

Ed Collin's
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A Chara, - I read with interest your report that Shell have again dismissed the idea of an offshore processing platform for the Corrib gas field ("Offshore platform not viable, says Shell" - May 6th).

I am disappointed that Andy Pyle, Shell chief executive, seems to be able to get away with saying that he was prepared to discuss this option on Thursday and then contradicting himself on Friday.

There are already enough contradictions in the various reports produced on the Corrib gas field to raise serious environmental and safety concerns about this project, and it should really not be left up to vested interests to determine what is and isn't viable; it is far cheaper for a company like Shell to build the cheapest pipeline possible, and hire a PR company to spin on their behalf than it is to do things in the safest manner possible; so this is of course the route that they have chosen.

The first duty of the Government is to protect its citizens who may be put at risk by this pipeline, and I would like to voice my support for those who have stood in the face of the PR blitz and given voice to their most reasonable concerns. - Is Mise,

Senator MARY WHITE
Seanad Éireann,
Dublin 2.

OH Doc No.

28C

Recd From:

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Date Recd:

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Converting Hydrogen Sulfide by the Claus Process

Hydrogen sulfide (H_2S) is a smelly, corrosive, highly toxic gas. Besides its other bad habits, it also deactivates industrial catalysts. H_2S is commonly found in natural gas and is also made at oil refineries, especially if the crude oil contains a lot of sulfur compounds.

Because H_2S is such an obnoxious substance, it is converted to non-toxic and useful elemental sulfur at most locations that produce it. The process of choice is the Claus Sulfur Recovery process.

Description of the Claus Process

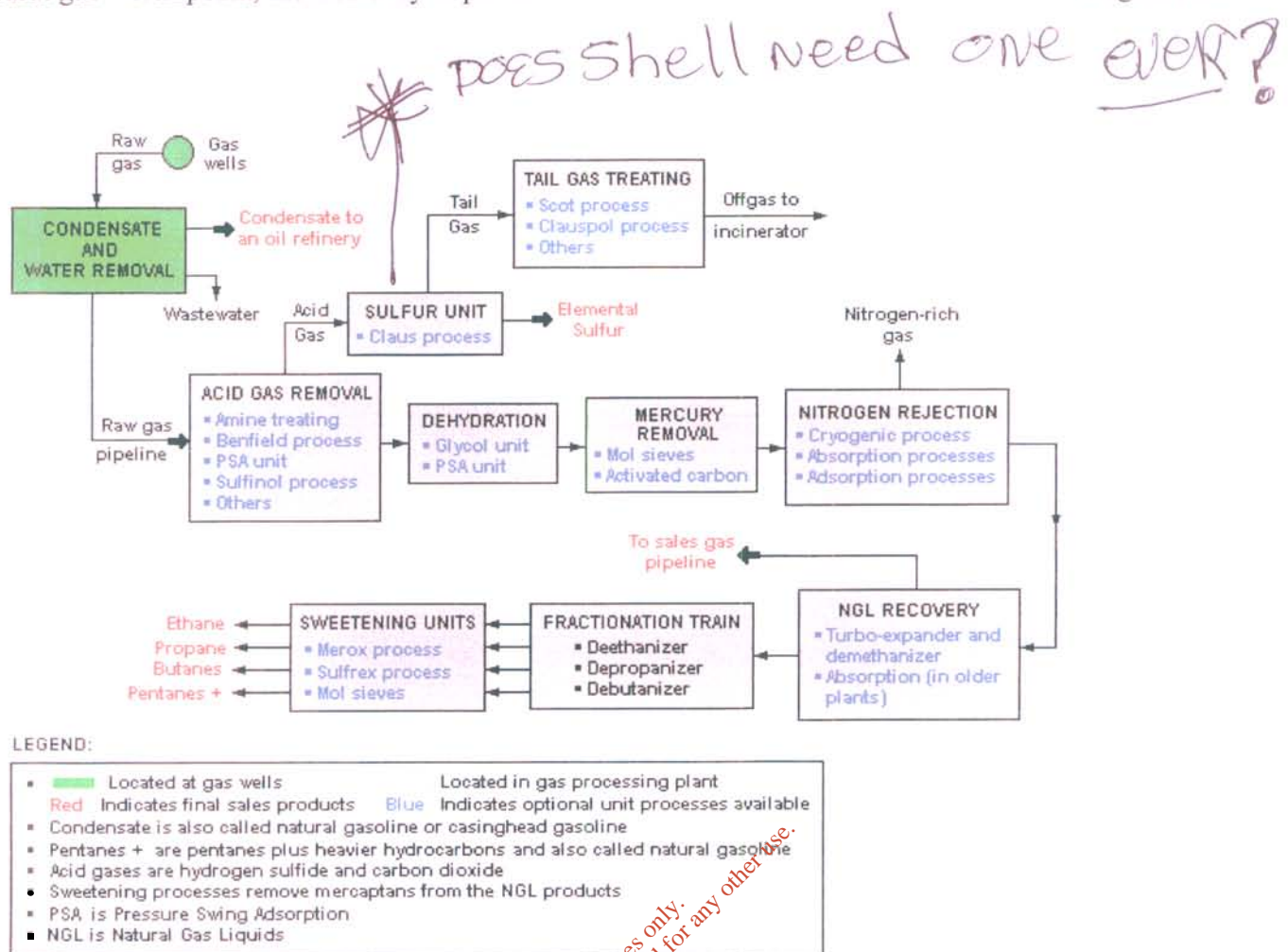
First the H_2S is separated from the host gas stream using *amine extraction*. Then it is fed to the Claus unit, where it is converted in two steps:

1. **Thermal Step.** The H_2S is partially oxidized with air. This is done in a reaction furnace at high temperatures (1000-1400 deg C). Sulfur is formed, but some H_2S remains unreacted, and some SO_2 is made.
2. **Catalytic Step.** The remaining H_2S is reacted with the SO_2 at lower temperatures (about 200-350 deg C) over a catalyst to make more sulfur.

A catalyst is needed in the second step to help the components react with reasonable speed. Unfortunately the reaction does not go to completion even with the best catalyst. For this reason two or three stages are used, with sulfur being removed between the stages. Engineers know how different factors like concentration, contact time and reaction temperature influence the reaction, and these are set to give the best conversions.

The reaction is as follows: $2\text{H}_2\text{S} + \text{SO}_2 \Rightarrow 3\text{S} + 2\text{H}_2\text{O}$

Inevitably a small amount of H_2S remains in the tail gas. This residual quantity, together with other trace sulfur compounds, is usually dealt with in a *tail gas unit*. The latter can give overall sulfur recoveries of about 99.8%, which is very impressive indeed.



Schematic flow diagram of a typical natural gas processing plant

Storage and transport

The major difficulty in the use of natural gas is transportation and storage because of its low density. Natural gas pipelines are economical, but are impractical across oceans. Many existing pipelines in North America are close to reaching their capacity, prompting some politicians in colder climates to speak publicly of potential shortages.

LNG carriers can be used to transport liquefied natural gas (LNG) across oceans, while tank trucks can carry liquefied or compressed natural gas (CNG) over shorter distances. They may transport natural



Polyethylene gas main

**The Dirty Four:
The Case Against Letting BP Amoco, ExxonMobil, Chevron, and Phillips Petroleum
Drill in the Arctic Refuge**

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conversations with Amnesty International about human-rights issues associated with oil exploration, working with the World Wildlife Fund to preserve biodiversity in Bolivia and China, and developing low-sulfur gasoline to be sold in 40 of the world's most polluted cities. In 1999, BP bought Solarex for \$45 million, making it the largest solar company in the world, and announced plans to install solar panels on 200 gas stations. (Its solar subsidiary still accounts for scarcely 0.1 percent of its revenue, however.) ARCO is a participant in the California Fuel Cell Partnership, which aims to produce 70 fuel-cell passenger cars and buses between 2000 and 2003.

EXXONMOBIL

When Exxon and Mobil merged in November 1999, it created the largest private oil company in the world. The new megacorporation has 15,913 U.S. outlets, \$233 billion in sales, and the top spot on the Fortune 500 list. ExxonMobil sells gas under its own name and operates the On the Run chain of convenience stores.

Black marks: Exxon infamously refuses to pay \$5 billion in punitive damages ordered by an Alaska court after the 1989 Valdez tanker oil spill. The company spent \$2.2 billion on cleanup but never took responsibility for the accident. Exxon has since developed a reputation as one of the industry's most outspoken opponents of stronger environmental regulations. The company also spilled more than 500,000 gallons near Staten Island, New York, in January 1990. Fines levied against it include: \$4.7 million for nearly 200 violations of the Clean Air Act, as cited by the EPA in 1998; \$4.8 million in damages (along with Tosco) in August 1998 for discharging carcinogenic selenium into the San Francisco Bay.

ExxonMobil is one of the "Dirty Four" seeking to drill in the Arctic National Wildlife Refuge. In March, ExxonMobil suspended production at the Arun gas fields in Aceh, Indonesia, citing increased violence by separatist groups. Active in the country for 30 years, Mobil has been dogged by controversy over how much it knew about the Indonesian military's violent counterinsurgency campaign.

