Day-ahead Solar PV Power Forecasting using AI
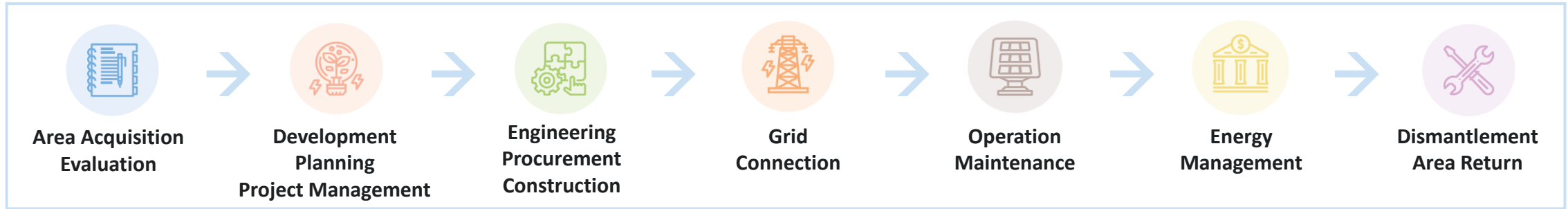
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ENERPARC AG

Enerparc AG since 2008

| Area Acquisition Evaluation | → | Development Planning Project Management | → | Engineering Procurement Construction | → | Grid Connection | → | Operation Maintenance | → | Energy Management | → | Dismantlement Area Return |

→ **Focus** on planning, engineering, execution and operation of large-scale solar PV power plants

→ **Team** of 320 professionals, comprising 100 engineers

→ More than 3,600 MW of installed solar electricity in Europe, India, USA, Asia and Australia

→ 2,700 MWp own power plants as **Independent Power Producer**

→ Enerparc **International**:
   Spain, France, Netherlands, Portugal, India, Australia

→ Enerparc **Group** in Germany:

sunnic   pvwerk   ENERPARC SERVICE

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Agenda

Key Concepts to develop a PV Forecasting Model

- Data, Model, Validation and Operation

Project Overview in Practice

Assessment of the Current Model

- Compare with Measurement
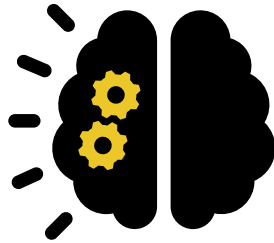
Challenges and Following Steps

Key Concepts to develop a PV Forecasting Model
Data, Model, Validation and Operation

Data

→ Define parameters

→ Collect historical data

→ Collect weather forecast data

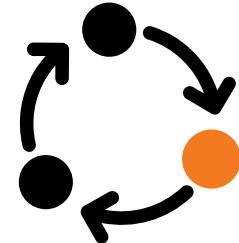→ Perform data processing

→ Collect and build master database

Model

→ Define input parameters

→ Define a model

→ Research on the model

→ Build the model

→ Optimize the model

Validation

→ Compare the output with measurement data
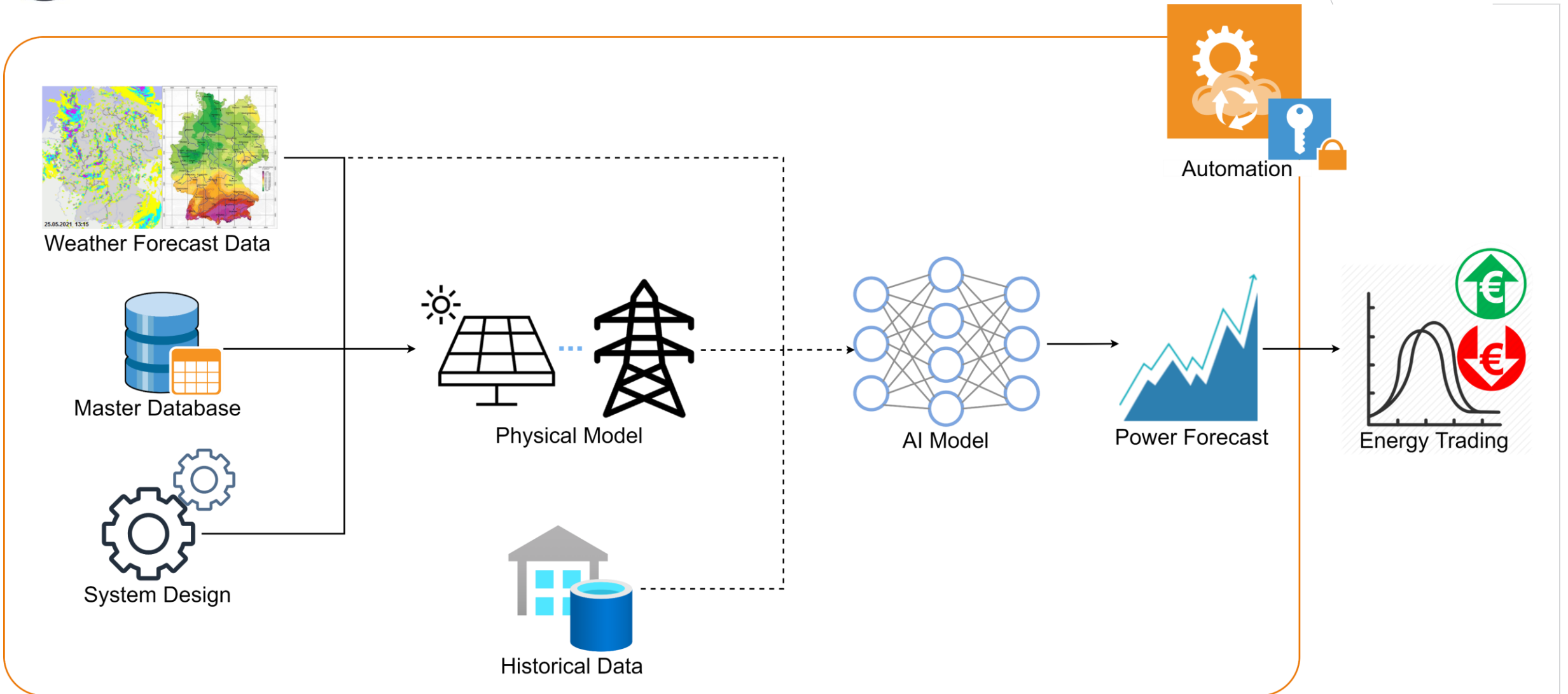
→ Evaluate results using metrics

