

AES Transformer Loss Control Program

London Power Forum

13-Nov-2014

Transformer Failure





At AES, we have developed a solution to reduce losses from transformer failures

AES Business
Interruption Risk

-68%

-1.5B USD

Agenda

● Relevant transformer information

● What is the AES solution?

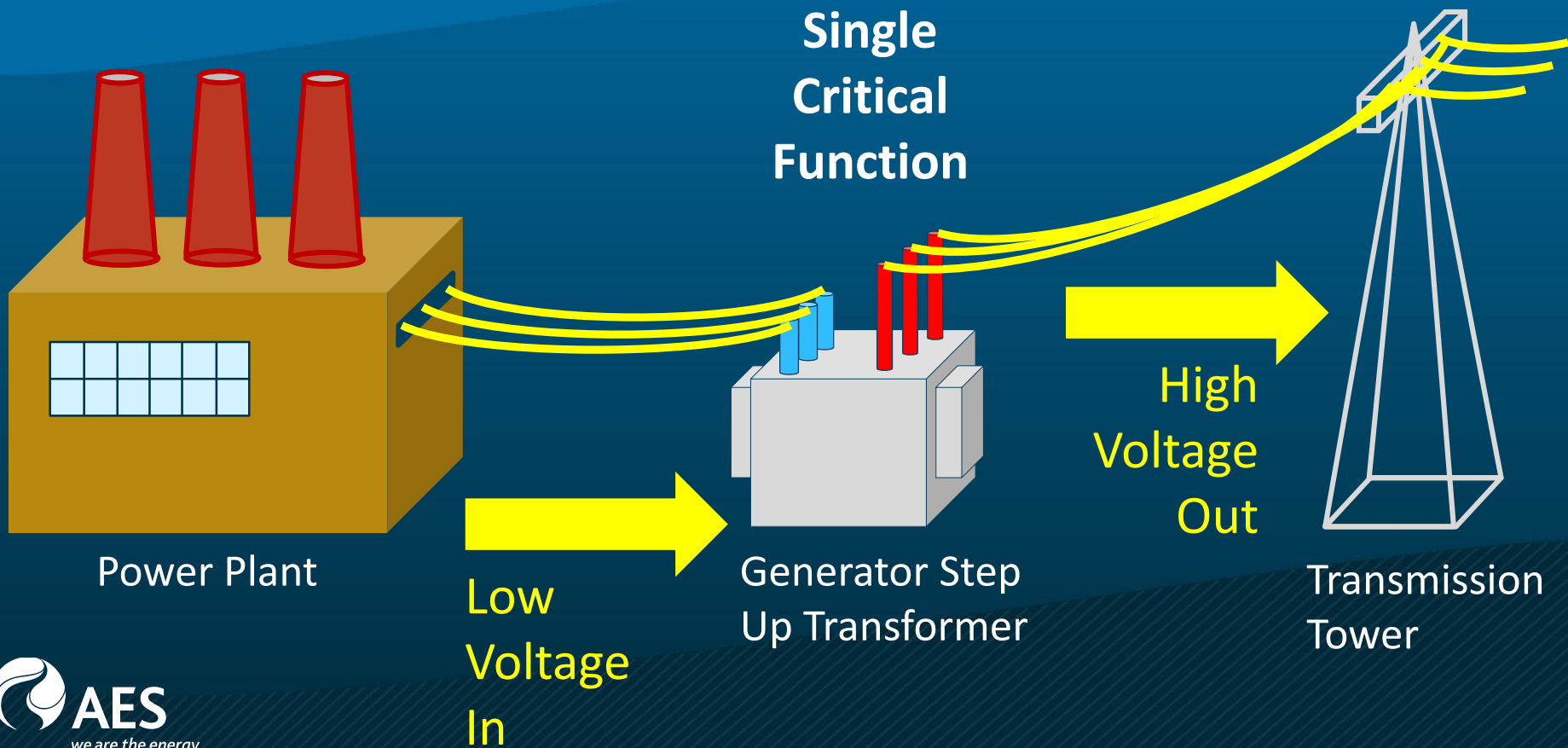
● How does it work?

● How does it benefit the industry?

