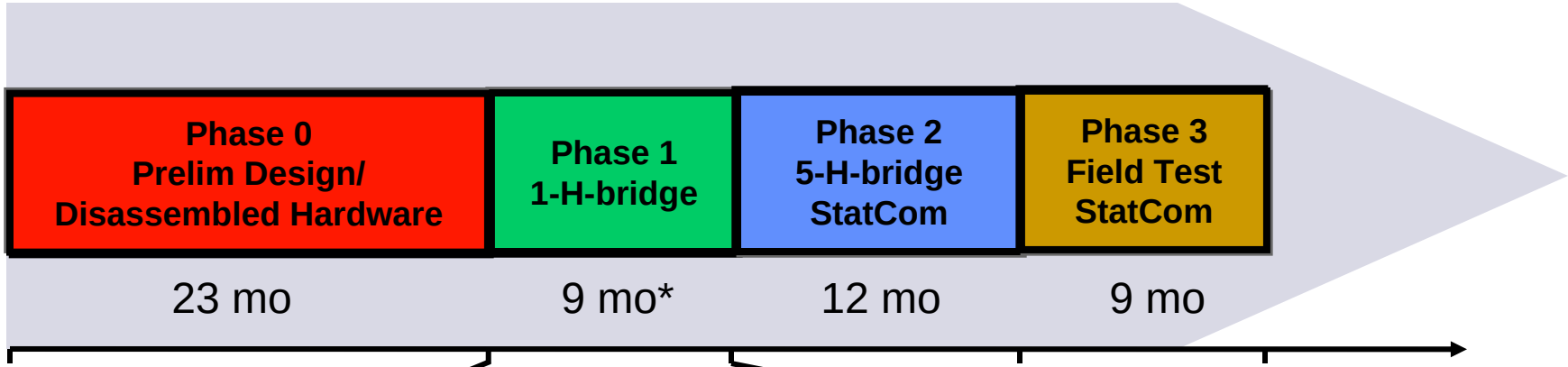
SAND2010-1320C

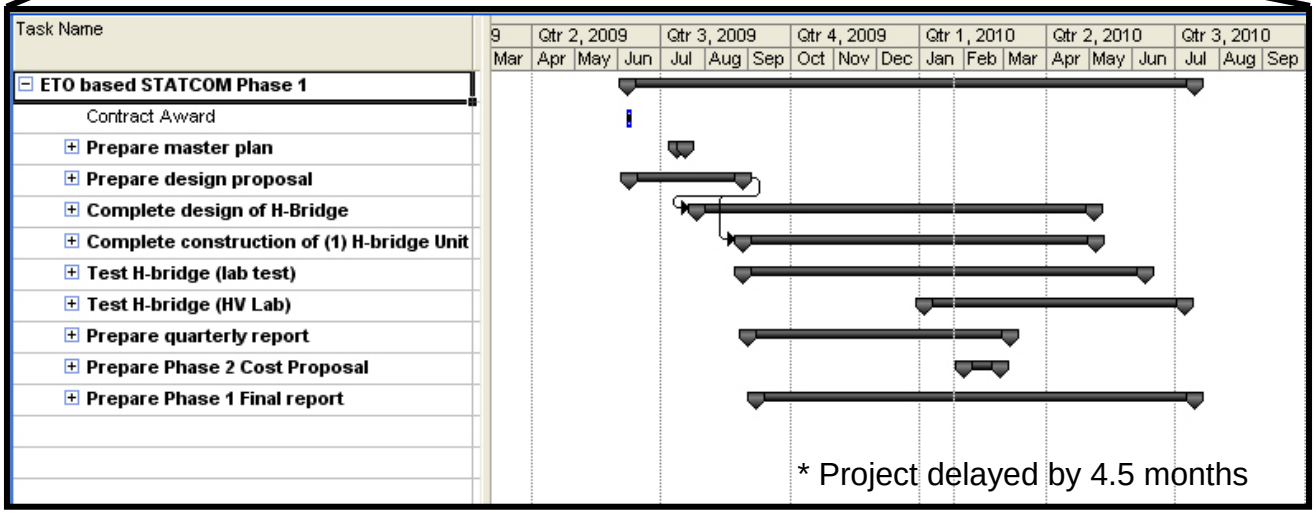
ETO StatCom Project Update

Stan Atcitty, PhD

Sandia National Laboratories
Energy Infrastructure & DER, Dept. 6336
February 03, 2010

