FEASIBILITY STUDY

Mobile Transformer Oil
Purification & Regeneration Business

Included Hydraulic Oil Regeneration

Operating Base: Iraq
Service Coverage: Iraq & Kuwait
Evaluation Period: 5 Years

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February 2026

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1. Executive Summary

This study evaluates the feasibility of establishing a mobile transformer oil purification and regeneration business based in Iraq, with service coverage extending to Kuwait. The project deploys a 20-foot containerized mobile unit to provide on-site transformer oil services, supported by a fixed hydraulic oil regeneration activity that stabilizes revenue.

Total initial investment (CAPEX): USD 400,000

At full nominal operating capacity, the business generates:

- Transformer services revenue: **USD 324,000/year**
- Profit from antioxidant & new transformer oil sales: **USD 25,000/year**
- Hydraulic oil regeneration gross margin: **USD 70,000/year**
- Total annual revenue contribution: **USD 419,000/year**

Financial outcomes (base plan):

- Simple payback: **~1.8 years**
- NPV at 8%: **~USD 624,000**
- IRR: **~52–54%**
- Break-even: **~29% of nominal transformer capacity**

2. Project Overview

The project consists of a mobile oil treatment plant installed in a 20-foot container, designed to operate directly at customer sites (substations, power plants, industrial facilities). The system can perform both purification and full regeneration of transformer oil, including vacuum dehydration and degassing. A small fixed base in Iraq is used for logistics, storage, laboratory testing, and hydraulic oil regeneration.

3. Market Assessment – Iraq & Kuwait

3.1 Iraq

- Large and aging transformer fleet, high ambient temperature, frequent stress and failures.
- Large transformers predominantly government-owned (utility/Ministry entities).
- Oil & gas and industrial operators offer faster decision cycles and often outsource maintenance.

Competition:

- Filtration services exist; structured full regeneration services are less widely organized in many areas.
- Entry advantage depends on ability to mobilize quickly, document oil test improvement, and secure payment terms.

3.2 Kuwait

- Smaller transformer fleet but higher standards and more structured maintenance market.
- Competition is stronger than Iraq, but payment reliability is typically better.
- Kuwait is positioned as a premium extension market after establishing references in Iraq.

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4. Technical Description

4.1 Purification Process (On-site)

1. Oil heating
2. Pre-filtration
3. Fine filtration
4. Vacuum dehydration & degassing
5. Coalescence filtration
6. Return to transformer

Purpose: remove moisture, dissolved gases, and particulates; improve dielectric strength.

4.2 Regeneration & Purification Process (On-site)

1. Oil heating
2. Pre-filtration
3. Passing through adsorbent columns
4. Reheating if required
5. Fine filtration
6. Vacuum dehydration stage
7. Coalescence filter
8. Optional antioxidant dosing
9. Return to transformer

Purpose: remove acids, oxidation products, and sludge precursors; restore oil properties.

Adsorbent consumption:
2,000 kg/year × $3/kg = $6,000/year

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5. Capital Expenditure (CAPEX)

Item	Amount (US$)
Mobile plant (incl. shipping & customs)	260,000
Truck + trailer	50,000
Tanks & agitators	30,000
Laboratory equipment & tools	30,000
Working capital	30,000
Total CAPEX	**400,000 US$**

6. Operating Costs (OPEX)

6.1 Staff (Annual)

- Operational Manager: 36,000 **US$**
- Marketing/Admin (2): 24,000
- Engineer: 12,000
- Technicians (2): 14,400
- Driver: 6,000
  Total Staff: 92,400 US$

6.2 Other Annual Costs

- Rent / yard: 12,000 US$
- Fuel (approx. 1,000 km/week): 11,000
- Adsorbent (2,000 kg/year): 6,000
- Plant maintenance: 6,000
- Truck maintenance: 2,000
- Other consumables (vacuum pump oil, cartridges, activated carbon, etc.): 4,000
- Electricity / utilities: 4,000
- Insurance & admin: 8,000

Total OPEX (Year 1): 141,400 US$

For projection purposes, modest OPEX increases are assumed with higher utilization:

- Year 2: 145,000
- Year 3: 150,000
- Year 4: 160,000
- Year 5: 165,000

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7. Revenue Model (Transformer + Hydraulic + Oil/Additive Sales)

7.1 Transformer Oil Volumes (Nominal 100%)

- Purification only: 45,000 L/month = 540,000 L/year
- Purification + regeneration: 15,000 L/month = 180,000 L/year
  Total treated: 720,000 L/year

7.2 Pricing

- Purification: **$0.35/L**
- Purification + regeneration: **$0.75/L**

7.3 Hydraulic Oil Economics (Annual)

- Hydraulic volume: **100,000 L/year**
- Buy used oil: **$0.25/L**
- Additive: **$0.15/L**
- Bulk sell: **$1.10/L**
  Margin per liter = 1.10 − (0.25 + 0.15) = **$0.70/L**
  Annual hydraulic margin = 100,000 × 0.70 = **$70,000/year**

Note 1:
If market demand for transformer oil regeneration increases, the processing capacity currently allocated to hydraulic oil regeneration can be reassigned to transformer oil regeneration. The economic margin per liter is approximately comparable in both activities. This provides operational flexibility and a built-in safety mechanism, allowing regeneration capacity to be shifted between hydraulic oil and transformer oil depending on market conditions and demand priorities.

