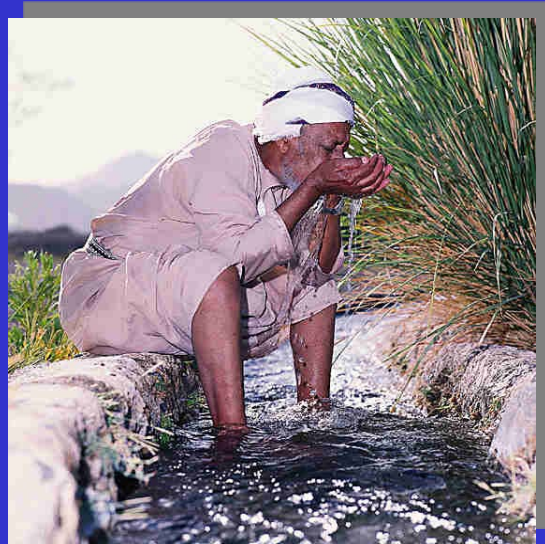


How to turn Produced Water from a “Legacy” to an Opportunity?



Water Foot Print

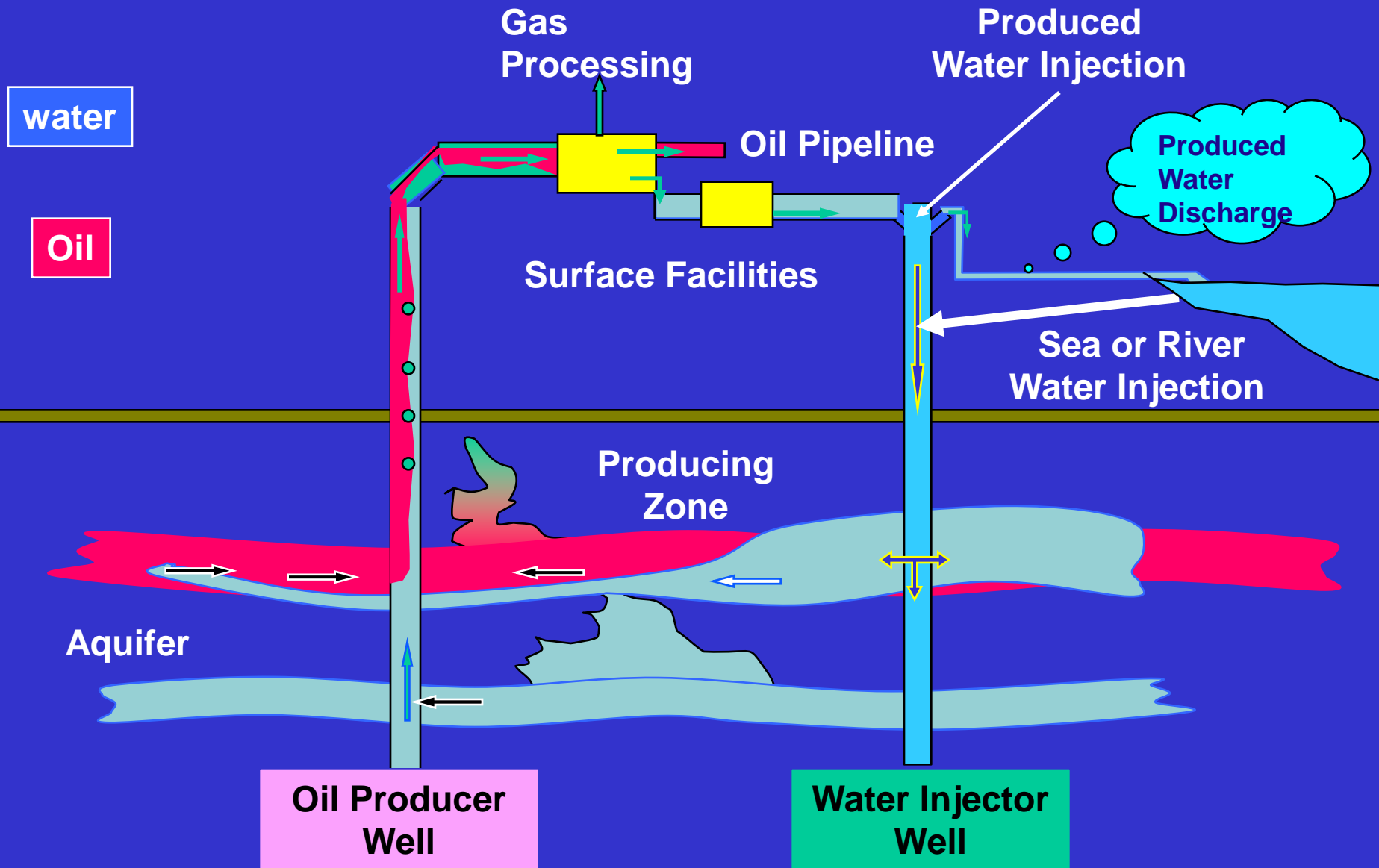
<u>Primary energy carrier</u>	<u>Average water footprint (m³/GJ)</u>
Wind Energy	0.00
Solar Thermal	0.27
Crude Oil	
Conventional	0.006
Water flooding	0.6
Thermal recovery	0.05 (95% water recovery)
Unconventionals	
Oil sands (mine)	0.1
Oil Sands (up grader)	0.026
Coal Bed Methane	
Natural Gas	0.006
Hydro Power	22
Biomass	70 (range 250-250)

