



Nanotech Petroleum



**nanotech**  
EXTRATION<sup>®</sup>

*THE EVOLUTION IN OIL EXPLORATION*

## OUR 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.



With 7% less CO2 emissions into the atmosphere, STIS pipes are also sustainable, as they significantly help to preserve the environment.



*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\$ 3.3 billion savings**  
on insulating column purchases



**US\$17 million savings**  
on energy inside the well



**340,000 tons less**  
CO2 burned in the environment

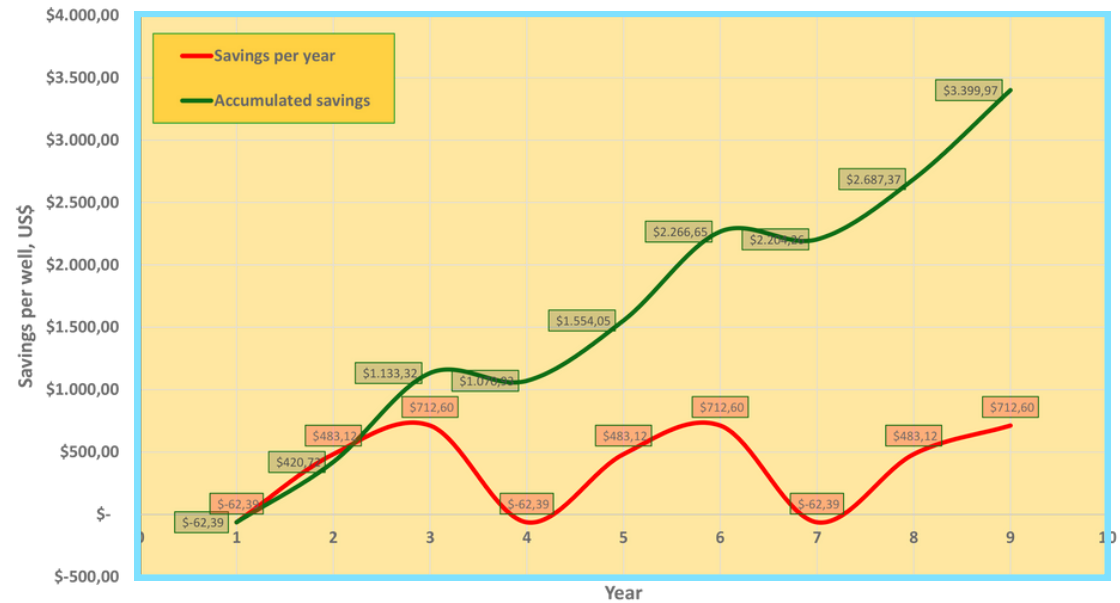
## comparison CHARTS

### STEAM INJECTION

**STIS**  
*Super Thermal Insulation System*

X

**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



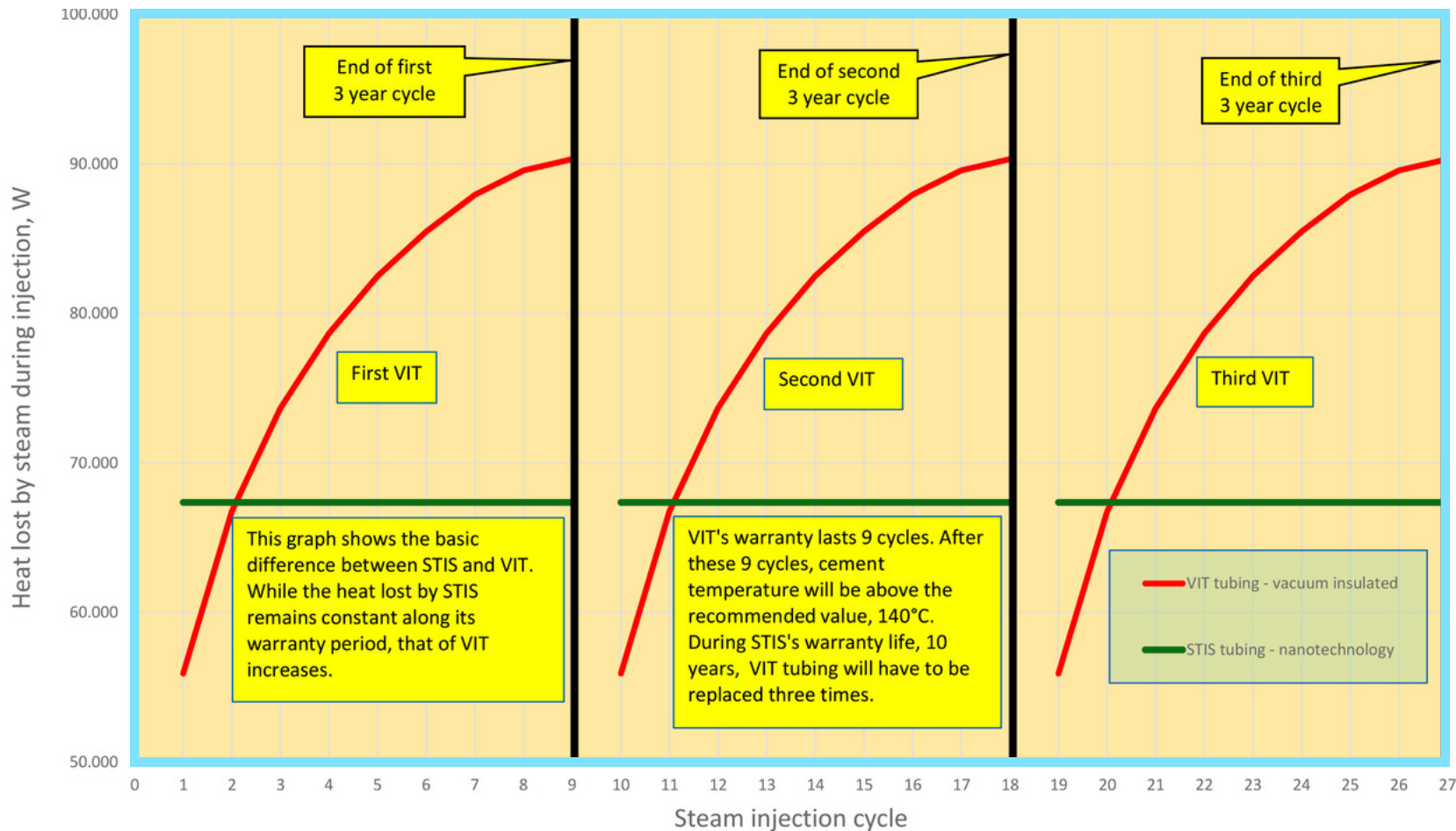
# more technical COMPARISON

## 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

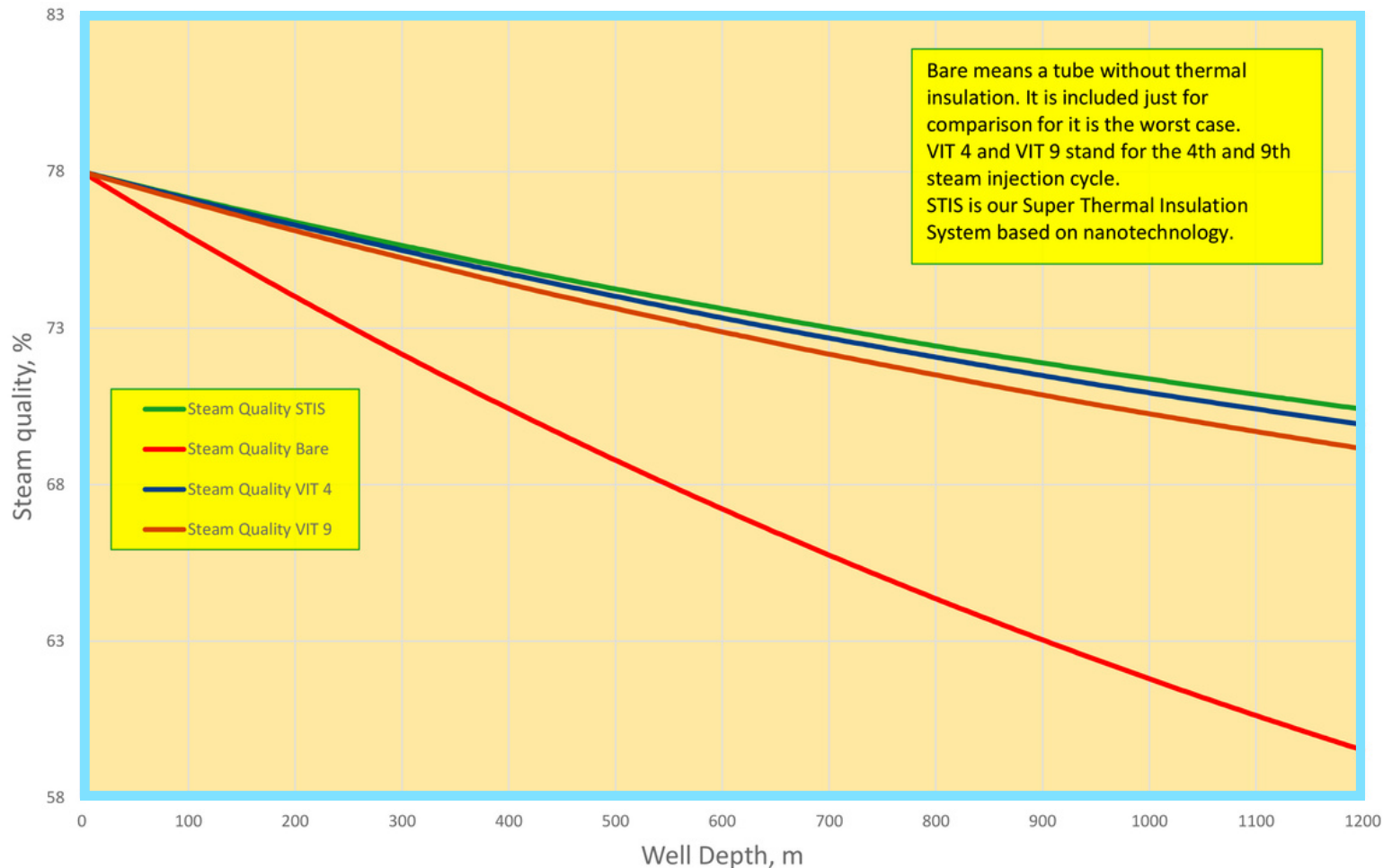
# more technical COMPARISON

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

**STIS**  
*Super Thermal Insulation System*

X

**VIT**  
*Vacuum Insulated Tubing*



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

