



Financing Innovations in RES and EE in Germany

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Content

1. Background: NRW, EnergyAgency.NRW and German Energy Transition
2. Financing Innovations in Germany - Overview
3. Knowledge Transfer
4. Instruments Financing Innovations in Germany
 - i. Research funding
 - ii. Innovation funding for established SMEs
 - iii. Funding for innovative start-up companies
 - iv. Project based funding for innovative technologies
 - v. Crowdfunding
5. Lessons learnt

Background (1/8)

Europe – Germany – North Rhine-Westphalia (NRW)



Background (2/8)

NRW – The European Centre of the Energy Sector

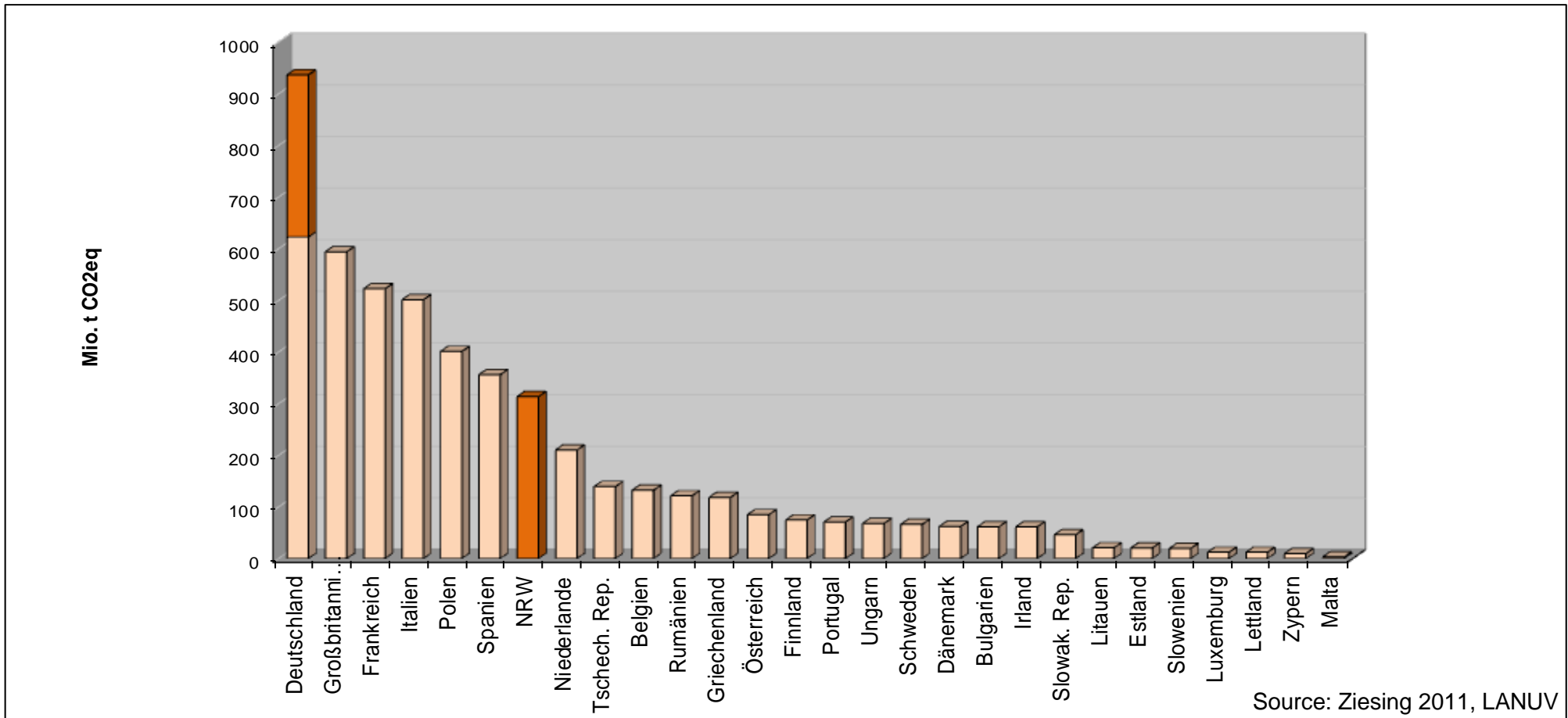


- 18 million inhabitants, GDP 580 bn. € /year
- 25% of German electricity consumption
- 29% of German electricity production (176 TWh)
- 45,000 MW power generation capacity installed
- No nuclear energy
- 10% of electricity from RES
- 240,000 employees in energy sector (of whom 28,000 work with RES)

the “Energy Region No.1” in Europe

Background (3/8)

