DANAGAS

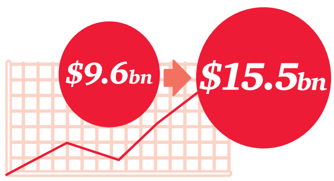
Crescent Petroleum

Dana Gas and Crescent Petroleum
Gas Project in Kurdistan Region of Iraq

Socio Economic Benefits Report

Investment of
c.$1.1bn

Downstream economic impact assessed to be



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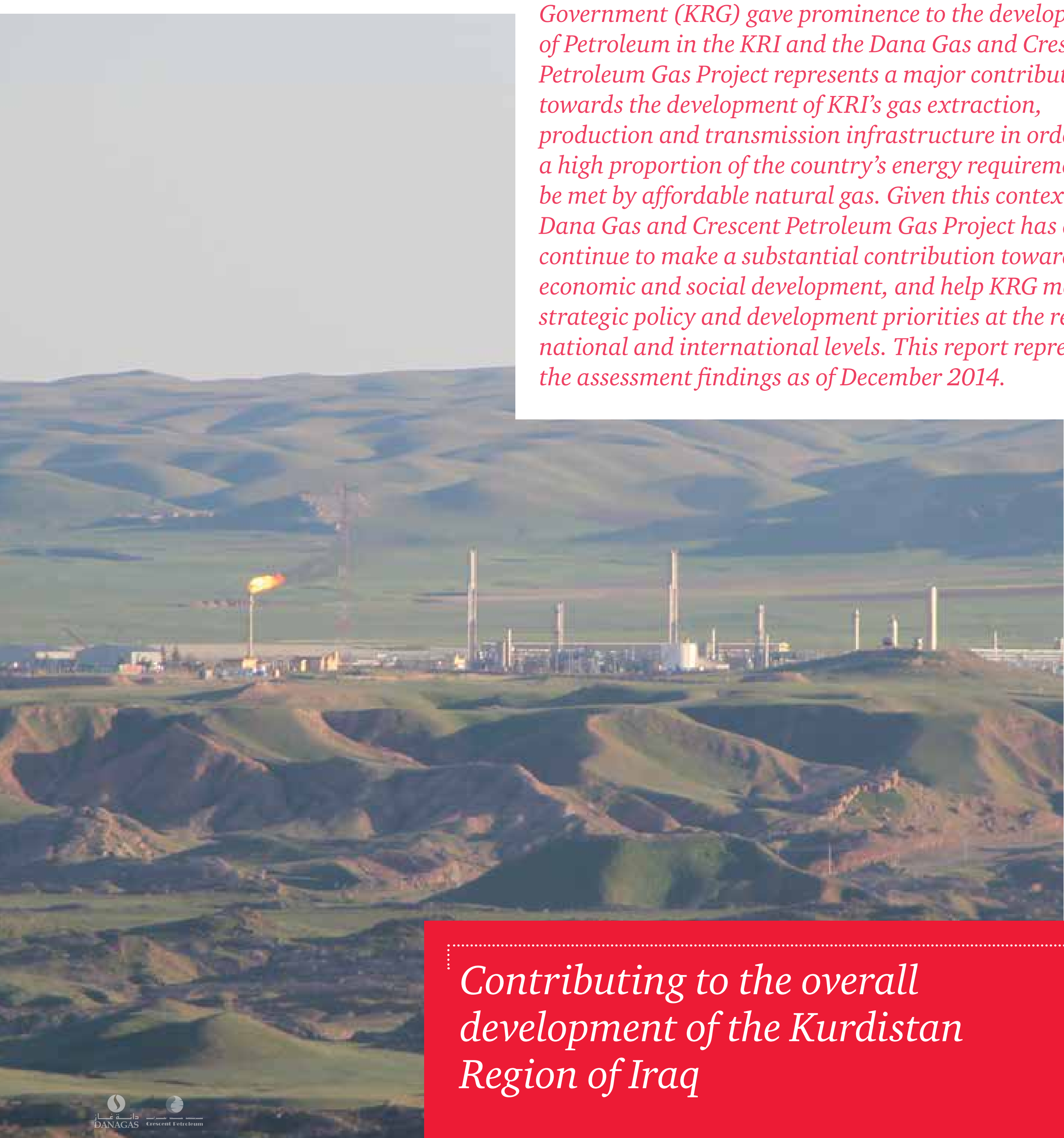
Executive summary

