KAPSARC

مركز الملك عبدالله للدراسات والبحوث البترولية

King Abdullah Petroleum Studies and Research Center

The Economics of Renewable Energy in the Gulf

Hisham Akhonbay

Mission

The King Abdullah Petroleum Studies and Research Center (KAPSARC) is a non-profit global institution dedicated to independent research into energy economics, policy, technology, and the environment, across all types of energy.

KAPSARC's mandate is to advance the understanding of energy challenges and opportunities facing the world and Saudi Arabia, through objective research that informs quality decision-making.

AGENDA

Project Overview

Highlights from the Book

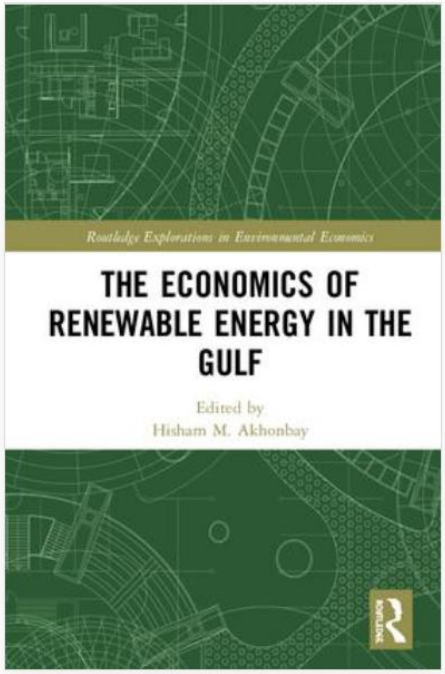
Outline of the Book

Project Overview

11 Research Centers from 8 countries

GCC Energy Expert Roundtable

26 contributors



Started in December 2015

3 Years to complete

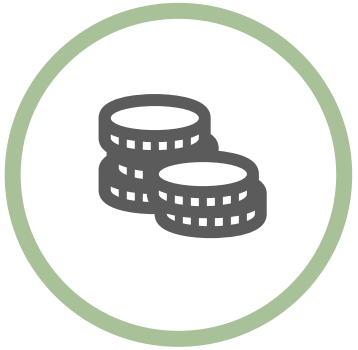
Themes from the Book

Energy **supply and in demand** in the GCC

Assessing **opportunities**

Lessons from the **European Union**

Prioritizing **renewable energy**



De-risking **low carbon investments**

Themes from the Book

Policies to Promote renewable

Job Creation

Deployment in GCC

Outline of the Book

Overview of energy supply and in demand in the GCC

Low tariffs have dictate a system that is based on fossil fuels
There is a strong link between energy and water

