Federal Ministry
for Economic Affairs
and Climate Action

MITTELSTAND
GLOBAL
ENERGY SOLUTIONS
MADE IN GERMANY

German energy solutions to unlock Jordan's solar thermal potentials

Hamzeh Yakhoul – Project Development Programme

Country Representative

15-09-2022, Amman-Jordan

Facilitator

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

The German Energy Solutions Initiative

- Facilitates business partnerships in the field of renewables, energy efficiency technologies, smart grids and storage technologies

- Based on a **parliament decision** 2002 with the aims
  - to support SMEs
  - to distribute smart and sustainable energy solutions
  - to contribute to international climate protection

- Coordinated and financed by the **German Federal Ministry for Economic Affairs and Climate Action**

www.german-energy-solutions.de

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German Energy Solutions Initiative offers

- **Support market entry**
- **Market preparation**
    - *Fact-finding missions* for foreign decision-makers to Germany
    - *Technology marketing* through publications, conferences, trade fairs, website
- **Information and advice**
    - *Information events* on technologies "Made in Germany" and webinars on export markets
    - *Specialist events* at the BMWk on export-relevant topics
    - *Publications* such as target market analysis, financing and country factsheets, market studies
    - Current *market news* and *tenders* abroad
    - Monthly *Newsletter* and upcoming *Events*

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German Energy Solutions Initiative offers

- **Energy Business Trips abroad**
  - Companies present their energy solutions to local industry experts and companies at a one-day conference
  - Companies meet potential customers and partners on site at individual business meetings accompanied by the German Chambers of Commerce
- **Marketing Support**
  - German Pavilion stand at foreign trade fairs
  - Presentation of reference projects on an international website
  - Online database: Profiles and contact information of German companies
  - Brand Umbrella for corporate communications
- **Reference projects abroad**
  - Implementation and marketing of reference projects
  - Presentation of already successfully implemented reference projects abroad

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Who is GIZ and PDP?

GIZ is a non-profit technical service provider in international cooperation for sustainable development Active in 120 countries, 20,000 employees

- Mainly funded by German Ministries
- In Jordan since [1979]

The Project Development Programme (PDP) within the German Energy Solutions Initiative is funded by the German Federal Ministry for Economic Affairs and Climate Action supporting energy transition in 18 countries

- Business development
- Market development
- Project development

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We accompany you along all steps of solar project development

PDP service portfolio

We help you assess whether renewable energy is the right choice for you at no cost for our services

Assessment of energy needs

- Analysis of current and future power needs
- Assessment of current power costs
- Assessment of site suitability

→ **Is solar right for you?**

Technical optimization

- System type
- Optimum system size
- Space requirements

→ **What system is best for you?**

Investment models

- Business case analysis
- Cash flow model
- Evaluation of investment options

→ **How big is your economic advantage?**

Finding suitable partners

- Provision of technical specifications for components
- Requirements for EPC
- Access to finance
- Finding suitable partners

→ **How to implement?**

Finding the best system for businesses and ensuring successful project implementation

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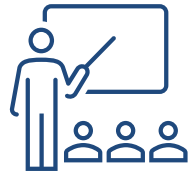
Upcoming events in Jordan

- **Energy Efficiency**
  - 06-11-2022 to 10-11-2022, German Training Week (GTW)



- **PV self-consumption systems in Jordan and Lebanon**
  - 05-12-2022 to 07-12-2022, Reference Trip

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Sector Assessment Report

- WP1: Preparation for the sector analysis
- WP2: Country profile, business policies, market access and market conditions
- WP3: Jordan´s heat sector overview
- WP4: Detailed analysis on the market for heat supply and recovery solutions in Jordan
- WP5: Identification of economic sectors with a high potential for efficient heat supply and recovery applications
- WP6: Identifying leads for RE / EE heat supply and recovery applications in Jordan

Country Brief

- Jordan, or officially the Hashemite Kingdom of Jordan, is an Arab country in the southwest of Asia, neighboring Syria, Iraq, Saudi Arabia, Israel and the West Bank.
- In 2021 Jordan counted a population of 11,042,719.
- Amman is Jordan's capital and largest city, as well as its economic, political, and cultural center.
- Sunni Islam is the dominant religion in Jordan. Muslims make up about 95% of the country's population and Christians make up about 4% of the population.
- The official language is Arabic. English is taught in schools and universities and is widely spoken, French is offered electively in many schools and German is becoming increasingly popular since the establishment of the German Jordanian University.