The merged company's 25-year, \$3.5 billion project to build a pipeline from landlocked Chad to the Atlantic coast of Cameroon would cut through the rainforest home of indigenous communities. (For more information, see www.sierraclub.org/human-rights/indian/intel.asp.)



Refining record: Of the nine Exxon and Mobil refineries Environmental Defense evaluated, Exxon had two refineries in the bottom 20 percent and Mobil had one. Stance on global warming: Both Exxon and Mobil belonged to the Global Climate Coalition. ExxonMobil chairman and CEO Lee R. Raymond still insists that there's "uncertainty" over whether global warming is created by human activity or natural causes, and Exxon has contributed financially (along with Chevron) to public-relations efforts that promote the work of climate-science skeptics. Environmentalists in Europe are boycotting ExxonMobil—known there as Esso—until the company accepts the Kyoto Protocol. (Visit www.altpress.com for details.)

Green initiatives: Exxon is donating \$10 million over eight years to the Save the Tiger Fund, established with the National Fish and Wildlife Foundation. As a partner in American Forests' Global ReLeaf Project, Mobil paid for the planting of a million trees in the late 1990s.

ROYAL DUTCH/HELL: The world's number 2 oil and gas group has 9,423 gasoline stations in the United States and \$149 billion in sales.

Black marks: In Nigeria in 1995, nine Ogoni activists were killed by the military regime for protesting Shell's operations there, leading the Sierra Club Board of Directors to approve a boycott of Shell for its human-rights violations. At the time, Shell was the largest oil producer (and one of the biggest polluters) in Nigeria, creating almost half of the country's wealth. Much of this money supported the military government; little, if any, went to the communities of the Niger Delta, where Shell's leaky pipelines contaminated farmlands and fisheries. (See www.sierraclub.org/human-rights/nigeria.)



Refining record: Of the seven Shell refineries Environmental Defense evaluated, four ranked in the bottom 20 percent; one ranked in the top 15 percent.

Stance on global warming: A former member of the Global Climate Coalition, Shell has since joined the Business Environmental Leadership Council. Green initiatives: Shell Hydrogen is a participant in the California Fuel Cell Partnership (see BP entry).

Exxon

A subsidiary of Petróleos de Venezuela, the country's national oil company, CITGO has more than 15,000 outlets in the United States and furnishes gas to 7-Eleven stores. CITGO has \$22 billion in sales.

Black marks: Along with BP and Conoco, CITGO obtained drilling rights in Venezuela's Amacuro Delta, a part of the Orinoco River watershed inhabited by 25,000 Warao Indians. The Venezuelan government opened this area's estuaries, tidal marshes, and mangrove swamps to petroleum development in 1995 without any environmental assessments.



Refining record: Of the six CITGO refineries Environmental Defense evaluated, one ranked in the bottom 20 percent; two ranked in the top 15 percent.

Stance on global warming: According to its corporate Web site, CITGO believes that "[t]he scientific debate on whether global warming is a real phenomenon is ongoing and should not be cut short." In reality, the debate is over for the vast majority of mainstream scientists, who agree that the earth is heating up due to human activity.

BP & Conoco

Another heavy hitter, Texaco has 13,088 gasoline stations in the United States and \$51 billion in sales. Last October, Chevron agreed to acquire Texaco. If approved by the U.S. Federal Trade Commission, the deal would create the world's fourth-largest oil company.

Black marks: In November 1993, indigenous residents of Ecuador and Peru filed a \$1.5-billion class-action lawsuit against Texaco, charging that the company's extraction operations in the Ecuadorian Amazon dumped 16 million gallons of crude oil into local rivers between 1964 and 1990. A federal judge dismissed the lawsuit in May, saying the matter belongs in an Ecuadorian court; Texaco has agreed to contribute to a cleanup fund for the area, but denies any illegal environmental wrongdoing.



Refining record: Of the seven Texaco and Star (a joint venture of Texaco and Saudi Aramco) refineries Environmental Defense evaluated, one ranked in the bottom 20 percent.

Stance on global warming: In February 2000, Texaco became the first U.S. oil giant to drop out of the Global Climate Coalition, which led the GCC to reconfigure its membership.

Green initiatives: Texaco is a participant in the California Fuel Cell Partnership (see BP entry). In May 2000, Texaco spent \$67.4 million on a 20 percent share in Energy Conversion Devices Incorporated, an alternative-energy firm working on fuel cells and other new technologies.

Exxon & Chevron

Chevron has 7,980 outlets in the United States and \$52 billion in annual sales. In October of last year, the company agreed to acquire Texaco, pending the merger's approval by the U.S. Federal Trade Commission.

Black marks: When Chevron bought Gulf Oil in 1984, it acquired its operations in Nigeria, where it has since been criticized for human-rights violations. In 1998, Nigerian military and