

# DNV KEMA Energy & Sustainability

Services for the power industry

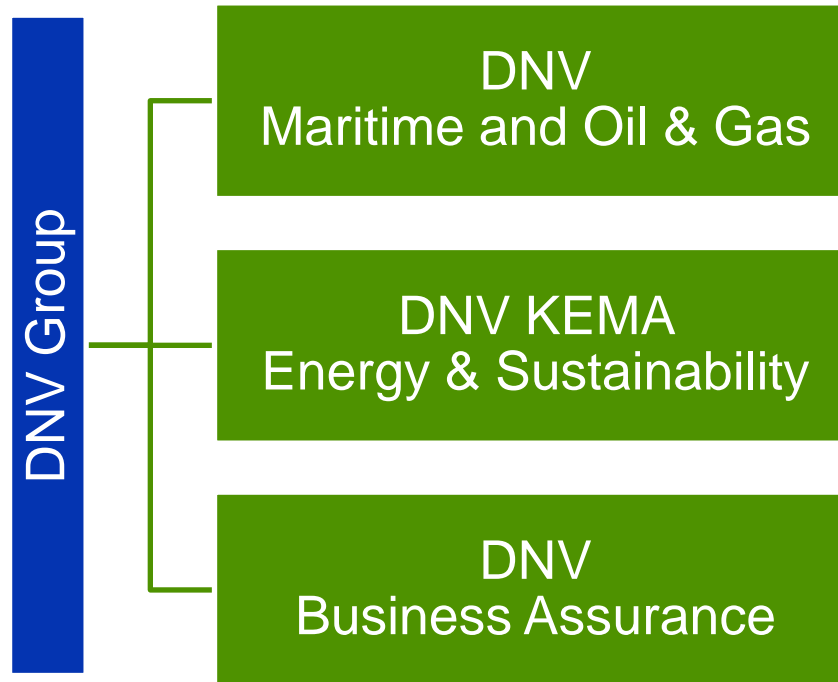
Mongolia Energy 2012

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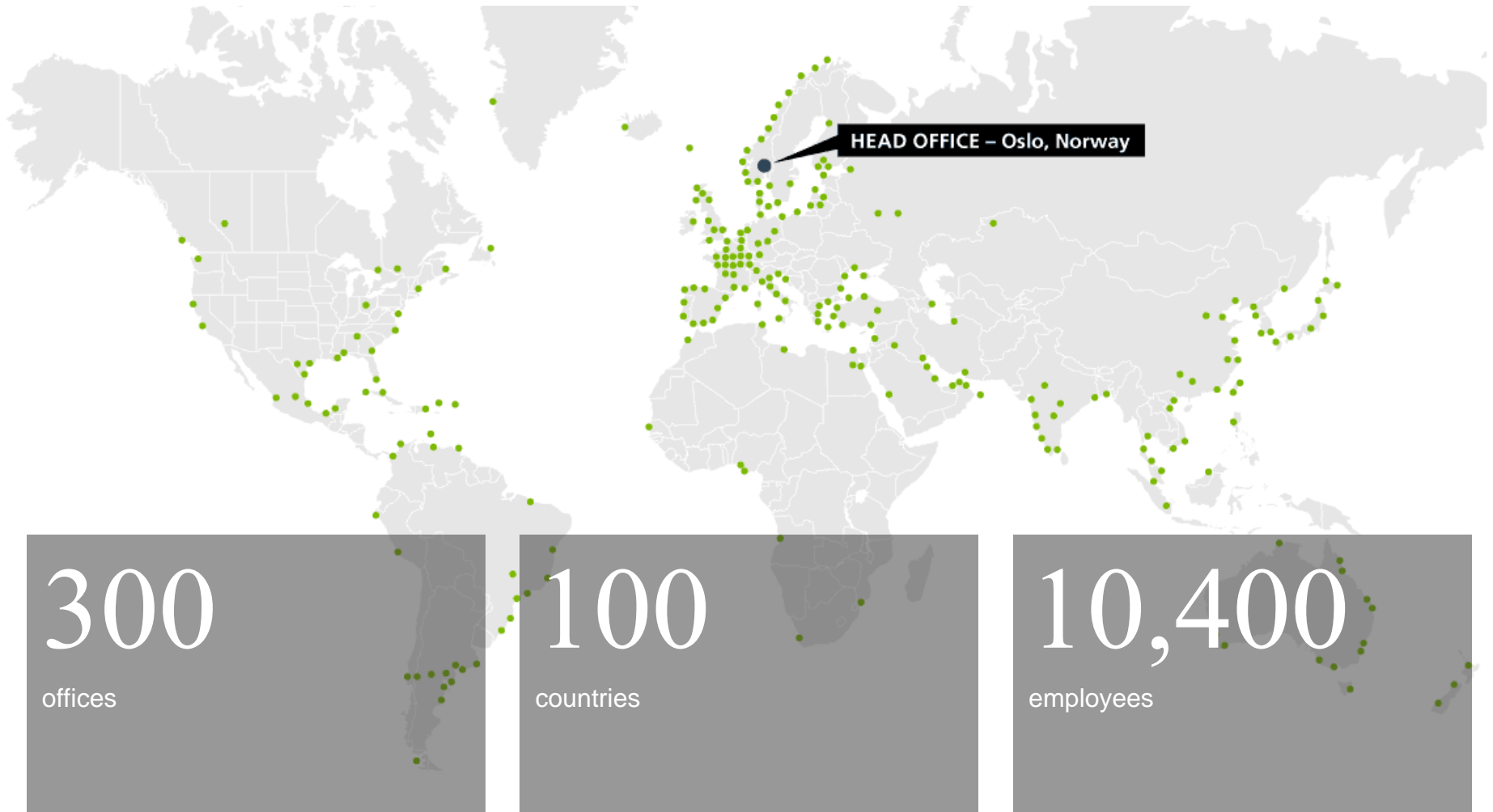