7.4 Additional Sales Profit

- Antioxidant & new transformer oil sales profit: **$25,000/year**

7.5 Nominal Annual Revenue (100%)

Transformer purification revenue:
540,000 × 0.35 = **189,000**

Transformer regeneration revenue:
180,000 × 0.75 = **135,000**

Transformer services subtotal: **324,000**
Plus oil/additive sales profit: **25,000**
Plus hydraulic oil regeneration margin: 70,000

- ✓ **Total at 100%: 419,000/year**

7.6 Utilization Ramp-Up

- Year 1: 80%
- Year 2: 90%
- Year 3: 100%
- Year 4: 110%
- Year 5: 110%

(For consistency, hydraulic and the $25,000 sales profit are included per the base plan and treated as achievable from Year 1.)

8. Financial Evaluation – WITHOUT Discount Rate

8.1 Cash Flow Table (Simple / Undiscounted)

Year	Utilization	Revenue	OPEX	Net Cash Flow
0	–	–	–	**-400,000**
1	80%	349,200	141,400	**207,800**
2	90%	384,100	145,000	**239,100**
3	100%	419,000	150,000	**269,000**
4	110%	453,900	160,000	**293,900**
5	110%	453,900	165,000	**288,900**

8.2 Simple Payback

Cumulative cash flow:

- End Year 1: -192,200
- End Year 2: +46,900

Simple payback ≈ 1 + (192,200 / 239,100) = **1.80 years**

8.3 Simple ROI

Average annual net cash flow (Years 1–5):
(207,800 + 239,100 + 269,000 + 293,900 + 288,900) / 5
= 1,298,700 / 5
= **259,740/year**

Simple ROI ≈ 259,740 / 400,000 = **65% per year**

9. Financial Evaluation, WITH 8% Discount Rate (Time Value of Money)

9.1 Discounted Cash Flow Table

Discount factors (8%):
Year 1: 0.9259
Year 2: 0.8573
Year 3: 0.7938
Year 4: 0.7350
Year 5: 0.6806

Year	Net Cash Flow	Discount Factor	Present Value
0	-400,000	1.0000	-400,000
1	207,800	0.9259	192,407
2	239,100	0.8573	205,012
3	269,000	0.7938	213,624
4	293,900	0.7350	216,009
5	288,900	0.6806	196,657

Total PV of inflows =
192,407 + 205,012 + 213,624 + 216,009 + 196,657
= **1,023,709**

- ✓ **NPV (8%) = 1,023,709 − 400,000 = 623,709 USD**

9.2 Discounted Payback

Cumulative PV:

- After Year 1: -207,593
- After Year 2: -2,581
- After Year 3: +211,043

2 + (2,581 / 213,624) ≈ **2.01 years (about 2 years)**

9.3 IRR (Estimated)

With the above cash flows, IRR is approximately **52–54%**.

10. Break-Even Analysis (Year 1 – 100% Nominal Capacity Reference)

This section determines the minimum operational level required for the project to remain financially viable during the first year.

10.1 Cost Structure Classification

Fixed Costs (Annual)

These costs remain largely independent of operational volume:

- Human resources
- Rent
- Insurance and administration

Total Fixed Costs = USD 112,400

Variable Costs (Annual at 100% Capacity)

These costs vary proportionally with activity level:

- Fuel (approx. 1,000 km/week): 11,000
- Adsorbent (2,000 kg/year): 6,000
- Plant maintenance: 6,000
- Truck maintenance: 2,000
- Other consumables (vacuum pump oil, cartridges, activated carbon, etc.): 4,000
- Electricity / utilities: 4,000

Total Variable Cost at 100% Capacity = USD 33,000

Total Cost at 100% Capacity

Total Annual Expense = Fixed + Variable
= 112,400 + 33,000
= **USD 145,400**

10.2 Revenue at 100% Capacity

Transformer purification revenue:
540,000 L × $0.35 = **189,000**

Transformer regeneration revenue:
180,000 L × $0.75 = **135,000**

Transformer services subtotal: 324,000

Oil/additive sales profit: 25,000
Hydraulic oil regeneration margin: 70,000
Total Revenue at 100% Capacity = USD 419,000

10.3 Break-Even Calculation

Let:
BD = Break-Even capacity ratio (as percentage of nominal capacity)
At break-even:
BD × 419,000 = 112,400 + (BD × 33,000)
Solve:
419,000 BD = 112,400 + 33,000 BD
419,000 BD − 33,000 BD = 112,400
386,000 BD = 112,400
BD = 112,400 / 386,000
BD ≈ **0.291**

10.4 Break-Even Result

Break-Even Ratio ≈ **29% of nominal capacity**

This means:

If the plant operates at more than 29% of its full nominal capacity, the project covers all fixed and variable costs and remains financially viable.

