



**In The Name Of God**

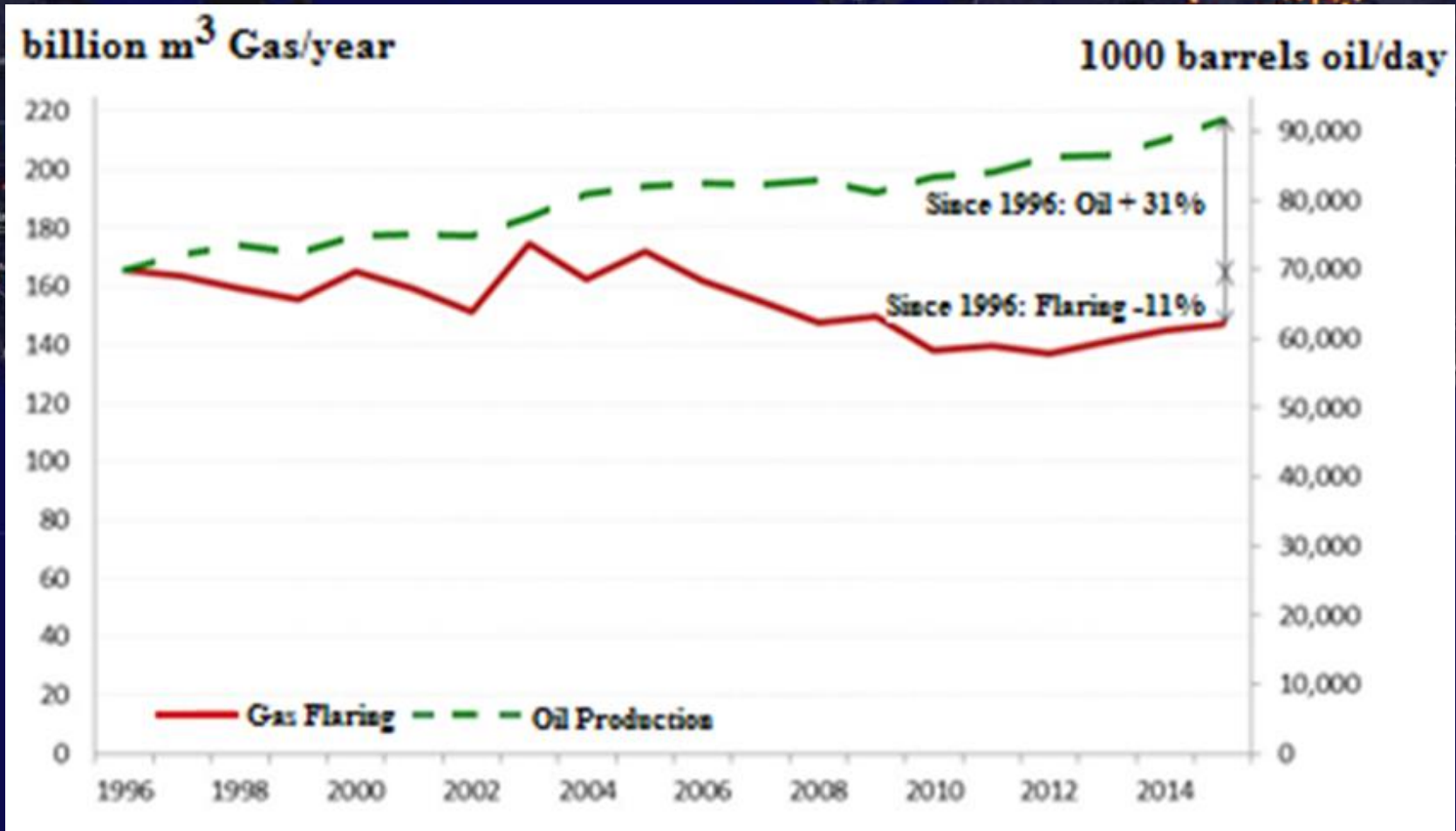
**Title:**

**Economic and Environmental Evaluation of  
Iran Gas Flaring Reduction With GPPs: Case  
Study of NGL-3200 Plant of Iran**

# Agenda

- Statistical Review of Gas Flaring in World and Iran
- Projects of Flaring Utilization in Iran
- Specification of NGL-3200 Projects
- Economic and Environmental Evaluation of NGL-3200
- Conclusions