Water footprint: Volume of freshwater used for the production of that product at the place it is actually produced

Source: Water footprint of Bio-energy and other primary energy carriers UNESCO-IHE Gerbens-Leenes, Hoekstra van der Meer, March 2008

1 BOE = 6.12 GJ = 5.68 BTU = 1.7 MWh

Produced Water Sources



Globally

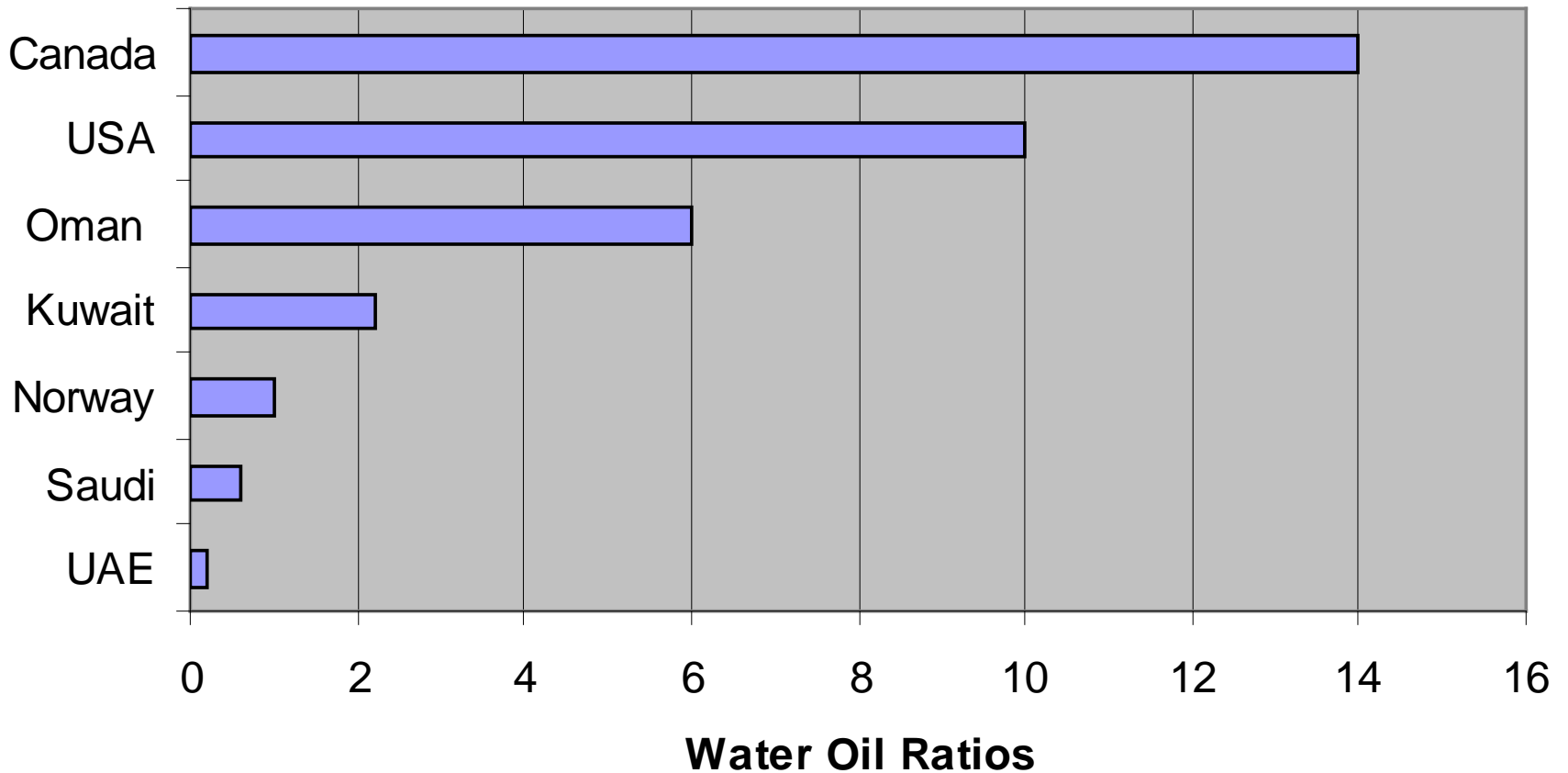
**For Every Barrel of Oil Produced
3 Barrels of Water are Co-produced**

