Removal of Offshore Platforms: Rationale for Retaining Infrastructure, Renewable Resources

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Removal of Offshore Oil and Gas Platforms: Rationale for Retaining Infrastructure to Develop Offshore Renewable Resources in the Gulf of Mexico

By
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Introduction

The Gulf of Mexico is home to 3,959 offshore oil and gas platforms (MMS 2008). When production from the wells becomes unprofitable, federal regulations (30 CFR 250.112) require that the platforms be removed. Thousands of structures have already been removed and most of the remaining platforms are scheduled for removal by 2020. Retired structures, if not removed, could be redeployed to harness energy from the ocean, generate hydrogen and sequester greenhouse gases and they can be used to culture coral, fish, crabs and oysters. The retiring offshore oil and gas infrastructure can produce an economic second life to the coastal communities and employ 27,000 citizens (Kolian and Sammarco 2005 & 2006).

Offshore platforms create complex coral reef ecosystems that would otherwise not exist on thousands of square miles of generally featureless continental shelf (see: Video of Platform). The offshore platforms create one of the most prolific ecosystems on the planet. Stanley and Wilson (2000) reported that 10,000-30,000 adult fish reside around a single platform in an area about half the size of a football field. The fish biomass at offshore platforms is ten times greater, per unit area, than the fish biomass at protected coral reefs in fish sanctuaries (Flower Gardens) and platforms toppled as artificial reefs (Wilson et. al 2003). The long-term, unexpected, effect of oil and gas production has been to create critical habitat for federally managed marine species, such as:

- Loggerhead, hawksbill, and green sea turtles;
- Hermatypic (reef-building) corals, octocorals, black coral, sponges, and bryozoans;
- Fish such as grouper, snapper, jacks, etc.;
- Crustaceans such as lobsters, stone crabs, etc.

Platforms Removed

The platform owners, following federal platform removal regulations, have, to date, removed 1,736 fixed platforms (see Figure 1) resulting in the destruction of an estimated 2,098 acres of coral reef habitat (LGL 1998). The total volume of the underwater portion of the platforms already removed is 52,398,731 m$^3$. Oil and gas platforms are one of the most effective artificial reefs in the world. Artificial reefs are expensive to build and install. The size and the construction materials and installation expense affect the cost of deploying artificial reefs. They are measured in units of volume, usually in units of cubic meters. In literature review, a range was found between $67/m^3$ - $320/m^3$ with $140/m^3$ the average cost (RB 2008, Goreau and Hilbertz 2005, Takafumi 2003, Grove 1994). Today’s cost to replace 52,398,731 m$^3$ of artificial reefs at $140/m^3$ is $7.3$ billion.
Idle Platforms Scheduled for Removal Today

Currently, 744 offshore platforms are idle and no-longer in production and are awaiting removal (see Figure 2). These platforms contain an estimated 890 acres of coral reef habitat (LGL 1998). The total volume of the underwater portion of the platforms scheduled for removal is 24,401,169m$^3$. Today’s cost to replace an equivalent number of artificial reefs at $140/m^3$ is $3.4$ billion.

Existing Platforms

Currently, there are 3,959 fixed oil and gas platforms in the Gulf of Mexico. Most offshore petroleum wells are productive for 15 years (Pulsipher et. al. 2001). Due to the depletion of petroleum fields, by 2020, the Gulf of Mexico will lose the majority of the structures in water depths less than 600 feet. There is an estimated 4,465 acres of coral reef habitat currently existing in the Gulf of Mexico in the form of oil and gas platforms. The total volume of the underwater portion of the existing platforms is 127,712,369m$^3$. Today’s cost to replace an equivalent number of artificial reefs at $140/m^3$ is $17.9$ billion (see Figure 3).

Solution to Platform Removal

The retired structures can be redeployed for alternate uses: see: EcoRigs Technical Report. Most platforms become unprofitable long before they lose their structural integrity. If cathodic protection is maintained and the structure does not encounter a catastrophic weather event, they will last indefinitely as long as the sacrificial anodes are replaced and maintenance is performed on a regular schedule (Chevron 2004). The retired offshore platforms can be used for alternate uses such as:

- Production of renewable energy derived from wind, current, wave, geo-thermal, salinity gradients, and bio-fuels;
- Hydrogen production, (i.e. extraction of hydrogen from seawater via electrolysis);
- Marine aquaculture (mariculture; e.g. of coral and sponges, oyster depuration, ornamental and food fish, etc.);
- Artificial marine habitats;
- Recreational fishing and diving parks;
- Culture of pharmaceutically valuable organisms;
- Sequestration of greenhouse gases.