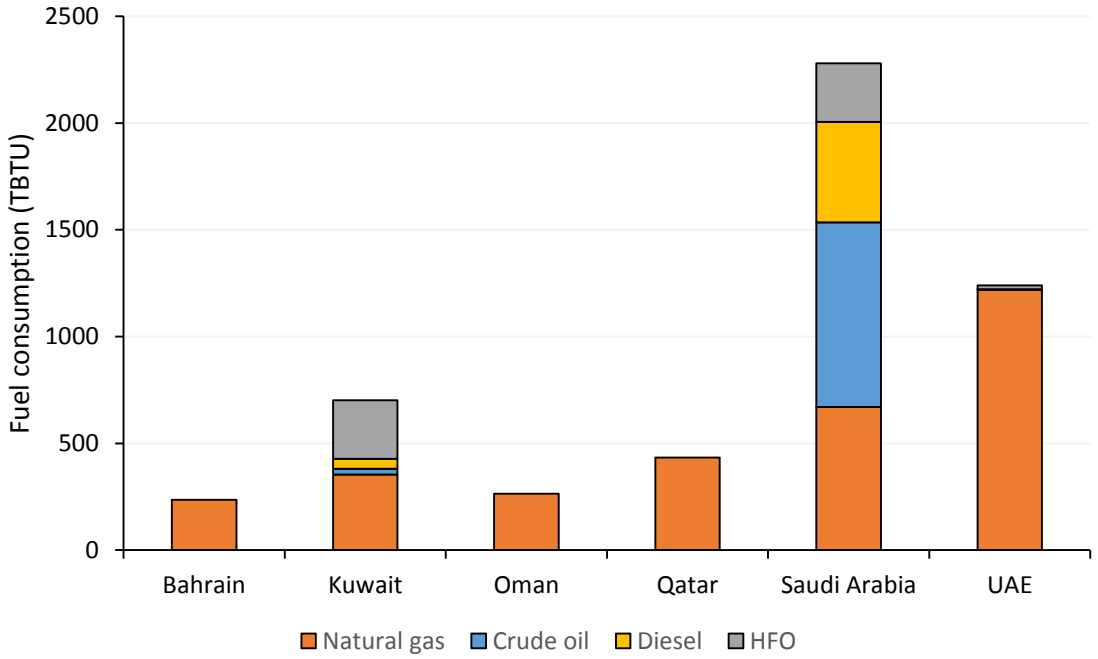


Fig. 2.7 Estimated Fuel Mix for Power and Water Sectors by GCC Member States (Kingdom of Bahrain NOGA 2015, Kuwait MEW, OPWP 2015, QEWC 2014, ECRA 2014, UAE Ministry of Energy 2015, ADWEC 2014, DEWA 2014, SEWA 2012, UAE FEWA 2015, KAPSARC)

Outline of the Book

Economics of solar power in the GCC: assessing opportunities at residential and utility scale

To make PV competitive electricity prices should be $0.12/kWh
Every 1 GW of Renewable energy capacity saves 3 MM BOE/ Year