*Average Global Produced Water Volumes Increased by
20% in Last Two Years
(US - DOE J. Vale)*

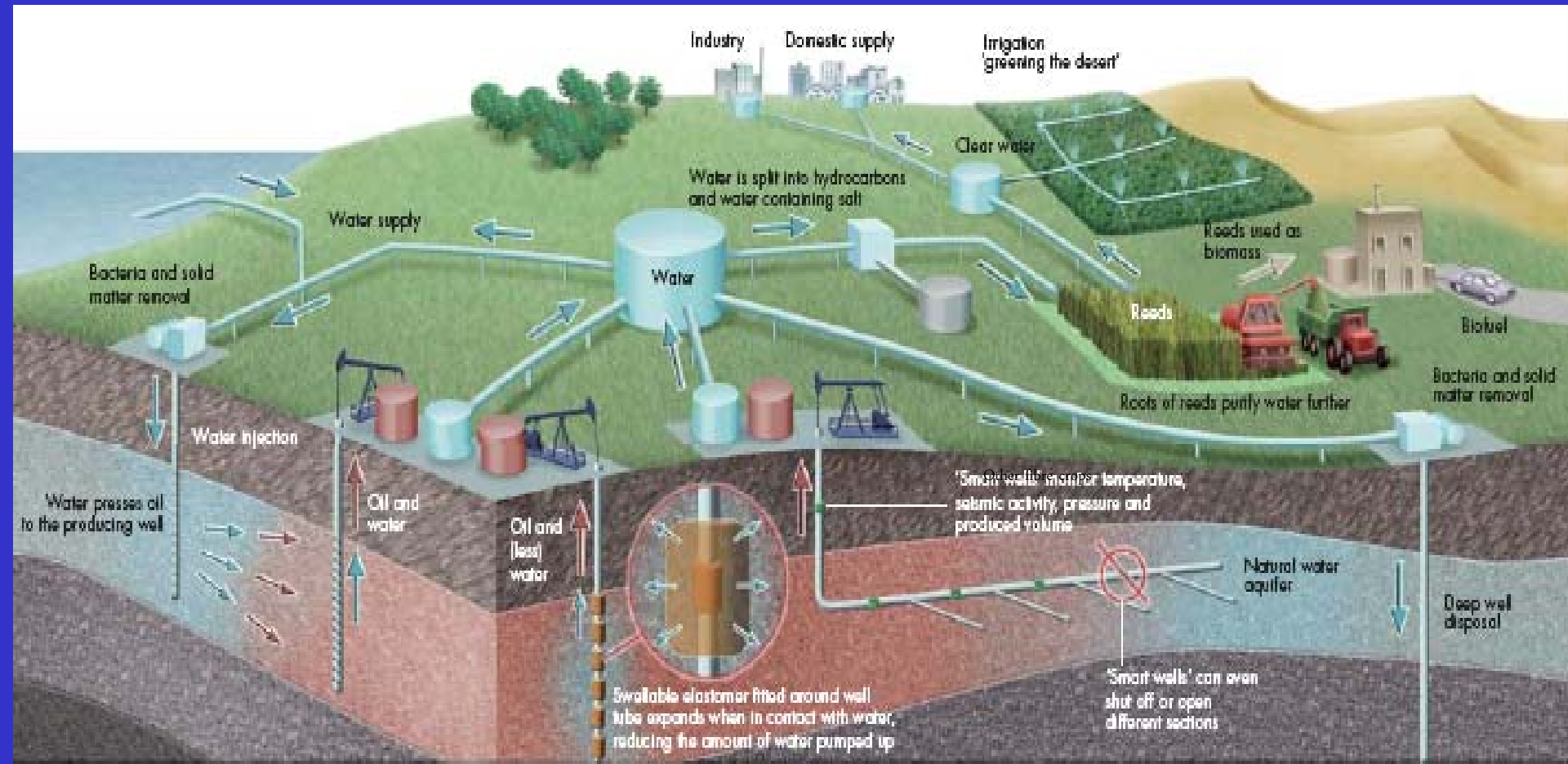
Produced Water Handling Is Costly
Cost ranges from \$0.15-\$15/bbl of water

