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Introductory Chapter: Oil and Gas Wells - Advances and New Challenges

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1. Introduction

Oil and gas are the most useful fossil energy; they are presenting more than 80% of the world energy production (see **Figure 1**), with the increasing demand of these energy in the last decades due to rapid development of the world industries. Exploration, production, transport, refining, and commercialization of oil and gas require new methods and procedures to satisfy the needs of the different industrial sectors and world population in terms of fuel energy.

A study by Hull [2] (a Halliburton Consulting) shows that the production of oil and gas in the world is under the economic limit since 2010, and it continues to decrease until 2030; the peak of production was in 1968 (see **Figure 2**). Another aspect showed in this report that when talking about mature fields is the concept of economic limit. The fact that we only recover on average 35% of the oil in place globally is not a function of technology or know-how, but rather it is dictated by what is economic to extract. The challenge for oil companies and researchers, therefore, is finding and applying technology and know-how that allows us to extract the resources at a cost that achieves the economic threshold [2].

For example, in the oil and gas domain, we can distinguish two kinds of oil and gas types which are conventional and unconventional; they have the same chemical characteristics and components; the only difference between them is in their way of extraction, since the conventional oil and gas are small quantities easy to develop with low cost; however the unconventional hydrocarbons are huge quantities requiring

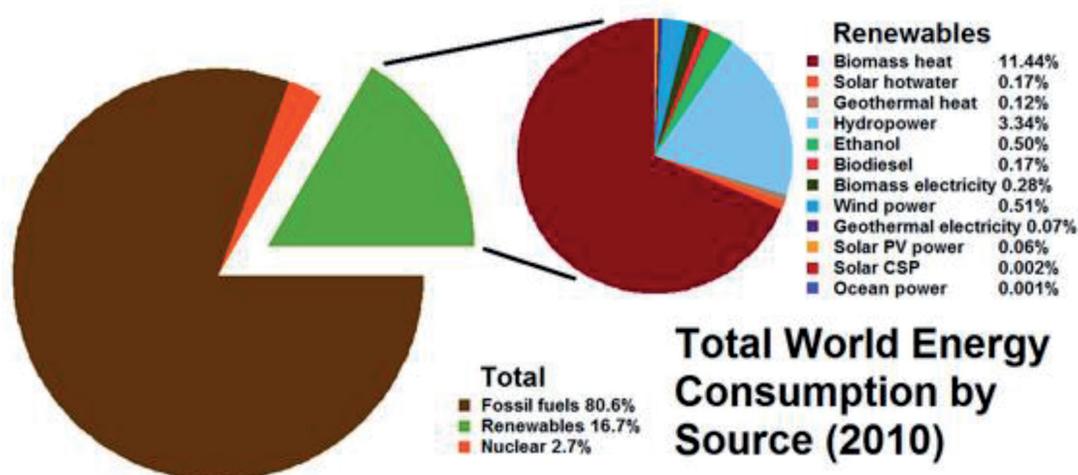


Figure 1.
World energy development [1].

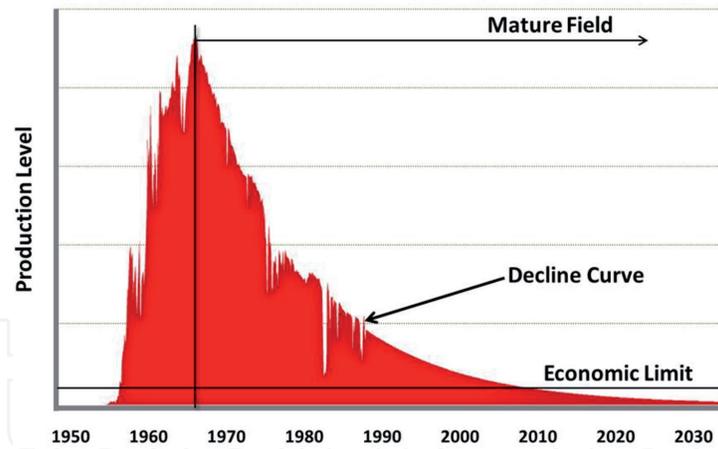


Figure 2.
Oil and gas production curve (Hull, 2012).

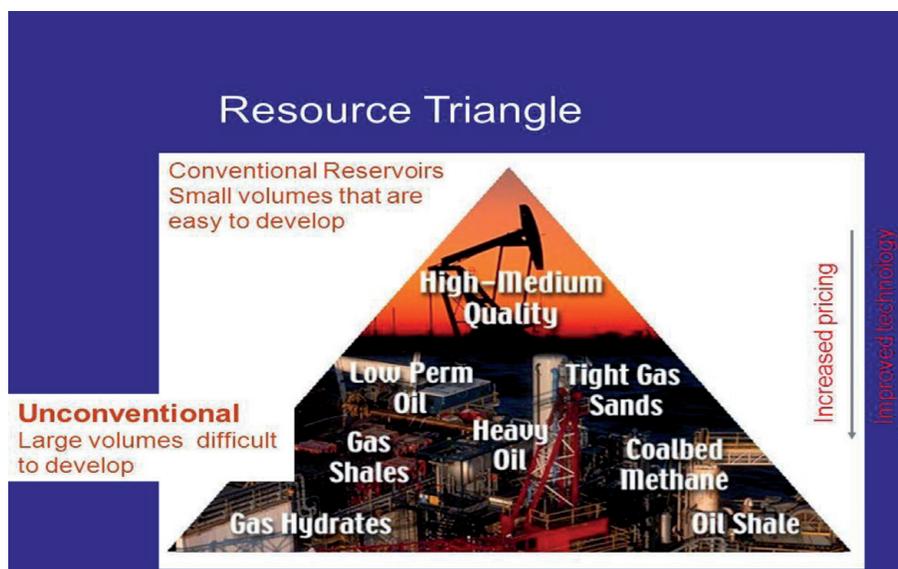


Figure 3.
Oil and gas resources triangle (from [4]).

advanced technology to develop them with increasing price [3, 5] **Figure 3.** Shows the different kinds of conventional and unconventional oil and gas resources.

Each phase in the oil and gas field requires continuous scientific research to improve the methodologies and procedures used in different stages inside this phase. The aim of this book is to show some advances in different topics of the oil and gas field technology; two chapters of the book are dedicated to the scientific research in the domain of reservoir engineering and characterization, four other chapters are dedicated to the field well drilling and performance, while another chapter is related to oil and transport.

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