# Statistical Review of Gas Flaring in World and Iran

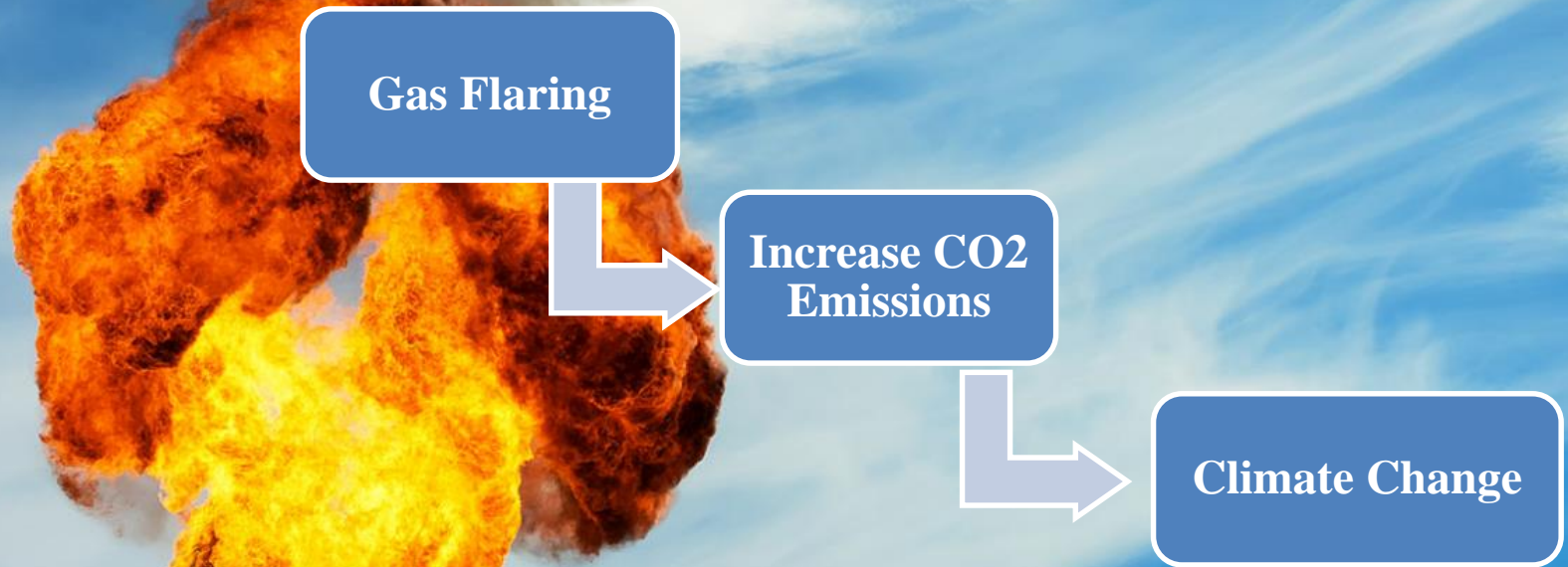


Draw Area of Interest

# Statistical Review of Gas Flaring in World and Iran (Billion Cubic Meters/year)

year Countries	2008	2009	2010	2011	2012	2013	2014	2015	Growth rate per annum	
									2014-2015	2008-2015
Russia	42	46.6	35.6	37.4	34.8	21.1	19.7	21.2	7.6	-9.3
Iraq	7.1	8.1	9	9.4	10.3	13.3	14	16.2	15.7	12.5
Iran	10.8	10.9	11.3	11.4	10.7	11.1	12.2	12.1	-0.82	1.63
USA	2.4	3.3	4.6	7.1	11.6	9.2	11.3	11.8	4.42	25.5
Venezuela	2.7	2.8	2.8	3.5	4.3	9.3	9.9	9.3	-6.06	19.3
Algeria	5.4	5	3.8	4.7	4.6	8.2	8.7	9.1	4.6	7.74
Nigeria	15.5	14.9	15	14.6	14.7	9.3	8.4	7.6	-9.5	-9.7
Mexico	3.6	3	2.8	2.1	2	4.3	4.8	5	4.15	4.8
Angola	3.5	3.4	4.1	4.1	3.8	3.2	3.5	4.2	20	2.63
Malaysia	1.9	1.9	1.5	1.6	1.5	2.8	3.4	3.7	8.82	9.98
Kazakhstan	5.4	5	3.8	4.7	4.6	3.8	3.9	3.7	-5.12	-5.25
Indonesia	2.5	2.9	2.2	2.2	2.5	3.1	3.1	2.9	-6.45	2.14
Egypt	1.6	1.8	1.6	1.6	2	2.4	2.8	2.8	0.00	8.32
Libya	4	3.5	3.8	2.2	3.2	4.1	2.9	2.6	-10.34	-5.95
Oman	2	1.9	1.6	1.6	2.1	2.3	2.6	2.4	-7.7	2.63
Total of 15 Countries	111	115	117	108	113	108	111	115	3.6	0.5
Other countries	35	32	21	32	30	33	34	32	-5.88	-1.27
Total	146	147	138	140	144	141	145	147	1.38	0.09