Total GHG Emissions of NRW compared to Europe



Background (4/8)

EnergyAgency.NRW: objectives (1/2)

- Since 1990 NRW's independent and non-commercial platform for all energy-related topics to
- Founded 1990 mainly for economic reasons
 - Supporting the development of alternatives to the coal based energy supply of NRW
 - Later on the focus shifted towards sustainable energy systems
- Fully financed by NRW State Government: € 17 m/year
- Activities
 - **Innovation Clusters:** cluster EnergyRegion.NRW, cluster EnergyResearch.NRW
 - **Energy consulting** for companies, local authorities and private persons
 - **Continuous training** for companies, federations, institutes, local authorities and end consumers
 - **Marketing activities and public relations:** brochures; newsletter, conferences organized trade fair participations; marketing campaigns, foreign trade activities

Background (5/8)

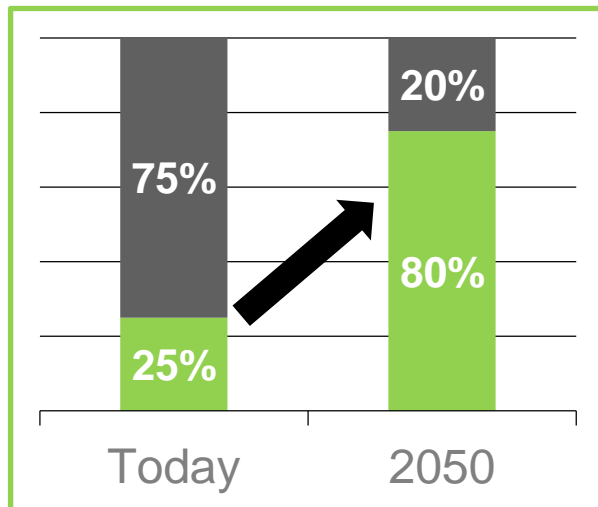
EnergyAgency.NRW: achievements (2/2)

- **3,300 companies and institutions are partner of the EnergyAgency.NRW**
 - 76 % of the companies are SMEs
 - 64 universities, 107 institutions and 94 associations
 - 5,200 individuals actively involved in working groups and networks
- **8 innovation clusters**
 - Wind Power
 - Biomass
 - Photovoltaics
 - Geothermal Energy
 - Fuel Cells and Hydrogen
 - Energy-efficient and Solar Construction
 - Fuels and Engines of the Future
 - Power Plant Technologies

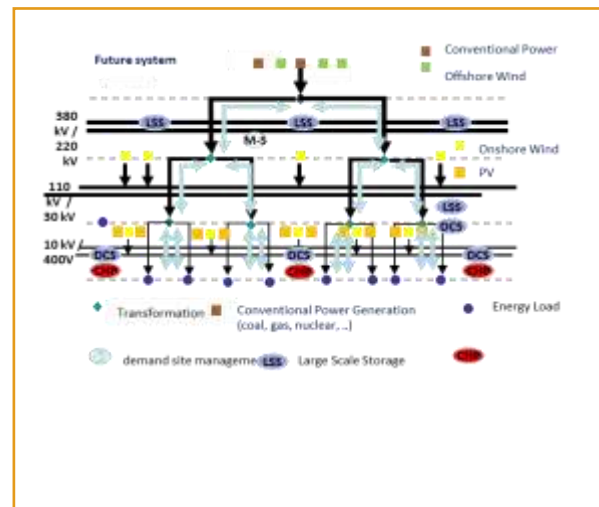
Background (6/8)

Energy Transition in Germany

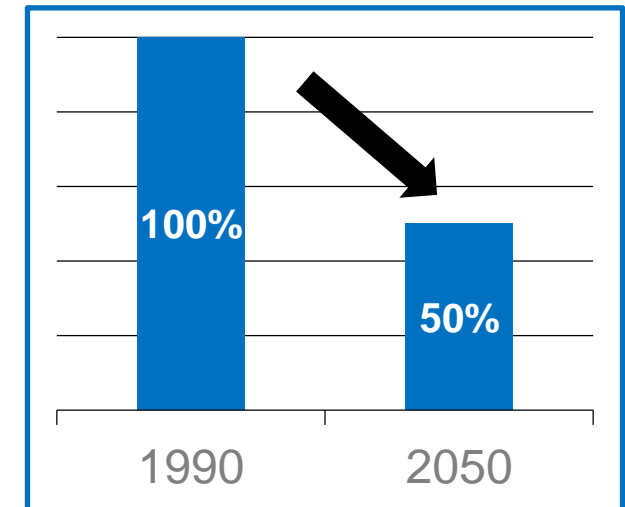
Renewable energies



Infrastructure



Energy efficiency



- Renewable energies
- Conventional sources

- Total energy demand

- This is what we call “Energiewende“**

Background (7/8)