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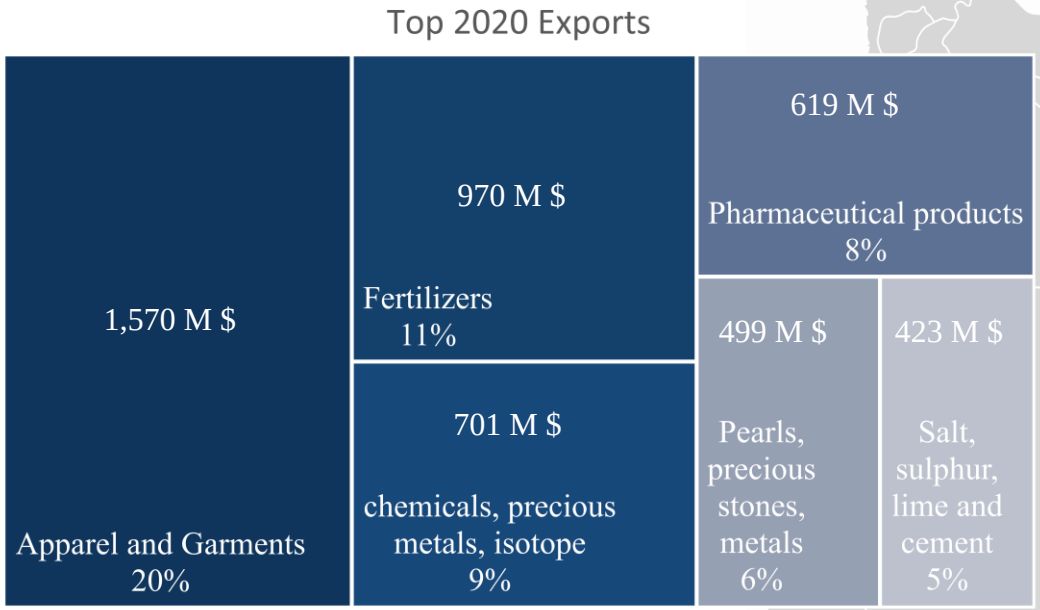
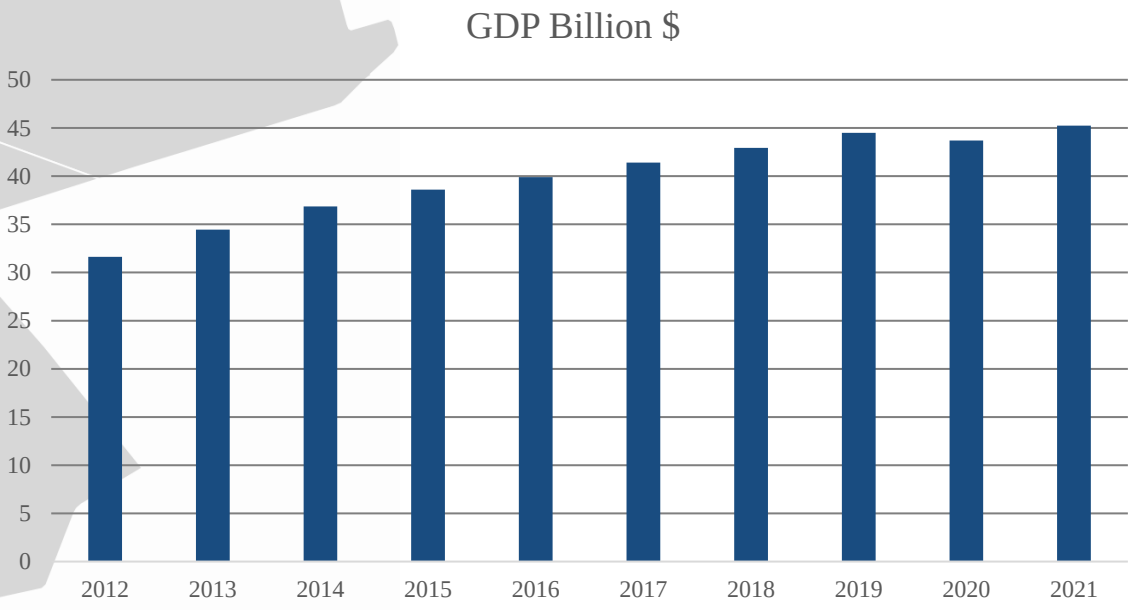
Source: Wikipedia

