

Industry

NAVIGATOR

SUSTAINABLE DEVELOPMENT
STRATEGIES FOR T&D

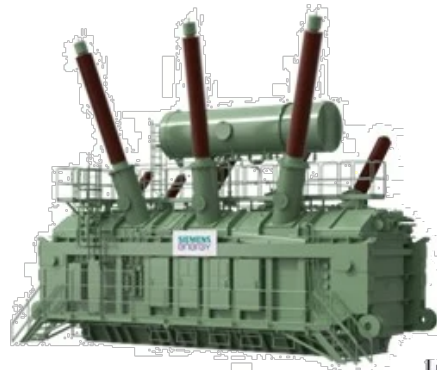
CONFERENCE 2025

Sustainable Solutions for Transformer Lifespan Extension: The Role of On-Site Services

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Power Transformers Services



**Equip-
ment in
service**

Installation & Commissioning

**End of
warranty**

Midlife

- Lifetime extensions**
- Bushing replacement
 - Oil treatment (REG, DRY)
 - Winding modernization

- Onsite or factory repair**
- Active part repair and / or drying
 - External parts refurbishment
 - Diagnostic services (DIAG 3 - HV testing)

Midlife +

End of life

- Scrap
- Recycle
- Replace

More lifecycle services: Consultancy - service programs - emergency services - monitoring - trainings - spare parts

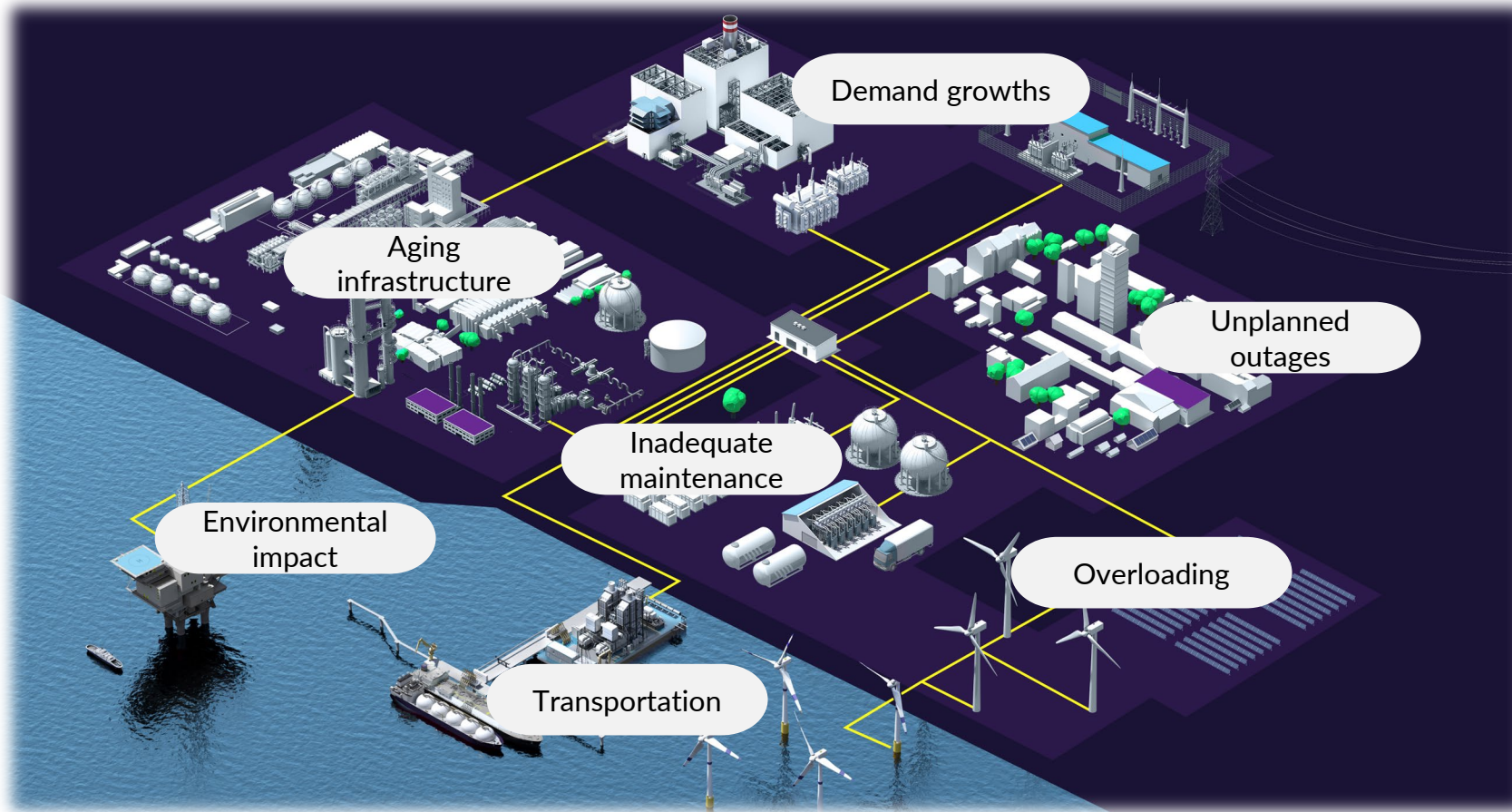
Tailored time-based or condition-based maintenance strategy

