

Environmental & Property Solutions

REMOTE MONITORING AND CONTROL FOR OPTIMIZATION OF REMEDIATION SYSTEMS Jennifer Lawrence PG, ExxonMobil Environmental & Property Solutions - Houston, TX Leslie Steele PE, Kleinfelder - Baltimore, MD

BACKGROUND

Telemetry, Supervisory Control and Data Acquisition (SCADA) systems and other industrial control system equipment (ICSE) provide many benefits for the operation of optimized remediation systems:

- Improve system runtime through remote restarts
- Enhance system optimization through real-time data analytics
- Reduce site visits
- Best Management Practice (BMP) for Green and Sustainable Remediation (GSR)

CHALLENGES

Inconsistent knowledge and use of ICSE across global remediation system portfolio.

- Varying levels of awareness of rapidly evolving technology and risks
- Potential gaps in security of remote monitoring & controls equipment
- No standard expectations for design, procurement and operation of ICSE for remediation systems
- Poor reliability of some alarm communications

SOLUTIONS

Inventoried ICSE used at each site across global remediation system portfolio. Using industry guidance identified applicable standard practices for remediation system portfolio ICSE.1 Assessed risks associated with use of ICSE at typical remediation systems and determined risk reduction controls. Developed requirements for:

- Tracking ICSE in use at remediation systems
- Preparation of system-specific Controls Network Architecture Diagrams (CNAD)
- Application of basic and advanced controls to maintain ICSE reliability and security, including:
 - Failsafe design (e.g. separation of controls and safety circuits)
 - Virus protection
 - Control of removable media
 - Licensing requirements
 - Network control points / firewalls
 - Physical isolation from corporate networks

Provided training and design support for existing system operators and managers, and new system designs.

¹June 2011, U.S. Department of Commerce, National Institute of Standards and Technology Special Publication 800-82, Guide to Industrial Control Systems Security

