NATIONAL RENEWABLE ENERGY CO CO LLC
OIL & GAS FIELD SERVICES

RECOVERING LIQUID HYDROCARBONS FROM FLARE GAS

3S TECHNOLOGY · SUPERSONIC GAS SEPARATION



Presentation for partners in Turkmenistan and the UAE

November 2026 · Confidential

ABOUT THE COMPANY

3S — PROVEN GAS PROCESSING TECHNOLOGY

1997

Development started; first patents granted in 1998

12

industrial units installed, incl. for Rosneft, Novatek and PetroChina

10 bcm

of gas per year processed by 3S units (over 1,000 MMSCFD)

24 patents

in 15+ countries, including Turkmenistan, Azerbaijan and Kazakhstan

Group of companies

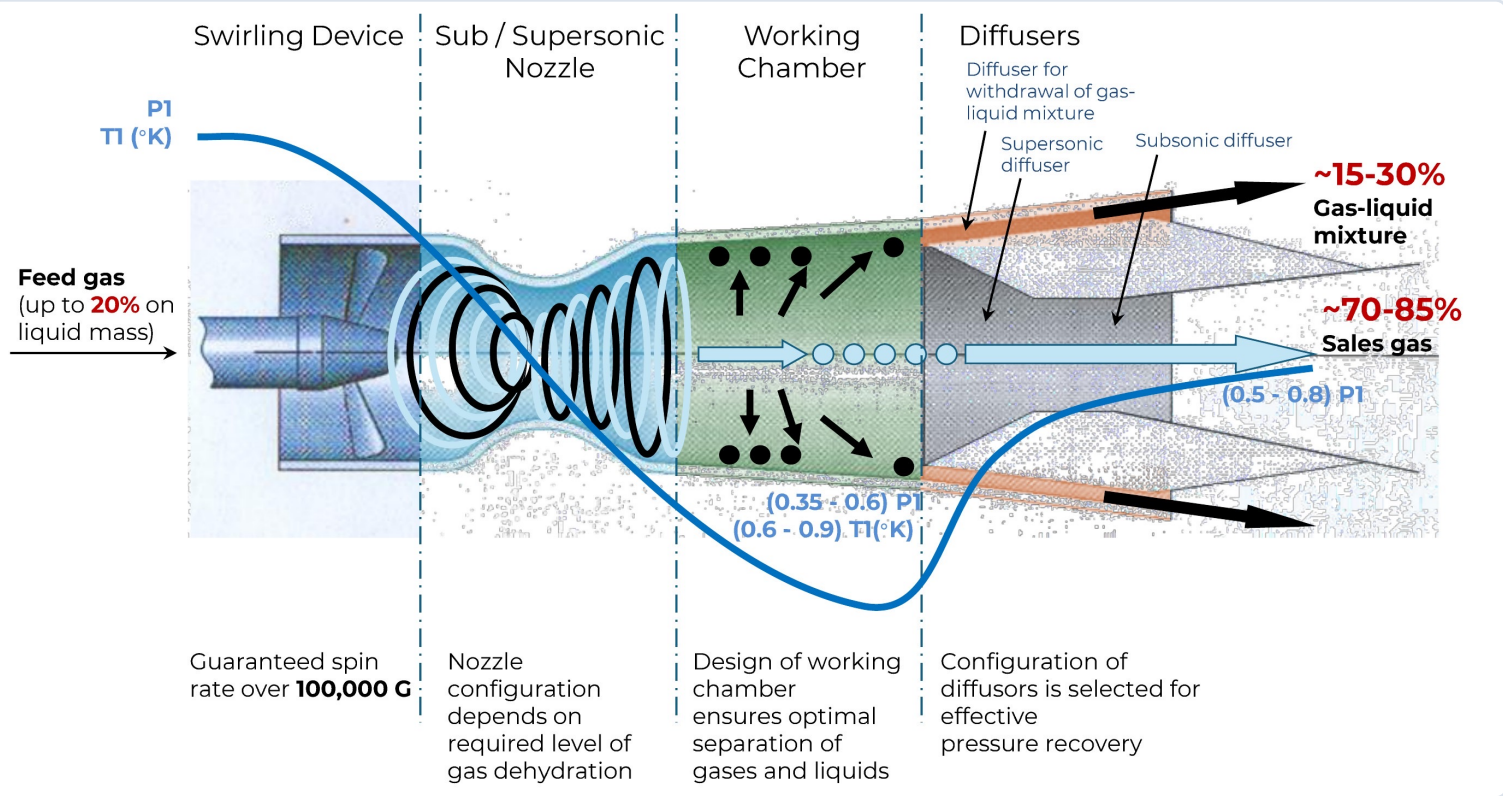
- 3S Worldwide Tech, Dubai — operating company
- 3S Gas Technologies, Cyprus — patent holder
- 3S Caspian Engineering, Baku — Caspian and Central Asia
- 3S North America (Houston); offices in Indonesia and Vietnam
- Separators manufactured in Slovenia to EU / API standards

