ENERGY EFFICIENCY CENTER
A SAFA ENERGY VENTURE

REVENUE STREAM 03

Pipeline Integrity Monitoring

Turn the dark fibre already buried beside the pipeline into a 24/7 tap-detection nervous system.

1 tap / 50 min
Mexico, today

100 km
monitored per interrogator

<1%
of pipeline cost (10-yr TCO)

THE OPPORTUNITY

PEMEX recorded **10,591 illegal perforations in 2025**, statistically a clandestine tap drilled **every 50 minutes**. The epicentre is the Tula-Tlahuelilpan corridor in Hidalgo (2,785 taps, up 13.3%). This physical theft is the primary driver of the MX$23.5B loss.

THE SOLUTION

- **DFOS / DAS:** standard fibre-optic telecom cable buried alongside the pipe becomes a continuous acoustic and vibration sensor.
- **Pre-breach detection:** ML monitors the fibre's backscatter for the acoustic signature of digging, machinery or drilling, before the pipe is pierced.
- **Tap localisation (NPW):** the instant a pipe is pierced, the negative-pressure wave is detected and AI locates the origin to within metres.
- **Action loop:** the moment digging is detected, dispatch a drone or response team, stop the tap before product is lost.

PROOF IN THE FIELD

Saudi Aramco
Validated and deployed DFOS to protect crude pipelines; part of an IoT network with 40,000 sensors across 500 wells at Khurais alone.

Nigeria, Niger Delta
In a comparably high-risk operating environment, surveillance cut theft to near-zero in monitored zones; national output rebounded 1.1 to 1.8M bpd.

Bandweaver / Hifi / AP Sensing
ML-driven DAS monitors up to 100 km per interrogator and virtually eliminates false alarms.

MEXICO APPLICATION

PEMEX is the world's most indebted oil major (~$101B), with capex down 47.5% YoY, a nationwide rollout is impossible. The play is **laser-focused on the highest-bleed arteries**: the Tula-Tlahuelilpan corridor (Hidalgo) and the Tierra Blanca-Omealca-Tres Valles strip (Veracruz), reusing existing “dark fibre” already in the ground, no new trenching.

REVENUE MODEL

- Monitoring-as-a-Service: a moderate upfront integration fee for interrogator hardware and edge-AI.
- A recurring monthly per-kilometre monitoring fee, shifting PEMEX from capex burden to manageable opex.
- Bundled 24/7 control-room alerting, software updates and maintenance.

PROJECTED ROI

A single next-gen system monitors 100 km with a **10-year total cost of ownership under 1% of pipeline build cost**. On the ~100 km Tula-Tlahuelilpan corridor, preventing even a fraction of the MX$23.5B annual loss justifies the spend, and pre-breach detection avoids product loss, environmental cleanup and catastrophic explosions.