ETO StatCom Project Schedule





* Project delayed by 4.5 months

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ETO StatCom Project – Phase 1

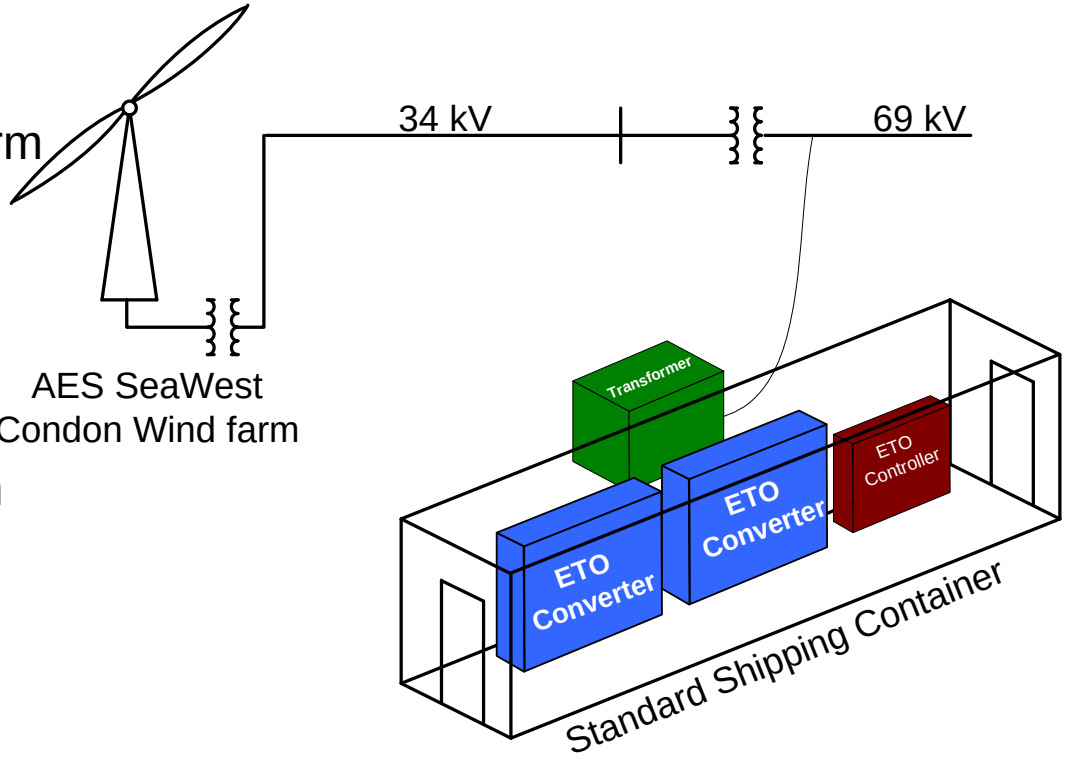
Phase 1 Project Duration: 06/08/09 — 07/15/10
Total Project Budget for Phase 1: $990,378
Spent to Date: $202,458
SPCO Dollars Leveraged: $80,301
BPA Lead: Mike Hulse
Sandia Lead: Stan Atcitty
Consultant: Silicon Power Corporation (SPCO)

ETO StatCom Project – Phase 3 proposed*

Funded under the DOE Energy Storage Program: Dr. Imre Gyuk
Sandia Energy Infrastructure & DER manager: John Boyes

- **Issue:** Voltage fluctuations introduced at Condon Wind Farm have an adverse effect on other nearby customers.

