



gtz



CWPC
中国风电研究与培训中心
...serving China and World Climate

China Wind Power
Research & Training Project



国家电网
STATE GRID

中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE



龙源电力集团股份有限公司
CHINA LONGYUAN POWER GROUP CORPORATION LIMITED

China Wind Power Center – CWPC an Example for GTZ Wind Power Support

Introduced by

DuBois, Andreas – GTZ Project Director Wind Power Projects China

Wang Yang – Vice President Repower North China

Sommer, Dieter – CLYPG Vice Director Suzhou Training Center

Prof. WANG, Weisheng – CEPRI Project Director and Director CEPRI-RED





gtz



C W P
中国风电研究与培训项目
...serving China and World Climate

China Wind Power
Research & Training Project



国家电网
STATE GRID

中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE



龙源电力集团股份有限公司
CHINA LONGYUAN POWER GROUP CORPORATION LIMITED

Situation Wind Power China 2000

- Slow growth
- Badly performing wind farms
- Imported technology
- No wind grid planning
- No wind power consulting services
- ➔ CEPRI applied for wind power project





gtz



CWIP
中国风电研究与培训项目
...serving China and World Climate

China Wind Power
Research & Training Project



国家电网
STATE GRID

中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE



龙源电力集团股份有限公司
CHINA LONGYUAN POWER GROUP CORPORATION LIMITED

Wind Problem Map 2002

Proposed Solutions by GTZ Team

➔ Mmap





gtz



CWIP
中国风电研究与培训项目
...serving China and World Climate

China Wind Power
Research & Training Project



国家电网
STATE GRID

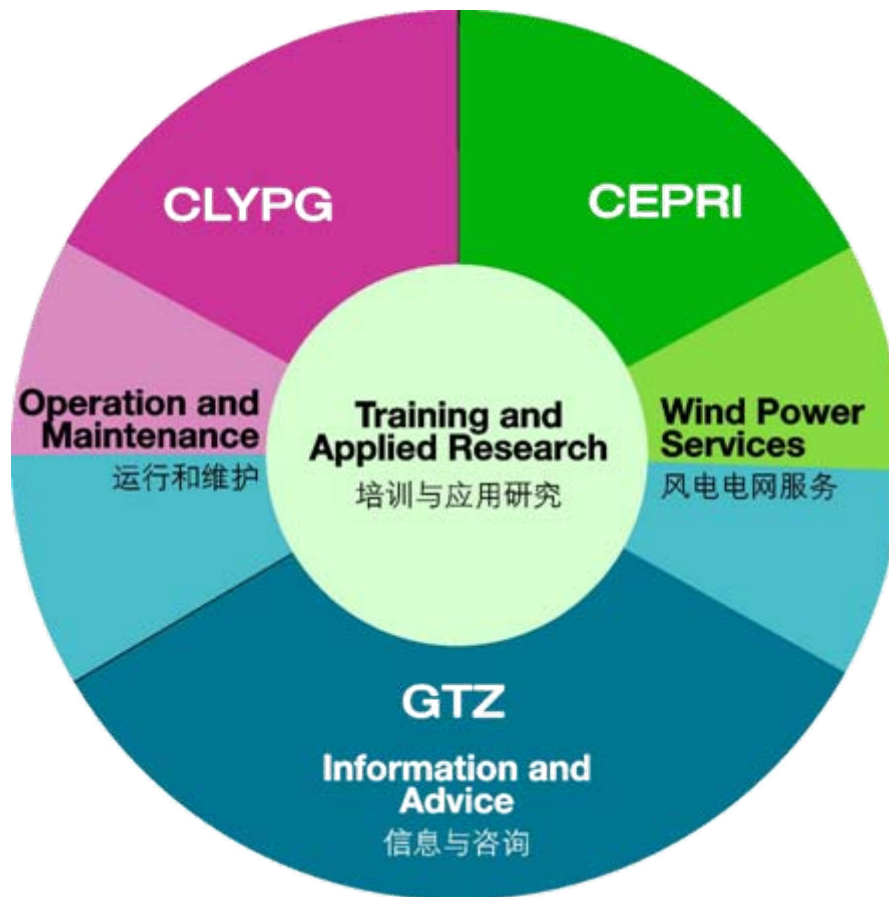
中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE



龙源电力集团股份有限公司
CHINA LONGYUAN POWER GROUP CORPORATION LIMITED



Project duration 5 years
2005/04 – 2010/10
German Contribution
~5 Mio Euro





gtz



CWPC
中国风电研究与培训中心
...serving China and World Climate

China Wind Power
Research & Training Project



CWPC Workareas - 工作领域

运行及维护

Operation & Maintenance

CLYPG

Blöcke und Trainings
Zentrum für
Windenergie-technik

培训及应用研究

Training & Applied Research

CWPP

Wind Turbines
• Meteorology
• Electrical Grid
• WindPR / WAP

Training Courses

CLYPG + GTZ + CEPRI

Wind Research Network

- WP Planning
- Finance
- University X

风能服务

Wind Power Services

CEPRI

WindGuard
Mountain

信息及建议

Information & Advise

GTZ

International
Q & A Service

有一个, 我们建立
伸在年的人, 我们建立, 我们
展一开发和利月可再生能源

- CWPC Internet Portal
- Seminars
- Policy & Finance





gtz



C W P C
中国风电研究与培训中心
...serving China and World Climate

China Wind Power
Research & Training Project



国家电网
STATE GRID

中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE



龙源电力集团股份有限公司
CHINA LONGYUAN POWER GROUP CORPORATION LIMITED

Work Area 1: **Operation & Maintenance @ CLYPG** 工作领域 1: 运行及维护 @ 龙源电力集团公司

Establish Wind Power Technician Training School at Suzhou 建立苏州风电技工学校

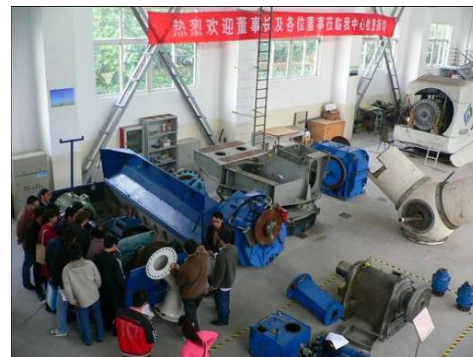
- Support training of trainers and course development
教员的培训和教材的编写

Improve Operation of Windfarms - 风电场运行的改进

- Assess technical problems in windparks
风电厂技术问题评估
- Suggest remedies for problems
提出改善运行及风电场收益的方法

Introduce advanced wind power support technologies - 介绍先进的风电技术

- Vibration Analysis - 震动分析
- Condition Monitoring Systems – CMS - 境监控系统 - CMS
- Remote Windfarm Operational Monitoring & Technical Management
偏远风电场运行监控技术管理



Major cooperation partners:

8.2





gtz



C W P
中国风电研究与培训中心
...serving China and World Climate

China Wind Power
Research & Training Project



Work Area 2: Wind Power Services @ CEPRI 工作领域 2: 风能服务 @ 中国电力科学研究院

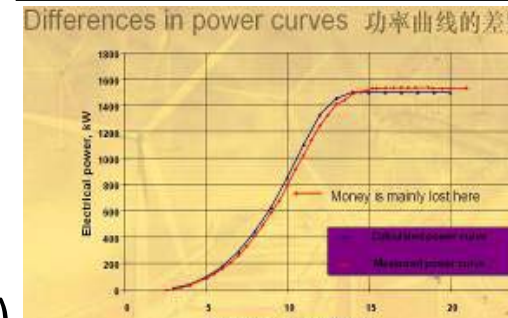
Center for - 中心:

- Wind Power Grid **Integration** Planning - 并网规划
- Wind **Resource** Assessment - 风资源评估



Wind Turbine Testing Lab according IEC61400 & MEASNET

- **Power Quality** of Turbines & Windfarms – 电能质量评估(风机及风电场)
- **Power Performance** Assessment (power curve verification) 功率特性评估(功率曲线确认)
- **Noise Measurement** - 噪声测量
- **Load Measurement** - 负荷测量
- **Anemometer Calibration** - 风速计标定
- **LVRT** – testing of turbines