# Three companies with globally leading positions

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# Highly skilled people across the world



# A pioneering partner for the energy world



Labs

Operates some of the largest and most advanced high-power and high voltage test labs in the world

No. 1

in providing impartial technical and business support to smart grid development

2,000+

experts in energy efficiency, power generation, transmission and distribution

# Our Purpose and Values

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## Our Purpose

To safeguard life, property and the environment

## Our values

- We build trust and confidence
- We never compromise on quality or integrity
- We are committed to teamwork and innovation
- We care for our customers and each other

# Covering the entire energy value chain.

Policy & Strategy



Production



Trading



Transport & Distribution



Use



One company serving the diverse needs of the energy marketplace



# FOSSIL POWER GENERATION

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## Our services are aimed at:

- Increasing the profitability of power stations
  - Reduction of CO2 emissions
  - Improving energy efficiency
  - Reduction of environmental impact
- through**
- Improved operation, best practices, better equipment
  - Improved reliability, availability, maintenance
  - Reduced maintenance costs, failure rates
  - Extension of the useful life time of power stations

# Our capabilities in Fossil Power Generation

## Generation Efficiency

1. Fuel optimization
2. Combustion optimization
3. Thermo dynamic modeling
4. Boiler/HRSG efficiency
5. Turbine efficiency Dispatch /AGC  
(automatic generation control)
6. Storage and reserves

## Environment Management

1. Emissions management
2. Projections & Dispersion
3. Carbon footprint optimization
4. Ash management
5. CO2 Sequestration
6. SO2, NOx reduction Scrubbers, Filters  
Selective Catalytic Reduction

## Generation Reliability

1. Condition based maintenance
2. Corrosion management
3. Protection schemes
4. Operational Excellence
5. Cooling water management
6. Combustion management

## Generation Sustainability

1. Life extension plans
2. Fleet fuel mix conversions
3. Biomass / Co-firing
4. Renewable Energy
5. Fleet Asset Optimization
6. Smart & Green technologies (IGCC, USC)



# Fossil Power Generation

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## I. Clean Fossil Fuel

*Clean fossil fuel generation is the cost effective and efficient conversion of fossil fuels into power and heat while reducing the environmental impact*

- Efficiency Improvement (e.g. P3M Quick Scan)
- Emission reduction CO<sub>2</sub> , SO<sub>2</sub> , NO<sub>x</sub>
- Retrofits for emission reduction
- Co-firing of biomass
- Co-generation (heat & power)

# Fossil Power Generation

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## Efficiency improvement

### Power Plant Performance Management - P3M

- Quick Scan
  - ❖ Pre-study
  - ❖ Site Investigation
  - ❖ Reporting
- Project selection and approval
- Owner's engineer
  - ❖ Draw up specifications
  - ❖ Prepare tender documents
  - ❖ Selection, witnessing
  - ❖ Certification