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11. Strategic Flexibility Note (Short)

If transformer oil regeneration demand becomes strong and continuous, operating hours can be reallocated from hydraulic oil activities to increase transformer regeneration output. In this case, the hydraulic operation serves as a safety and stabilization measure rather than a permanent constraint on transformer service growth.

12. Final Conclusion

The proposed mobile transformer oil purification and regeneration business based in Iraq, with service extension to Kuwait, is financially feasible and attractive under conservative assumptions.

Key results:

- CAPEX: **$400,000**
- Simple payback: **~1.8 years**
- NPV at 8%: **~$624,000**
- IRR: **~52–54%**
- Break-even: **~29% of nominal transformer capacity**

The project's resilience is strengthened by the hydraulic oil margin, while the transformer oil service business remains the core operational focus.

The video clip of the plant can be watched in: https://enviroflex.at/?page_id=3950

ReGenX-2000™

Enviroflex
Used Oil Treatment & Re-refining Technology

Transformer Insulating Oil Purification & Regeneration Plant

SPECIAL DEAL - ONE UNIT ONLY!

Ready for Immediate Delivery / Made in Germany / 2025 Build

Ask for Exclusive Price !

Save Over 45% Compared to Market Value

- Brand New | Never Used
- Purification | Regeneration | Desludging

Plant in 3 Rooms — Regeneration Room

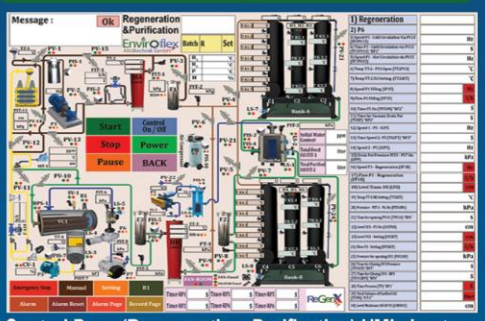
Enviromentally Friendly Electrical Power Systems

- Ultra-Fast Return on Investment
- High Margin, Low Maintenance
- Profitable Asset
- Earn While You Serve

* Better Than Buying New Oil
* Regenerate & Save
* Your Competitive Edge in Transformer Oil Service

Multiple Applications:

- Transformer Oil Purification , Regeneration & Desludging
- Hydraulic Oil Regeneration
- Base Oil Upgrading & Polishing
- Diesel Treatment
- Distilled Oil Polishing



Control Page (Regeneration, Purification) HMI - Laptop

View Photos & Video:
https://enviroflex.at/?page_id=3950

Enviroflex Altöltechnik GmbH https://enviroflex.at aeb@enviroflex.at

ReGenX-2000™

Technical Specification

Model:	**ReGenX-2000** (6 Columns)
Code:	**ENF-TOPRDMP-2000-8CF-6C16**
	Code Description: **P**: Purification, **R**: Regeneration, **D**: Desludging **M**: Mobile, **2000**: Regeneration flow rate in **l/h** **8**: Quantity of coalesce filters, **6**: Quantity of columns **16**: Diameter of columns in inch
Flow Rate:	Regeneration:600-2000 l/h, Desludging: 600-1500 l/h, Purification: 2500 l/h
Quantity of Columns:	6
Container:	Container in 3 Compartments with several doors & windows with dimension of 20-foot. shipping container
Mobile Transport:	Trailer, Double Axel (Not Included)
Inlet pump:	Gear type, GVR-Italy, 3.0 kW
Inlet strainer:	90 micron
Inlet filter:	1 Stages, Porosity 5 µm, 12 glass Fiber Cartridges (2.5" × 30"), Housing: AISI-304
Oil heating:	Indirect Electrical Heater, Low Watt Density (2 W/cm²) Stage 1: 36 kW (18 × 2 kW), Stage 2: 24 kW (12 × 2 kW), (total: 60 kW)
Vacuum chamber:	Enviroflex's design with 8 Coalesce Cartridge Filters
Vacuum pumps:	Direct drive, high efficiency Rotary Vane vacuum pumps, 2.2 kW, Leybold-Germany
Vacuum booster:	Direct drive, Roots Vacuum Booster, 2.2 kW, 280 m³/h, Pedro Gill-Spain
Adsorbent Treatment:	Mild steel Columns filled with about 870 kg structured Aluminum Base Adsorbent (TURBOSORB)
Adsorbent Reactivation:	Thermal, Electrical, up to 500 time Reactivation before replacement, Ignition Heater: 6 X 3 kW (total 18 kW), Roots Blower: 11 kW Pedro Gill-Spain 300-500 times Reactivation before replacement, Reactivation in 600 - 700˚C
Polishing filter:	2 Stage, Stage 1: 1 µm, Stage 2: 0.5 µm (each stage 12 Cartridges), Housing: AISI-304
Discharge Pump:	High Suction, Centrifugal, 2.2 kW, Calpeda-Italy
Drain pump:	Eccentric Screw Pump, 2.2 kW Bellin-Italy
Oil Storage Tank:	2000 Liter, 2 Compartments
Odor Emission Unit:	Reduces emissions from the system consists of Chemical Scrubber & Activated Charcoal (Carbon) Filter
Control Panel:	Steel Painted Cabinet with Siemens Components PLC Siemens S7-1200, HMI (touch 9 inch) Laptop
Control Instruments:	Temperature (33 pcs), Pressure (19 pcs) Level (8 pcs), Moisture (1), Photo Electric (1)
Electrical Supply:	400 VAC, 50 Hz, Total Power: Max. 160 kW (150 A), Operational Power: 75 kW (115 A) Cable: H07RN-F 5 G70 mm²
Main Application:	Transformer Oil Purification, Regeneration & Desludging
Other Applications:	Base Oil Upgrading, Hydraulic Oil Regeneration, Diesel Treatment, Paraffin Decolorization

