

**THE TOXICITY OF ETHYLENE  
GLYCOL IN THE DEHYDRATION  
OF NATURAL GAS IN NIGERIA:  
A NIGER DELTA PERSPECTIVE  
ON COMMUNITIES' RIGHT TO  
KNOW**

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## Nigeria's Potential as a Gas Major:

- At present Nigeria has over 183 Trillion Standard Cubic Feet of Associated Gas (AS) – this gas that has been discovered in the process of exploring for petrol. Until very recently, and for the past 50 years, this gas was simply flared.
- With a dedicated Gas regime, Nigeria has potential for over 600 trillion SCF. This would place Nigeria at fourth position behind Russia, Iran and Qatar.

## Quality of Nigerian Gas

- Nigeria's gas is of 'sweet' quality (sweet gas).
- It has 0% Sulphur, and is rich in natural gas liquids.
- It is in high demand worldwide because it is cheaper to harness and easier to refine.

How this is important for major economies like North America

In the case of the USA, energy certainty now amounts to a national security issue, and you are increasingly looking to Gulf of Guinea countries like Nigeria to remain stable, and to make up for what the Persian Gulf no longer guarantees.

In terms of geopolitics too, neither Russia nor Iran can be considered great friends and collaborators in securing energy security for USA

There is a problem with Nigeria's Gas Masterplan

The FGN believes that in order to realise and sustain this potential, the structure of the gas sector must support *continued cost effectiveness* in supply of all markets (domestic, regional and export), scalability of capacity and above all, must be *fully liberalised and market driven*.

The question that arises for me is: Where do the people come in?

From conception to full design, Nigeria's Master-plan so far fails to take into consideration the safe disposal of, and probable environmental hazards associated with these toxic by-products and after-effects of the dehydration of gas using chemicals. From all presentations to investors in the industry it has become clear that the logic of *economic benefits to be gained* predominates, and environmental consequences are not touched on. Apparently there is the fear of scaring off investors when environmental aspects are brought into the equation. For instance, nowhere in it has consideration been given to human persons that might be affected and impacted by this budding gas industry. The toxic by-products of this process, as we shall demonstrate, are many and varied, and may bear down directly on the human, animal and aquatic populations in the Niger Delta.

It must be borne in mind that our purpose is not to oppose the Federal Government's intention to exploit our vast resources of natural gas, as this is necessary to meet the cash-calls for reaching our developmental goals. At the same time, we know that development that does not factor in possible consequences for human beings is a contradiction in terms. This is why we wish to reiterate that all the above mentioned toxic effects arise only when EG is used in the process of gas dehydration/purification. But there is now tested technology that does not require the use of EG, a good example being that in use right now in the Afam Gas Plant, which feeds Afam Power Station. My point is, since we know this technology exists, and is already being used at least in one gas plant in Nigeria, why not replicate it in others as well? Prevention, as they say, is better than cure; so why do we not choose to avoid the toxicity of BTX wastes by making a safe technology choice now, rather than be saddled with the social and environmental impact, and the possible political fallouts of unsafe disposal of these carcinogenic wastes? So far the only reason militating against this is the economics of cost-saving and profitmaking. But I do not find this convincing, because if one looks seriously at the equation, we must base our economic model on LCC, life cycle cost. This means that the cost of a project must be calculated from the day of conceptual design to the moment of dismantling the plant, including operational expenses OPEX (i.e. proper waste removal during operation) and removal expenses (i.e. proper waste removal after operation), and not only capital expenditure CAPEX, or the initial cost for setting up a gas processing unit. My view is that if you take all the removal/disposal costs into consideration, even apart from the related environmental, social and political problems, new chemical-free technology will prevail in advantage over EG-dependent processes.

## **WHY IS IT NECESSARY TO HAVE A WATCH DOG ON BEHALF OF THE PEOPLE?**

**ANSWER:** The Chemistry of the process used in the treatment of natural gas from the well, before it gets to the consumer, produces hazardous substances which are harmful to humans. I shall now present to you some aspect of these processes and their by-products.

The process involves gas dehydration during which unwanted components such as water vapour, hydrogen sulphide, aromatic hydrocarbons, saturated compounds, etc., are removed

## PROCESSES IN GAS DEHYDRATION

A common method of removing water from natural gas (wet gas) is **GLYCOL DEHYDRATION**. In this process ethylene glycol is used to remove the presence of water vapour from the gas stream.

### STRUCTURE OF ETHYLENE

HO

OH

(DYHYDROXY ALCOHOL)