The SolSteam Project
funded by the German federal ministry of economic affairs and Energy

Lisa Willwerth
Solar Field at RAM Pharma, Amman

- Solar field: linear Fresnel collectors of Industrial Solar GmbH
- Supply of saturated steam at 6 bar gauge
- Start of operation: March 2015

Collector field and steam drum with piping to steam network
Solar Field at RAMPharma, Amman

General design, SD only
Experience of Operation with SD

7th of April 2015

Data Source: DLR.de • Chart 4
Lisa Willwerth • The SolSteam Project • 15th of March 2017
Experience of Operation with SD

- Reliable operation
- No negative interference with conventional steam supply
- Solar steam supply often higher than demand
- SD function as Ruth storage works well by supplying steam in a pressure range from $7 \text{ bar}_g$ to $14 \text{ bar}_g$
Topics of the SolSteam project

- Stability of operation
- Performance test
- Testing and improving layout and control
  - Alternative parameters for control
  - Alternative separator
- Safety test
- Water quality
- Etc.
Cyclone at RAMPharma, Amman

- SolSteam project: test of alternative separator
- Motivation: save investment costs
Solar Field at RAMPharma, Amman
Solar field at RAMPharma, Amman

Instrumentation to control the water level in the piping below the cyclone
Solar field at RAMPharma, Amman

Manual control of condensate level during cyclone operation
Conclusions

Extensive amount of data collected and analyzed

Operation along cyclone:
• Works with rapid automatic control
• Allows faster start up
• No storage

Operation along steam drum:
• Works well
• Stabilizes operation
  ➤ Solar steam supply constant even at strong variations in demand
  ➤ Storage function for clouds and evening operation