# Fossil Fuel Power Generation

## Examples of findings (Qingzhen, Guiyang and 2<sup>nd</sup> Power Plant, Taiyuan)

Problem	Improvement Method	Investment, Euro Mln	Relative Efficiency improvement, %
Incomplete combustion	Combustion control equipment	1-2	1.5%
Incomplete combustion	Combustion control + new burners	3.5 – 4.5	3%
Air heater leakage	O2 measurement before and after air heater	0.1 + repair costs	1 – 2.5%
Air heater leakage	Constructional improvement or air heater	Unknown	2.5% + reduction of energy consumption auxiliary equipment
Condenser leakage	Helium detection	Unknown	1%

# Fossil Fuel Power Generation

## Examples of findings

Power Plant	Location	Year	Capacity MW	Improvement %
Gatchina	Leningrad, Russia	1999	50	>5
Turcini 3	Romania	2000	330	2.1 – 7.4
6			330	4.1 – 7.4
7			330	1.6 – 7.4
Deva 1	Romania	2000	210	1.8 – 5.4
2			210	1.5 – 5.4
4			210	0.5 – 5.4
Arad	Romania	2000	50	14.8
Craiova 2-1	Romania	2000	150	1.9 – 11.2
2-2			150	2.4 – 11.2
Isalnita 7	Romania	2000	315	0.7 – 2.0
Oradea 1	Romania	2000	50	8.0 – 8.2
2			50	8.2 - 13

# Power Generation and Renewables

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## II. Monitoring and Testing

*Monitoring and testing services focus on power output, efficiency, and load following of (new) power stations*

- Witnessing/conducting performance guarantee measurements of power generation plants
- Performance and reliability monitoring implementation
- Factory and site acceptance tests
- (Annual) performance check ups
- Gas turbine combustion monitoring
- Condition assessment measurements

# Power Generation and Renewables

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## III. Inspections, Failure Analysis and Microscopy

*These services focus on the quality of the applied material in power generation and industrial process plants*

- *Quality Assurance and Quality Control*
- *Auditing*
- *Independent failure analysis*
- *Root cause analysis*
- *Independent expert*
- *Microscopy (sample preparation, optical microscope)*

*Components: gas & steam turbines, boilers and furnaces, condensers and heat exchangers, piping and tanks, pumps, compressors and fans, flue gas treatment, fuel handling, ash handling*

# Power Generation and Renewables

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## IV. Materials, Corrosion and Analysis

*These services focus on reliability improvement and remaining lifetime issues as well as reducing the costs of maintenance, retrofits and/or loss of production*

- Material consultancy, Welding consultancy
- High temperature, fire-side corrosion monitoring
- Design review, consultancy and calculations
- “Fit-for-purpose” analysis
- Condition assessment & lifetime extension
- Reliability & availability improvement
- Risk assessment & analysis

# Power Generation and Renewables

## V. Non-destructive testing

*These standard and special techniques provide vital support to the Monitoring, Corrosion and Analysis services*

<u>Standard Non-destructive testing service</u>	<u>Special Non-destructive testing services</u>
Eddy Current Ultrasound Magnetic Dye penetrating Visual/endoscopic inspections Infrared thermography Helium Leak testing	KIRR :Generator Retaining Ring Inspections TOFD: Time of Flight Diffraction COCOM: Coating Condition Monitoring VINSPEC: In-situ Gas Turbine Blade Inspections KEMBUS: Fireside wall thickness measurement KEMWAT: Onstream wall thickness monitoring Boresonic: Testing of hollow turbine shafts Honing of hollow turbine shafts



# Power Generation and Renewables

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## VI. Asset Life and Performance Management

- Life time extension consultancy
- Improving infrastructure performance
- System/component utilisation improvement
- Codes, standards and regulations assessment
- Asset replacement strategy and modeling

# Power Generation and Renewables

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## VII. Wind power

*There are many aspects that influence the feasibility of a wind farm. KEMA offers a complete package for the development from green field to wind farm.*

- Site identification
- Wind resource assessment
- Basic wind farm design
- Financial advice
- Contracting (tender assessment, contract awarding)
- Project Management
- **Grid integration**
- Off-shore wind farms

# Markets and Regulations

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- Energy & Environmental Policy
- Pricing & Tariff setting
- Energy market design & network access
- Market rules & technical codes
- Market analyses and strategy
- Generation & market modeling
- Trading & risk management
- Feasibility studies & cost benefit analysis
- Due diligence support (regulatory and market advisor)

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# Thank you for your attention!

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