Major cooperation partners: 7





gtz



CWIP
中国风电研究与培训中心
...serving China and World Climate

China Wind Power
Research & Training Project



国家电网
STATE GRID

中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE



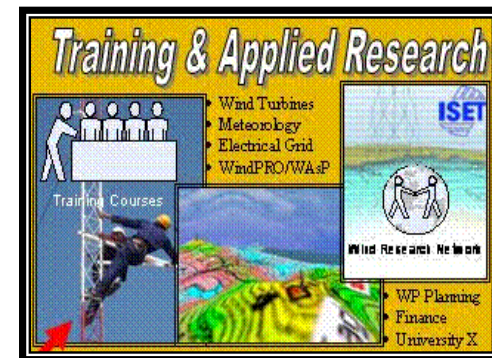
龙源电力集团股份有限公司
CHINA LONGYUAN POWER GROUP CORPORATION LIMITED

Work Area 3: Training & Applied Research CLYPG & CEPRI & GTZ 工作领域 3: 培训及应用研究 - 龙源与电科院与德国技术合作公司

Training Programmes for Work Areas 1 & 2

对于工作领域1和2的培训

- **Support** Wind Power Training for participants from all over China on **all subjects** applicable to the wind energy sector
支持来自全中国的参与者在风能领域的培训
- **Wind Farm Micrositing & Resource calculations**
微选址及风资源计算 (例如: WindPRO, WAsP, WINDSIM)
- **Grid planning/simulation** software (e.g. Digsilent Powerfactory)
电网规划/仿真软件 (例如: Digsilent)
- ISET/WindGuard support for „**Wind Power Engineering Courses**“;
支持 „风能工程课程“
- Support **Applied Research** (e.g. grid, **wind-power prediction** for dispatch, CFD, etc)
支持应用研究 (例如 电网, 风电调度预测, 振动, 等等)



windsim

AL
Planen Rechnen Optimieren



EMD





gtz



CWIP
中国风电研究与培训中心
...serving China and World Climate

China Wind Power
Research & Training Project



Training & Applied Research - 培训及应用研究

Achievements – 成果

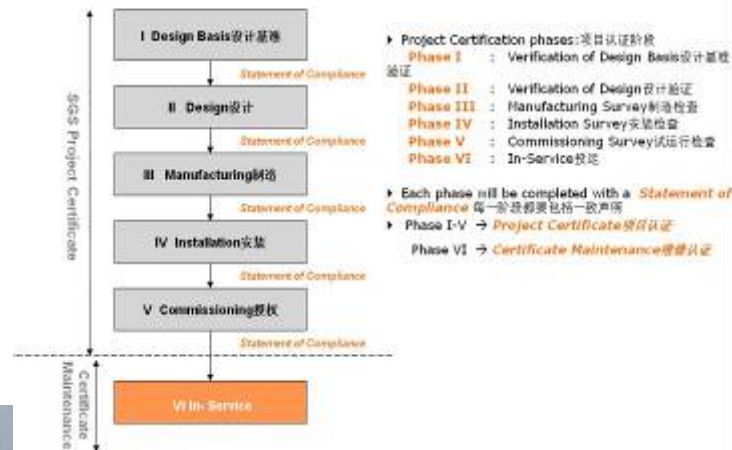
Course on Wind Farm construction management

风电场建设管理课程



SGS

Project Certification of Wind Farms
- Site Assessment 风场的项目认证





gtz



CWPP
中国风电研究与培训项目
...serving China and World Climate

China Wind Power
Research & Training Project



国家电网
STATE GRID

中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE



龙源电力集团股份有限公司
CHINA LONGYUAN POWER GROUP CORPORATION LIMITED

Work Area 4: Information & Advise - CWPP – GTZ 工作领域 4: 信息及建议 - 德国技术合作公司

Support for - 支持:

- Participation in Conferences & Exhibitions - 参与会议及展会
- **Study Tours** – Info Trips abroad
- RE-Policy support in case required by Chinese Government
在中国政府需要的情况下, 提供可再生能源政策支持
- **Public Wind Power Information Service - Awareness**
提供风能的公共信息服务
- Windpower Helpdesk via Internet Q&A (coop ISET)
风能网上问答式服务台 (与ISET合作)
- Access to European Academy of Wind Energy EAWE / REnewNet
访问欧洲风能学院EAWE/REnewNet网站





gtz



CWIP
中国风电研究与培训中心
...serving China and World Climate

China Wind Power
Research & Training Project



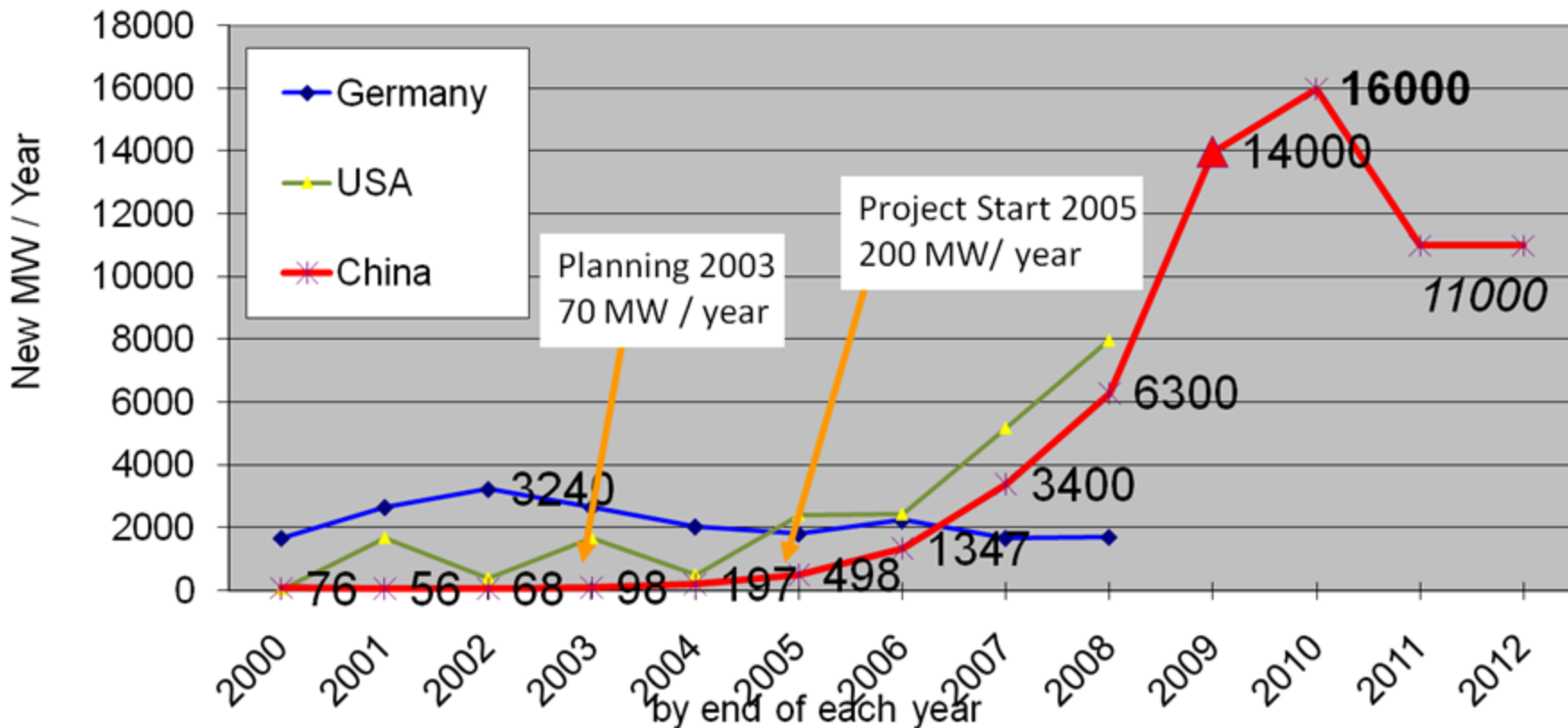
国家电网
STATE GRID

中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE



龙源电力集团股份有限公司
CHINA LONGYUAN POWER GROUP CORPORATION LIMITED

Annual New Wind Turbine Capacity in MW





gtz



CWP
中国风电研究与培训项目
...serving China and World Climate

China Wind Power
Research & Training Project



龙源电力集团股份有限公司
LONGYUAN ELECTRIC POWER GROUP CO., LTD.