Typical Generator Step Up Transformer (GSU)



GSU Critical Function

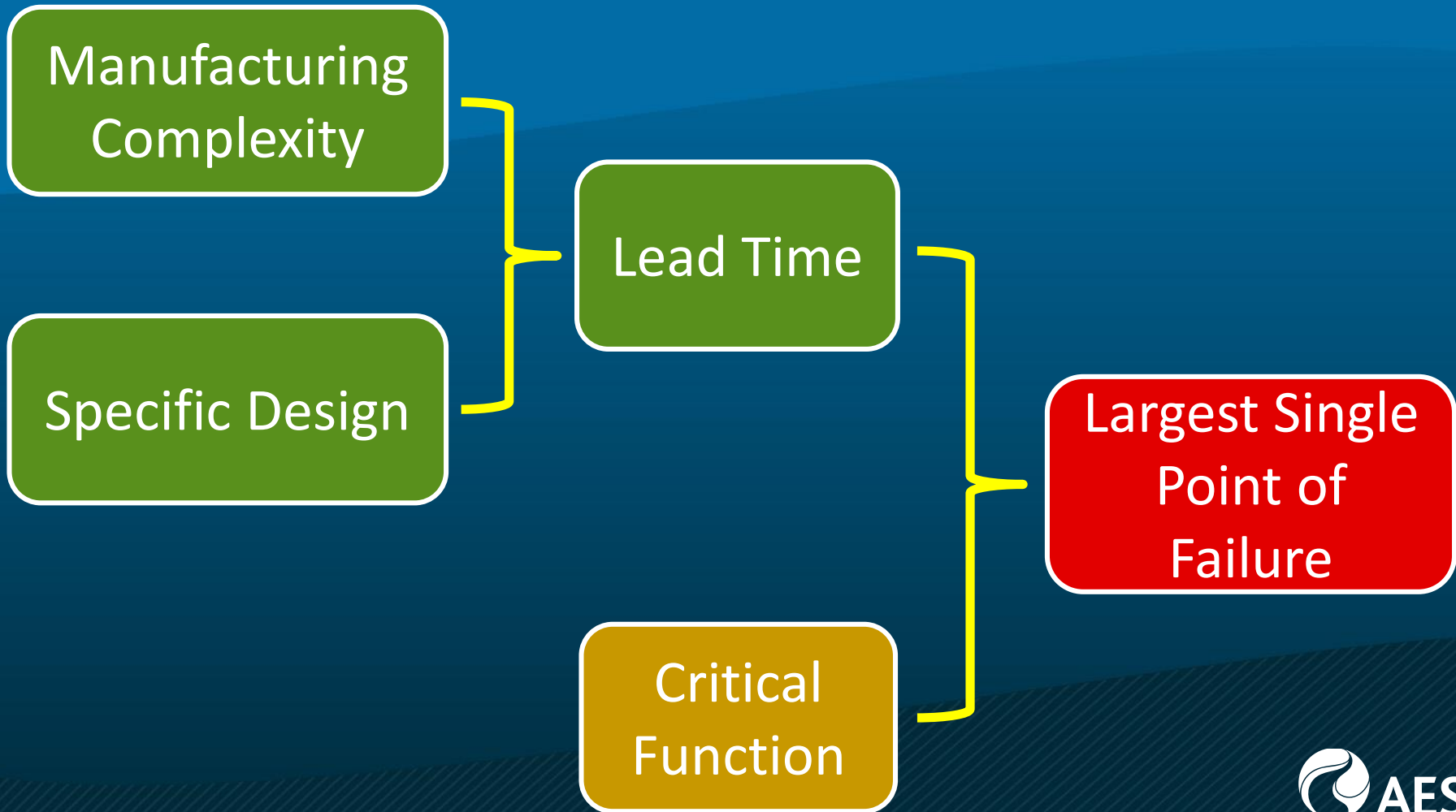




Manufacturing
Complexity
Labor Intensive
Assembly Sequence
Order Backlog

Size



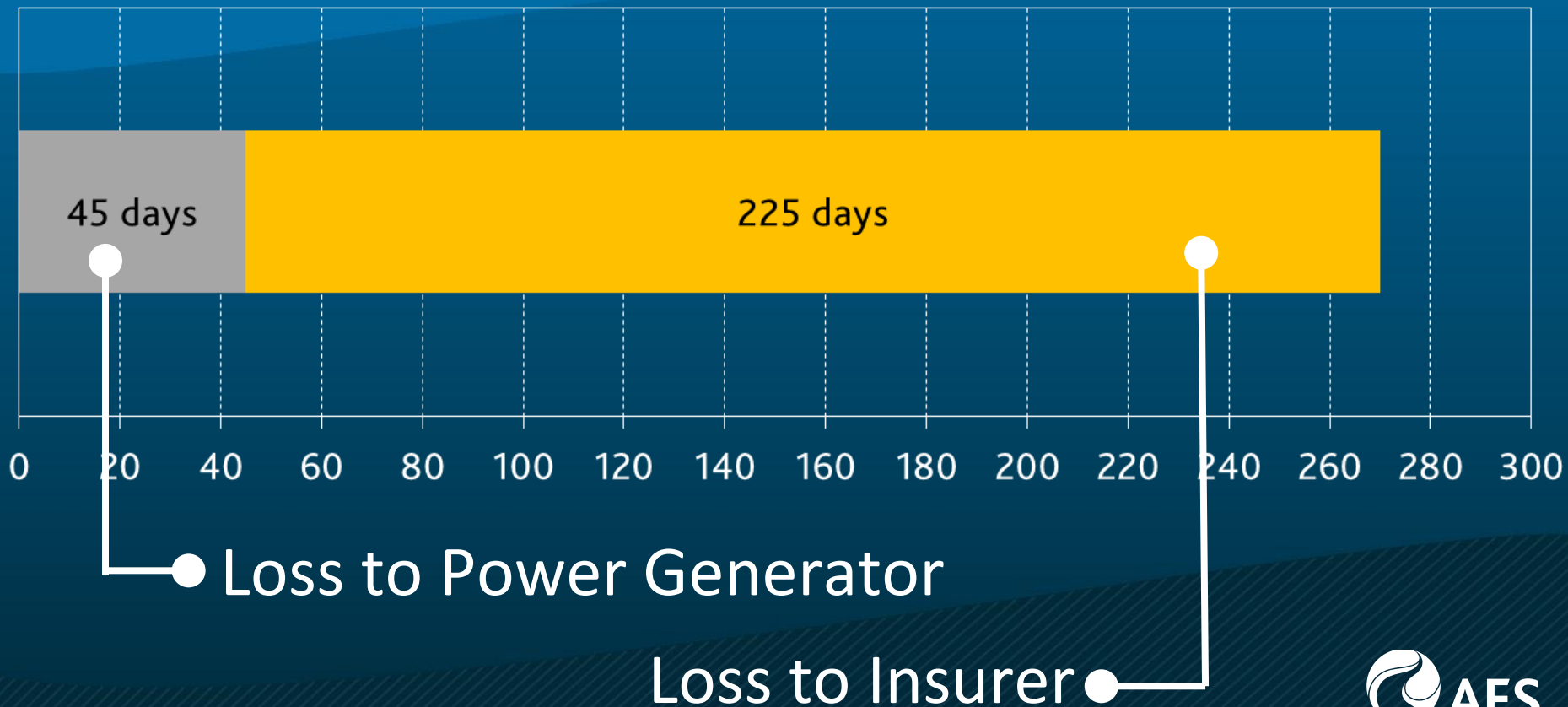


Options

(1) Invest in a spare transformer

(2) Operate without a spare