PwC has been commissioned by Dana Gas and Crescent Petroleum to undertake an assessment of the societal benefits generated by their investment in the Dana Gas and Crescent Petroleum Gas Project ("DGCP Project") in the Kurdistan Region of Iraq ("KRI"). The Kurdistan Regional Government (KRG) gave prominence to the development of Petroleum in the KRI and the Dana Gas and Crescent Petroleum Gas Project represents a major contribution towards the development of KRI's gas extraction, production and transmission infrastructure in order that a high proportion of the country's energy requirements can be met by affordable natural gas. Given this context, the Dana Gas and Crescent Petroleum Gas Project has and will continue to make a substantial contribution towards KRI's economic and social development, and help KRG meet its strategic policy and development priorities at the regional, national and international levels. This report represents the assessment findings as of December 2014.

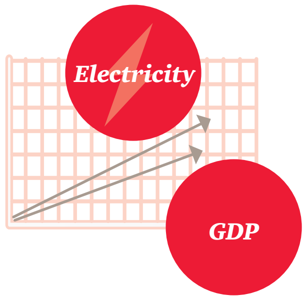


Contributing to the overall development of the Kurdistan Region of Iraq

DGCP Project

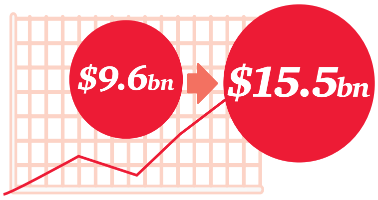
Total Investment to date

Electricity and GDP



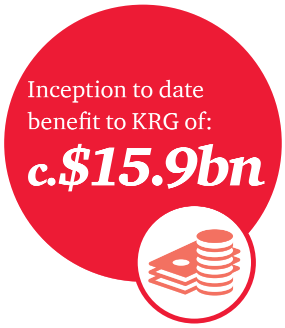
Increased availability of electricity from 8 hours to 22 hours within KRI (while other parts of Iraq continue to lack adequate supply of power) fuelled additional private sector investment in the KRI of over $30bn with resulting significant GDP growth.

Downstream Project Benefits



Downstream economic impact assessed to be $9.6bn to $15.5bn (range 40% – 66% of GDP of Kurdistan Region of Iraq).

Direct Project Benefits (Diesel Substitution)



The Dana Gas and Crescent Petroleum Gas Project

In April 2007, Dana Gas PJSC ("Dana Gas") entered into agreement with the Kurdistan Regional Government of Iraq for the appraisal and development of two major gas fields (Khormor and Chemchemal) in the Region. Under the terms of the agreement Crescent Petroleum Company International Limited and Dana Gas (together "Joint Operators") were given exclusive rights to appraise, develop, process, market and sell petroleum from the substantial Khor Mor and Chemchemal Gas Fields, and as a first phase to provide natural gas supplies to fuel two major domestic electric power generation plants being built in Erbil and Chemchemal, as well as for local industries and export.

Further planned major investments in the fields and in various social impact projects are on hold due to a dispute with Ministry of Natural Resources (MNR) since May 2009. The resolution of the dispute will enable full and proper development of these fields for the benefit of the people of the Kurdistan Region of Iraq. Currently these fields produce over 80,000 barrels of oil equivalent per day including Gas production of 320MMscf/day.

Dana Gas and Crescent Petroleum have to date, with their European partners OMV & MOL,[1] invested more than $1.1 billion under the agreement with KRG in building major gas transmission pipeline and processing facilities, which makes this one of the largest private sector investments in Iraq's Oil and Gas sector.

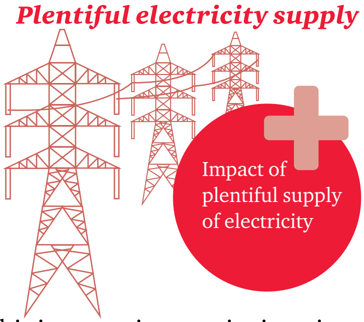
1 OMV, Austria's largest listed industrial company, and MOL Hungarian Oil and Gas Company, Hungary's largest listed company, are two of Europe's most dynamic integrated oil and gas companies.

