



100% Renewable Energy Cities

Komila Nabiyeva
Energy Watch Group

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European Union Energy Day
Clean energy solutions for the buildings of the future

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Agenda

Energy Watch Group: who we are

Why 100% renewable energy in cities?

100% renewable energy around the world & best practices

Preconditions for a successful energy transition in cities

Conclusions



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- Independent non-profit global network of scientists and parliamentarians
- President Hans-Josef Fell, ex-German MP and co-author of the draft German Renewable Energy Act 2000
- Monitoring & analyses of energy developments
- Studies on peak oil and coal, nuclear and renewable energy
- Analyses of the IEA World Energy Outlook



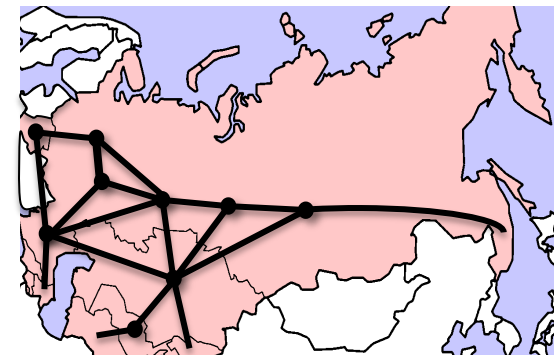
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- Current project: unique modelling of a global 100% RE system on hourly resolution across 4 sectors -electricity, heating, transport & industrial demand (together with the Lappeenranta University of Technology – due 08.2018)



LUT Eurasia Study: Average cost for generation, distribution & storage: 5,2 ct/kWh

- First study results show 100% RE based systems are more cost-effective than the existing ones



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Why 100% Renewable Energy in Cities?

- Urban areas account for 50% and by 2030 for 2/3 of the world's population
- => 67% of global energy use & 70% of energy-related CO2 emissions
- The biggest contributors, but also most vulnerable to climate change:
- 90% of urban areas are coastal, over 90% cope with air exceeding WHO limits

The good news is:

- Renewable energy has been breaking records, as costs for solar and wind keep falling
- In the next 5 years, RE will be cheaper than coal and gas generation => stranded assets
- Advantages: strong resilience, economic growth, new jobs and better quality of life

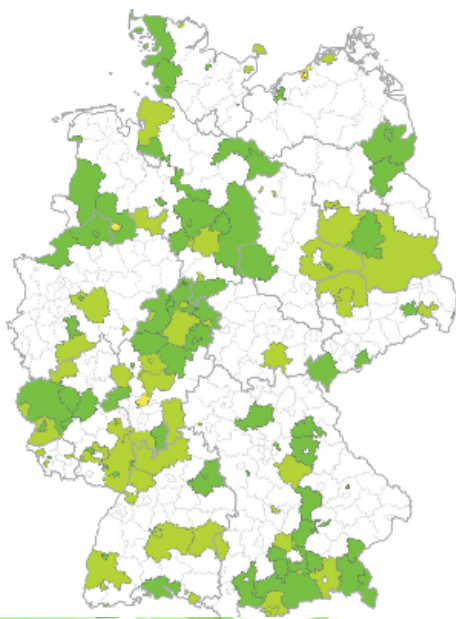
Sources: IRENA, REN21, Bloomberg NEO



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100% Renewable Energy Around the World



German cities and regions, which committed to 100% RE and take action. Source: www.100-go.de

- Countries: Denmark, Sweden, *Costa Rica*, Iceland, Cape Verde
- Climate Vulnerable Forum (48 countries) -100% RE till 2050
- Cities: Barcelona, Munich, Vancouver, San Francisco, Copenhagen, Sydney
- In 2015, in Paris over 700 city leaders joined 100% RE
- Companies: 100 companies with 100% renewable electricity target, incl. Google, Apple, Ikea, Axa and *Dong Energy*

More examples at www.go100re.net and www.there100.org/companies



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Preconditions for a Successful Energy Transition

- Policy: embed 100% RE and energy efficiency in a broader strategy and vision
- Finance: Adopt mechanisms to fund local RE generation and energy efficiency
- Cooperation: Foster cooperation between cities and their surrounding area
- Community: Raise awareness and involve citizens & community
- Key sectors for the transformation: buildings, transport and integrated urban energy systems



Examples: 100%RE Buildings blocks, CLER „Cities heading towards 100% renewable energy”

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Visions for Clean Energy Cities

- The highest growth in energy use is expected in cities in emerging & developing countries => we need a major shift in urban planning, transport and combined systems
- Emerging & developing countries can leapfrog the mistakes of the developed ones
- Cities should be built for people, not for cars
- Make use of historic know-how on energy-efficient construction

wood, straw bale, wattle and daub (mud-houses) – regional, sustainable, cost-effective, energy-efficient

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A Message to Astana

„The Dubai of Central Asia”

Why not aim for more: „The Astana of Europe or the Americas“?