Transformer Failure Loss Allocation



Sep 2008

AES Plant Europe

470 MVA

Losses

AES: \$(5.3) M

Ins: \$(18.2) M

\$(23.5) M

Dec 2008

AES Plant South America

220 MVA

Losses

AES: $\$(7.8) \text{ M}$

Ins: $\$(11.6) \text{ M}$

$\$(19.4) \text{ M}$

Jul-2009

AES Plant Central America

312 MVA

Losses

AES: \$(16.9) M

Ins: \$(29.8) M

\$(46.7) M

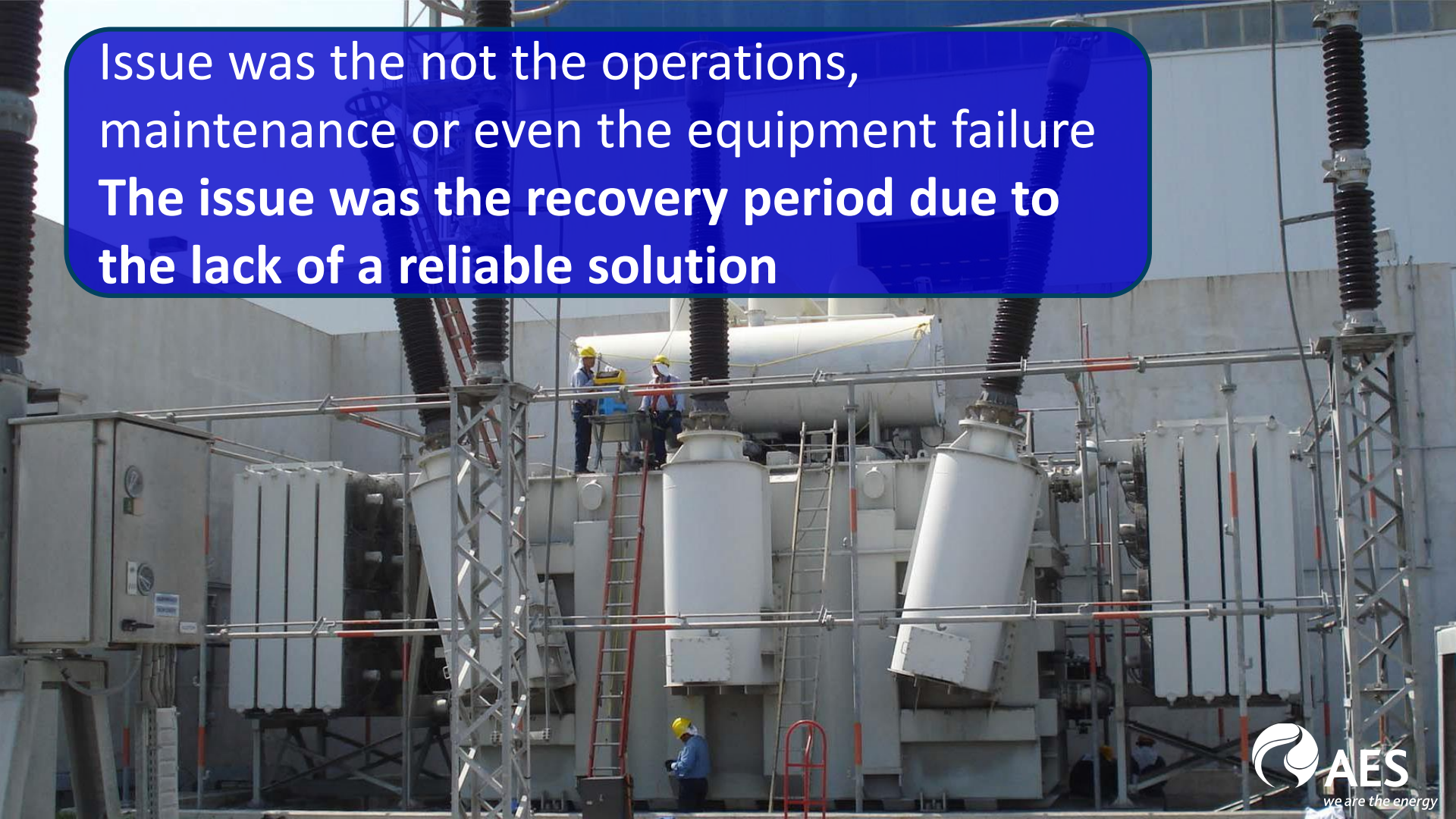
TOTAL LOSSES:

AES: \$(30.0) M

Ins: \$(59.7) M

} \$(89.7) M

Issue was the not the operations,
maintenance or even the equipment failure
**The issue was the recovery period due to
the lack of a reliable solution**



AES response:

