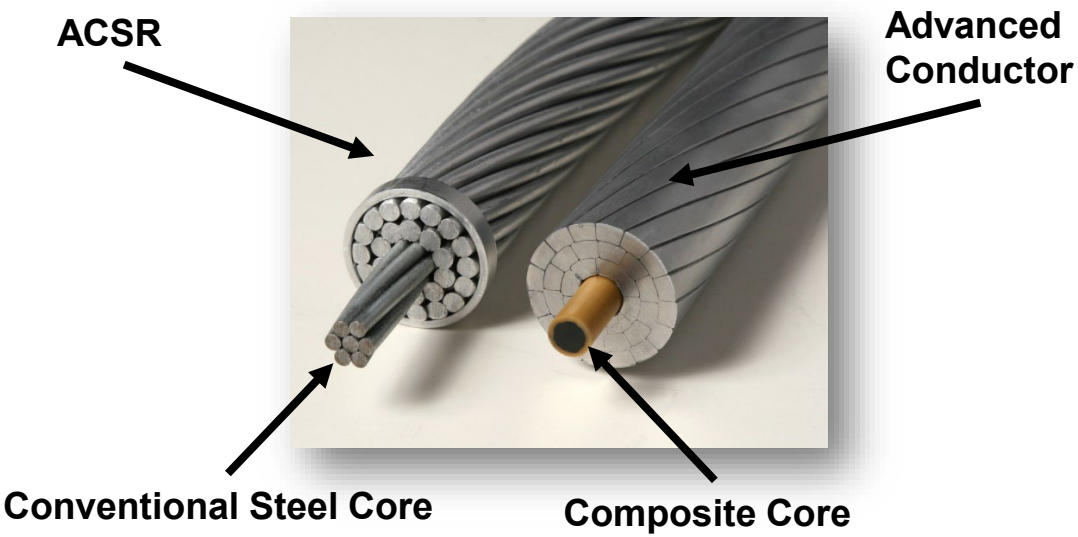
Composite Core: Enables a Unique Capability

Even after more aluminum is added, the composite core Advanced Conductor weighs about the same as the conventional ACSR of the same diameter.



ENABLES A UNIQUE CAPABILITY:

Reconductor with Advanced Conductors on EXISTING STRUCTURES (designed for the conventional ACSR) to provide much greater capacity and energy efficiency (and lower sag).

GETs

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Grid Enhancing Application: GET MORE NOW

Reconductoring old legacy ACSR conductor with high-efficiency, high-capacity Advanced Conductor using existing structures generates consumer savings:

- 50%-100% more capacity in same ROW
- 25%-40% lower line losses
- HALF the cost of conventional structural rebuild to uprate line
- Fast Process: ~12 - 24 months from decision to an energized line
  - Construction permit (& process) is eliminated
  - Maintenance practices for installation

  AND
- LOW SAG => Wildfire Risk Mitigation

Reconductoring at congestion points
To interconnect more offshore wind
(Netherlands & Germany)

IIJA and IRA Applications

- 3 - IIJA Transmission Programs explicitly call out Advanced Conductors:
  - Grid Resilience (40101): reconductoring fire-prone areas with low-sag advanced conductors
  - Transmission Facilitation Program (40106): Advanced Conductor use is prioritized for funding
  - Smart Grid (40107): Grid Enhancing applications, including with advanced conductors, with more capacity, efficiency, resiliency, and reliability.
- IRA 22004: $9.7B for Coop projects including to increase the efficiency of the transmission and distribution system
- IIJA Innovation Program (40103): demonstrate innovative approaches to T&D infrastructure to harden and enhance resilience and reliability; upgrade T&D lines in rural areas;

Conductor Energy Efficiency

- DOE will do a national study looking at the effects of a Conductor Efficiency Standard
  - Directed by 2023 Appropriations Bill Report Language
  - 180 days to report to Congress
  - A "report regarding the environmental, economic, and clean energy deployment benefits of establishing an energy conservation standard for overhead electricity conductors":
    - 5 specified areas of investigation
    - DOE -OE, -GDO, -EERE, and FERC shall cooperate on the report

- For YOUR projects NOW…….
  - Make sure that the project is investing appropriately in high efficiency conductors (and transformers)
  - Energy Efficiency (line losses) should be a DESIGN CRITERION at the project design stage
    - Reduces energy costs (and losses)
    - Reduces emissions
    - Reduces the required generating capacity to serve loads

FIRST: Get MORE from the Existing Grid

Reconductoring on existing T&D structures with high-efficiency advanced conductor is the **fastest, lowest-cost way to add substantial capacity to the existing grid**

and it adds

efficiency, resiliency, and reliability

Come by the table to get information and see how we can help you.