Operation

→ Build an architecture of database

→ Set up a daily schedule

→ Adopt data security measures

→ Track simulations using logger
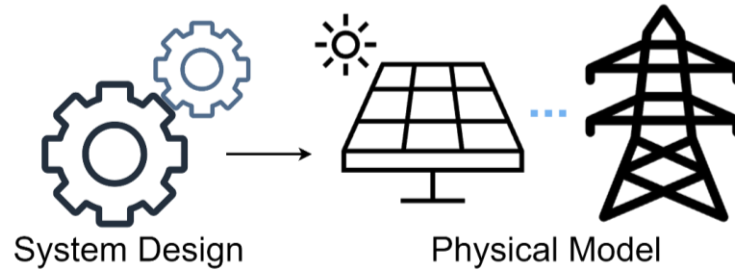
Project Overview in Practice

Weather Forecast Data

Master Database

System Design

Physical Model

Historical Data

AI Model

Power Forecast

Energy Trading

Automation

Project Overview in Practice

Historical Data

System Design → Physical Model

AI Model

Access to a broad range of historical data

Specify system modelling individually for each power plant

Enhance the quality of AI model training

→ Enerparc in-house monitoring software

→ Solar PV module

→ Inverter

→ Tilt angle

→ Azimuth angle

→ Distance between PV arrays

→ Height of mounting system

→ Installed capacity as one of the input parameters

→ An advantage for plant extension and repowering cases

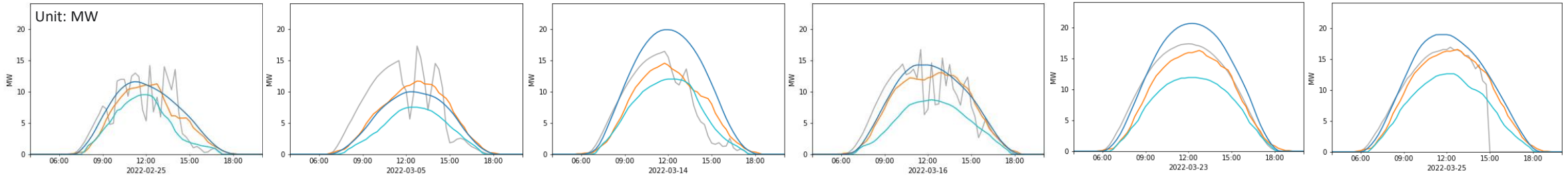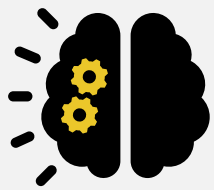KPIs: nRMSE, nMAE, nMB

Challenges and Following Steps

Challenges

Data
- → Enhance quality of weather forecast data
- → Deal with missing/wrong data
- → Update master database and historical data

Model
- → Optimize the model
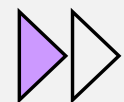- → Search and test other alternative models

Operation
- → Introduce a measure for fast debugging

Following Steps

Validation
- → Real-time validation

Next Project
- → Intraday-market solar PV power forecasting
- → Further cooperative work with German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt)

DLR

Thank you for your attention

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