



nanotech EXTRATION®

THE EVOLUTION IN OIL EXPLORATION

### OUL **TECHNOLOGY**

Nanotech Petroleum has incorporated Nanotech Extraction® into its portfolio, which is a cutting-edge technology in the process of injecting steam into recovery wells.

The big difference is the use of STIS (Super Thermal Insulation System) tubes for oil extraction.

### STIS - Super Thermal Insulation System

In addition to the nanotechnology incorporated into STIS pipes, the advanced welding process guarantees greater durability, protecting against ruptures and fatigue cracks, the like of which has never been seen in pipes currently available on the market.



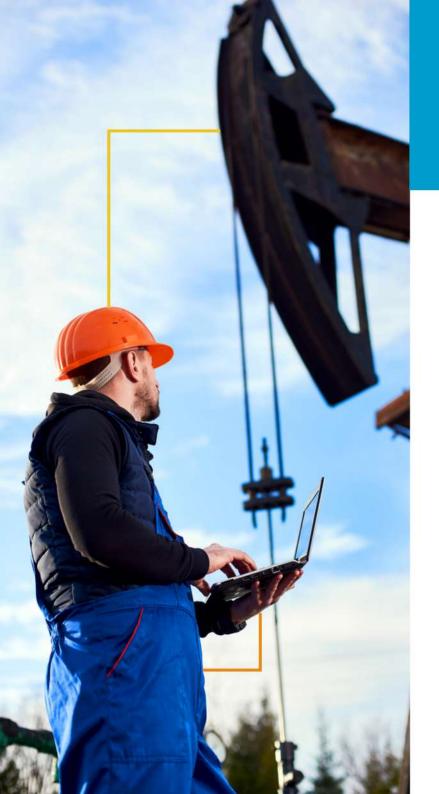
STIS pipes are also sustainable, as they significantly help to preserve the environment.

With 7% less CO2 emissions into the atmosphere,

THE SUSTENTABILITY IN OIL EXPLORATION







# using STIS PIPES

Nanotech Extraction® makes the future real



Technology operating successfully since 2003. In Brazil for over 15 years;

More than 500 wells in Brazil have used STIS;

SIAO - More than 70 technology contracts with Petrobras.



In-well energy savings of 7 percent;

10 years of continuous efficiency;

Energy produced and transported with maximum efficiency.

**DON'T THROW YOUR ENERGY AWAY!** 

THE TRUE ECONOMY IN OIL EXPLORATION

# Study of a **Typical Oil Field**

Considered 5.000 injection wells of 1.200 meters with STIS operating for 10 years



US\$17 million savings
on energy inside the well

340,000 tons less
CO2 burned in the environment

### comparison CHARTS

#### STEAM INJECTION



VIT

Vacuum Insulated Tubing



The savings were calculated according to the cost of the natural gas needed to generate steam

US\$ 3.399,97 in accumulated savings, per well, over 10 years

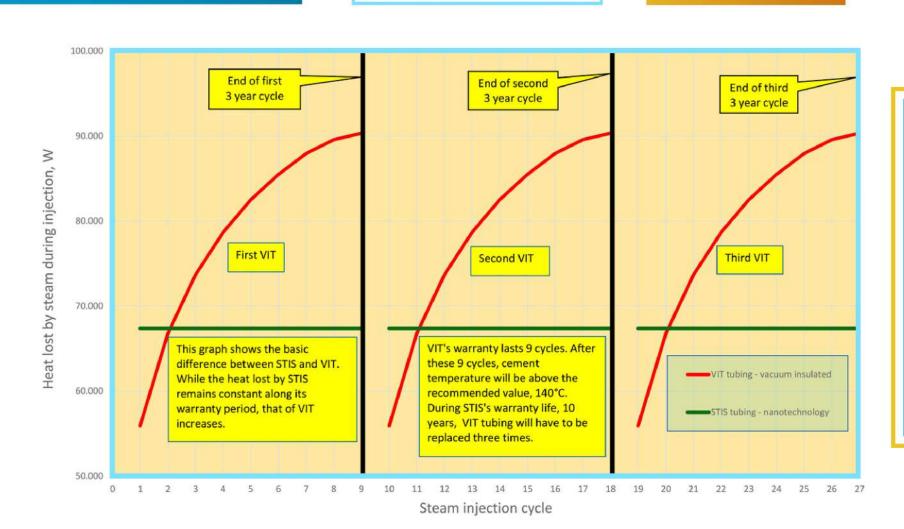
## more technical COMPARISON

#### **HEAT LOST BY DIFFERENT TUBING CONFIGURATIONS**

STIS
Super Thermal Insulation System

X

VIT
Vacuum Insulated Tubing



While the heat lost by STIS remains constant along its warranty period, that of VIT increases