EnergyAgency.NRW: in line with Germany's energy transition

Renewable energies

- Wind
- Biomass
- Photovoltaics
- Geothermics
- Hydropower

Infrastructure

- Power grid / storage
- Smart grid
- Advanced power plant technology
- CHP decentralized
- Electromobility
- Power to gas

Energy efficiency

- Lighthouse projects
 - Buildings
 - Transport
- Initial advise
 - Industry
 - Communities
 - Households

Background (8/8)

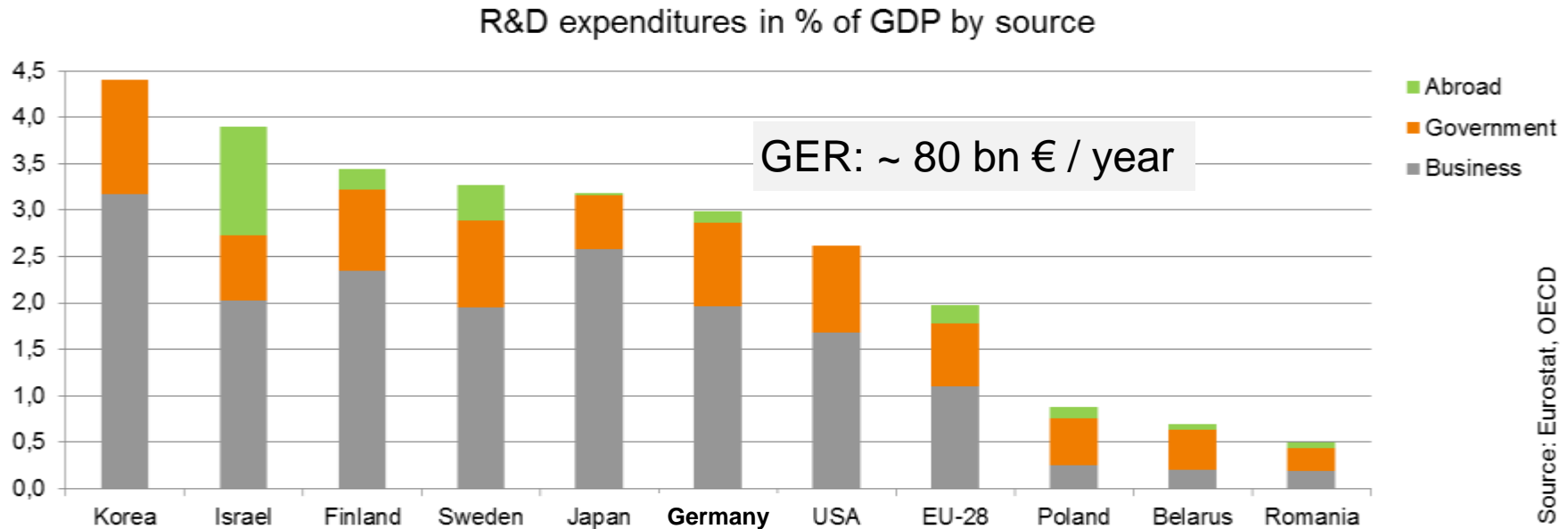
Achievements in Climate Protection and Energy Transition

- Energy:
 - Share of renewables in electricity consumption increased from 6.2% in 2000 to **25.4%** in 2013
 - GHG-Savings of 145 million tons through RES
 - Decrease of imported energy resources like oil and gas
- Economy:
 - Investments in RES in 2013: **16.2 bn. Euro**
 - **370,000 employees** in Renewable sector in 2013
 - German companies are leading in several technologies of renewable sector.
- Policy:
 - EEG has been copied by 65 countries since adoption
 - Germany is seen as a “forerunner” in many cases