Regeneration Module (Bank A) with 3 Columns

Vacuum Chamber for Gas & Water Removal

Purification Room (Vacuum Chamber, Cartrige Filter,Roots Blower, Demister, Charcoal Filter, Feed & Discharge Pumps, ...

Performance & Process Strength:

- Up to 500 Adsorbent Reactivation Cycles
- No Waste Clay Disposal – Clean, Reusable Adsorbent (TURBOSORB)
- Outperforms Traditional Fuller's Earth Systems
- Built for Industrial Duty

Rotary Vane Vacuum Pump
Leybold-Germany

Roots Vacuum Pump - Pedro Gill-Spain

TEST DESCRIPTION	METHOD	UNIT	INITIAL OIL CONDITION	SINGLE PASS QUALITY
MOISTURE	1EC 733	PPM	< 100	5
BREAKDOWN VOLTAGE	IEC 156	Kv/2.5 mm	< 20	> 70 (up to 100)
ACIDITY	IEC 296	mg KOH/g	<0.20	<0.03 (up to 0.01)
Power Factor @ 100˚C	ASTM D-924-15	%	> 1	< 0.4
TAN DELTA (90 degrees C)	IEC 247		<0.01	<0.005
INTERFACIAL TENSION	ASTM D-971-20	Dynes/cm	<15	>35 (up to 50)
COLOUR APPEARANCE		VISUAL	BROWN/CLOUDY	CLEAR LIGHT YELLOW
GAS CONTENT	ASTM D-2945	%v/v	8	> 0.01
OXIDATION	IEC 74 164 HOURS		DEPLETED	RESTORED

Analyze of Transformer Oil before and after treatment

Gate for Oil inlet & outlet (Flanges or Hoses)

Drain Pump, Bellin-Italy

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ReGenX™

Transformer Insulating Oil Purification & Regeneration Plant

Purification

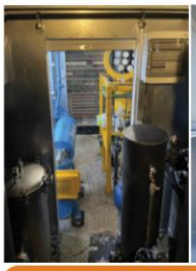
Purification of transformer insulating oil is a well-recognized preventive maintenance practice performed regularly; typically every few months; to ensure the reliable performance of electrical apparatus such as power transformers, tap changers, circuit breakers, and bushings. Over time, insulating oils absorb moisture, gases, and solid contaminants, which can significantly impair their dual role as a dielectric insulator and cooling medium. If left untreated, these impurities may lead to electrical failures, reduced insulation resistance, and overheating. The purification process includes controlled heating, filtration, and vacuum degassing to remove dissolved gases and moisture. The oil is circulated through fine filters to eliminate solid particles and sludge, followed by vacuum treatment under high vacuum conditions. A coalescing filter is typically integrated to enhance water removal efficiency. This process restores the oil's dielectric strength, reduces oxidation risks, and extends the life of both the insulating fluid and the transformer.

Regeneration

Aging Transformer Oil forms sludge contains aldehydes, acids and proxides. Sludge attacks the cellulose insulation, inhibits oil flow, and traps heat inside the transformer

Eventually the dielectric gap is bridged, resulting infailure of the transformer. Enviroflex Transformer-Insulating Oil Regeneration Unit removes acidity, sludge and soluble oil decay products with our adsorbent called TURBOSORB.When the treatment is complete, the regenerated oil meets or exceeds international standards for new oil with lower acidity and improved tan delta, interfacial tension, and oxidation stability. The cellulose insulation and internal components of the transformer also benefit from the flushing affect of multiple passes of hot reclaimed oil, which helps remove decay products and sludge from surfaces.