## more technical COMPARISON

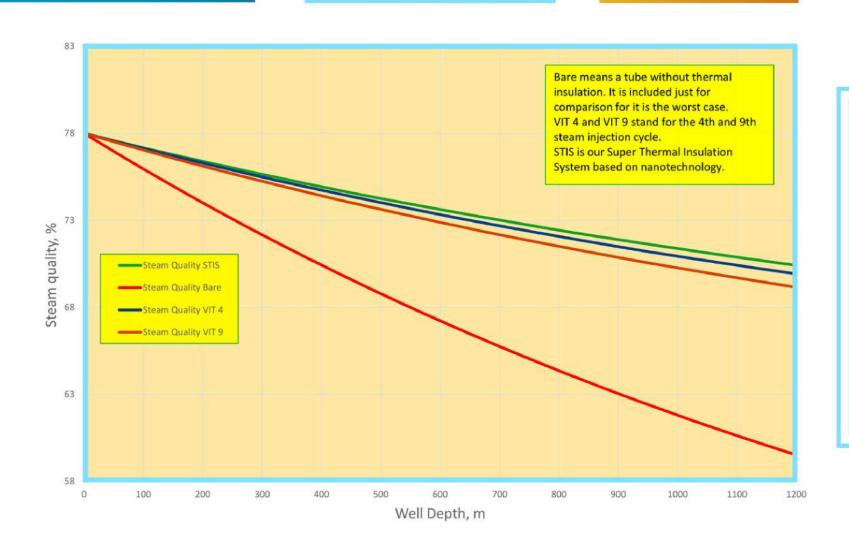
### STEAM QUALITY VARIATION ALONG WELL DEPTH ACCORDING TO THE TYPE OF THERMAL INSULATION

STIS

Super Thermal Insulation System



VIT
Vacuum Insulated Tubing



is superior to the different types of VIT pipes. The built-in nano technology makes all the difference!

### Summary STIS X VIT

# STIS X VIT for steam — injection in oil recovery

### Environmental benefits and natural gas savings

Steam properties at well

head

# sustainability with results



flow rate ton/day							
	Pressure psi	Quality %	Excess NG burned ton/well	Excess CO2 into atmosphere ton/well	Number of wells in the field	Excess NG (1) burned ton/field	Excess CO2 (2) into atmosphere ton/field
150	2500	78	24,32	68,10	5000	121.610,78	340.510,18
(1) As a res	ult of the lo	wer insulation	efficiency of VIT as	compared to STIS'	s insulation	efficiency;	
(2) This is the	ne CO2 resu	Ited from the	combustion of the e	xcess NG (1)		1000	
Notes abou	t injection p	perod length					
Period length						9	year
VIT life span						9	cycle
STIS life span						10	year
STIS's overall heat transfer coefficient, U value						1,92	W/m2K
VIT's fourth cycle overall heat transfer coefficient, U value						2,29	W/m2K
VIT's ninth cycle overall heat transfer coefficient, U value						2,89	W/m2K
STIS's apparent thermal conductivityt, k value						0,002165	W/mK
VIT's second year apparent thermal conductivityt, k value					0,002580	W/mK	
VIT's forth year apparent thermal conductivityt, k value					0,003260	W/mK	

Results per well

Results for a 9 year steam injection period

Results per field

3,000

0,140

16.999.874,11

85.551,80

84.777,23

774,56

US\$/million BTU

US\$/kg

US\$/(9 years)

ton/(9 years)

ton/(9 years)

ton/(9 years)

Tubin	g and well o	lata:	
Well depth	1200	m	
STIS/VIT length	30	ft, Range 2	
STIS/VIT length	9,144		
Numer of tubings	132	tubings/well	

Steam effectively injected into well by STIS

Steam effectively injected into well by VIT

Natural gas cost savings by STIS during a 9 year injection period

Amount o additional steam injected by STIS compared to VIT

Natural gas cost Natural gas cost

Cost of STIS	7000	US\$/tubing					
Cost of VIT	4000	US\$/tubing					
Results for a 9 year injection period							
Tubing	Number	Cost					
STIS	1	\$ 7.000,00					
VIT	3	\$ 12.000,00					
Tubing savings pe	\$ 5.000,00						
Tubing savings per	period/well	\$ 660.000,00					
Tubing savings per period/field	\$	3.300.000.000,00					
Total savings per period/field	\$	3.316.999.874,11					
Complementary notes:							
Since STIS's nanotechnology uses very low vacuum, its efficiency remains constant with time							
Since VIT is dependent on very high vacuum to maintain good efficiency and since vacuum is not permanent, VIT's efficiency decreases with time							
STIS is a better and more stable insulator than VIT							
STIS injects more vapor in the well than VIT							

In the long run, STIS is more cost effective than VIT

usually due to thread wear

loss of vacuum, which is certain

reducing the amount of oil produced

The sole reason to replace STIS is mechanical failure,

Besides thread wear, the main reason to replace VIT is

By using VIT, more liquid water is injected into well and, it will have to be pumped out the well, therefore,