- **StatCom Specs:**
  - +/- 10 MVA
  - Active & Reactive Injection
  - DC Bus Voltage = 2170 V
  - V_{pcc} = 4160 V
  - Nominal Current = 1400 A
  - Peak Current = 1979 A
  - PWM control
  - Multilayer Topology



ETO-Based STATCOM

BPA demonstration site TBD*

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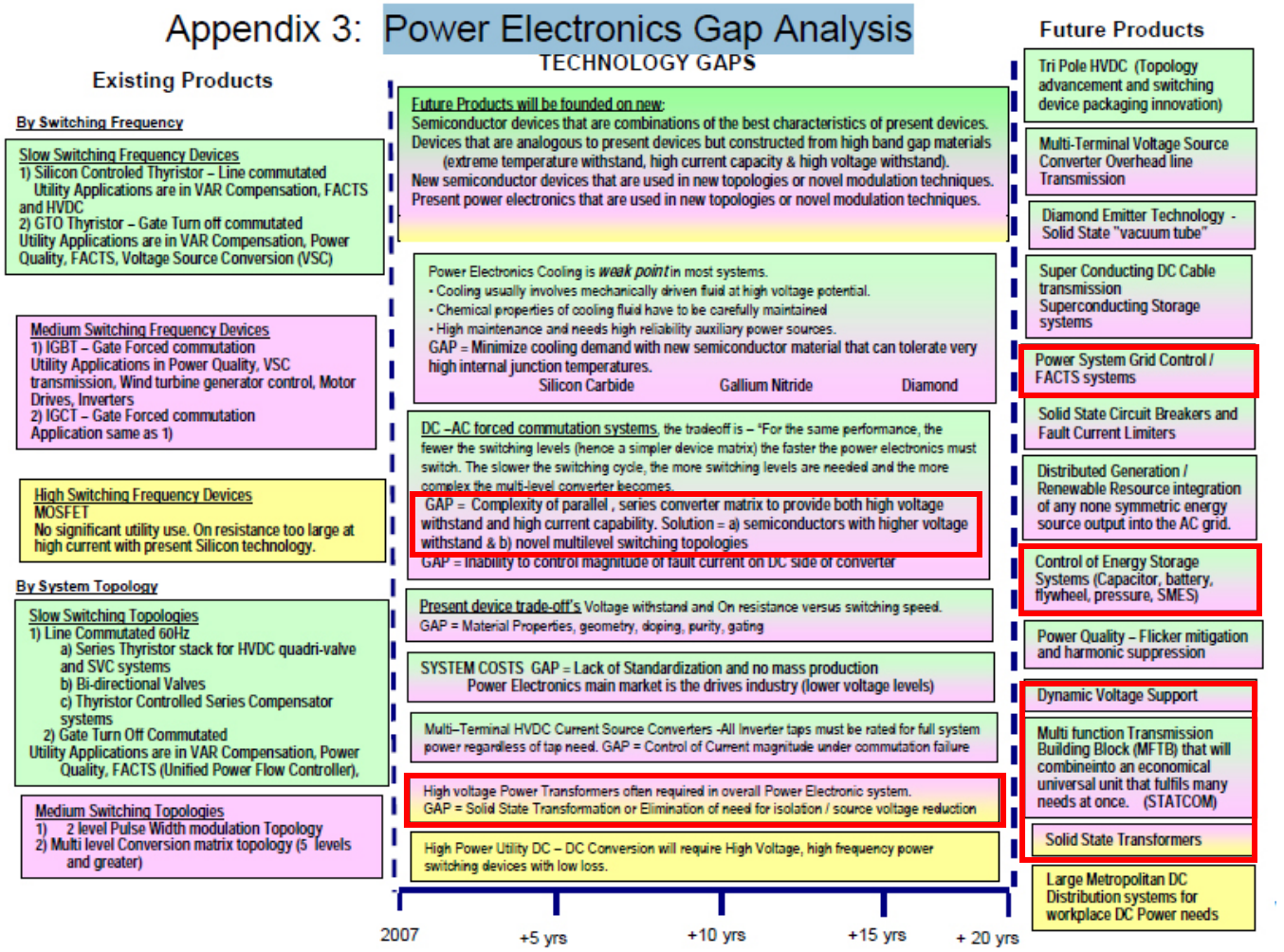
ETO StatCom Project – Gap Analysis