国家电网
STATE GRID
中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE

Workshop for Grid Integration of Wind Power RWTH IAEW + CEPRI 18. + 19.11.2008 Beijing Prof. Haubrich + Prof. Wang Weisheng



Bundesministerium
für Umwelt, Naturschutz
und Reaktorsicherheit





gtz



C W P
中国风电研究与培训中心
...serving China and World Climate

China Wind Power
Research & Training Project



国家电网
STATE GRID
中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE



龙源电力集团股份有限公司
CHINA

Workshop on LVRT-Performance of Wind Turbines FGH + RWTH IFHT + CEPRI 06. + 07.01.2009 Prof. Schnettler + Prof. Wang Weisheng



Bundesministerium
für Umwelt, Naturschutz
und Reaktorsicherheit



DuBois杜博斯
(Andreas)





gtz



CWPP
中国风电研究与培训项目
...serving China and World Climate

China Wind
Research & Training



国家电网
STATE GRID

中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE

国家电网
STATE GRID

中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE

龙源电力集团股份有限公司
CHINA LONGYUAN POWER GROUP CORPORATION LIMITED

Sino-German WP Initiative 中德风电发展倡议

China Wind Power Training & Research Project (CWPP)
中国风电培训与研究项目

Wind Environment Research & Training Center (WERT)
风电环境研究与培训中心

Guodian 国电集团
CLYPG 龙源

SGCC 国网公司
电科院

CEPRI

SGCC 国网公司
电科院

CEPRI

- Technical Training
技术培训
- Technical Management
技术管理

- Wind Grid Simulation
风电并网仿真
- Wind Resource Prediction
风资源预测
- Wind Power Laboratory
风电实验室

- Wind Grid Support
风电并网支持
- LVRT Testing
低电压穿越测试
- WTGrid Certification
风电机组认证

- Wind Engineer Certificate Training
风电工程师证书培训
- Wind Power Blended Learning
风电学位教育





gtz



CWIP
中国风电研究与培训中心

...serving China and World Climate

China Wind Power
Research & Training Project



国家电网
STATE GRID

中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE



龙源电力集团股份有限公司
CHINA LONGYUAN POWER GROUP CORPORATION LIMITED

Phase 1 & 2 第一阶段: 11/2008-10/2010



WERT-Test 测试:

- Advanced Wind Turbine grid testing, especially Low-Voltage-Ride Through (including LVRT-Test Hardware from Germany)
Wind Farm Grid Code compliance testing
高级风机并网测试 (包括有德国引进低电压穿越测试设备)
- Support for development of locally adapted versions of standards and their practical evaluation under Cold Climate Conditions at a test wind turbine
支持测试风机对于本地天气等的适应性的提高

WERT-Training 培训:

- Certificate courses for large numbers of engineers as Blended-Learning:
ONLINE-Face2Face as well as practical training and applied research at a test turbine
工程师证书培训及集面授与网络教育于一体的混合式风电教育