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Conclusions

- 100% RE is reality today – technology, know how & best practices exist
- Key sectors for the transformation: buildings, transport and urban energy systems
- Emerging and developing countries can leapfrog the mistakes of developed ones
- Preconditions for a successful energy transition:
 - Solid policy & strategy
 - Investment security
 - Awareness on RE and energy efficiency benefits
 - Citizen & community involvement

Contact

Komila Nabiyeva
Energy Watch Group
Albrechtstr. 22, 10117 Berlin

+49 (30) 609898810

nabiyeva@energywatchgroup.org

www.energywatchgroup.org

@EWGNetwork



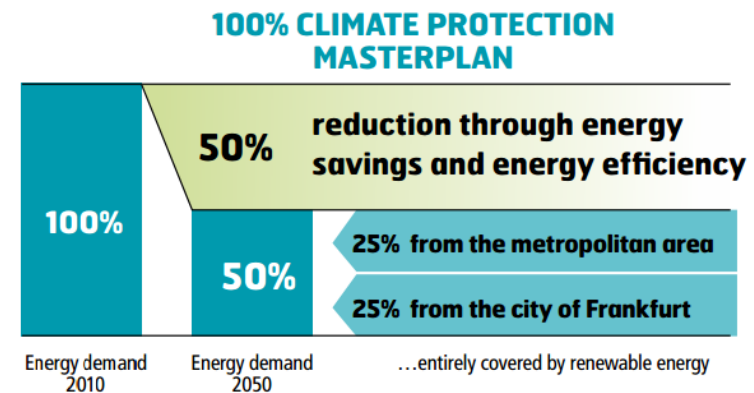
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Best Practices

Frankfurt am Main, Germany

- One of the 1st GER cities with 100% RE Roadmap till 2050
- Key part - Energy efficiency
- RE: solar PV, wind, biomass plus cogeneration units for heating



Source: IRENA, 2016



Best Practices

Kisielice, Poland

- Pioneer in a country, relying on coal (about 90% of electricity in PL)
- Kisielice achieved 100% renewable electricity in 2014 (wind and biomass)
- 85% of winter heating from local biomass CHP plant



Source: Global 100% RE Platform



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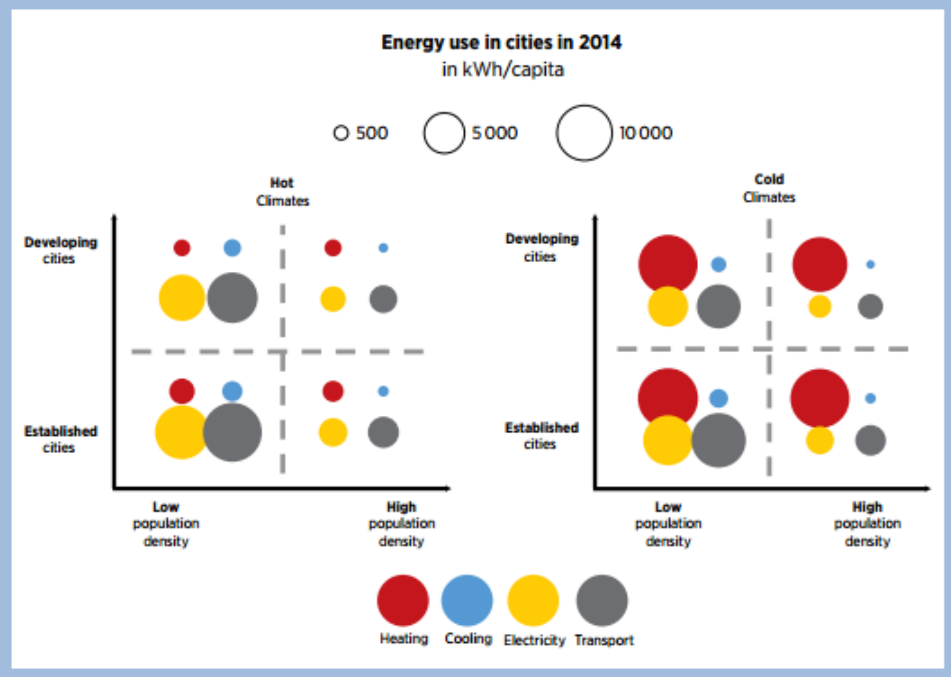
Useful Resources and References

- Energy Watch Group (watch out for the global study on 100% RE)
- Lappeenranta University of Technology, Prof. Christian Breyer (regional and country studies on 100% RE)
- Global 100% renewable energy platform, www.go100re.net (studies, guides and tools)
- IRENA, Renewable energy in cities, Oct. 2016
- CLER, Cities heading towards 100% renewable energy, Nov. 2016
- EU Covenant of Mayors on Climate and Energy
- Climate Action Network, TransitionInAction.org (guides, facts & stories)
- ICLEI network



Additional Materials

Figure ES1: Energy use by application in different city types, 2014





Paris, December 3, 2015



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