- Condition assessment / diagnostic services (DIAG)**
- DIAG EA (expert assessment)
 - DIAG 1 (oil analysis, visual check, thermography)
 - DIAG 2 (electrical measurements)

Maintenance
according to OEM specifications



Challenges faced by Power Transformers



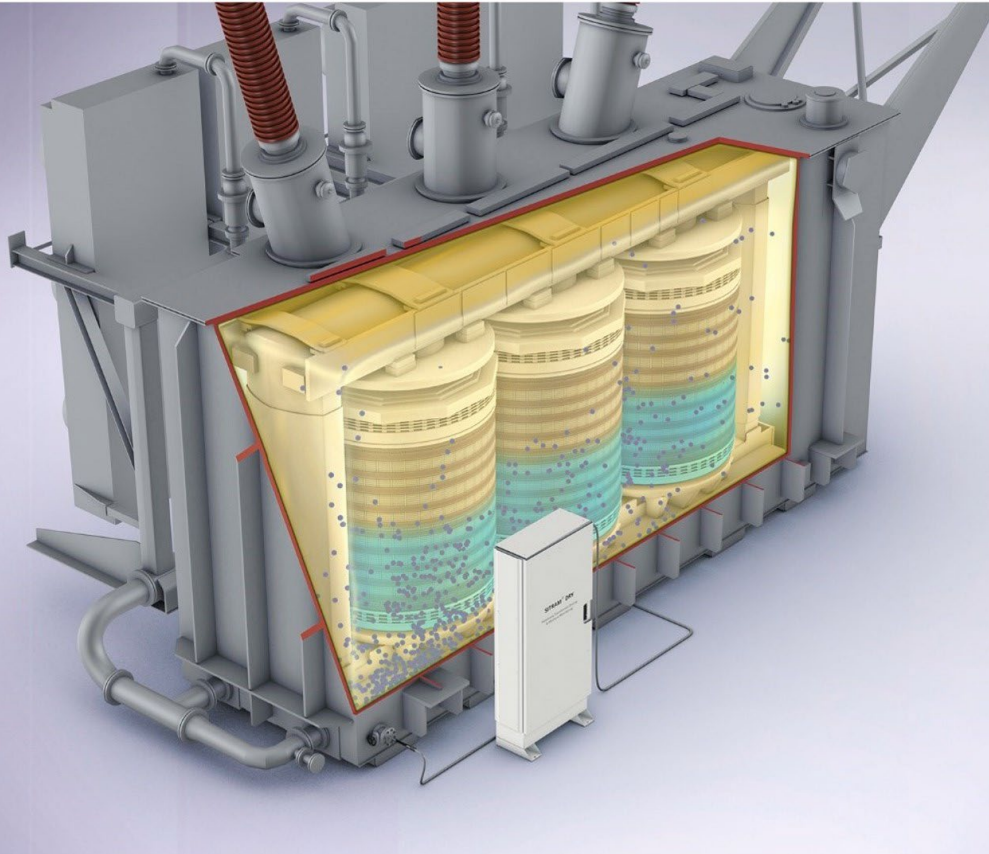
On-Site Services



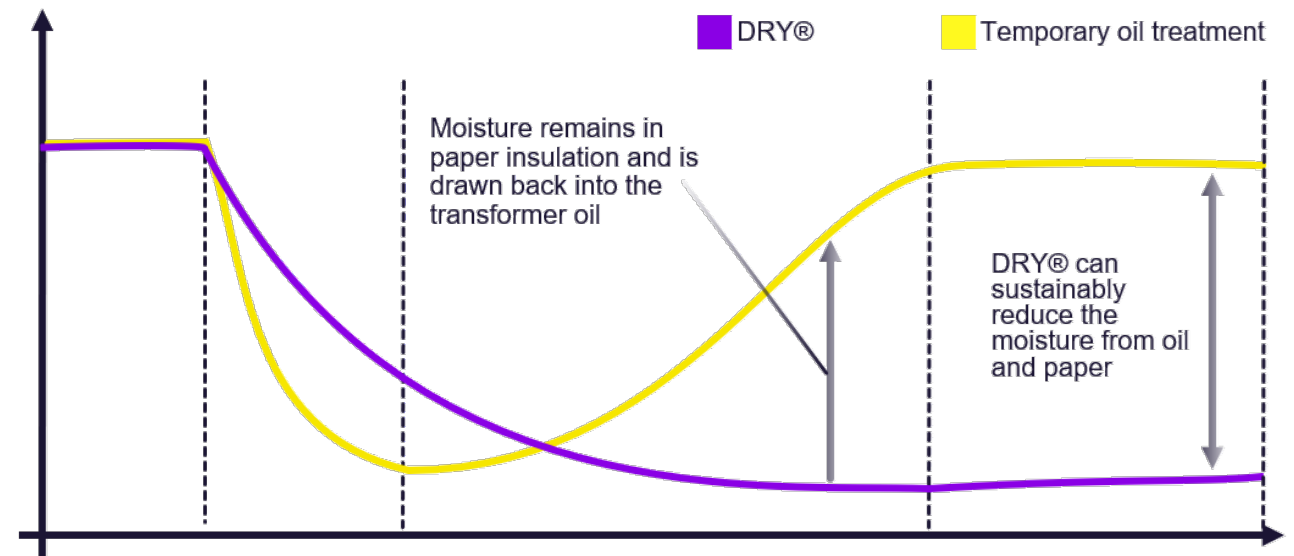
- DRY® - Continuous drying system
- REG® - Regeneration system
- CLEAN® - Continuous drying + decontamination system