Country Economic profile





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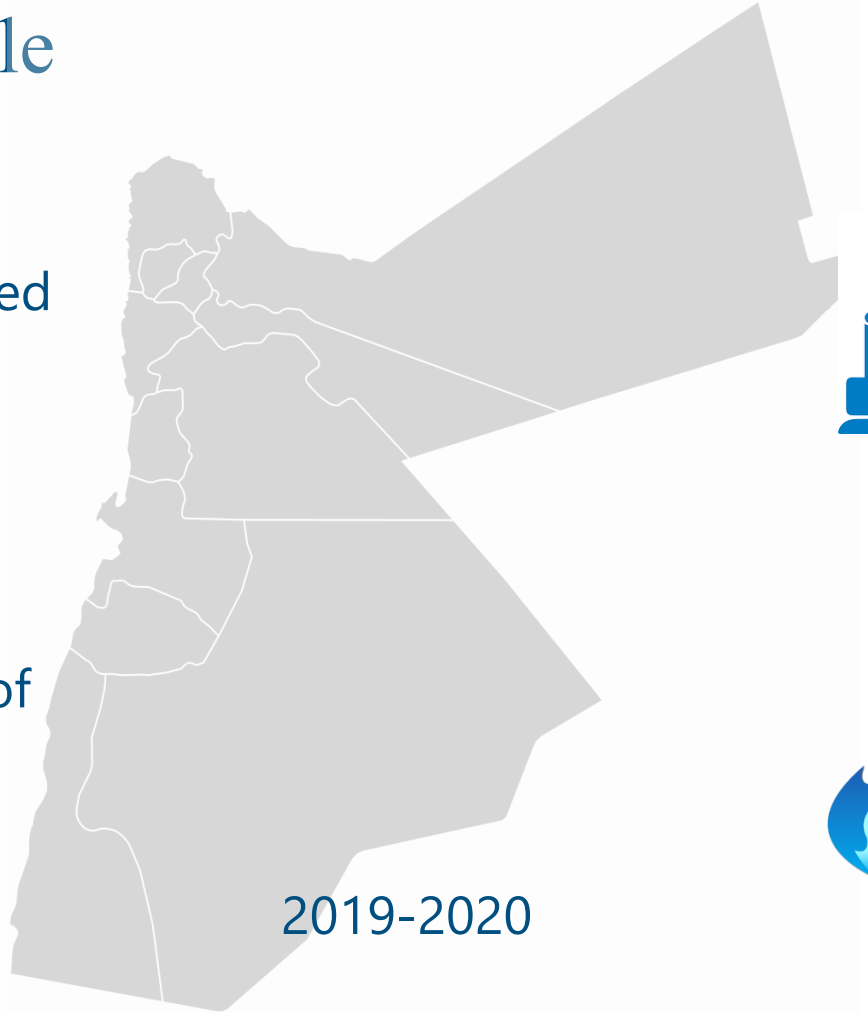
Source: TRADING ECONOMICS-Exports, TRADING ECONOMICS-GDP