Downstream Project Benefits

Whilst this Project generates significant direct benefits to KRI (discussed separately in this report), it should be recognised that the more substantial and long term benefits of this investment arise through its downstream impacts. This section quantifies the downstream economic impacts generated by Dana Gas and Crescent Petroleum through the provision of gas to the Erbil and Chemchemal power plants. Based on an extensive review of the international evidence, interpreted in the context of the KRI, our findings are multi-fold:

1

Plentiful electricity supply



This increase in capacity is estimated to boost long-run GDP by some

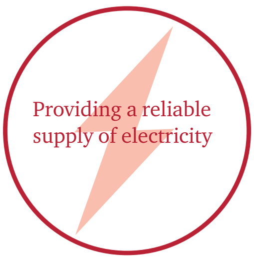
$6.2 – 15.5bn

(26 – 66% of GDP).

Dana Gas and Crescent Petroleum provide cheap gas as feedstock to Erbil and Chemchemal power plants which supports 46% of the rated capacity of KRI, and has more than trebled the capacity that existed in these locations before construction of the new plants begun in 2008. **This increase in capacity is estimated to boost long-run GDP by some $6.2 – 15.5bn (26 – 66% of 2011 KRI GDP).** This number relates to the amount of power and is linked to the ability of an economy to expand, industrialize, and diversify over time; all of which fundamentally requires electrical energy.

2

Reliable electricity supply



This increase in reliability is estimated to result in avoided business costs of

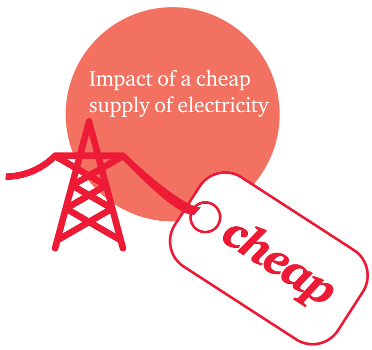
$9.6 – $21.2 bn

(41% – 90% of GDP).

Since the Erbil and Chemchemal power plants have come online, the average hours of power each day has increased from 8 hours in 2006 (2 hours in 2002 and before) to 22 hours in 2012; nearly an uninterrupted supply. **This increase in reliability is estimated to result in avoided business costs of $9.6 – $21.2 bn (41% – 90% of 2011 KRI GDP).** This number relates to the reliability and constancy of supply – an unreliable supply generates costs for business including capex and opex on backup generation, write-offs of semi-processed goods, idle labour costs, and so on. In severe cases, these costs may make doing business not worthwhile, and so represent GDP that never existed as well as a decrease in GDP.

3

Cheap electricity supply



The provision of cheap natural gas to the Erbil and Chemchemal power plants supports the generation of electricity at internationally and nationally competitive rates. The wider impact of this has not been quantified but it is clear that this supports the cheap electricity tariffs currently prevailing in KRI and/also ease pressure on Government Ministries which financially support low tariffs. This impact is additional to the fiscal savings from diesel substitution discussed under the 'Direct Project Benefits' section.

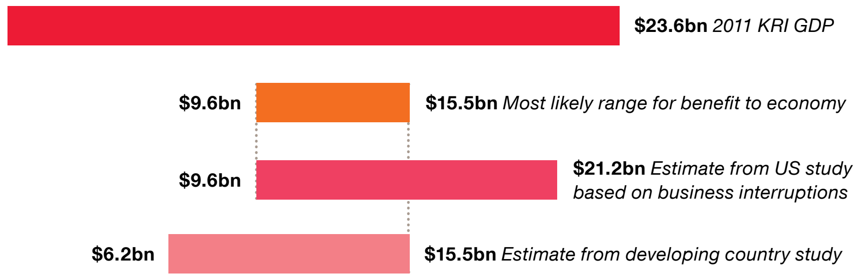
These estimates are subject to variation in the absence of more reliable energy and economic data in the Kurdistan Region of Iraq. However, they suggest that provision of cheap natural gas to local power plants are likely to be at least 40% of GDP in the Kurdistan region.