# Summary

## STIS X VIT for steam injection in oil recovery

Environmental benefits and natural gas savings

sustainability with results



Steam flow rate ton/day	Steam properties at well head		Results for a 9 year steam injection period				
	Pressure psi	Quality %	Results per well		Number of wells in the field	Results per field	
			Excess NG burned ton/well	Excess CO2 into atmosphere ton/well		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 result of the lower insulation efficiency of VIT as compared to STIS's insulation efficiency;							
(2) This is the CO2 resulted from the combustion of the excess NG (1)							
Notes about injection period 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 conductivity, k value			0,002165	W/mK			
VIT's second year apparent thermal conductivity, k value			0,002580	W/mK			
VIT's fourth year apparent thermal conductivity, k value			0,003260	W/mK			
Natural gas cost			3,000	US\$/million BTU			
Natural gas cost			0,140	US\$/kg			
<b>Natural gas cost savings by STIS during a 9 year injection period</b>			<b>16.999.874,11</b>	<b>US\$/(9 years)</b>			
Steam effectively injected into well by STIS			85.551,80	ton/(9 years)			
Steam effectively injected into well by VIT			84.777,23	ton/(9 years)			
Amount of additional steam injected by STIS compared to VIT			774,56	ton/(9 years)			
Tubing and well data:							
Well depth	1200	m					
STIS/VIT length	30	ft, Range 2					
STIS/VIT length	9,144						
Numer of tubings	132	tubings/well					

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 per period		\$ 5.000,00
Tubing savings per period/well		\$ 660.000,00
<b>Tubing savings per period/field</b>	<b>\$</b>	<b>3.300.000.000,00</b>
<b>Total savings per period/field</b>	<b>\$</b>	<b>3.316.999.874,11</b>
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		
The sole reason to replace STIS is mechanical failure, usually due to thread wear		
Besides thread wear, the main reason to replace VIT is loss of vacuum, which is certain		
By using VIT, more liquid water is injected into well and, it will have to be pumped out the well, therefore, reducing the amount of oil produced		

FACTS & BENEFITS