AES Strategic Equipment Holding
Company (ASEHC)
created in 2010

AES Challenge



21 Countries

5 Continents

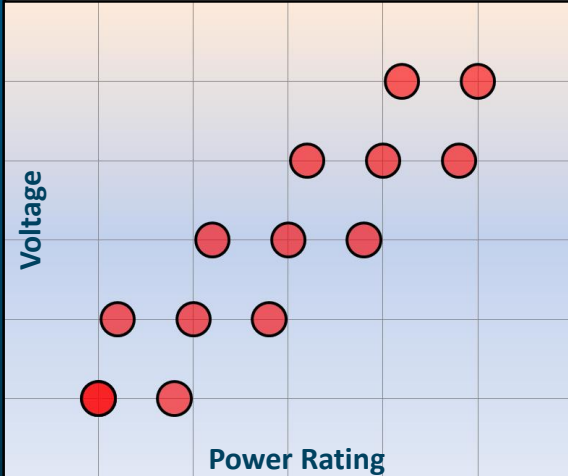
38,390 MW

80 Power Plants

251 Generator Step Up Transformers

Innovation: AES Spare Transformer Fleet (STF)

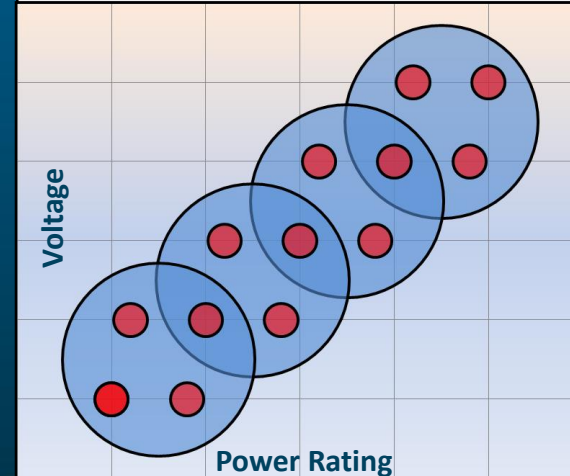
Existing Spare Transformer Operational Range



Multi Use Transformer Operational Range



Combined AES Spare Transformer Fleet Range



Multi Use Transformer

Development team

- World Class Manufacturer
- International Engineering Firm
- AES Engineers

Transformer Fleet Operational Range

Range	50 MVA to 500 MVA
Grid Operation	50 HZ to 60 HZ
LV Connection	10 kV to 24 kV
HV Connection	90 kV to 400 kV