Country Energy profile

Cost of consumed energy
→ **10 %** of GDP



High dependency on imported energy
→ **92 %**

Annual growth of electricity demand → **2 %**

Annual Growth of primary energy demand
→ **-8 %** *

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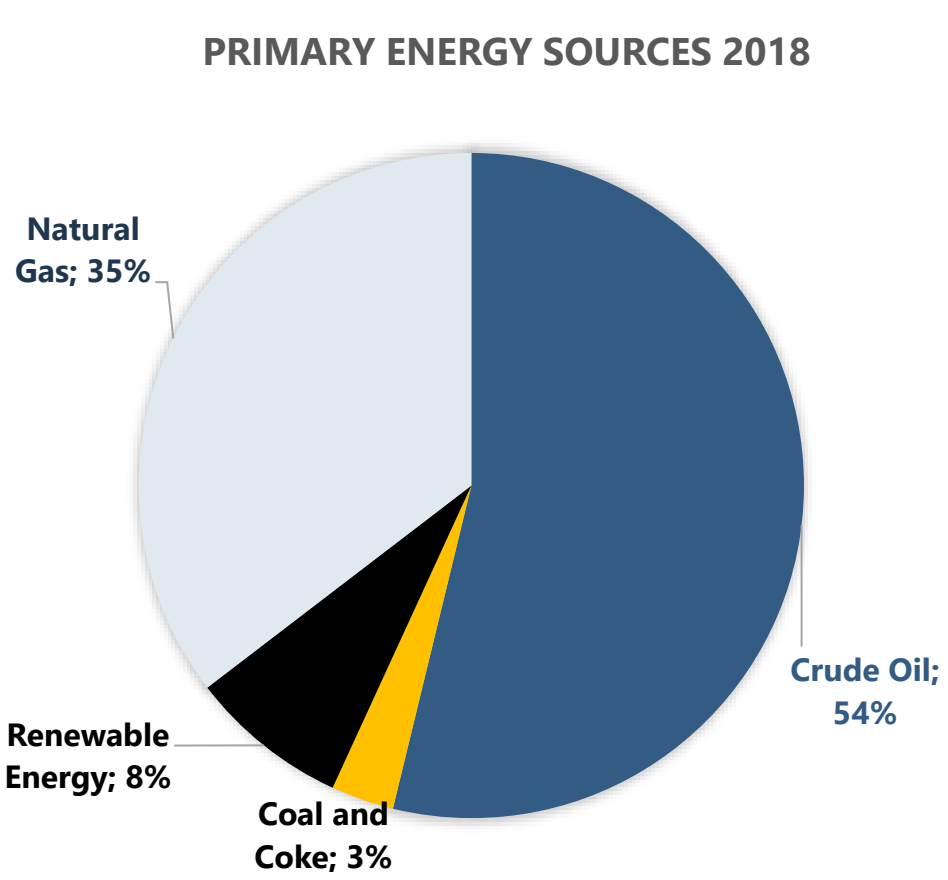
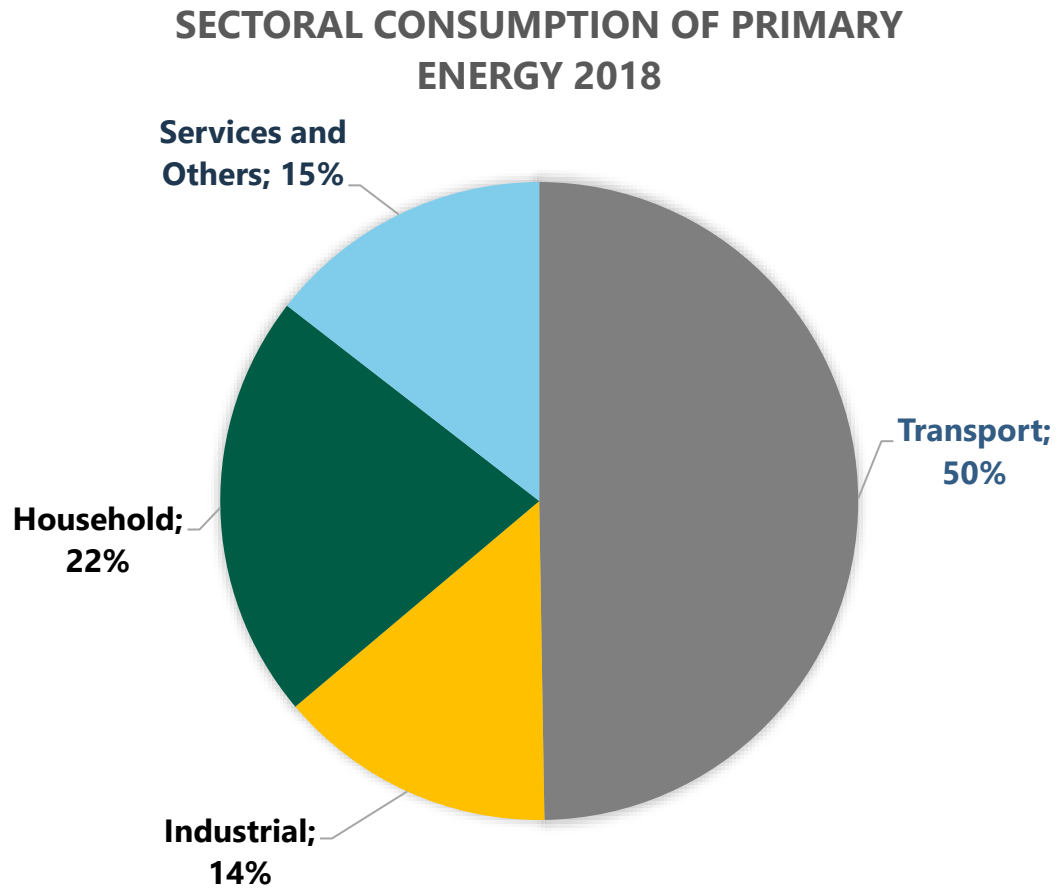
* The decrease is mainly due to COVID impacts

