

Oilfield Power Consumption Benchmark & ESS Configuration Matching

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Applicable to: Oilfield service companies, drilling contractors, and national oil companies

Target Product: Heverda Containerized Energy Storage System (BESS) — 700 kW / 1.687 MWh standard cabinet

1. Daily Power Consumption Benchmark by Operation Type

Data sources: Springer Journal of Petroleum Exploration and Production Technology (measured data from 20 rigs, Rosneft fleet), World Oil (electrified rigs by Hess/Nabors, USA), Carbon-Source Energy Storage Network (CNPC Bohai Drilling, Well X36-10-7H), and Heverda industry experience.

1.1 By Operation Type

Operation Type	Peak Power	Average Power	Daily Consumption	24-h Continuous	Remarks
Large drilling rig (>2,000 HP)	3,000–5,000 kW	800–1,040 kW	20,000–25,000 kWh	Yes	Hess/Nabors, West Texas case
Medium drilling rig (1,500 HP)	2,500 kW	750 kW	18,000 kWh	Yes	Typical US 1,500 HP rig
Light drilling rig (320 t class)	—	350–500 kW	8,400–12,000 kWh	Yes	Typical in Rosneft fleet; optimal ESS 150–350 kWh
CNPC Bohai drilling (Well X36-10-7H)	—	—	12,000–13,000 kWh	Yes	170,000–180,000 kWh per well (full drilling cycle)
Workover	300–500 kW	100–300 kW	1,500–3,000 kWh	Yes	Typical oilfield service application
Well testing	100–200 kW	50–150 kW	800–2,000 kWh	Yes	Short-cycle operation, 3–15 days
Downhole tool testing (milling / fishing)	200–400 kW	80–200 kW	1,200–2,500 kWh	Yes	Typical oilfield service application
Sidetrack	800–1,500 kW	300–500 kW	5,000–8,000 kWh	Yes	Similar to medium drilling

Operation Type	Peak Power	Average Power	Daily Consumption	24-h Continuous	Remarks
Pumping unit clusters (production wells)	5–50 kW/well	3–30 kW/well	72–720 kWh/well; scales with well count	Yes	ESP / PCP / Sucker Rod
Water injection / transfer pump stations	100–500 kW	80–400 kW	1,920–9,600 kWh	Yes	Oilfield production infrastructure
Crew camp	50–150 kW	30–80 kW	720–1,920 kWh	Yes	Lighting / A/C / catering

1.2 Typical Workover & Tool-Testing Demand Profile

Workover, downhole tool testing, and milling & fishing operations are among the most common mobile-power applications for oilfield service companies. Their daily power demand concentrates in the **1,500–3,000 kWh** range, with peak requirements of **100–400 kW** and 24-hour continuous operation — demanding **mobile, plug-and-play, highly reliable power supply**.

2. ESS Configuration Matching Matrix

Based on the Heverda standard cabinet (700 kW / 1.687 MWh), recommended configurations per operation scenario.

2.1 Configuration Quick Reference

Operation Scenario	Daily Consumption	Recommended ESS Configuration	Companion Diesel Genset	Companion PV	Rationale
Workover site	1,500–3,000 kWh	1 cabinet (700 kW / 1.687 MWh)	300–500 kW backup	Optional	One cabinet covers 2–4 days continuous operation
Downhole tool testing	1,200–2,500 kWh	1 cabinet (700 kW / 1.687 MWh)	200–400 kW backup	Optional	One cabinet covers 3–5 days continuous operation
Well testing	800–2,000 kWh	1 cabinet (700 kW / 1.687 MWh)	200–300 kW backup	Optional	Ample capacity; absorbs equipment start-up peaks
Small drilling / sidetrack	8,000–13,000 kWh	2 cabinets in parallel (1.4 MW / 3.374 MWh) + genset	800–1,200 kW	Optional	Peak shaving; genset runs at reduced load
Medium drilling (1,500 HP)	18,000 kWh	3 cabinets in parallel (2.1 MW / 5.061 MWh) + genset	1,500–2,000 kW	Optional	Uninterrupted power for full drilling cycle

