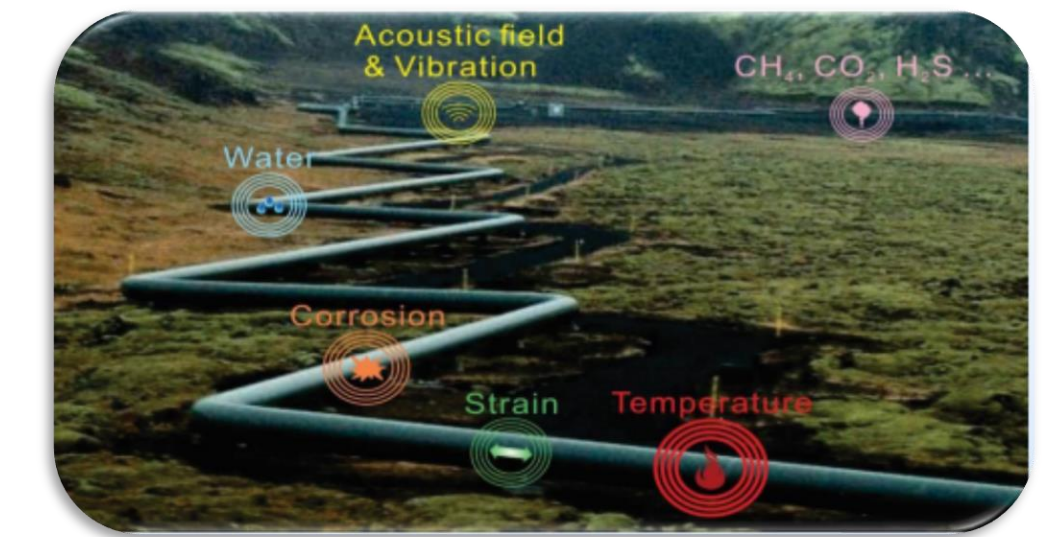


Overview of Fiber Optic Sensors R&D: Interrogation Systems and their Applications