Source: MEMR 2019 Brochure, MEMR 2020 Annual Report

Primary Energy Sources and Consumption





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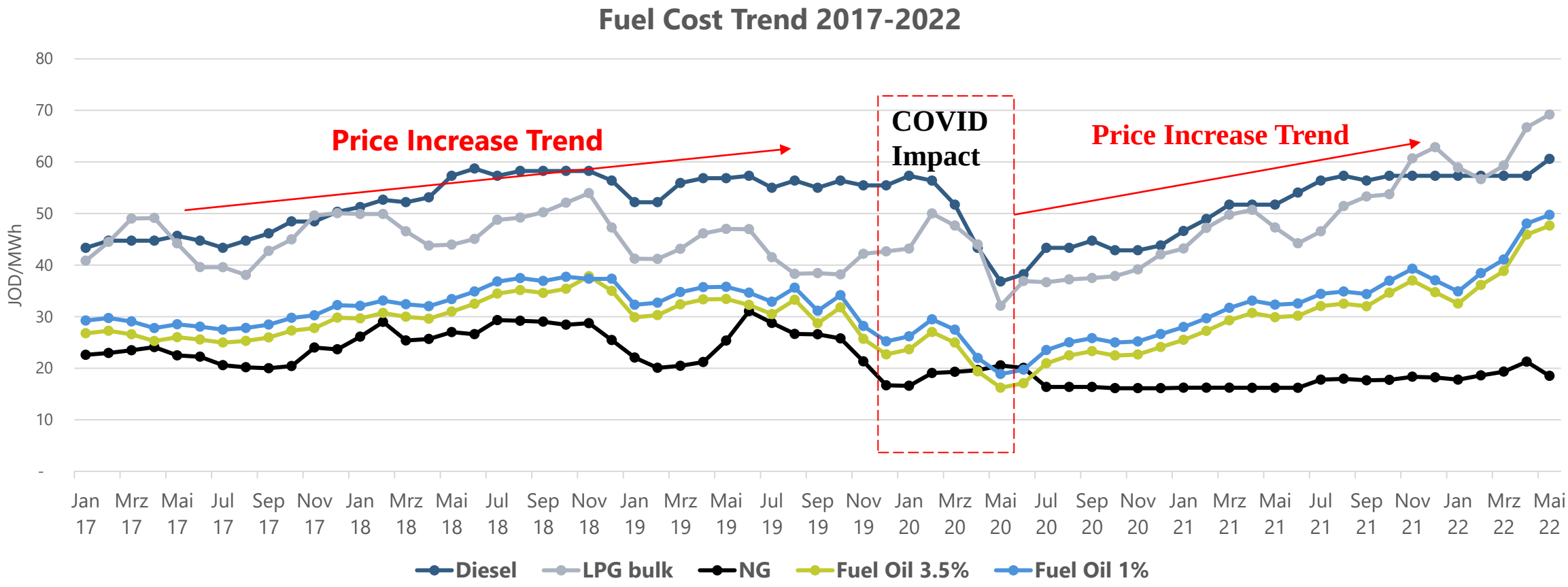
Source: MEMR 2019 Brochure

Main Heating Fuels Cost Trend



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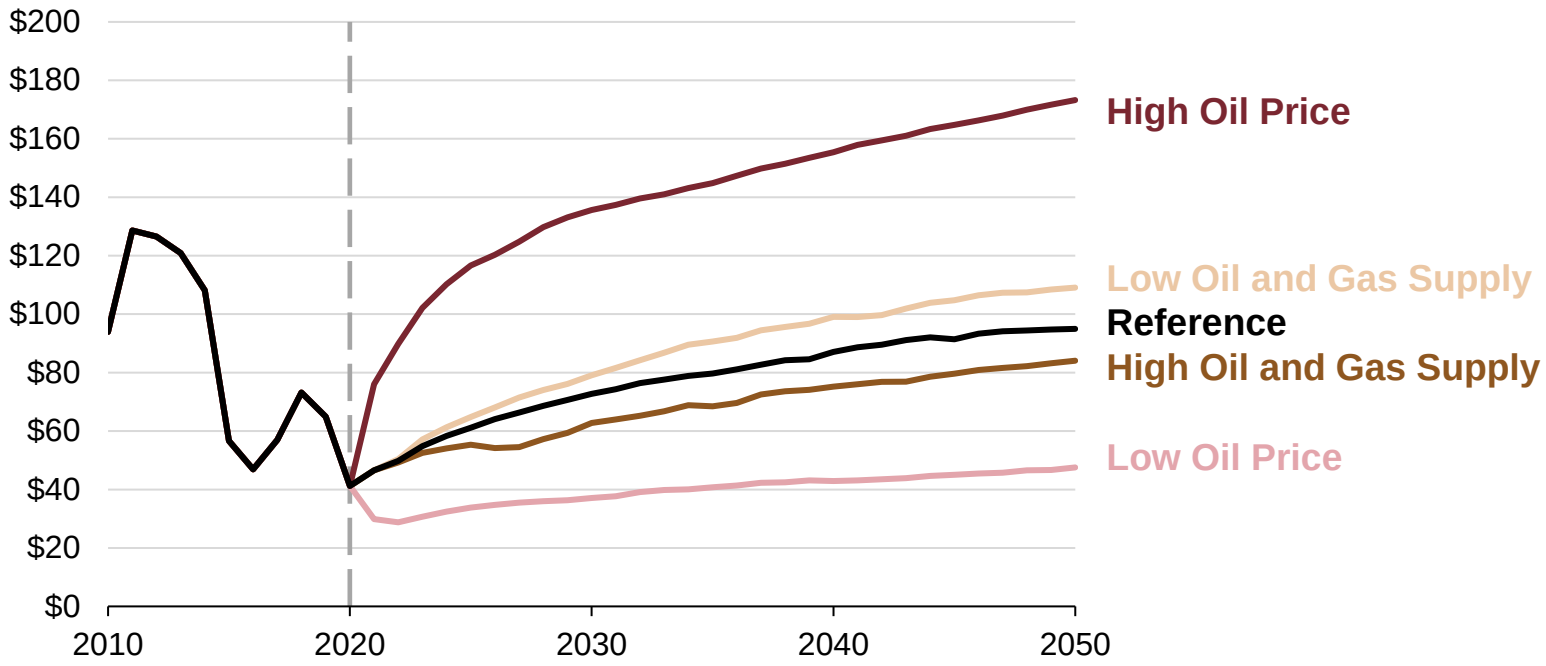
Source: MEMR Fuel Price List