Operation Scenario	Daily Consumption	Recommended ESS Configuration	Companion Diesel Genset	Companion PV	Rationale
Large drilling (>2,000 HP)	20,000–25,000 kWh	4–5 cabinets in parallel + genset + grid	2,500–3,500 kW	Optional	Hybrid supply with genset / grid
Crew camp	720–1,920 kWh	Half cabinet or 1 cabinet	50–100 kW backup	Optional	Silent, zero-emission operation

2.2 Typical Deployment Scenarios

Scenario A: Workover Site

- **Daily consumption:** 1,500–3,000 kWh
- **Peak demand:** 300–500 kW (workover rig + mud pumps + lighting + camp)
- **Recommended configuration:** 1 × Heverda ESS cabinet (700 kW / 1.687 MWh) + 300 kW diesel genset (backup)
- **Operating mode:** ESS as primary power source (24 h); genset recharges ESS during low-load periods and provides emergency backup
- **Expected benefits:**
 - Diesel consumption reduced by **60–80%**
 - Noise reduced from ~95 dB to **< 60 dB** (night-time)
 - Compliant with national oil company green-site requirements

Scenario B: Downhole Tool Testing Base

- **Daily consumption:** 1,200–2,500 kWh
- **Peak demand:** 200–400 kW (surface test frames, power equipment, offices)
- **Recommended configuration:** 1 × Heverda ESS cabinet (700 kW / 1.687 MWh) + 200 kW genset
- **Operating mode:** ESS supplies power around the clock; genset serves as emergency backup only
- **Value:** the testing base can run "quietly", enabling uninterrupted 24-h precision testing

Scenario C: Hybrid Solution for Oilfield Operation Areas (PV-ESS-Genset)

- **Daily consumption:** 5,000–8,000 kWh
- **Recommended configuration:** 2 × Heverda ESS cabinets (1.4 MW / 3.374 MWh) + 500 kW PV + 800 kW genset
- **Operating mode:** PV supplies load during daytime → ESS performs peak shaving / valley filling → genset for emergency and valley-period charging
- **CO₂ reduction:** **40–60%** lower emissions vs. pure diesel solution

3. Key Conclusions & Recommendations

3.1 Single Cabinet Covers the Most Common Scenarios (Recommended Entry)

The Heverda 700 kW / 1.687 MWh single cabinet covers **workover, downhole tool testing, and well testing** — the three most common oilfield service scenarios. For most operators, "**one cabinet, one operation site**" is the simplest unit of deployment.

3.2 Multi-Cabinet Parallel for Larger Projects

When operations move to drilling, sidetrack, or hybrid energy projects, 2–5 cabinet parallel configurations cover all scenarios. Parallel control strategy (master-slave / peer-to-peer) should be discussed in advance.

3.3 ESS as a Trust Anchor and Green Compliance Passport

The ESS value goes beyond replacing diesel — it is a **passport to national oil company green-supplier shortlists**. During supplier assessment phases, an ESS demonstration is a strong trust anchor, demonstrating **system integration capability** and **green compliance vision**.

3.4 Promotion Cadence

1. **Phase 1 (Month 0–1):** single cabinet into workover / testing scenarios, bundled with existing tool orders as a "green add-on"
2. **Phase 2 (Month 1–3):** field-validate fuel-saving data at operation sites, build a case study
3. **Phase 3 (Month 3–6):** promote 2–3 cabinet parallel solutions into drilling / sidetrack scenarios
4. **Phase 4 (Month 6+):** PV-ESS-genset hybrid solutions for large oilfield projects

4. Appendix: References

1. Springer Journal of Petroleum Exploration and Production Technology, "Energy storage systems for drilling rigs", 2021
2. World Oil Magazine, "Rig electrification drives down emissions", Oct 2023
3. Carbon-Source Energy Storage Network, "Heshun Electric — CNPC Bohai Drilling ESS project commissioned", 2025-11-11
4. Electric Drilling Technologies (EDT) — HybridGrid White Paper
5. Heverda ESS Product Specification (700 kW / 1.687 MWh cabinet)

This document is prepared by Heverda (Shenzhen Hexinhe Technology Co., Ltd.) for business partners. Data is compiled from public industry sources and Heverda internal experience for reference.