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1 LGL 1998 calculated the average underwater surface area of typical oil and gas platform, the sample size included 290 different oil and gas structures in the Gulf of Mexico. This publication utilized LGL data for the average area per platform, however, the authors of this publication found a significantly larger number of fixed platforms in the Gulf of Mexico. LGL found 2,309 fixed platforms in 1998 and the authors found 3,959 fixed platforms in 2008. LGL reported 2,891 acres of surface area in 1998 and the authors calculated 4,465 acres in 2008.
Scientists in Japan have similar ideas about producing energy and seafood from the ocean and are pursuing an ambitious project to build offshore platforms to without the benefit of petroleum reserves and an offshore engineering infrastructure: See: Japanese Platform Technology

**Economic Significance of Offshore Oil and Gas Infrastructure**

The oil and gas companies have invested $200 billion building and installing the petroleum infrastructure in the Gulf of Mexico (API 2004). The oil and gas industry in the Gulf of Mexico directly employs 55,000 people annually. The decline of offshore oil and gas production and the increasing maturity of the oil and gas fields will lead to a loss of offshore production platforms and a reduction of oil and gas related jobs. The petroleum fields on the continental shelf are depleting and platform removals are currently costing the oil and gas industry $500 million per year. Decommissioning and removal of all the platforms will eventually cost the oil and gas operators in the Gulf of Mexico over $15 billion.

The platforms are used extensively by fisherman and divers, and they currently generate $324 million annually in economic impact and create 5,560 full-time jobs in the marine sport fishing and diving industries (MMS 2006). If the retired platforms were properly managed to maximize their potential for alternate uses, the new industry could directly employ 27,000 citizens in our coastal communities (Kolian and Sammarco 2006).

Two independent socio-economic studies on the impact of artificial reefs in Florida and a third in Mississippi indicate the substantial economic impact that artificial reef programs can have on coastal communities.

**Table 1. Summary of the socio-economic impact (revenue and employment) from the introduction of artificial reef programs in Gulf of Mexico.**

<table>
<thead>
<tr>
<th>Area</th>
<th>Annual Economic Impact</th>
<th>Job Creation</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southeast Florida</td>
<td>$2.4 billion</td>
<td>26,800</td>
<td>Johns et al., 2001</td>
</tr>
<tr>
<td>Northwest Florida</td>
<td>$415 million</td>
<td>8,100</td>
<td>Bell et al., 1998</td>
</tr>
<tr>
<td>Mississippi</td>
<td>$78 million</td>
<td>No data</td>
<td>Southwick 1998</td>
</tr>
<tr>
<td>Offshore platforms</td>
<td>$324 million</td>
<td>5,560</td>
<td>MMS 2006</td>
</tr>
</tbody>
</table>

The 3,959 offshore oil and gas platforms across the northern Gulf of Mexico represent $17.9 billion worth of highly productive artificial reefs in the form of oil and gas platforms. They constitute the largest collection of artificial reefs in the world; however, they will be destroyed in the next 10-15 years. Please go to [www.ecorigs.org](http://www.ecorigs.org) to learn about platform biological communities and alternate uses of retired platforms. We bring these matters to your attention to inform you about the benefits of retaining the offshore oil and gas platforms.
Number of Fixed Platforms Removed as of 2008

Total Number of Structures Removed: 3,816
Number of Fixed Platforms Removed: 1,736
Number of Cassions: 1,511
Number of Well Protectors: 558
Area of Coral Reef Habitat Destroyed: 2,098 acres

www.ecorigs.org
Number of Idle Platforms Scheduled to be Removed (2008)

Total Number of Structures to be Removed: 1,419
Number of Fixed Platforms: 744
Number of Casisions: 503
Number of Well Protectors: 172
Area of Coral Reef Habitat: 890 acres
Number of Existing Fixed Platforms (2008)

Total Number of Structures in Gulf of Mexico: 5,851
Number of Fixed Platforms: 3,959
Number of Cassions: 1,394
Number of Well Protectors: 452
Area of Coral Reef Habitat: 4,465 acres

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Governor Bobby Jindal: http://www.gov.la.gov

References


Chevron 2004, Personal communication with ChevronTexaco engineer during a LDNR Platforms for Mariculture Task Force Regulatory Work Group meeting. A platform engineer said that “as long as the cathodes are replaced, the structure should last indefinitely”.


Takafumi, N. 2003 Per.comm. size and cost of Japanese artificial reefs in the Artificial Fish Reef Project Kyoei Sangyo Ltd Matsuoka, Taira