Ref: BPA Transmission Technology Roadmap, p.71

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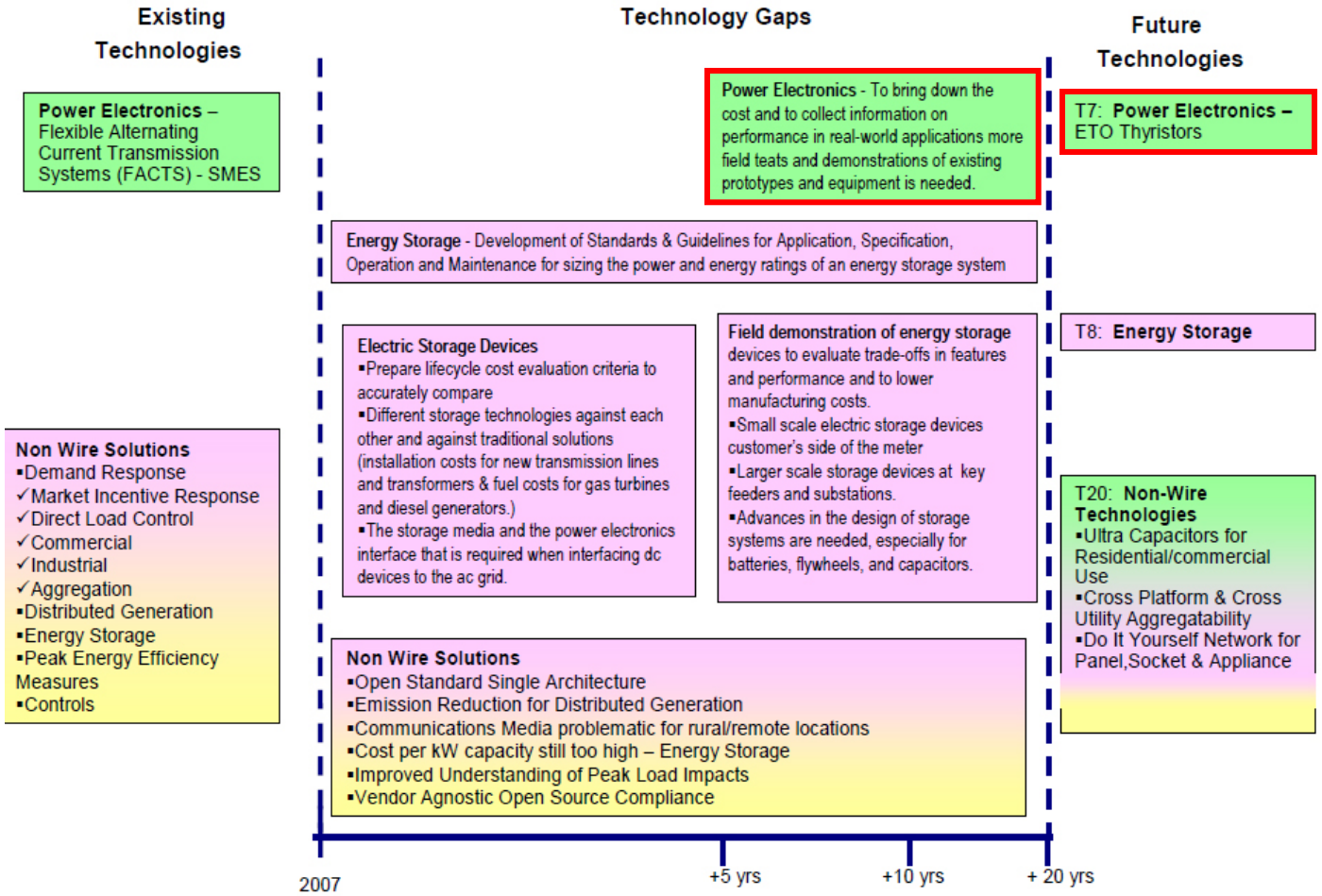
ETO StatCom Project – Gap Analysis (cont.)