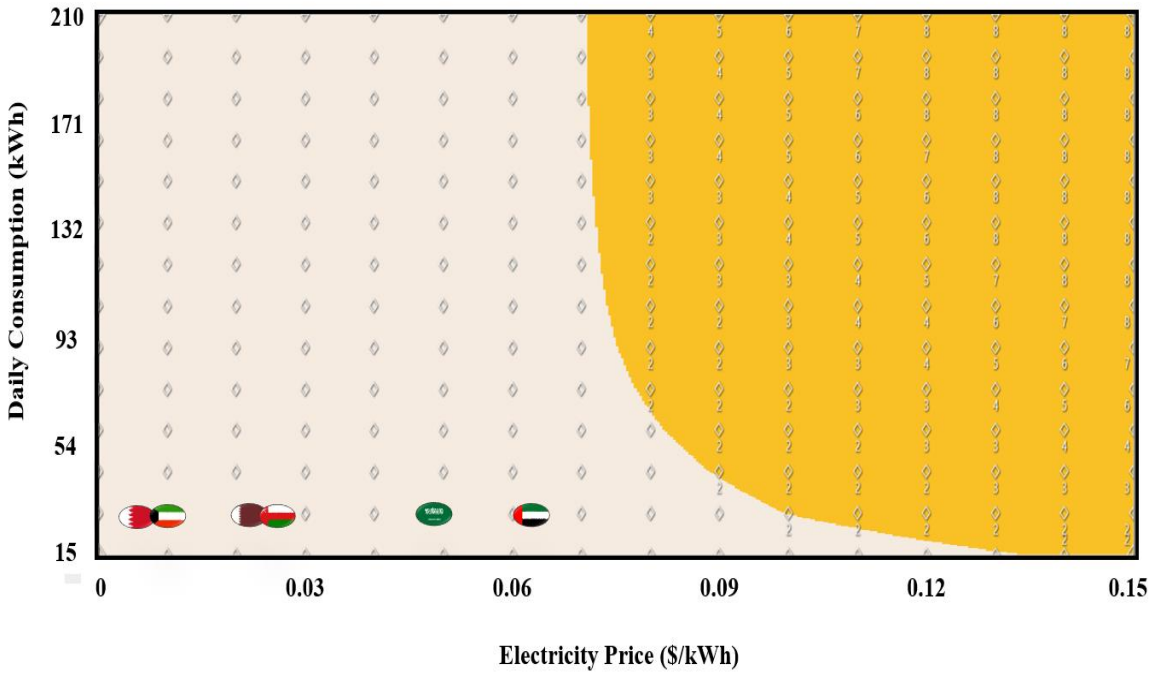


Fig. 3.1 Analysis of the Economics of Residential Solar in the GCC

Assumptions: **CAPEX of solar system:** $2.2/W; **Operations & Maintenance:** $0.01/W/year; **Discount rate:** 5%; **Inflation:** 2%; **Temperature effect on power output:** −0.45%/°C; **Nominal operation cell temperature:** 50°C; **Derating factor:** 80%; **Lifetime:** 25 years; **Solar conditions:** Riyadh; **Solar cell efficiency:** 17%; **Load curve:** calibrated from real data distinguishing between summer and winter days, and between weekdays and weekends.

Notes: This visual aid summarizes conditions, under no policy support, at which a residential solar system would be financially advantageous for a homeowner in the GCC. The x-axis is the price of electricity in USD/kWh; the y-axis is daily load. In the beige region, the homeowner is better off buying electricity from the grid only; in the yellow region, the homeowner is better off installing a solar system. Numbers in the yellow region represent the size of the solar system to be installed. The flags represent electricity prices at each consumption level in the respective country.

Outline of the Book

Navigating the transition to renewable energy in the GCC: lessons from the European Union

Collective Action
Collaboration to set regional policy framework
Mandatory targets

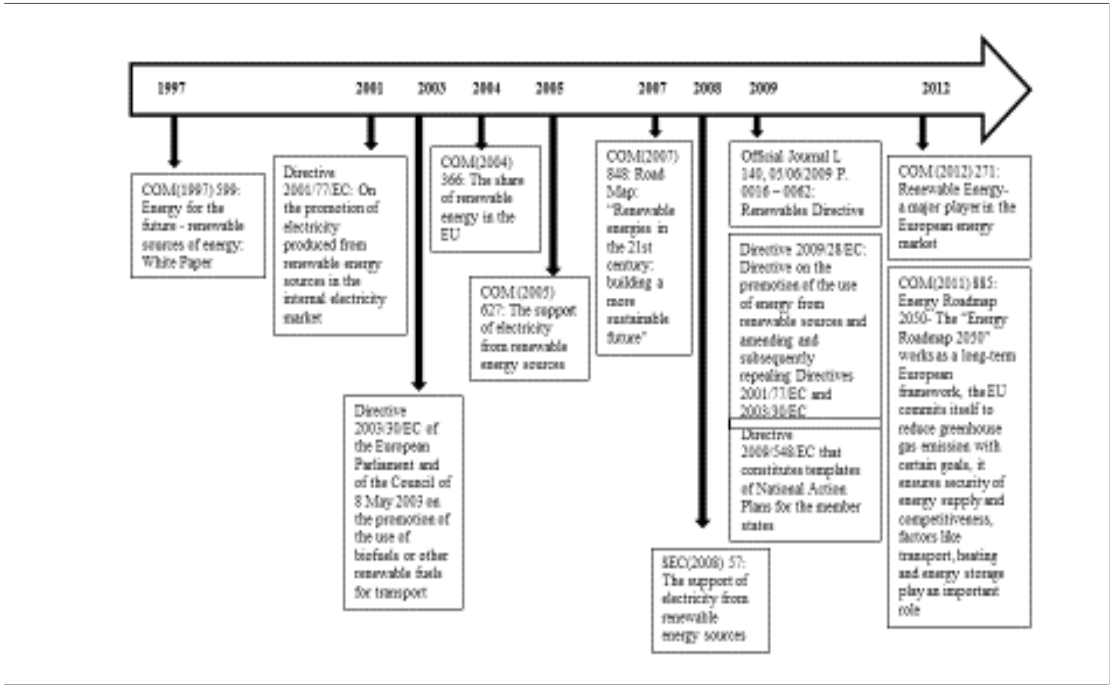


Fig. 4.1 Timeline Showing Main Elements of EU Renewables Policies (Adapted from: Steinbeis Europa Zentrum and Karlsruhe Institute of Technology [no date]; Langsdorf 2011; Sekercioglu and Yilmaz 2012; deLlano-Paz et al 2015; Scarlat et al 2015)

Notes: COM = Commission Communication; EC = European Commission; SEC = Staff Working Documents.