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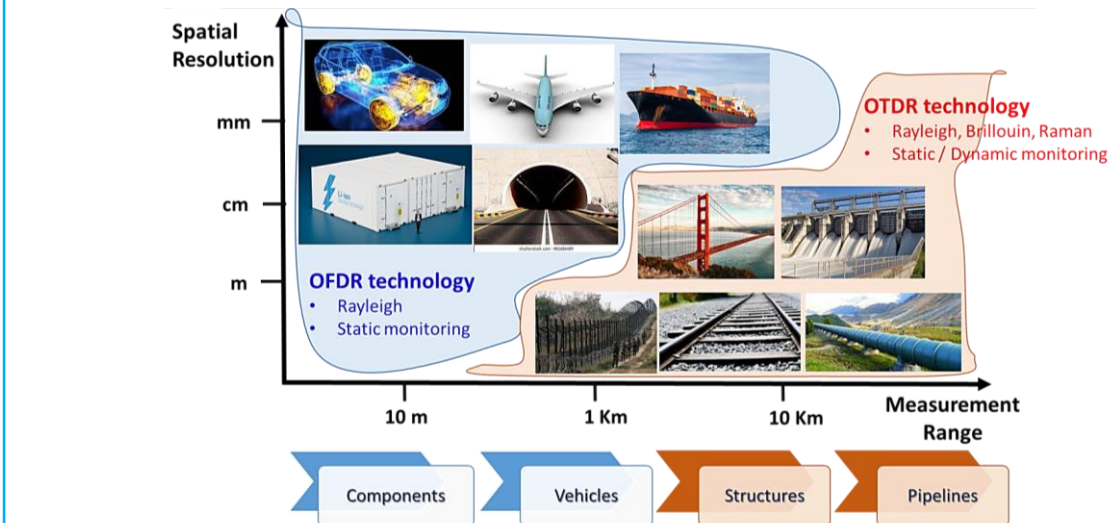
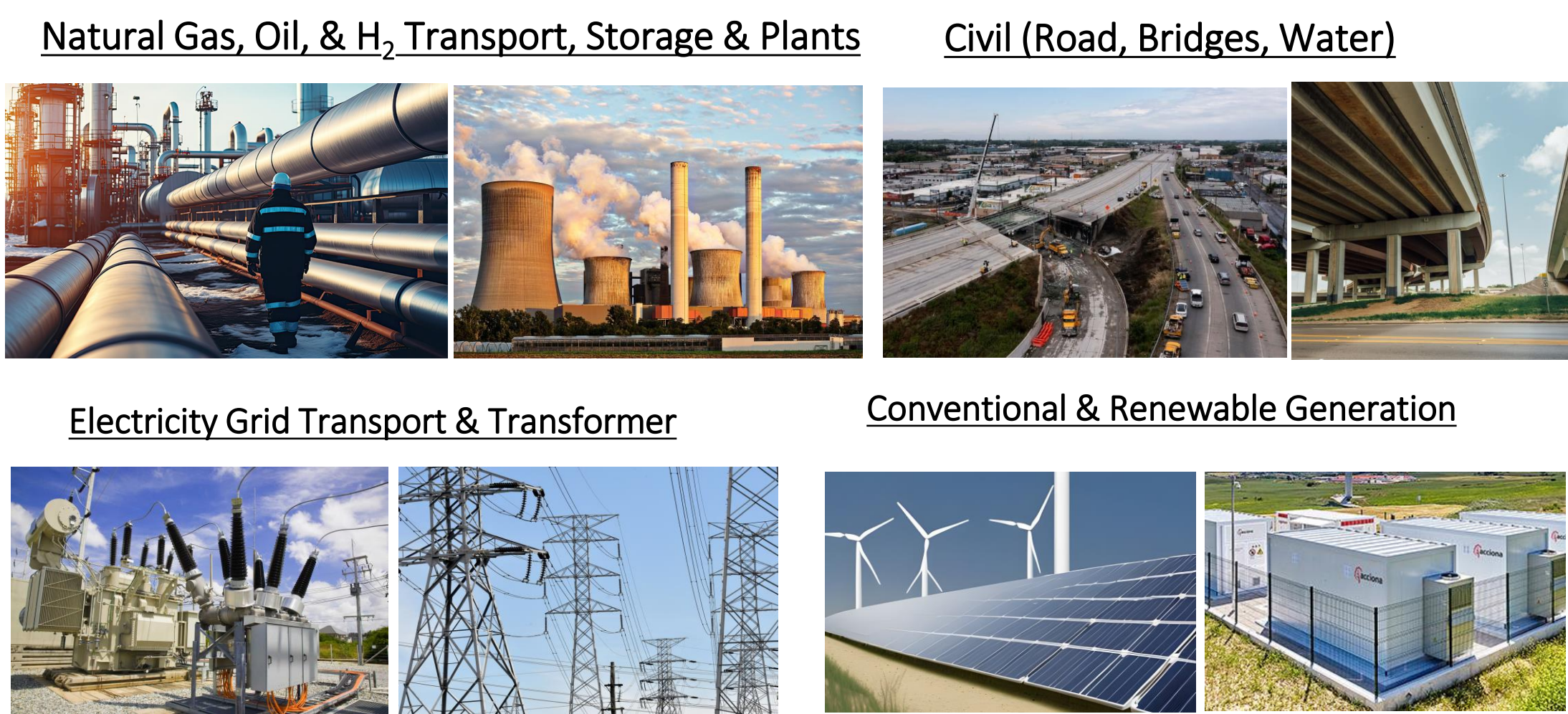
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1. Fiber Optic (FO) Sensors for Infrastructure Monitoring

Optical fiber sensor are:

- Lightweight / embeddable in composite material
- Explosion- and electrical-proof
- Can work up to 1000 °C temperature
- Point, quasi-distributed and distributed sensing



Distributed Fiber Sensors:

- Fiber optic cable act as a transducer
- Real-time detection of diverse events and objects
- Identify and Classify the events and objects; ML/AI
- Ability to simultaneously monitor: Acoustic, Vibration, Temperature and Strain

2. Optical Interrogation Methods

Custom-designed Systems

Ultrasound Acoustic Interrogator

FBG interrogator

Rayleigh DAS

Rayleigh OFDR

Commercial Systems

Rayleigh DAS

Raman DTS

FBG Interrogator

3. FO Sensors' Applications

Pipeline monitoring

Defective pipe

Acousto-ultrasonic profile of a defective pipe

Ultrasonic Acoustic Sensor

Optical acousto-ultrasonic profile of a pipe

Nuclear Canister monitoring

Field Testing SONGS canister

Partial Canister Mockup

Ultrasonic Acoustic Sensor

Acousto-ultrasonic profiles of the partial canister mockup

Custom FBG interrogator

Calibrations of two FBGs for simultaneous strain-temperature sensing applications

Custom ultrasonic Acoustic interrogator

Partial Discharge (PD) monitoring using fiber interferometric sensor at EPRI, NC.

Li-ion Battery monitoring

Thermal monitoring of 2000 mAh LiPo pouch cell for one charge/discharge cycle using a FBG sensor.