Figure 12: Cost-effective, Environmentally Sound Energy Supply & Demand Gap Analysis



Ref: BPA Transmission Technology Roadmap, p.46

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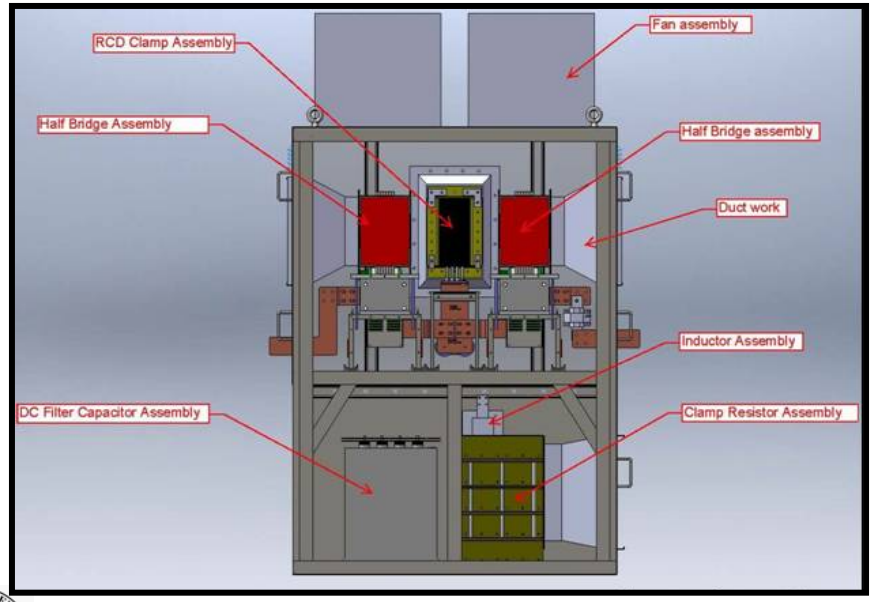
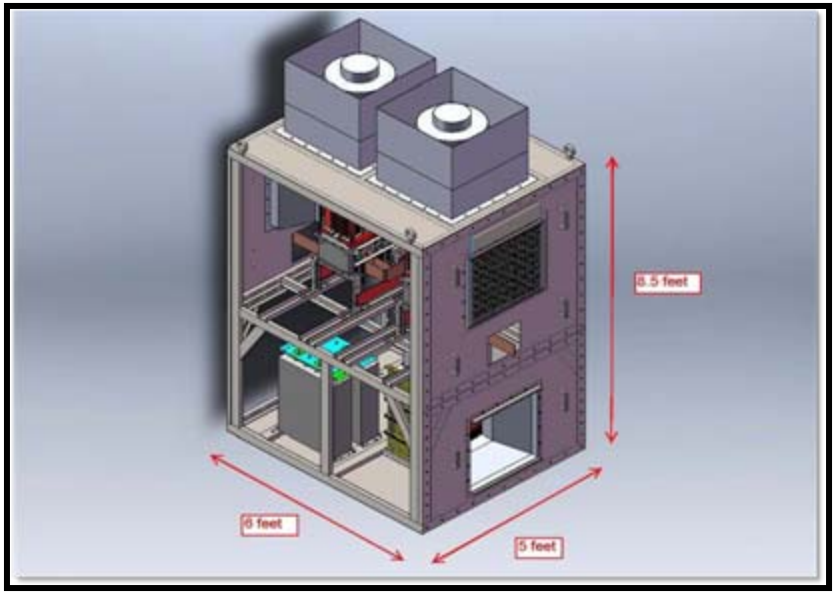
ETO StatCom Status and Milestones – Phase 1