DRY®

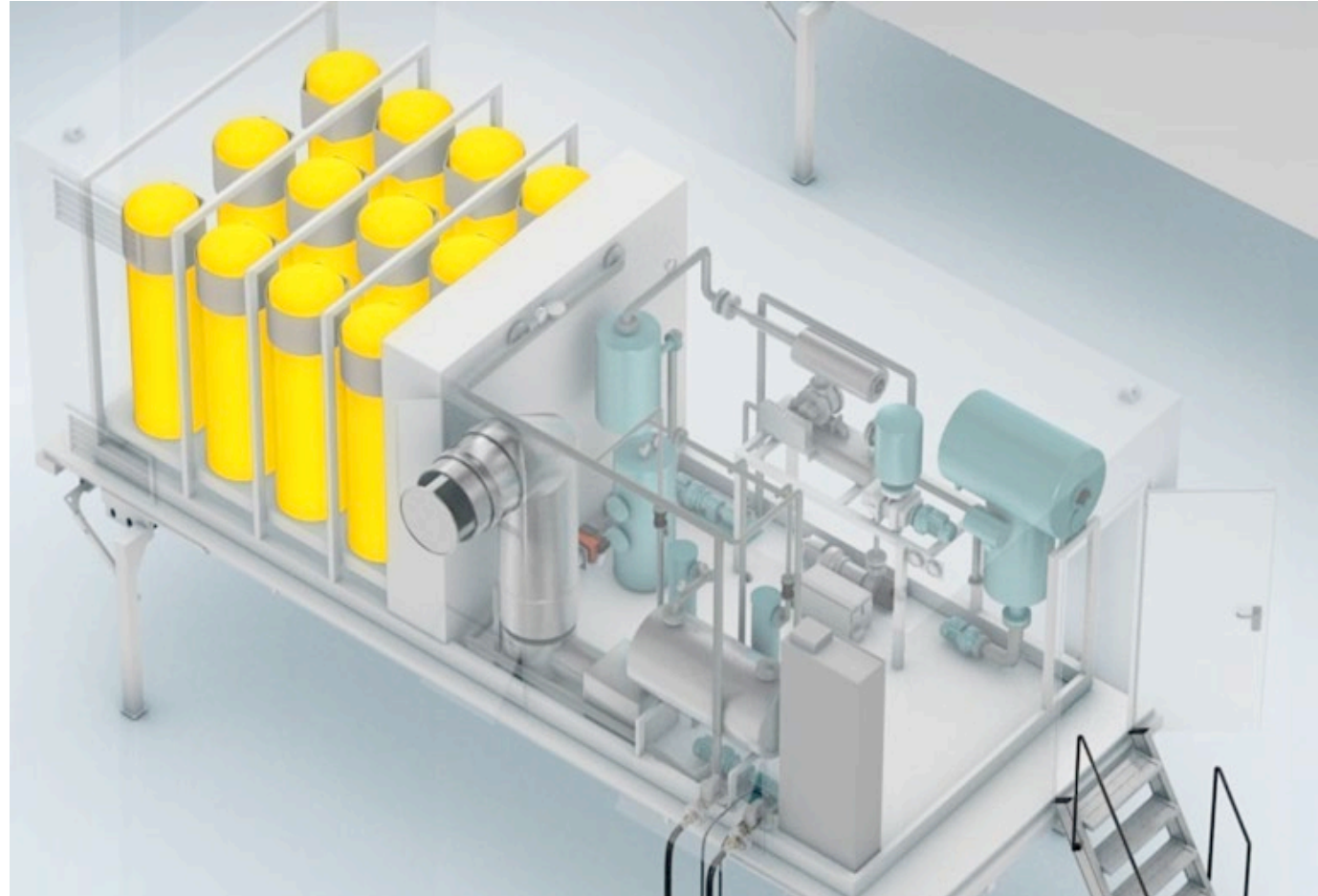


- Breakdown voltage can be restored within a few days
- Insulation paper can be dried over time and transformer aging speed significantly reduced
- Whole drying process can be done during transformer operation (online)

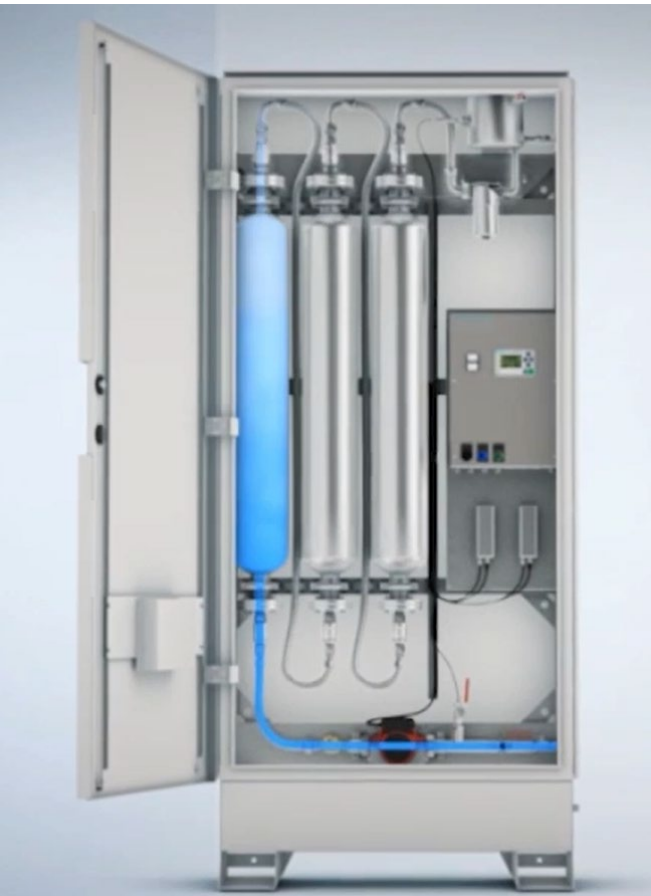


REG®

- Improvement of transformer oil to “**actual new oil quality**”
- **Long-time improvement** of transformer insulation condition
- **More economical** compared to oil change
- Complete and long-lasting **removal of DBDS** or another aggressive **corrosive Sulphur compounds**
- **Increased reliability** of old transformers
- **Mobile solution** applied on **energized transformers**



CLEAN®



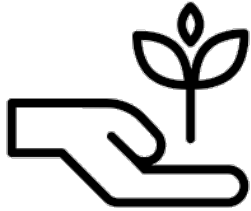
- **Enhances System Flexibility:** CLEAN® system works alongside the DRY® to effectively remove moisture from insulation
- CLEAN® enhances oil parameters while removing aging and oxidation products
- By using CLEAN®, the **lifespan** of transformers is extended, system **reliability** is boosted, and the need for frequent **maintenance** is reduced

Tab.1: Results of measurements after 3 weeks operation

	Neutralization number [mgKOH/kgOil]	Loss factor	Interfacial tension [mN/m]
Initial condition	0.017	0.0258	22.39
After 3 weeks	0.001	0.0094	36.98



Environmental and Economic Benefits – Oil Treatments



- **Resource Conservation & Waste Reduction**
Oil treatments use fewer new materials, preserving natural resources
- **Lower Carbon Footprint:**
Oil treatments have a smaller carbon footprint compared to the full life cycle of manufacturing and transporting new oil
- **Extended Transformer Lifespan:**
By improving oil quality, treatments reduce the need for frequent replacements, minimizing environmental impact



- **Cost Savings**
Oil treatments are more cost-effective than replacing oil, reducing overall expenses
- **Enhanced Efficiency:**
Improved oil quality leads to better transformer performance and reliability
- **Minimized Downtime:**
Faster oil treatment processes reduce downtime, maintaining continuous power supply and reducing economic strain.



Thank you



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