Average Produced Water Per Country

Water Oil Ratios (Bbl/bbl)



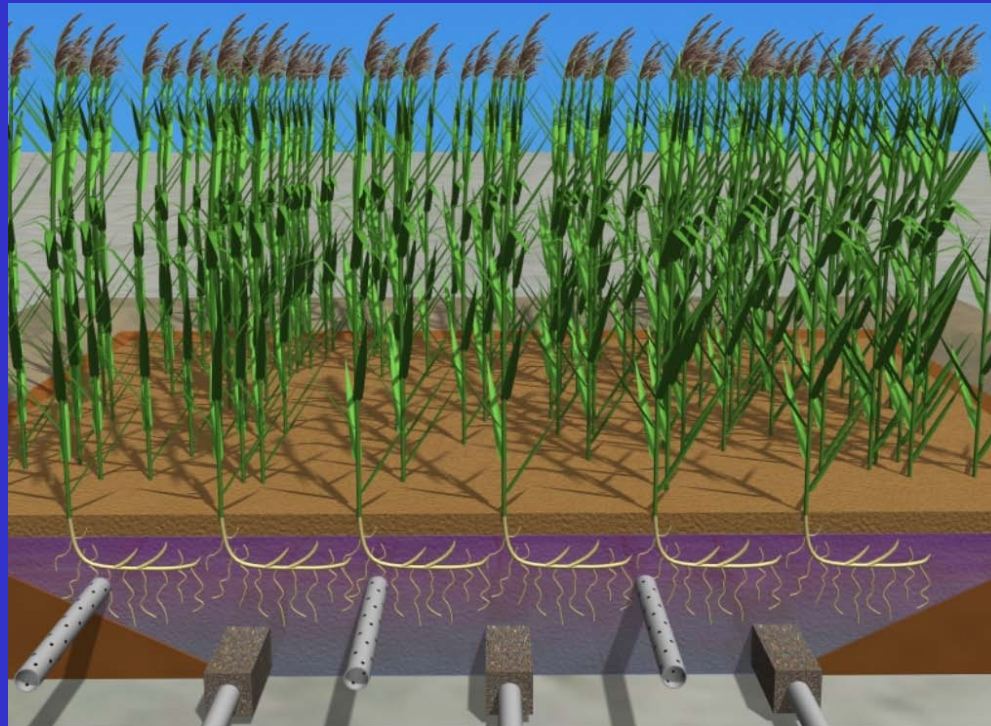
Maximise Resource Utilisation



Converting wasted water to value

Bio based Treatment Technology

“dirty” Production
water



“clean” Production
water

Reedbed/Bio filter: removing hydrocarbon and metals

OIW in the effluent is averaging 0-3 ppm

Reed Beds to Biofuels

For every 5000 m³ per day of produced water NOT injected in deep wells is equivalent to about :