for status checks, well

inspections and pre-

storm shut-downs

PROJECT EXAMPLE

CELLULAR 3G / LTE

CONNECTION

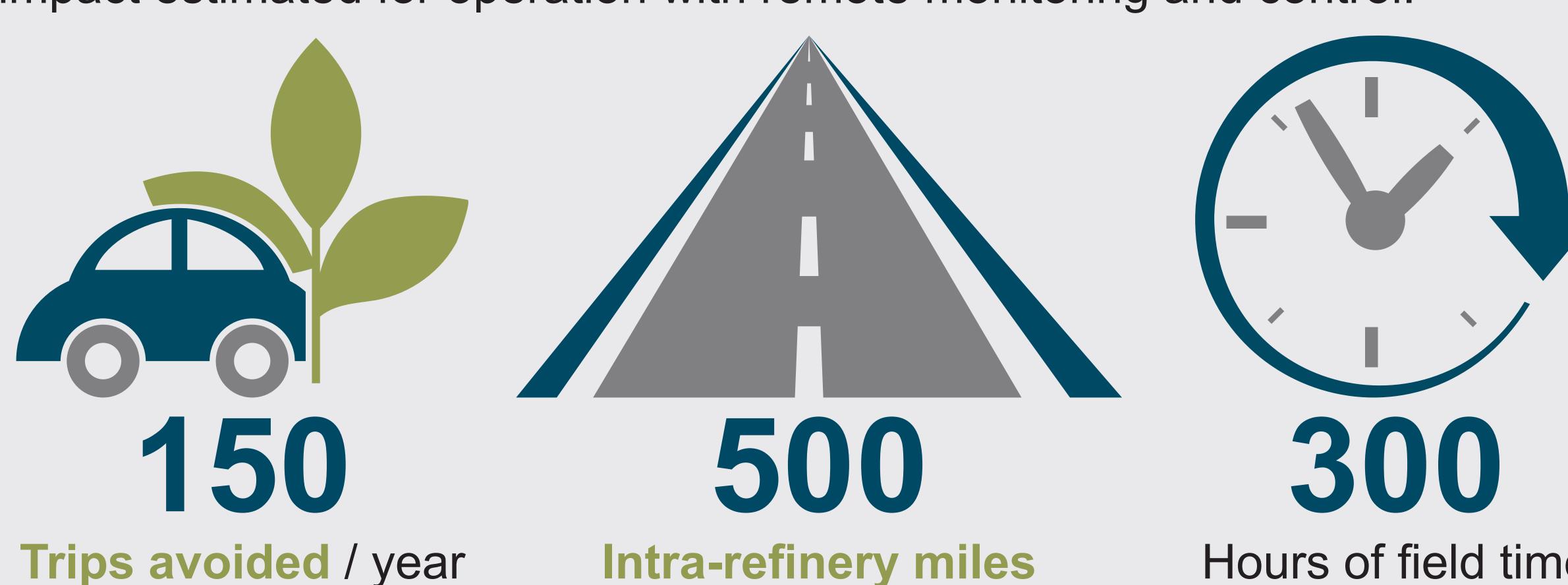
INTERNET

SATELLITE

REMOTE PC/ TABLETS &
SMARTPHONES

Hydraulic control system in remote area of active refinery. Anticipated impact estimated for operation with remote monitoring and control.

SATELLITE CONNECTION



avoided / year 🞾

Hours of field time

saved / year

1 HMI - Local

2 HMI - Remote

4 Processor Hardware

Servers/Personal

External Connections

Maintenance Laptops/
Local Programming
Terminal

Computers

3 Autodialer

PROJECT EXAMPLE

Groundwater and soil vapor extraction system in drinking water aquifer. Sustainability impact estimated over 12 years of operation with remote monitoring and control.



Mobilizations & off-hours disruptions avoided 🗯

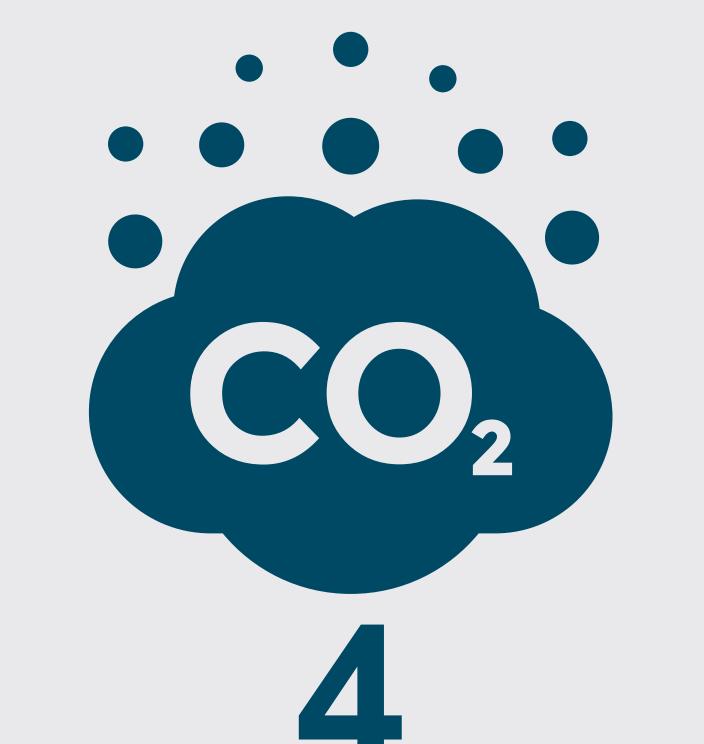


500 Gallons of gasoline saved



Months of downtime avoided





Tons of CO2 emissions equivalents avoided 🞏



Remote-initiated precautionary shut-downs

RESULTS & BENEFITS

With consistent & clear expectations for use of ICSE across the remediation system portfolio many sites are realizing the benefits of remote monitoring and controls, including:

- Reduced Downtime
- Remote response to onsite conditions
- Improved troubleshooting
- Resiliency (e.g. remote shutdown during storms in sensitive infrastructure areas)
- Environmental footprint reductions