Content

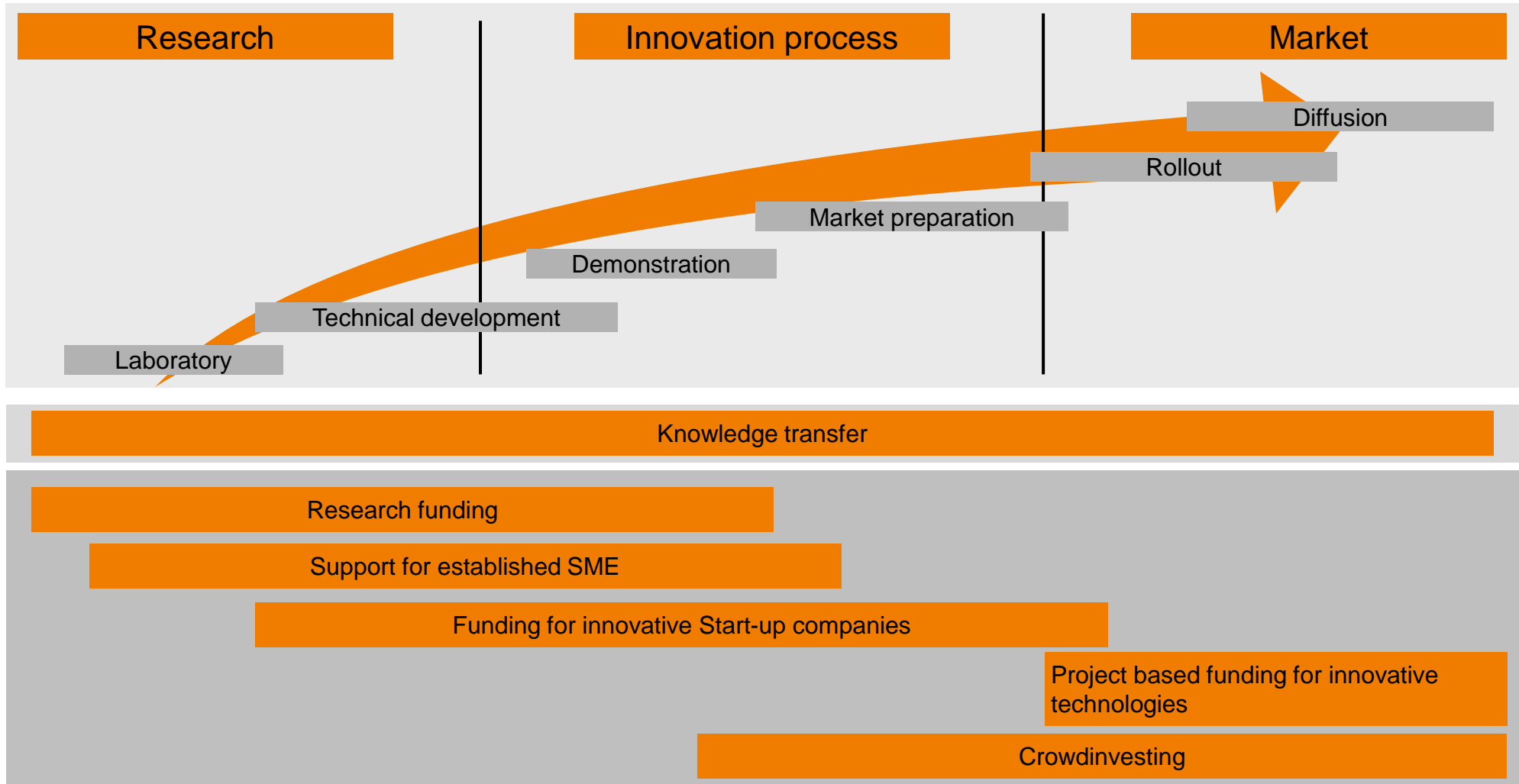
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Financing of Innovations in Germany (1/2): R&D expenditures compared with other countries



- Roughly 20% of business sector R&D is invested externally
 - Co-operation with other companies and knowledge transfer with academia works quite well
- But: R&D investments are concentrated in large companies and in a few sectors like automotive and chemical/pharmaceutical industry
 - Need to focus public R&D funding on SMEs and alternative sectors

Financing of Innovations in Germany (2/2): Instruments along the innovation process