Installed units

- Single unit: 36–222 MMSCFD (42–250 thousand Nm^3/h)
- Largest: Komsomolskaya CS (Rosneft), 222 MMSCFD
- Combined: ~10 bcm of gas per year
- Separator size: ~3 m long, ~1.7 m in diameter

TECHNOLOGY

HOW THE 3S SEPARATOR WORKS



1 Swirling device

Centrifugal acceleration above 100,000 g

2 Laval nozzle

Supersonic flow: pressure 0.35–0.6 P_1, temperature 0.6–0.9 T_1 (K)

3 Working chamber

Hydrocarbon and water droplets coalesce and move to the wall

4 Diffusers

15–30% gas-liquid mixture, 70–85% sales gas at 0.5–0.8 P_1

No moving parts | **No external refrigeration or power** | **Separator size: ~3 m × 1.7 m**

TECHNOLOGY

3S SEPARATOR VS. CONVENTIONAL TECHNOLOGIES

Gas conditioning and dehydration: water and hydrocarbon dew point

Criterion	3S separator	Turboexpander	Chiller
Operating pressure	**Any**	Limited at high pressure	Larger unit at high pressure
Flow variation tolerance	**±15% per unit**	Low tolerance	Not tolerated
Recovery rate	**up to 96%**	up to 99%	up to 90%
Delivery time	**6–8 months**	12–18 months	12–18 months
Scheduled maintenance	**1 day per year**	30–90 days per year	30–60 days per year
Operating costs	**Minimal**	Very high	High
Power consumption	**None**	High	Very high