Future Fuel Cost Projection



INCREASING FUEL COST PROJECTION

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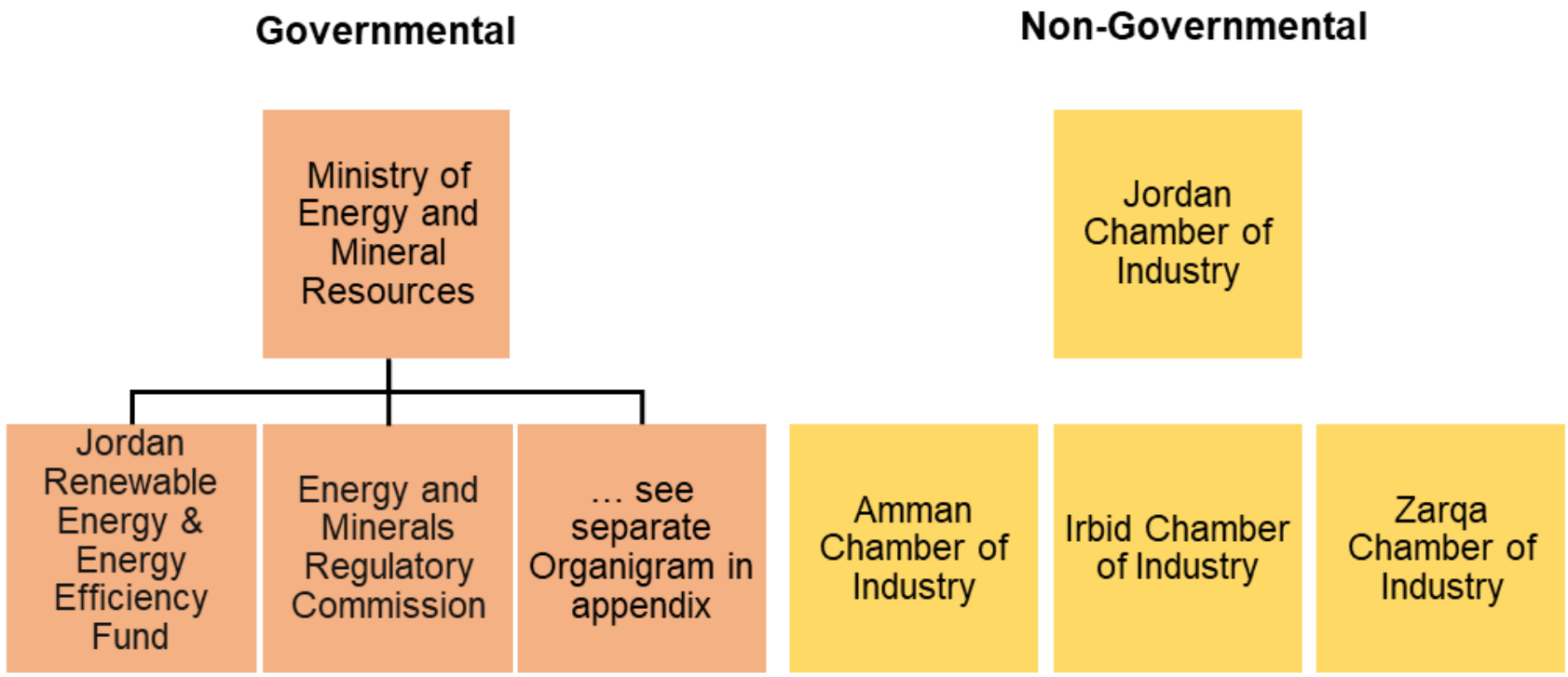
Source: EIA Annual Energy Outlook