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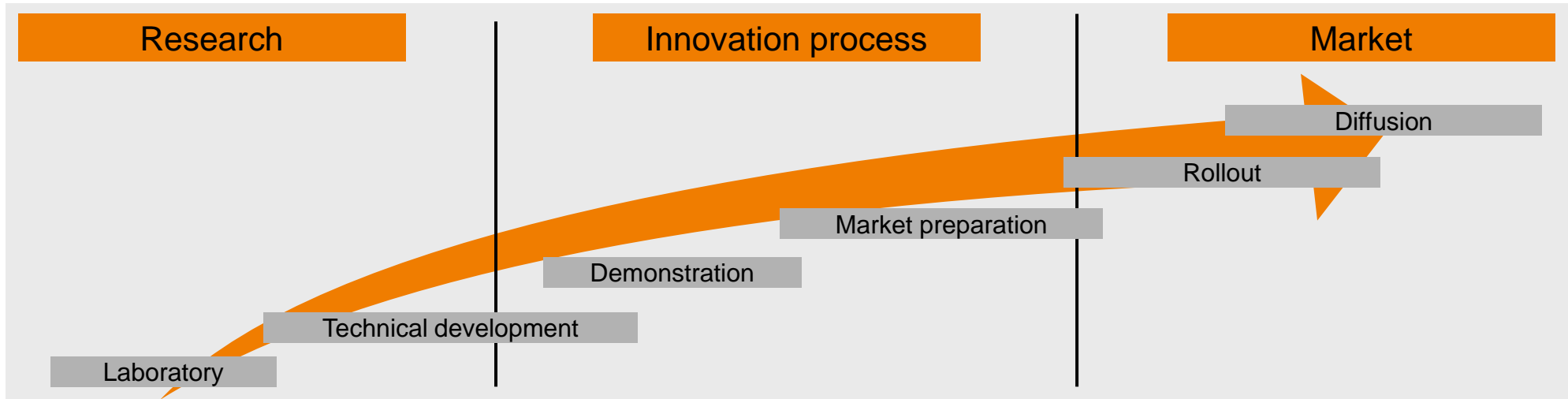
Knowledge Transfer (1/5): Central in Germany's Innovation Policy

- The central goal of Germany's high-tech strategy is to accelerate knowledge transfer from idea to innovation, especially through clusters
- Clusters are regional "hot-spots" of companies of a certain sector
- Focus on industrial sectors with high growth potential
- Competition for funding between the best clusters
 - The 15 successful clusters get 600,000 € funding from 2009 to 2017 primarily for cluster development
- The evaluation so far is impressive:
 - Every Euro funding to SMEs raised another 1.36 Euro investments in R&D
 - 900 innovations and 40 start-up companies

Germany's Leading-Edge Clusters



Knowledge Transfer (3/5): The Role of the EnergyAgency.NRW



 <p>energy research cluster</p> <p>Improve the knowledge transfer and coordination between public energy research institutions</p>	 <p>technology specific innovation networks</p> <p>Improve the knowledge transfer from research institutions to industry Representation of interests of different technology sectors in NRW</p>	 <p>Information, consulting, training, marketing campaigns</p> <p>Knowledge transfer to end users Support for widespread application of certain technologies (in PPP)</p>
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Knowledge transfer (4/5):