- Regular regeneration treatments every seven to twelve years:
- Reduced risk of unplanned outage and costly downtime
- Reduced maintenancecosts



Purification

* Water Removal
* Combustible Gas and Air Removal
* Particulate Matter and dirt Removal
* Tan Delta Improvement
* Dielectric Strength increment

ReGenX-2000, **Mobile in 20-foot Container, 6 Columns - 2000 l/h**

3 to 24 Columns
500 l/h to 10000 l/h

Regeneration of aged Transformer Oil to new condition acording to IEC 60422 & IEC 60269

Regeneration

* The increment of Interfacial Tension & Oxidation stability
* The reduction of Power Factor and gassing tendency
* The removal and reduction of **Acidity**, Silicon content, Sulfur Odor & Color

The ReGenX Plant can be delivered in two configurations: for **Regeneration** only, or for **Combined Purification and Regeneration** of transformer insulating oils. Depending on customer requirements, the system is available as a **Stationary Installation** or a **Mobile unit**. Mobile versions are custom-engineered and delivered in roadworthy trailers, semi-trailers, containers, or industrial cabins, allowing flexible operation on-site or across multiple transformer locations. Processing can be carried out **off-load** or **on-load** (energized transformers), or from storage tanks, drums, or IBC containers, depending on the operational setup. In the combined version, the oil is first preheated and prefiltered, then passed through regeneration columns filled with **TURBOSORB** adsorbent for the removal of aging by-products, acidity, and sludge. This is followed by further heating, fine filtration, and final degassing and moisture removal in a high-vacuum chamber operating at pressures below 1 mbar absolute, equipped with a coalescing filter to ensure optimal dryness and gas-free oil before returning it to service. An oil desludging mode is also available, operating at elevated temperatures around 85 °C, to effectively separate suspended and settled contaminants. Through the integrated control panel, the operator can easily select from different operating modes: purification only, regeneration only, combined purification and regeneration, or desludging; offering full process flexibility to match specific site or oil conditions.

"ReGenX keeps transformers efficient, reliable, and protected – while minimizing downtime and costs."

Two Stages Vacuum Pumps, (Vacuum pump & Boster) less than 1 mbar a, for Oil Degassing Process

Using Mineral Adsorbent for Oil Regenration

300-500 times Adsorbent Reactivation Befor replacement

Enviromentally Friendly Electrical Power Systems

TEST DESCRIPTION	METHOD	UNIT	INITIAL OIL CONDITION	SINGLE PASS QUALITY
MOISTURE	1EC 733	PPM	< 100	5
BREAKDOWN VOLTAGE	IEC 156	Kv/2.5 mm	< 20	> 70 (up to 100)
ACIDITY	IEC 296	mg KOH/g	<0.20	<0.03 (up to 0.01)
Power Factor @ 100°C	ASTM D-924-15	%	> 1	< 0.4
TAN DELTA (90 degrees C)	IEC 247		<0.01	<0.005
INTERFACIAL TENSION	ASTM D-971-20	Dynes/cm	<15	>35 (up to 50)
COLOUR APPEARANCE		VISUAL	BROWN/CLOUDY	CLEAR LIGHT YELLOW
GAS CONTENT	ASTM D-2945	%v/v	8	> 0.01
OXIDATION	IEC 74 164 HOURS		DEPLETED	RESTORED

Analyze of Transformer Oil before and after treatment

Technical information

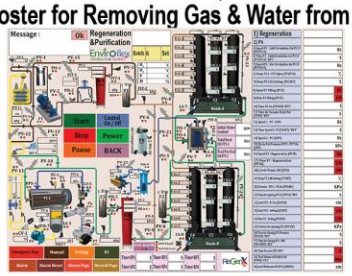
Enviroflex manufactures a wide range of Purification & Regeneration Plants (ReGeneX) of various models & codes. The following data is a general indication only:

Models:	ReGenX-1000 (3 Columns) , ReGenX-2000 (6 Columns) ReGenX-4000 (12 Columns), ReGenX-8000 (24 Columns)
Code:	ENF-TOPRDMP-f-nCF-mCd **Code Description:** P: Purification, R: Regeneration, D: Desludging M: Mobile (S: Stationary), f: flow rate in Liter per Hour n: Quantity of coalesce filters, m: Quantity of columns d: Diameter of columns in inch
Flow Rate:	500 l/h to 8000 l/h in different models & codes
Quantity of Columns:	3 - 6 - 12 - 24 in different models
Mobile Transport:	Trailer, Double Axel Semi-trailer
Inlet pump:	Gear type
Inlet strainer:	Gross particle removal 60 - 90 micron
Inlet filter:	Porosity 10 or 5 µm
Oil heating:	Indirect Electrical Heater, Low Watt Density
Vacuum chamber:	Our design with Coalesce Filters
Vacuum pumps:	Direct drive, high efficiency Rotary Vane or Dry Screw vacuum pumps
Vacuum booster:	Direct drive, Roots type
Adsorbent Treatment:	Mild steel columns filled with structured Adsorbent (TURBOSORB)
Adsorbent Reactivation:	Thermal, Electrical, up to 500 time before replacement
Polishing filter:	Porosity 0.5-1.0 µm
Discharge Pump:	High suction, Centrifugal
Drain pump:	Eccentric Screw Pump
Odor Emission Unit:	Reduces emissions from the system consists of Chemical Scrubber & Activated Charcoal Filter
Electrical Supply:	As required
Main Application:	Transformer Oil Purification, Regeneration & Desludging
Other Applications:	Base Oil Upgrading, Hydraulic Oil Regeneration, Diesel Treatment, Paraffin Decolorization