gtz



CWPP
中国风电研究与培训项目
...serving China and World Climate

China Wind Power
Research & Training Project

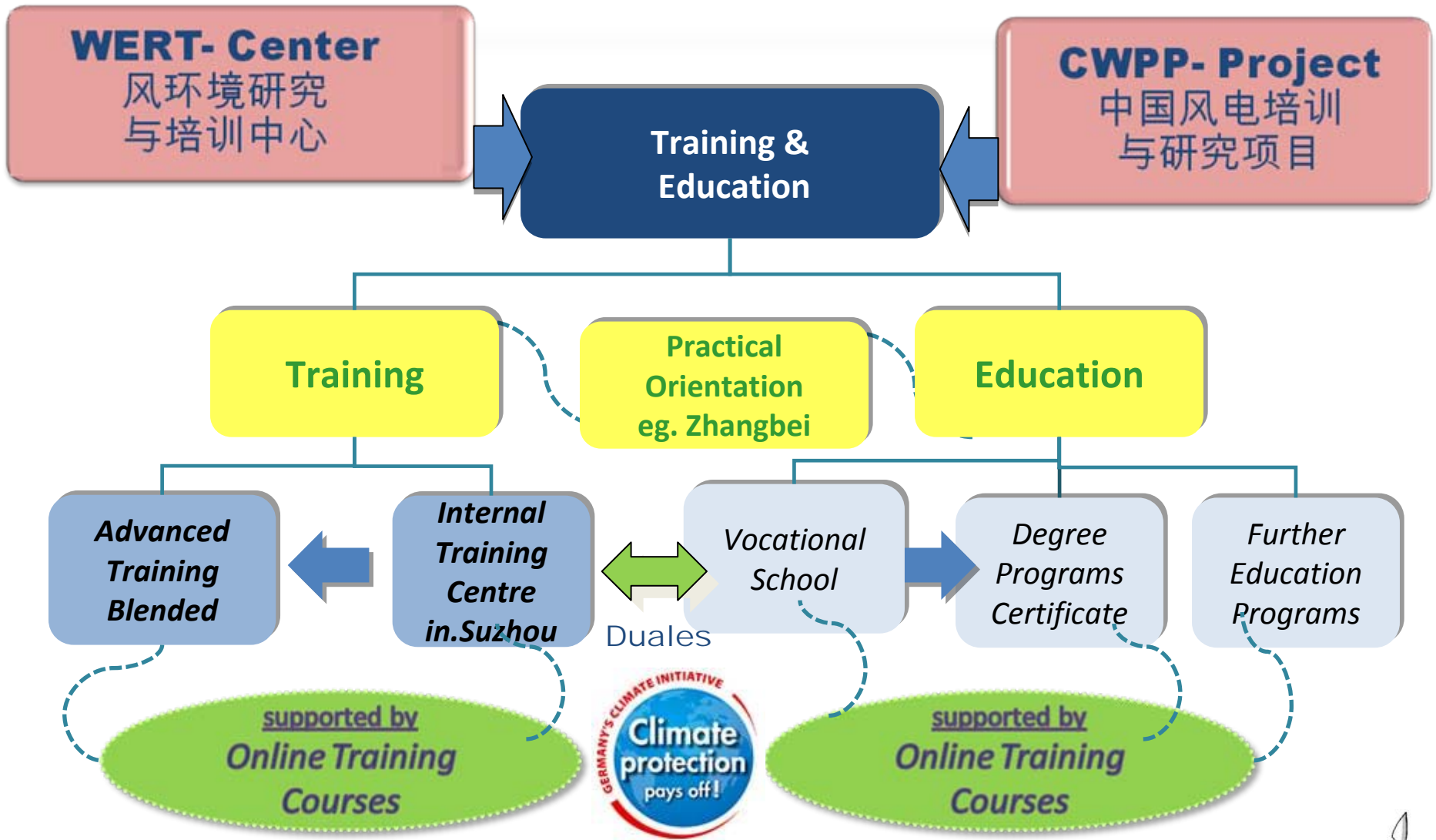


国家电网
STATE GRID

中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE



龙源电力集团股份有限公司
CHINA LONGYUAN POWER GROUP CORPORATION LIMITED





gtz



CWIP
中国风电研究与培训中心

...serving China and World Climate

China Wind Power
Research & Training Project



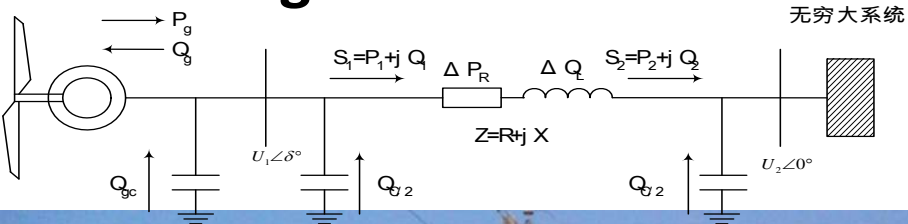
国家电网
STATE GRID

中国电力科学研究院
CHINA ELECTRIC POWER RESEARCH INSTITUTE



龙源电力集团股份有限公司
CHINA LONGYUAN POWER GROUP CORPORATION LIMITED

NORDEX 1.5 MW Test & Trainings Turbine installed



2009/12





gtz



C W P
中国风电研究与培训中心
...serving China and World Climate

China Wind Power
Research & Training Project



龙源电力集团股份有限公司
CHINA LONGYUAN POWER GROUP CORPORATION LIMITED

Low Voltage Ride Through Testing

低电压穿越能力测试

Mobile LVRT-Testing Container 40.5 kV
put into operation in Jilin 2010-03-01