- Four ETO devices were received from North Carolina State University
  - Additional spares will be acquired (each H-bridge requires four ETO devices)
- H-bridge design and simulations completed
- Thermal design of the system is underway (optimization phase)
- Final enclosure design is near complete
- NCSU control design has been reviewed and improvements are being made





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Expected Benefits

- ***What does this project actually do for us?***
  - **Addresses key technology gaps and future products identified in the BPA Transmission Technology Roadmap using DOE funds for Phase I**
  - **Provides access to innovative power devices, system & control ideas, and demonstrations**
  - **Near future support for smart grid distribution and transmisson application**
  - **Provides cost effective reactive power capabilities**
  - **Provides cost effective modular or 'cookie cutter' design**
  - **Provides long-term cost benefits because the air-cooled system requires less maintenance than a liquid-cooled system.**

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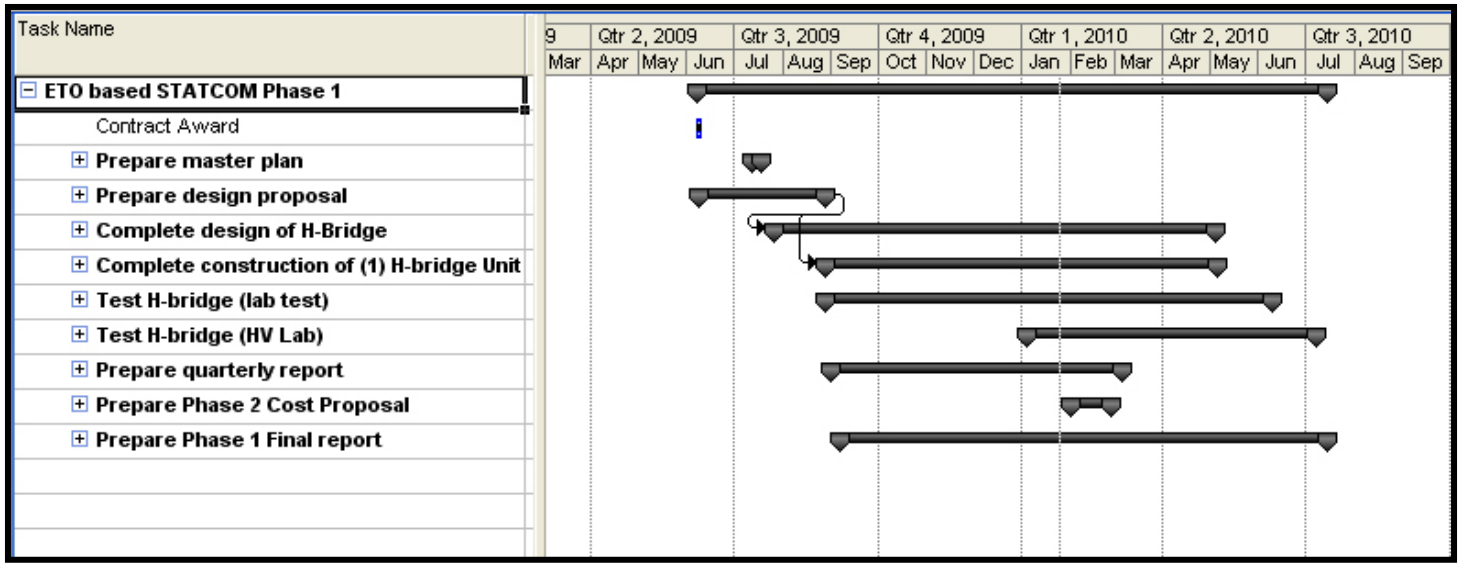
Summary – Phase 1

- **Project is currently on schedule with a new end date of July 14, 2010.**
- **Project funds are 20% spent through 64% of the project timeline.**
- **Expect a Phase 2 cost proposal from SPCO in late February**



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