Outline of the Book

Prioritizing renewable energy in a time of fiscal austerity

The evolution of the role of government
Private sector participation

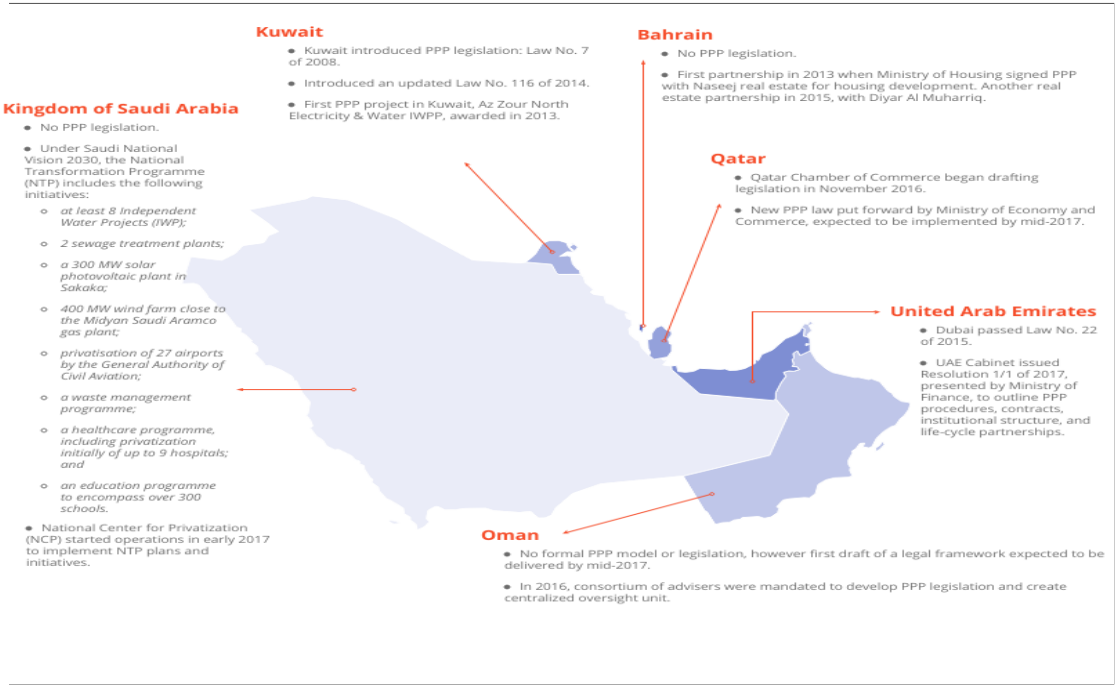


Fig. 5.2 Roll-out of Privatization Schemes in the GCC

Outline of the Book

De-risking low carbon investments in the GCC

GCC are financially capable
Use tool to develop public institutions

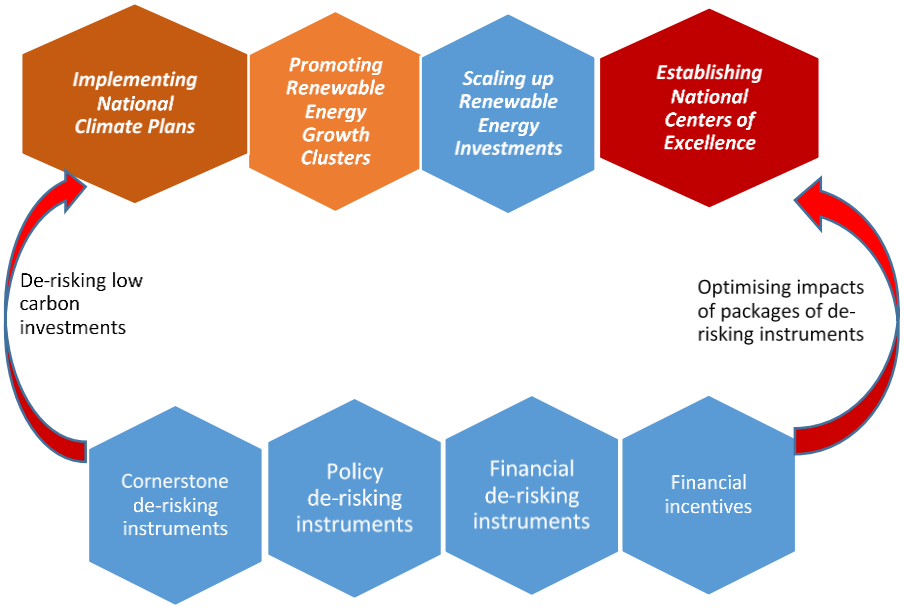


Fig. 6.3 Pillars for Making the GCC a Hub for Low Carbon Investments