# The Need to reduce Gas Flaring



- reducing gas flaring, reducing CO2 emission
- The need to Implementation of Projects for reducing gas flaring in Countries such as Iran

# Projects of Flaring Utilization in Iran

- The flaring Volume of Iran was 40 mcm/day in 2016
- NIOC planed projects for flaring decrease include:
  - NGL projects (GPPs units)
  - Inject of associated gas in oil field
- in present, 12 NGL units operate in Iran



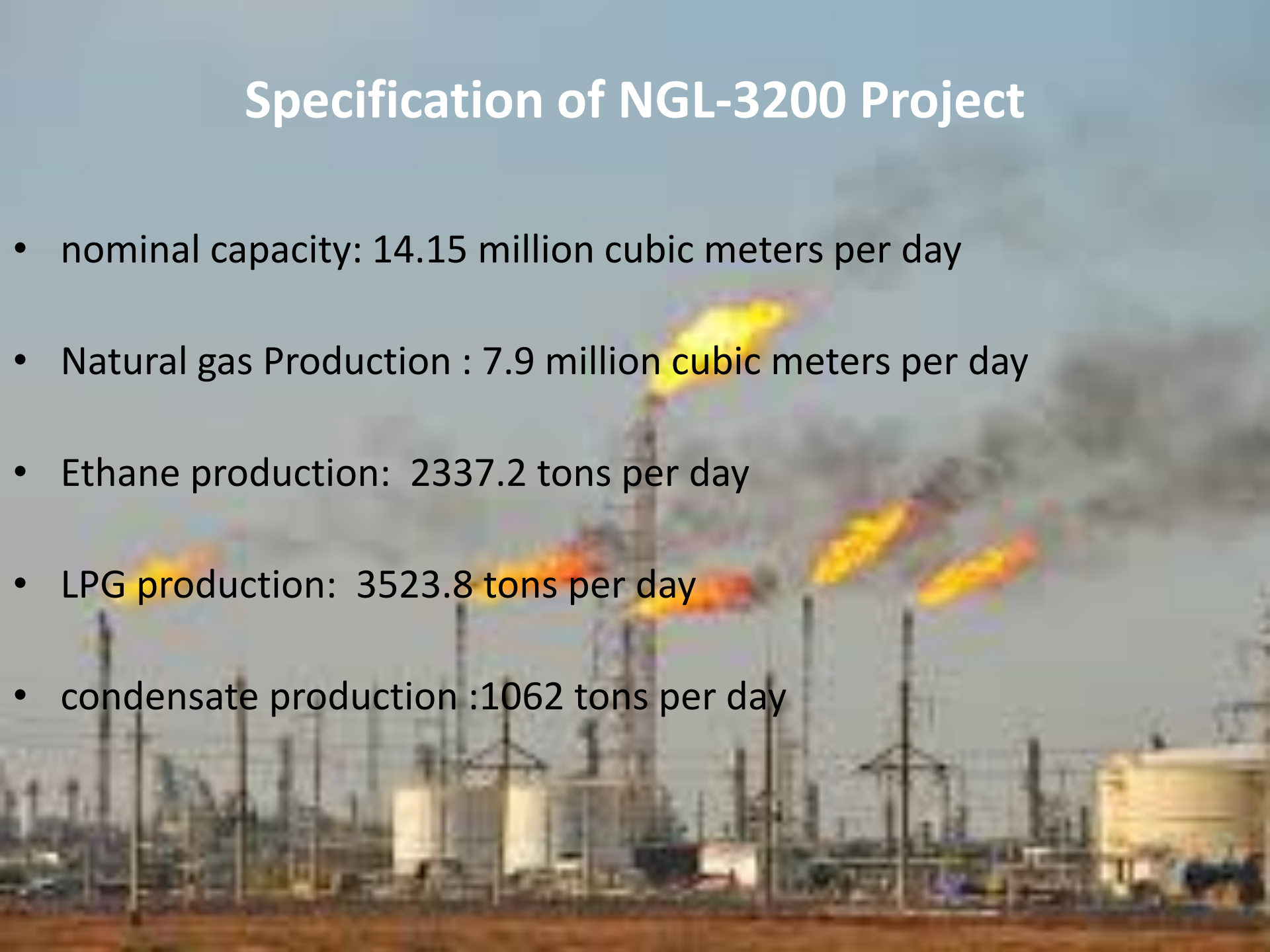
# Projects of Flaring Utilization in Iran (continue)