Institutional Key Players in the Sector for Industrial Heating



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Source: GIZ-Sector Assessment Report

Considered Technologies

- **Non-Concentrating Systems**
  - Flat-Plate Collectors
  - Evacuated Tube Collectors
- **Concentrating Systems**
  - Liner Fresnel Collector
  - Parabolic Trough Collector
  - Dish Collector
- **Heat Pumps**
  - Temperature difference around 30-50℃
  - Used for low-temperature applications <80℃
- **Waste heat recovery**
  - Reuse of exhaust gases
  - Reuse of residual hot water
- **Optimized generation (Industrial Boilers)**
  - Higher efficiency
  - Improving operating conditions and control
  - Heat recovery
- **Combined heat and power CHP**
  - Provide electricity and heat
  - High combined efficiency
  - Needs cheap fuel or by-product gas (biogas)
- **Biomass / waste-to-energy**
  - Direct combustion
  - Transfer to gas (bio-gas) and use in CHP

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Source: GIZ-Sector Assessment Report

Identification of economic sectors with a high potential

(Pharmaceutical Production)

Setup:

- Boilers: 3 steam boilers (2 x 5t/h, 3t/h)
- Supply: steam 5.6 barg @ 163°C
- Fuel: LPG

Opportunities:

- Steam used for space heating
- Low-temperature needs

Challenges:

- High seasonal variation

Perspective:

- Non-concentrating solar collectors
- Hybrid heat pumps for space heating + PV
- High-efficiency water boiler
- Waste heat recovery

(Food Production / Canned Food)

Setup:

- Boilers: 2 steam boilers (8t/h, 4t/h)
- Supply: steam 7-9 barg @ 170-180°C
- Fuel: HFO 1.5%S

Opportunities:

- Steam demand matches the solar profile

Challenges:

- Low available area
- Low fuel cost

Perspective:

- Concentrating solar collectors for supply level heat
- non-concentrating solar collectors for process-level heat
- Waste heat recovery

(Food Production / Dairy Products)

Setup:

- Boilers: 2 steam boilers (2x 5t/h)
- Supply: steam 7-9 barg @ 170-180°C
- Fuel: Diesel

Opportunities:

- Steam demand matches the solar profile
- High fuel cost

Challenges:

- Low demand/system size

Perspective:

- Concentrating solar collectors for supply level heat
- Waste heat recovery
- Heat pumps + PV

(Food Production / Halava and Tahini)

Setup:

- Boilers: 1 steam boilers (6t/h)
- Supply: steam 7.5 barg @ 170-180°C
- Fuel: Diesel

Opportunities:

- Steam demand matches the solar profile
- High fuel cost

Challenges:

- Waste generation during weekends (no production)

Perspective:

- Concentrating solar collectors for supply level heat
- Waste heat recovery
- Heat pumps + PV