It is pertinent to note that all these economic benefits have been quantified with the current gas production of c. 320MMscf/day from the KhorMor field alone and do not address the substantial added benefit that would have been realised had Dana Gas and Crescent Petroleum's gas development plan pursuant to their agreement not been stymied as a consequence of the unresolved dispute of May 2009 with KRG as outlined above. These substantial benefits would accrue to the KRI economy in the form of uninterrupted power, spurt of growth across various industrial sectors, an increase in the overall GDP of the economy, and a resultant increase in the per capita income for the people of KRI. The most likely range of downstream benefits to KRI is summarized in the picture overleaf.

DGCP's Gas pipeline – to the power stations

Supplies to two power plants providing 1,625MW of cost effective electricity

Summary of downstream economic benefits to KRI from gas supplied by DGCP Gas Project to Erbil and Chemchemal power plants



Source: PwC analysis. Note: These impacts represent different types of economic impact and are not additive. They are complementary analyses that suggest that the economic impact is likely to be at least 40% of KRI GDP in 2011.

Therefore, it is important to emphasise that whilst the construction phase of the Project generated significant benefits to the KRI economy, the much more substantial societal contribution of the Project is, and will continue to be, generated through its impact in providing an increased and more reliable supply of electricity to support the growth of the KRI economy. These downstream impacts could be an order of magnitude greater. This is because the power sector is traditionally one of the most interlinked with the rest of the economy. Electricity provides the key primary input to a range of industrial processes, and electricity consumption has been associated with faster economic growth at the macro level. Moreover, businesses cannot operate in an environment where power supplies are unpredictable and erratic. In a developed economy, the costs to business of power interruptions can quickly run into the billions of dollars.

Energy and growth in Iraq and KRI

Iraq in general and the KRI are fundamentally short on power. Peak demand in Iraq in 2011 was 15 GW, but available capacity only 9GW. Similarly, in the Kurdistan Region maximum demand (2,900 MW) exceeded the maximum load (1,900 MW) by 45% in the winter of 2012.

Rolling blackouts are not unusual in Iraq and even KRI (with the most advanced infrastructure and the smallest relative shortfall) continues to lack power for 2 hours on a typical day.

Within this context, recent economic growth has been impressive; for KRI 2011-12 growth was estimated at 12%. For Iraq as a whole, growth in 2011-12 was around 9.5% on a total GDP of $216 billion.

Nonetheless, there is widespread evidence that the power bottleneck is holding back economic growth and broader socio-economic development. Small and Medium Enterprises (SMEs) in particular have spoken out about the lack of reliable power, claiming it has had a “severe effect” on business. Stakeholders in the construction sector in KRI (accounting for 21% of regional GDP) claim that power is the main impediment to development. Regional and National Governments recognise this, and are pushing ambitious plans for the expansion of generation, transmission and distribution. A key part of this strategy is to increase the role of natural gas in KRI generation, from 63% in 2012 to 75% in 2020; in the process, diesel is planned to be eliminated as a primary fuel in power plants.

Case Study: Impact of electricity availability in KRI

Over the past decade, KRI has undergone a major transformation, with double-digit economic growth propelling a rapid rise in KRI's living standards. The energy revolution that has taken place within the KRI lies at the heart of this economic transformation. Back in 2006, the KRI relied on electricity imports from other parts of Iraq, Turkey and Iran for close to all of its electricity needs.[1] With intermittent power supplies and an average of 8 hours of electricity availability per day, economic activity was severely constrained. Fast forward to today, and thanks to the DGCP Gas Project, the KRI enjoys an average of 22 hours of electricity availability per day and could be on track to become an energy exporter by 2016.[2]

The KRG Prime Minister has attributed the rapid economic progress taking place partly to the energy revolution, stating that one of the key elements to KRI's success is because they "have taken bold and creative steps in the area of energy development and foreign investment to ensure that international companies, including blue-chips, establish a presence here and help us develop our energy resources."[3]

The investment of US$ 1.1 billion in the DGCP Gas Project has enabled the provision of locally produced natural gas[4] at a low cost resulting in increased availability of electricity (industrial and retail) in the region and has contributed to the KRI economy multi-fold. Some of the direct implications of this vastly improved energy supply are illustrated below:

- Since 2003, the KRI has experienced an incredible 1400% growth in per capita GDP,[5]; growth rates for economy has also been highest in the region
- Two international airports (Erbil & Suleymania) have been significantly expanded in the last few years
- Gas from the DGCP Gas Project has been used to power up the local economy across multiple sectors
- Availability of sufficient electricity has resulted in increased real estate activity in the local real estate market [6]:
  - Erbil's robust infrastructure continues to fuel the residential real estate market; (USAID – value of construction sector in Erbil $ 2.8 billion)
  - Tourism infrastructure and leisure offerings of the City and the hospitality sector is growing and expanding
  - Demand for office space in Erbil is being fueled by the increasing number of businesses
  - Increased levels of disposable income, and considerable stability is attracting more visitors causing the retail sector of Erbil to experience substantial growth

1 Kurdistan Invest in Group, 2013
2 Kurdistan Invest in Group, 2013
3 The Review, Kurdistan, Invest In Group, September 2013, p23
4 The Review, Kurdistan, Invest In Group, September 2013, p56
5 Overview: Kurdistan Region of Iraq, Economy (Invest In Group, 2013)
6 Ernst & Young – Overview of Erbil real estate market, 2014

Total production of 320MMscf/day

DGCP's Amine unit, LPG Plant

Annual recurring savings to KRG of $3.4bn from diesel substitution

Avoided Greenhouse Gas emissions of c.$300m per year; inception-to-date $1.4bn

Direct Project Benefits

In terms of direct benefits from the DGCP Gas Project, there are four primary mechanisms through which economic and social benefits are generated as a result of vastly improved supply of electricity. These include: (i) Diversification of the industrial base, (ii) Support for entrepreneurship and business growth, (iii) Wider social impacts for residents, and (iv) Financial savings to KRG.

It follows that one of the key economic rationale for the Project is to provide supply of natural gas feedstock to KRG's two power stations (Erbil and Chemchemal) within the ambit of DGCP's agreement with KRG. The agreement embodies further gas development for industry and export as part of KRG's wider programme of investment in economic infrastructure to help diversify the economic base of KRI and help shift KRI onto a pathway for sustainable economic growth.

These benefits have been assessed against each of KRG's four strategic priorities: (i) Enabling Infrastructure, (ii) Economic Growth, (iii) Social Well-Being, and (iv) Environmental Protection.

(Note that these benefits are currently stifled due to the ongoing dispute and will expand significantly after resolution of the ongoing dispute).

Investment of more than ***$1.1bn***

Enabling infrastructure by supplying ***cheap and reliable gas***

Providing ***employment*** *to locals*

Supplying gas to two power stations*, resulting in uninterrupted power supply* ***from 2 hrs (prior to 2002) to 22 hrs today***

Investing in tomorrow *through Community Action Programme (CAP)*

Protecting the environment by ***substituting polluting diesel fuel with Natural Gas***

KRG's priorities

Dana Gas and Crescent Petroleum Gas Project benefits

Enabling Infrastructure

Providing gas to two major power stations

Enabling low cost, secure energy supply to 4 million Iraqis.

4m

Recurring yearly financial savings to KRG of **$3.4bn** p.a., as a result of gas-for-diesel substitution.

Total financial savings to the KRG since the start of gas deliveries (in Oct. 2008) to 31 Dec. 2014 of $15.9bn.

$15.9bn of savings

2008 – 2014

Economic Growth

Creation of 40,000 construction job-years of employment in KRI, due to direct, indirect and induced impacts.

40,000 job-years

$326m Gross Value Added

c.18% of the total local nationals working in Oil & Gas companies are employed by Dana Gas and Crescent Petroleum.

Social Well-Being

The Project's Community Action Programme has invested significantly in improving the local social infrastructure.

Project related wages for local people are higher than average wages and poverty benchmarks.

DGCP's CSR initiative

Environmental Protection

Avoided Greenhouse Gas emissions as a result of switching from diesel to gas supply at both the power stations is valued at c.$300m per annum.

Total avoided Greenhouse Gas emissions since project inception (in Oct. 2008) to 31 Dec 2014 of **$1.43bn**

Design Services 28805 (03/15).