Average 5 days sail time
Average 10 days sail time
Average 15 days sail time

Staging Site
Antwerp

Staging Site
Houston



Future Staging Site
Panama

Future Staging Site
Indonesia

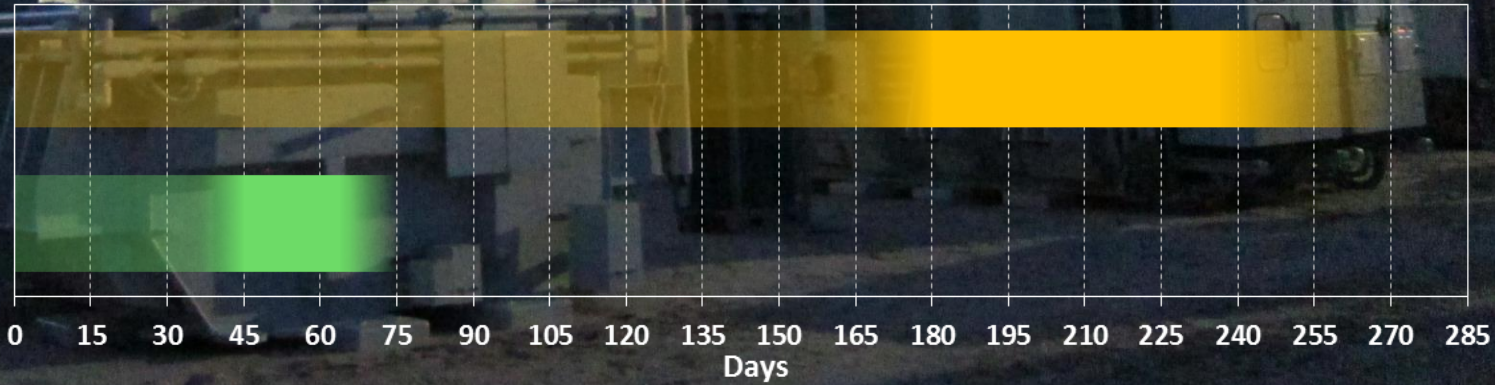


Speed of Recovery

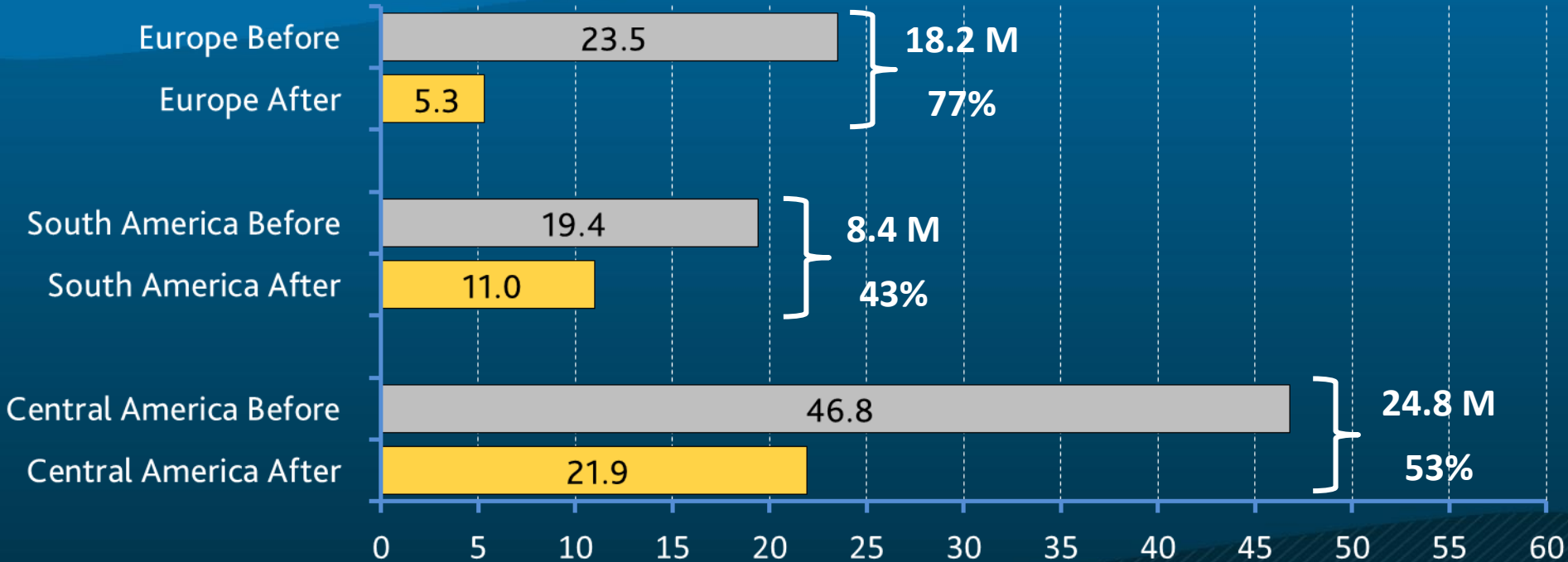
AES has the ability to reduce the transformer recovery period by 75%

Typical Transformer Recovery

AES STF Recovery



Looking Back



\$90M USD  **\$38M USD (57% Decrease)**

A large, white, multi-story transformer unit is being transported on a multi-axle trailer. The trailer is yellow and red, with multiple sets of large, black tires. The transformer unit is secured to the trailer with chains. The scene is outdoors, with a body of water and a building in the background. The sky is clear and blue.

The next step in the
evolution of the AES
Spare Transformer Fleet

AES STF
Transformer Lease Offer

Future Goal

Eliminate the current decision

(1) Invest in a spare transformer

(2) Operate without a spare

Instead:

Operate with reliance on the
AES Spare Transformer Fleet



Conclusion

- Growing Risk
- Impact
- AES Solution
- Recovery Decision
- Industry Standard

Thank you

www.AESSpareTransformerFleet.com