Outline of the Book

Policies to promote renewable energy in the Middle East and North Africa's resource rich countries

Combination of market and renewable subsidies
Removing investment barriers

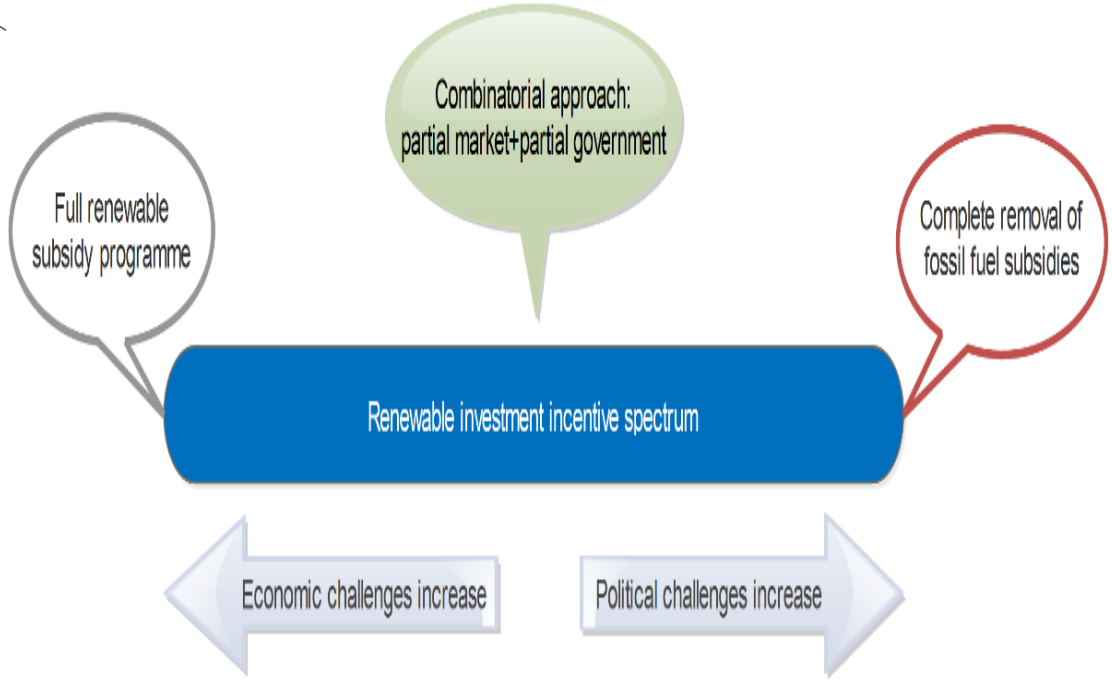


Fig.7.2 Renewable Investment Incentive Spectrum

Notes: All costs are in 2016 USD. Weighted average cost is 7.5 per cent for the Organisation for Economic Co-operation and Development (OECD) and China, and 10 per cent for the rest of the world. Image copyright IRENA.