Our “Heat Pump Market Place” as one Example

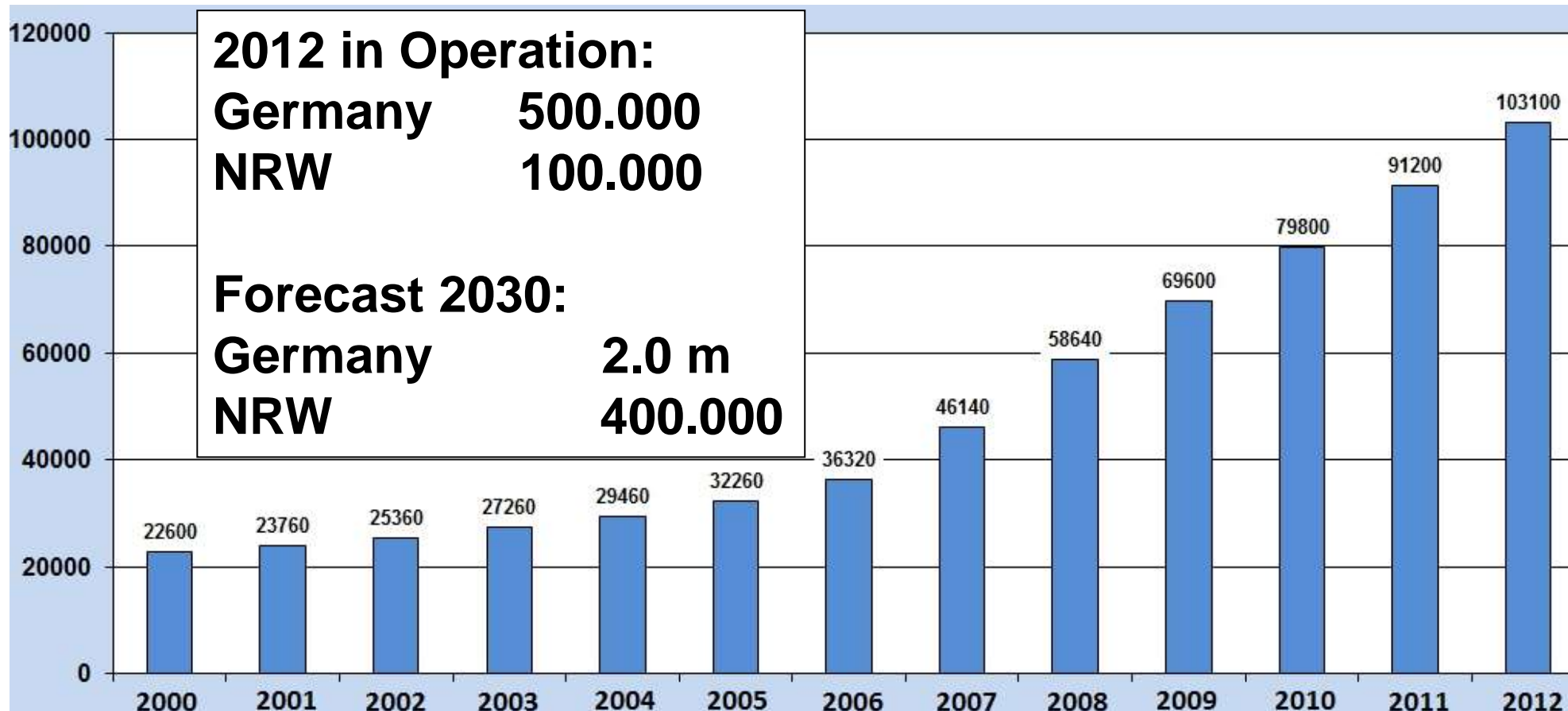
- Objective: Increase knowledge and application of the innovative energy efficient technology of heat pumps in NRW
- Co-financed by state and private sector partners
 - Founded 12 years ago, currently 100 members in total
 - drilling firms, manufacturers, architects and engineers, energy suppliers, associations and institutions
- The main task is to spread independent information for the utilisation of ambient heat to the customer
- Instruments:
 - market brochure, planning guide, annual heat pump weeks
 - road shows, media relations, presentations and retail trade fairs

Knowledge transfer (5/5):

Our “Heat Pump Market Place” as one Example



Sales figures: heat pumps in NRW 2012



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Research Funding for RES/EE: The Basis for Effective Innovation Policy

- There are 3 main sources of public sector research funding in Germany:
 1. Federal Government: Annual research funding for RES/EE increased from 200 m € in 2006 to 600 m € in 2013
 2. Federal states (16): In total 250 m € funding for energy research per year (mainly RES/EE)
 3. EU: Under the 7th Framework Research Program (2007-2013) 282 m € of grants for energy research were approved for Germany (the highest amount in EU)
- There is no data on private investments in R&D with regard to RES/EE
 - If we assume 50% funding and 50% private investments we have roughly R&D investments in RES/EE in Germany of **1.8 bn € / year**

Support for Innovations in Established Companies:

Central Innovation Program for SMEs (ZIM)