CE

Regeneration Module (Bank) with 3 Columns

Vacuum Chamber consists of Coalescer Filters, Vacuuum Pump & Booster for Removing Gas & Water from Oil



Plant Control Page, Automation, HMI, SCADA

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RePureX™

Vacuum Oil Purifier

The necessity for regular purification of electrical insulating fluids in electrical apparatus has been recognized for a very long time. Moisture, solids and gaseous contaminants can seriously affect the function of electrical insulating fluids as a coolant and insulator. This specification describes the equipment as supplied by **Enviroflex** for the processing (degasification, dehydration, filtration and de-acidification) of transformer insulating oil. **Enviroflex** purifiers are designed for processing transformer Insulation oil in workshops or in the field, in storage tanks, drums or directly in transformers. Purification of oil in transformers can be carried out off-load or on-load, depending on customer's preference.For purification of oil in the field, a mobile type Vacuum Oil Purifier, mounted on a roadworthy trailer and covered by a weatherproof canopy, is recommended.

The Vavuum Oil Purifier is also called in Asia as:

TRANSFORMER OIL CENTRIFUGING MACHINE

The Scope of Supply

The scope of supply of this specification shall include the design, fabrication and factory testing of Vacuum Oil Purifier. Equipment will be mounted on a common base (open frame) or in a trailer and supplied in the form of a pre-piped and pre-wired package, and shall provide a fully workable unit in accordance with this specification when received by the purchaser.

Vacuum Chamber for Gas & Water Removal

Rotary Vane Vacuum Pump

Roots Vacuum Pump

Process Description

Enviroflex process of treatment is based on the available technology:

Heating:

Oil Heating is done by indirect electric heaters with low density electric ceramic heaters (Max. 2 watt/cm^2) and exact temperature control.

Filtration:

Insulating oil is drawn in by an Inlet Pump, and is heated up in the Heater and filtered by Fine Filter before it reaches the Processing Vacuum Chamber, where water and gases contained in the oil are thoroughly exposed to vacuum by efficient spreading and removed through a Vacuum Pump. Filtration cartridges constructed of non-migration type glass fiber material featuring a large surface area and dirt holding capacity obvious advantages of cartridge type filters, and no loss of oil or time for back washing etc.

Spreading of Oil, Water & Gas remover:

Oil degassing & water removal is done in the Vacuum Chamber with coalescing filters which installed inside the Vacuum.

Spreading of Oil is vital for easy release of moisture and gaseous contaminants, is accomplished by porous media cartridge, called a coalescer. In this process, heated or unheated oil passes through the layer of bonded fiberglass, where millions of sharp edges shear oil and expose it to the effect of the vacuum in very low pressure range of 0.1 to 3 mbar a. Spreading of oil by passing through porous media is so efficient that oil can be treated at temperatures as low as 20°C.

Vacuum Chamber connected to 1-Stage Vacuum Pump (Rotary Vane or Screw Dry) or 2-Stage included Vacuum Pump and a Booster (Roots Vacuum Pump)

Operation & Maintenance:

Enviroflex Vacuum Oil purifiers **(RePureX)** combine maximum simplicity with high safety standards. A number of sensing devices are built in, continually monitoring all vital parameters.

If any of these parameters deviate from normal operation, Vacuum Oil purifiers **(RePureX)** will shut down, positively preventing inlet or outlet of oil, and a diagnostic light will remain on to inform the operator what corrective action is required.

Duty & Performance

Performance in a single pass or Multi pas through the Vacuum Purifier at a full flow rate shall be as follows:

Water Removal
From 50 ppm down to less than 5 ppm in a single pass and down to 1 ppm after multi passes as measured by the ASTM Method D-1533 with new or Regenerated Oil.

Gas Removal
From fully saturated with air (10% to 12% by volume) down to less than 0.1% by volume as measured by the ASTM Method D-2945 with new Regenerated Oil.

Particulate Matter Removal
98% of particles over 0.5 micrometer, or over 1 or 5 micrometer at customer's preference.

Tan Delta Improvement
Tan Delta value at 90°C can be improved to 0.005.
The Tan Delta correction pertains to polishing new/regenerated oil and is not recommended for used/old oil.

Dielectric Strength
Improvement in dielectric strength up to 75 kV with new or regenerated oil.

Main Components

Inlet Strainer
Solid particles over 90 microns are retained in the inlet Strainer, preventing damage to the inlet pump and other components.