Outline of the Book

Energy and climate policies to stimulate deployment in GCC countries

Looking at the next phase of policies which could address emissions

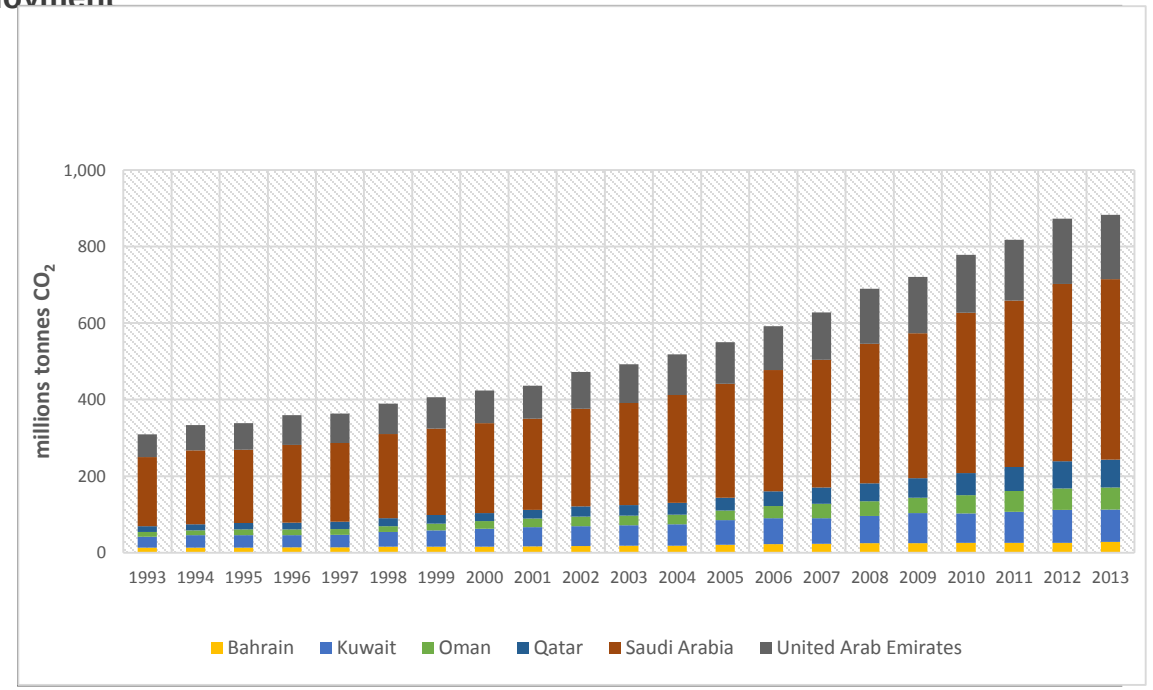


Fig. 8.1 Growth of CO_2 Emissions from Fuel Combustion in GCC Countries (IEA 2015a)

Outline of the Book

Renewable energy and its potential impact on GCC labor markets: opportunities and constraints