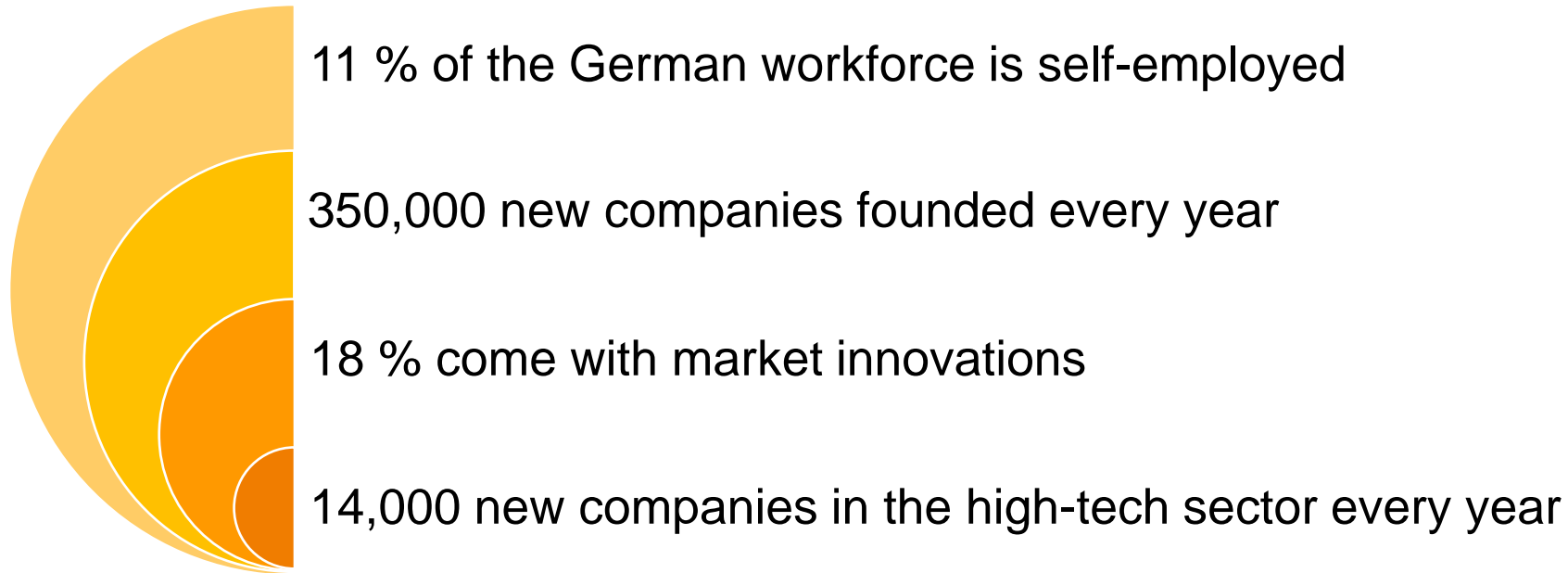
Source of capital	Federal Government (regular budget)
Target group	SMEs, co-operating research institutions
What is supported?	R&D projects (including services for commercialization), research network management
Technology	All types of technology
Type of support	Grant
Amount of subsidy per project	Percentage of project costs, max. 350,000 €
Amount of subsidy in total	543 m € (2012)
Eligibility criteria	innovative, high market potential, funds are necessary

Support for Innovations in Established Companies:

ERP innovation program (“ERP Innovationsprogramm”)

Source of capital	Federal Government (ERP fund)
Target group	companies up to 500 m € revenue
What is supported?	R&D projects, market launch projects (only SME)
Technology	Open to all technologies
Type of support	Loans, up to 60% subordinated loan
Amount of subsidy per project	Up to 100% of project costs, max. 5 m €
Amount of subsidy in total	814 m € (2013)
Eligibility criteria	Innovative for the applying company

Funding for innovative start-up companies (1/5): Entrepreneurship in Germany - Overview



Funding for innovative start-up companies (2/5):

The high-tech founder fund (High-Tech Gründerfonds)

Source of capital	PPP (Federal Government, KfW Bank, 18 major German companies)
Target group	High-tech start-up companies
What is supported?	Commercialization of high-tech inventions
Technology	Open to all high-tech start-up companies
Type of support	Subordinated loan, shareholding to attract other VC investors, coaching and networking
Amount of subsidy per project	15% shares of the company + subordinated loan (interest rate 10%), in total max. 0.5 m €
Amount of subsidy in total	573 m € invested capital to date (Currently 19 clean-tech investments)
Eligibility criteria	Technological innovation, significant growth potential ...to be described in a business plan

Funding for innovative start-up companies (3/5): Exist – University-Based Business Start-Ups

- EXIST is part of Germany's high-tech strategy
- It is aimed at
 - improving the entrepreneurial environment at universities and research institutions
 - increasing the number of technology and knowledge based business start-ups
- There are 3 program lines:



Funding for innovative start-up companies (4/5): Exist – University-Based Business Start-Ups

- **EXIST Business Start-Up Grant:**
 - Supports scientists, graduates and students in the preparation of their business start-up
 - Scholarship of max. 2,500 € /month for one year, 17,000 € for equipment, 5,000 € for coaching
- **EXIST Transfer of Research:**
 - Focused on high-tech business start-ups
 - In a first phase the feasibility proofing of the idea, prototype and business plan development is supported
 - 4 jobs + operating costs of 70,000 €
 - In a second phase the commencement of business is supported
 - Max. 150,000 € grant