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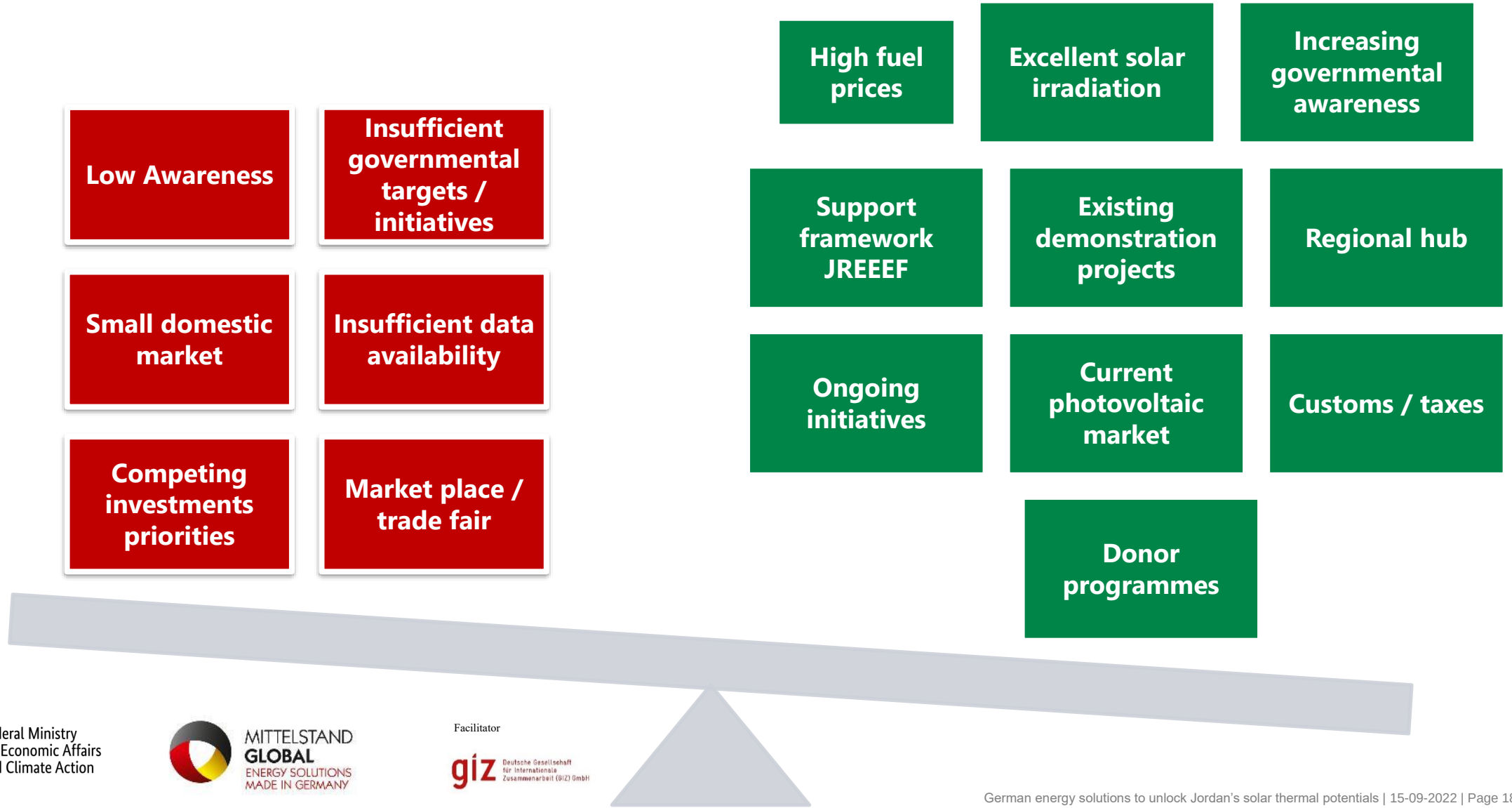
Source: GIZ-Sector Assessment Report

Challenges and Opportunities



Source: GIZ-Sector Assessment Report

Contact us

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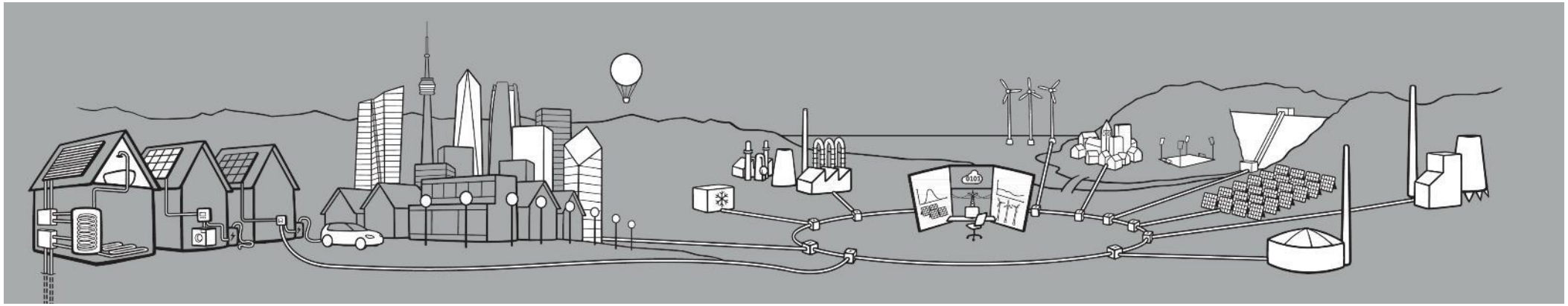

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