- **Plans of NIOC for gathering gas flaring**
  - ✓ Sale gas flaring to private sector
  - ✓ giving concession of NGL unit to private sectors
- **NGL projects are the most important projects for flaring utilization that include 7 NGL units as follow:**
  - NGL-1700, NGL-1800, NGL-2300, NGL-2400, NGL-3100 and NGL-3200
- **the NGL-3200 is one of the important and bigger of NGL project in Iran**
- **This NGL unit will gather 140 mcm/day (500 MCF/day) of associated gas that flaring it will release 11.5 million tons CO2 yearly**



# Specification of NGL-3200 Project

- nominal capacity: 14.15 million cubic meters per day
- Natural gas Production : 7.9 million cubic meters per day
- Ethane production: 2337.2 tons per day
- LPG production: 3523.8 tons per day
- condensate production :1062 tons per day





# Economic and Environmental Evaluation of NGL-3200



- Assumptions
  - Ethane price: \$240 per ton
  - LPG price: \$365 per ton
  - Condensate price: \$423 per ton (\$47 per barrel)
  - Gas Flaring price declared NIOC: 3.5 (cnets/CM)
  - Annual growth rate of operating costs: 5%
  - - Annual growth rate of product prices: 2%
  - discount rate: 22 %

# Economic and Environmental Evaluation of NGL-3200 (continue)

- Associated gas Prices: there are two scenarios for associated gas
  - Scenario 1: The price of gas flaring is based on the National Oil Company (NIOC) price and without regard to the value of CO2.
  - Scenario 2: The price of gas flaring is based on the National Oil Company (NIOC) price and considering the value of CO2.

	Carbon price (dollars per ton)	The amount of carbon emissions (tons per day)	Value per ton of carbon (cents)	Carbon price per burning per cubic meter (cents)
Carbon price	5	31650	15825000	1.12

# Economic and Environmental Evaluation of NGL-3200 (continue)

Scenarios related to the price of Flaring	IRR (percent)	Return on capital (year)
Scenario 1	28.29	3.5
Scenario 2	29.95	3.3

**The Considering CO2 Price may increases projects IRR and this can be an incentive for the presence of private sectors in gathering CO2**



# conclusions



- To Considering value of CO<sub>2</sub>, IRR will increase 2-3%
- If the feedstock of plant will be supplied completely , then the IRR and payback period will be 28.3% and 3.5 years, respectively.
- If the utilization rate of the plant would be less than 78%, then this project wouldn't be feasible.
- if the project would be technically revised and the nominal capacity of this plant become less than 40% of current nominal capacity, then this project wouldn't be feasible.
- Assuming that the products prices (including ethane, LPG and condensate) decreased by 17%, the project will not be feasible.
- Sensitivity analysis of IRR to product price changes shows that LPG price changes has the most impact . So that 10% reduction of LPG price, ethane, and condensate cause to 5.8, 1.8, and 1.4 percent decrease of IRR, respectively.

A large, intense fire or explosion erupts from a black pipe at the bottom center of the frame. The fire is bright orange and yellow, with thick black smoke rising from it. The background is a clear blue sky with wispy white clouds. The text "Thank you for your attention" is overlaid in the center of the image.

**Thank you for your attention**