Inlet Pump
One positive displacement gear type pump, complete with mechanical seal, direct-driven by electric motor.

In Direct Electric Heater
A low watt density heater (max. 2 watts/cm²) is used to prevent heat degradation of oil. Heater elements are encapsulated in steel tubes, thus comeletely insulated from oil to prevent fire hazard and provide uniform heating of oil. Heaters are Controlled by heavy-duty contactors and a failsafe electronic type temperature controller.

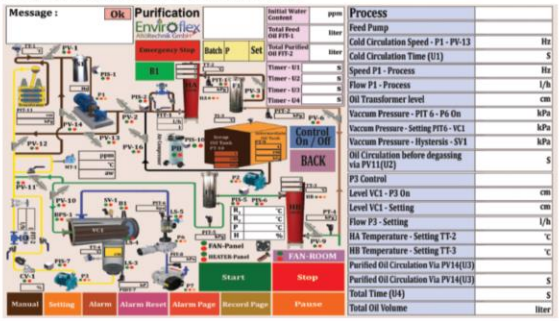
Fine Filter
Solid contaminants are retained by a Cartridge type filter, featuring easy and fast replacement of cartdidges.

Processing Chamber
Shell and all intemal parts are made of carbon steel construction, vacuum chamber features heavy-duty Design, suitable for mobile installation.

Vacuum Pump
Mechanical Vacuum Pump rotary vane type is air-cooled, direct driven by electric motor and is sized to maintain vacuum of less than 1 mbar in vacuum chamber during last pass.

Vacuum Booster (option)
A Roots Vacuum Pump can be combined to Vacuum Pump for better performance & lower pressure less than 7 mbar a

Oil Discharge Pump
Centrifugal pump featuring high suction capability removes oil from processing chamber and discharges it through a flow meter back into transformer. pump is Direct driven by electric motor mounted on common base.



Control Page - Purification - HMI - Laptop

Instrumentation

Instrumentation and electrical controls are located in a dust proof cabinet. A PLC & HMI or Scada system is provided for the convenience of the operator showing the functions of the main components of the plant by way of pilot lights. Although the Purifier features fully automatic operation, a manual override of various functions is provided as standard. Even with manual override vital plant protection such as oil overflow are still in force. Standard instrumentation and controls compromising of :

* Temperature Controller
* Vacuum Indicator
* Pressure Gauges
* Vacuum Gauges
* Flow Meter
* Level Control
* Flow Control
* Foam Control

Capacity

900 to 18000 liter per hour in different models

Types

Mobile or Stationary

Models

RePureX-900
RePureX-1350
RePureX-1800
RePureX-2700
RePureX-4500
RePureX-6000
RePureX-9000
RePureX-12000
RePureX-18000

(The numbers after RePureX refer to flow rate in l/h)

Identifition Codes

Each models may have different options and Specification that showed as codes in below:

ENF-RePureX-L-n-m-XX-S-W-f

Code Description:
L: Flow rate in l/h
n: Quantity of coalesce filter Cartridges
m: Quantity of Vacuum Chamber
XX: VB (Rotary Vane & Booster Vacuum Pumps)
DB (Screw Dry & Booster Vacuum Pumps)
V (Only Rotary Vane Vacuum Pump)
D (Only Screw Dry Vacuum Pump)
S: Vacuum Pump or Booster Suction in m^3/h
W: Total Power of Heaters in kW
f: Quantity of Filtrasion Stages

CE

Mobile Vacuum Oil Purifier (RePureX)