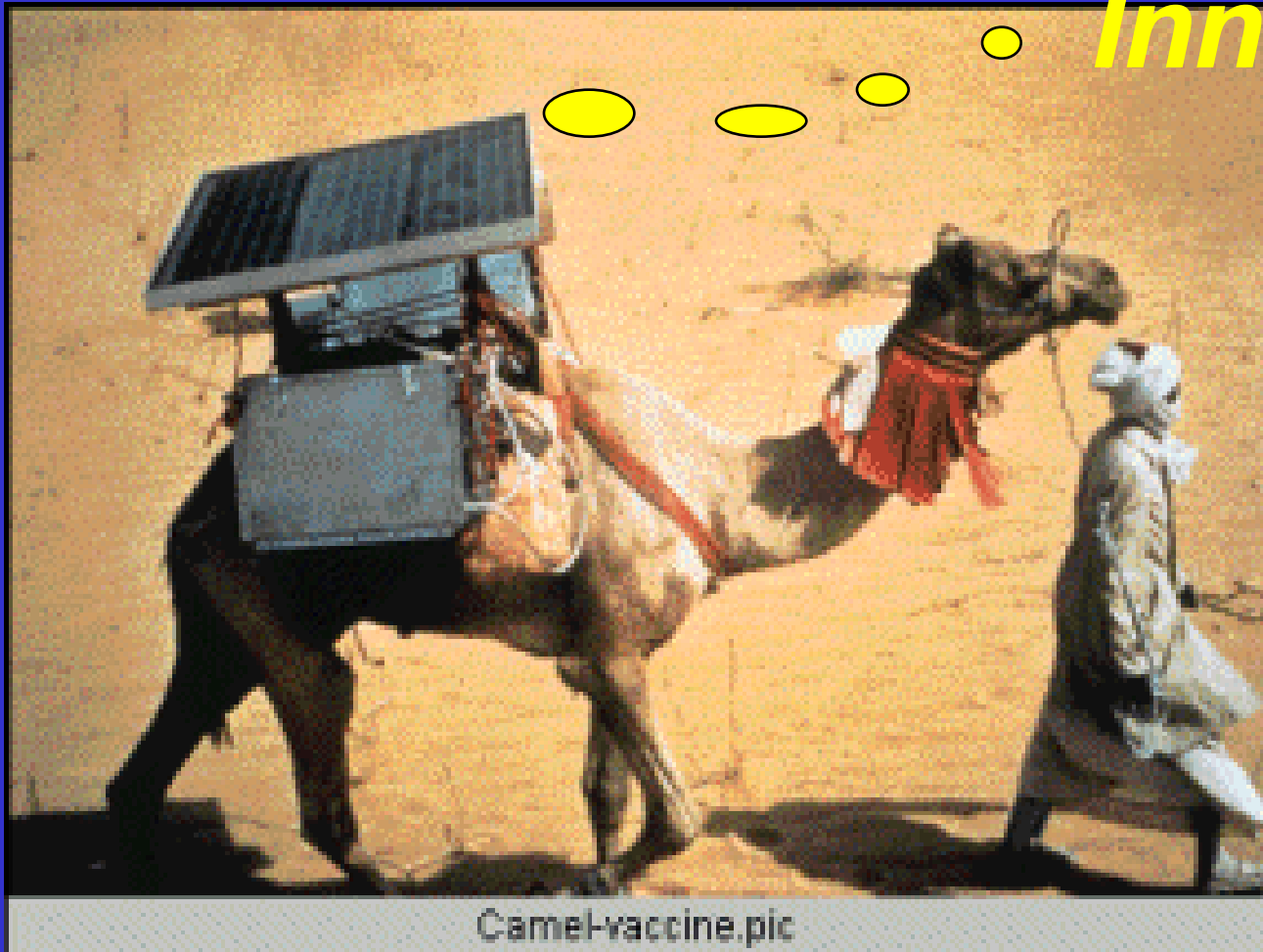
- 3 Million m³ per year of Gas savings and
- 5000 Ton per year of CO₂ less emission

and valuable Biomass that can be converted to Biofuels



“We are all guardians of the future. What we do today will impact on the world that the next generations will inherit”

Innovation



Thank You