Funding for innovative start-up companies (5/5): Climate-KIC Germany

Source of capital	PPP: European Institute on Innovation and Technology (EIT), universities, research institutions and companies
Target group	Development of start-up companies with focus on mitigation or adaptation to climate change (not limited to technological start-ups)
What is supported?	
Technology	
Type of support	Climate KIC Accelerator: 3 stage coaching and development process (offices, coaching, networking, scholarship)
Amount of subsidy per project	Scholarship: 1,400 € per person and month
Amount of subsidy in total	Currently 23 investments
Eligibility criteria	<ul style="list-style-type: none">• high potential ventures in terms of both climate impact and commercial viability and be related to new technology• at least two persons

Project based funding for innovative technologies

Basic principles of the German Renewable Energy Law (EEG)

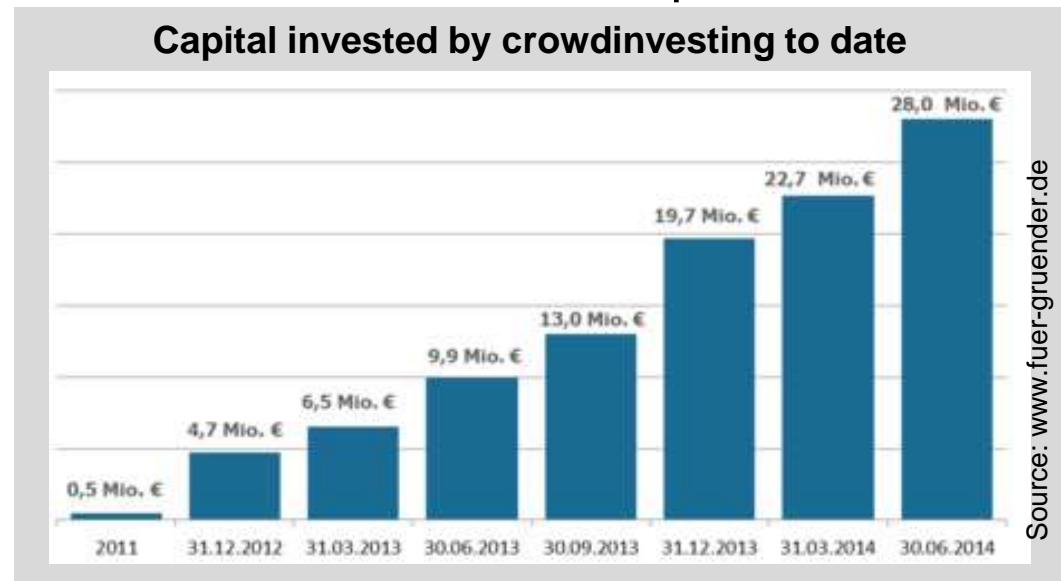
1. Safety of investment by guaranteed feed-in tariffs over 20 years and obligation of grid operator to connect
2. Incentives for innovation by declining remuneration
 - Currently:
 - Wind: 8.9 ct €/kWh (Offshore: 15.4 ct €/kWh)
 - PV: 9-13 ct €/kWh (depending on size)
 - Biogas: 13-15 ct/kWh (depending on size)
3. No liability for State treasury by a pay-as-you-go-system (EEG-Umlage)
 - Higher prices for end users (+ 67% since 2003)
 - Exceptions for energy intensive industries

Crowdfunding:

A promising way to finance innovations without state aid

- Crowdfunding means funding a project by raising monetary contributions from a large number of people, typically via the internet
- Crowdfunding is crowdfunding with the intention to make a profit

- Crowdfunding in Germany is new but growing:
 - 23 m € invested in 18 months



- Typical investments for crowdfunding are technology start-up companies or RES/EE projects
- ➔ Way to get funding for innovations in RES/EE via the market

Lessons Learnt

- There is not a “one fits it all”-instrument to come from ideas to innovative technologies in RES/EE
- Germany applies a combination of:
 - Ambitious goals in climate and energy policy
 - Mainly technology open funding instruments
 - Niche programs especially for green innovations
 - Different types of support (grant, loan, coaching)
 - For different stages in the innovation process (R&D, start-up, dissemination)
 - The reliable framework offered by the renewable energy law was crucial to stimulate the market for RES
 - Pitfalls to avoid (examples):
 - over-funding of different technologies
 - Fair burden sharing of costs to maintain support of the society

Thank You!



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