20–40% lower CAPEX than conventional schemes

6–12 months payback on reference projects

REFERENCES

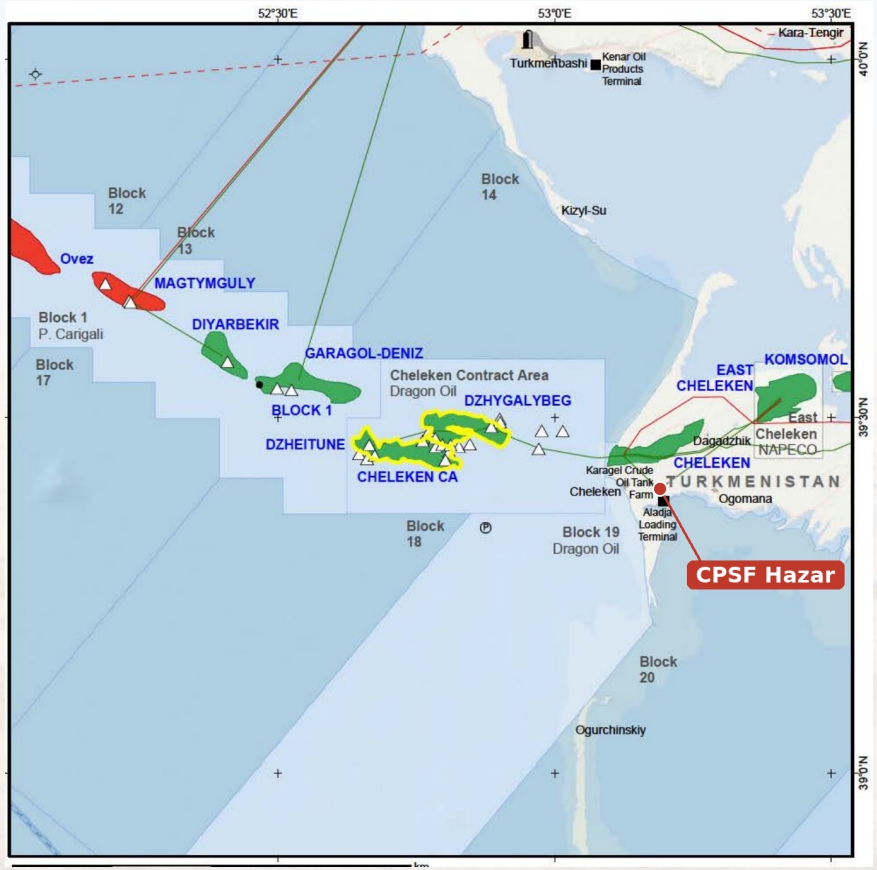
3S TECHNOLOGY TRACK RECORD

Date	Site	Client	Type	Gas flow	Result
Oct 2022	Yurkharovskoye, unit 2, Russia	Novatek	Industrial	50 MMSCFD	LPG recovery 9 kt/year
Jul 2022	Yurkharovskoye, unit 1, Russia	Novatek	Industrial	50 MMSCFD	C3+ 10 kt/year · payback 1 year
Jul 2020	Yarudeyskoye (Yargeo), Russia	Novatek	Industrial	160 MMSCFD	APG conditioning before reinjection
Nov 2017	Komsomolskaya CS, Russia	Rosneft	Industrial	222 MMSCFD	Dew point to Gazprom standard · 6 months
Oct 2017	Yarudeyskoye, Russia	Novatek	Industrial	170 MMSCFD	Plant capacity +80% · payback 6 months
Jan 2015	Dabei, China	PetroChina	Industrial	36 MMSCFD	Dew point at 11.8/9.0 MPa · 1 year
Nov 2014	North Komsomolskoye, Russia	Rosneft	Industrial	36 MMSCFD	NGL output +17.5 kt/year
Jun 2011	Tarim, China	PetroChina	Industrial	135 MMSCFD	NGL recovery +25% · payback 1 year
2009–2010	Zapolyarnoye, Russia	Gazprom	Trial	–	Successful 3S separator tests
Jul 2007	Gubkinskoye, Russia	Rosneft	Industrial	100 MMSCFD	Plant capacity +50%, NGL +10% · 6 months
2004	Western Siberia, Russia	SIBUR	Trial	–	Pilot commercial test
2001	Canada	TransCanada	Trial	–	Successful tests; JV with TransCanada

Projects in progress Azerbaijan · Kazakhstan · UAE · Indonesia · USA

PROJECT IN TURKMENISTAN

DRAGON OIL: CHELEKEN AND CPSF HAZAR



~63 kbbl/d
oil output in 2024 – the country's largest oil asset

>$10 bn
invested by Dragon Oil since 2000

2035
PSC term (extended in 2022)

- CPSF (Central Processing and Separation Facility) – onshore oil and gas processing complex at Hazar; 100,000 bbl/d capacity
- Current gas handling: all associated gas (~100 MMSCFD) has been piped ashore since 2011. Basic separation is carried out at the CPSF, with minor volumes of unprocessed gas supplied to local communities and industrial plants; the rest continues to be flared.
- Dragon Oil's own gas treatment plant: not yet sanctioned and repeatedly delayed