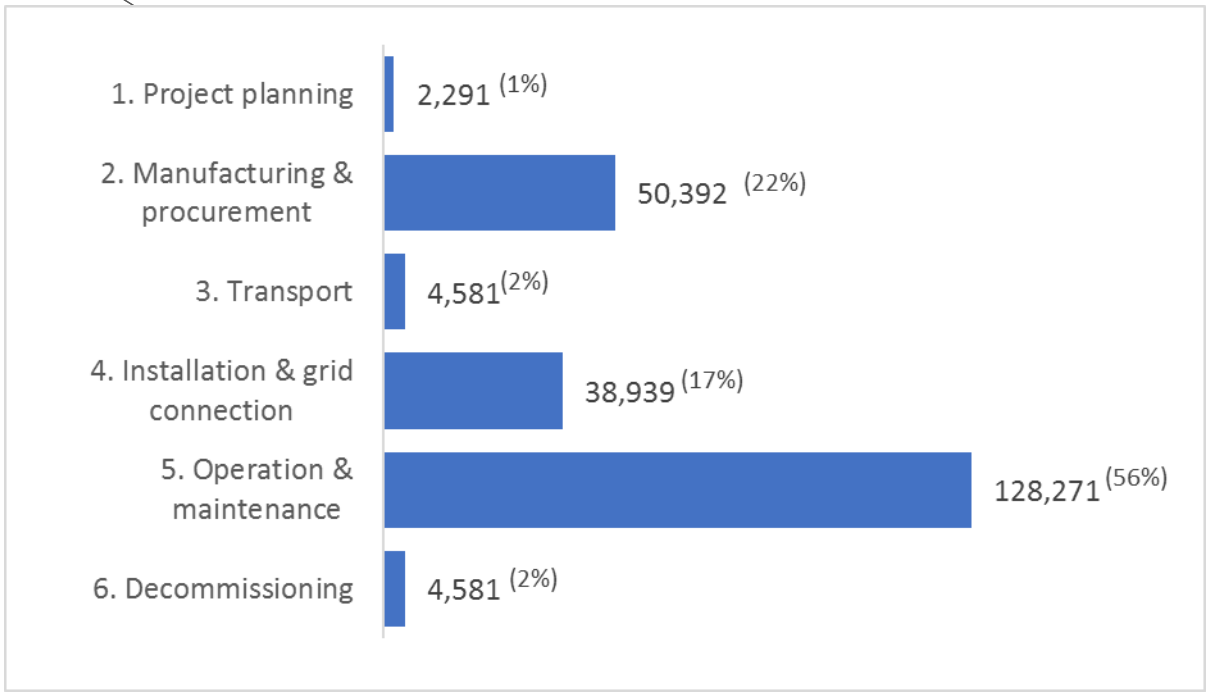


Fig. 10.7 Workforce Required at Different Stages of a Wind Power Project (in Person Days) (IRENA 2017)

Outline of the Book

Forging a more centralized GCC renewable energy policy

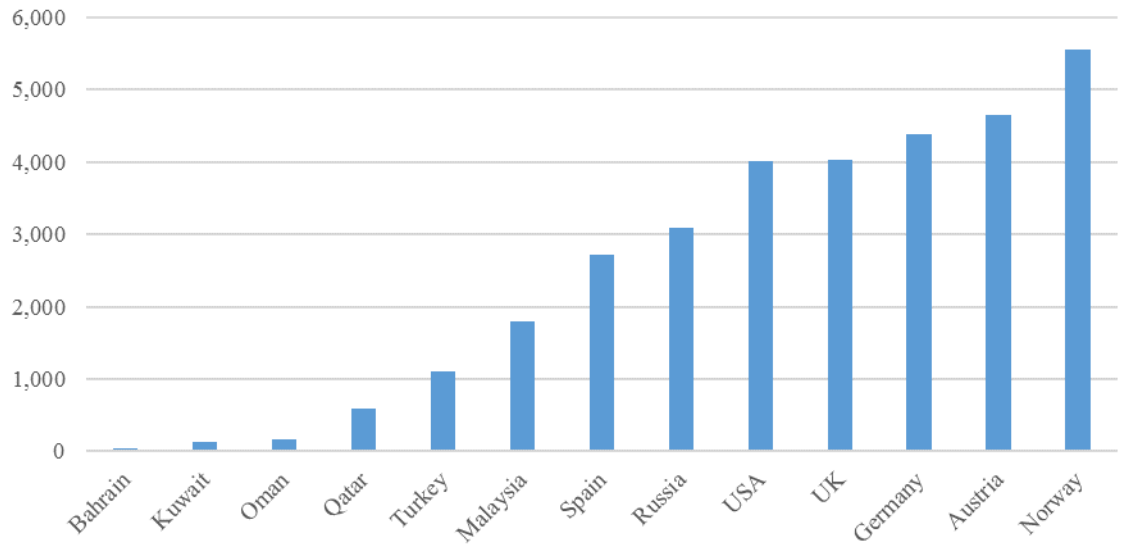


Fig. 11.2 Researchers per Million Inhabitants, 2012 (UN Statistical Database)

Questions?