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Enviroflex
ReGenX

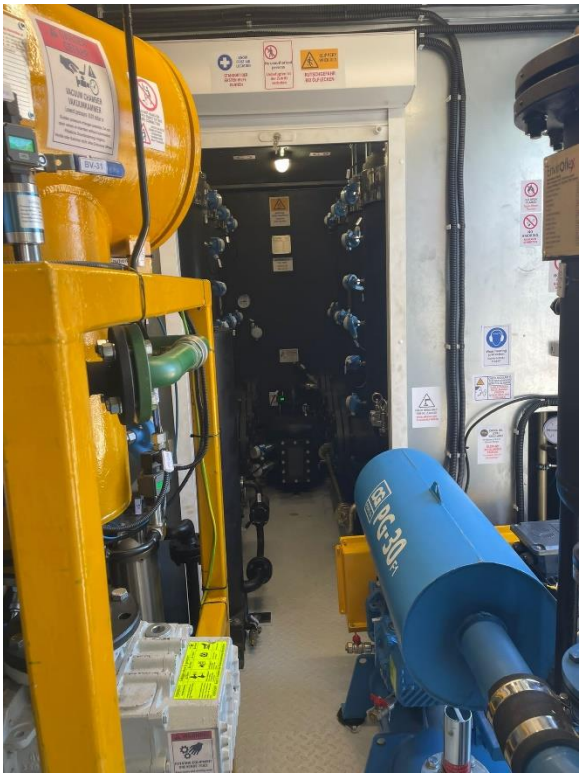

Enviroflex
Anlagentechnik GmbH
ReGenX

Oil Regeneration Room

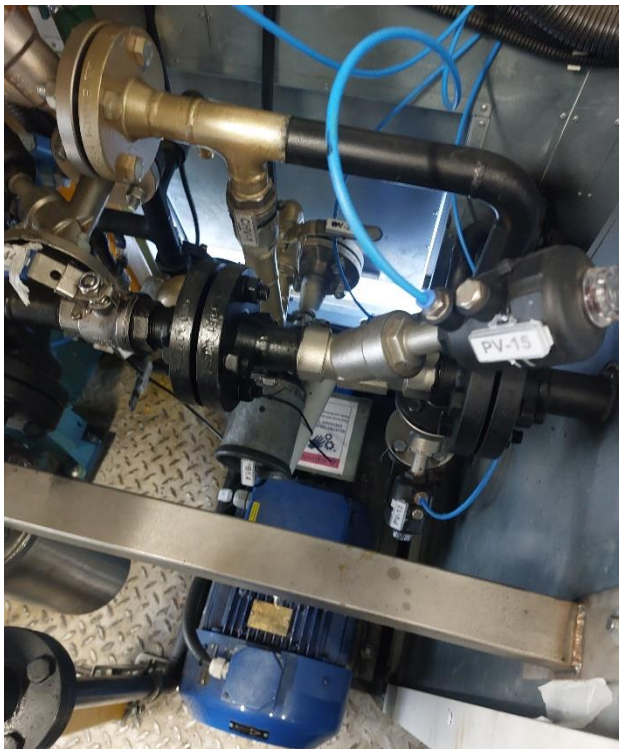
Oil Regeneration Room

Back Door-Oil Storage Vessel (2-Compartment)

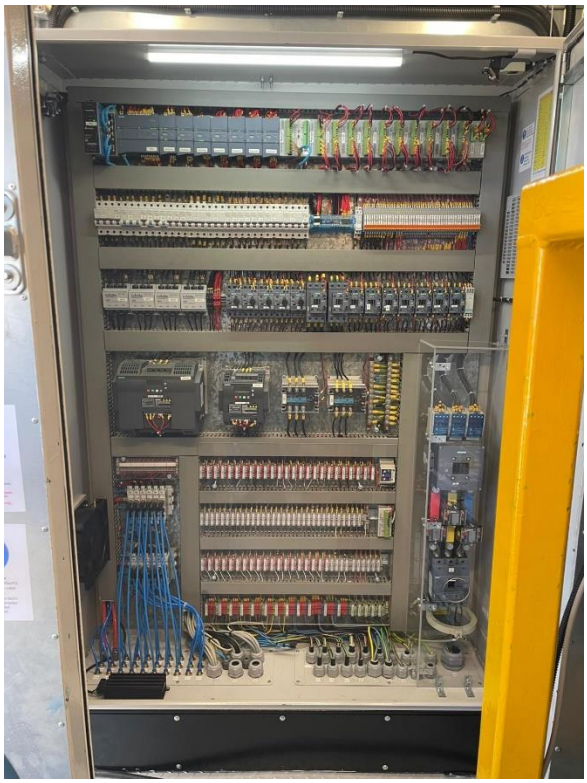
Oil Purification Room

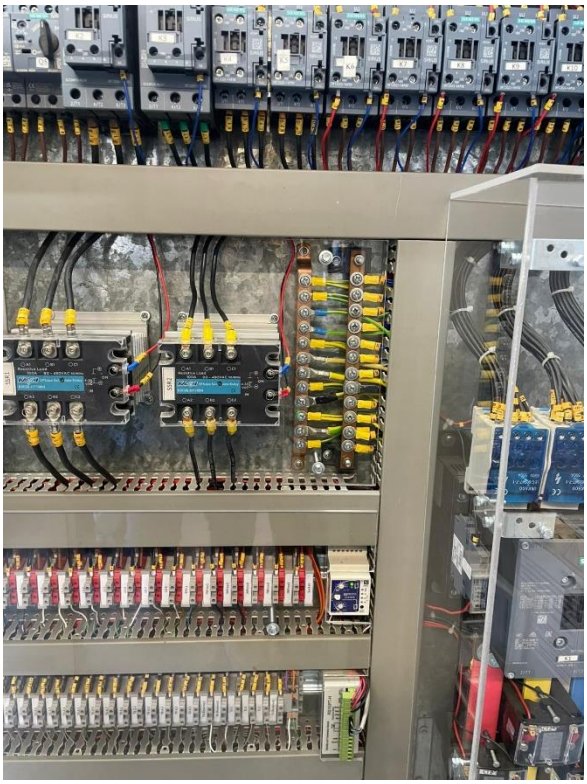


Oil Purification Room



Control Room





Some Control Pages (HMI-Laptop)