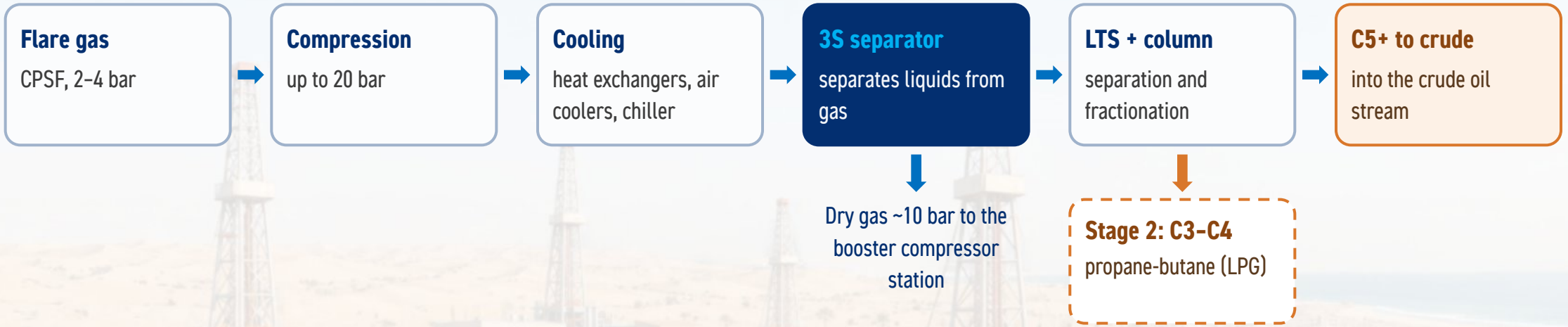
OPPORTUNITY FOR THE 3S SEPARATOR

Recovering condensate from flare gas: faster and cheaper to bring on stream than a gas treatment plant

Source: Wood Mackenzie, May 2025

3S PROPOSAL

STAGE 1: C5+ INTO CRUDE OIL · STAGE 2: C3–C4 (LPG)



93–94%

C5+ recovery: summer 94.4%, winter 93.0%

436,500

bbl of C5+ per year, ~1,195 bbl/d on average; no stabilization needed (RVP < 30 kPa)

180–330 t/d

Stage 2: C3–C4 potential in the gas (winter–summer); recovery to be modeled by 3S

12–15 months

from contract to start-up; compressor delivery 9–12 months

3S PROPOSAL

COMMERCIAL TERMS: STAGE 1 (C5+)

Term	Option 1 — sale	Option 2 — lease with buyout
Format	EPC turnkey: skid-mounted unit with 3S separator	10-year lease: 3S unit, engineering, commissioning, optimization
Price	$60.0 million	$38.5 per recovered barrel; paid quarterly on confirmed volumes
License and service	$0.5 million per year	License for the full term; service not specified separately
3S guarantee	Process performance per Design Basis	Process performance per Design Basis
Dragon Oil obligations	Payment of $60 million	Guaranteed gas flow and composition; minimum payment of $16.786 million/year if flow or composition falls short
Ownership	Transfers to Dragon Oil on purchase	Buyout: $60 million less $6 million per year; after 10 years, at no cost

≈ $37 m/year additional revenue for Dragon Oil from 436,500 bbl of C5+ at $85/bbl, plus reduced flaring

PROJECT STATUS

- **Done.** NDA, input data, HYSYS heat and mass balance
- **Done.** Budget estimate, P&ID, technical and commercial proposal
- **Done.** Series of technical working meetings with Dragon Oil on the process
- **On hold.** Awaiting Dragon Oil's internal approval
- **Next.** Approvals from Turkmennebit and Turkmengaz (likely two separate approvals)
- **Next.** Contract, supply and start-up within 12–15 months