

A WORLD GOING TOWARD 100% RENEWABLE ENERGY

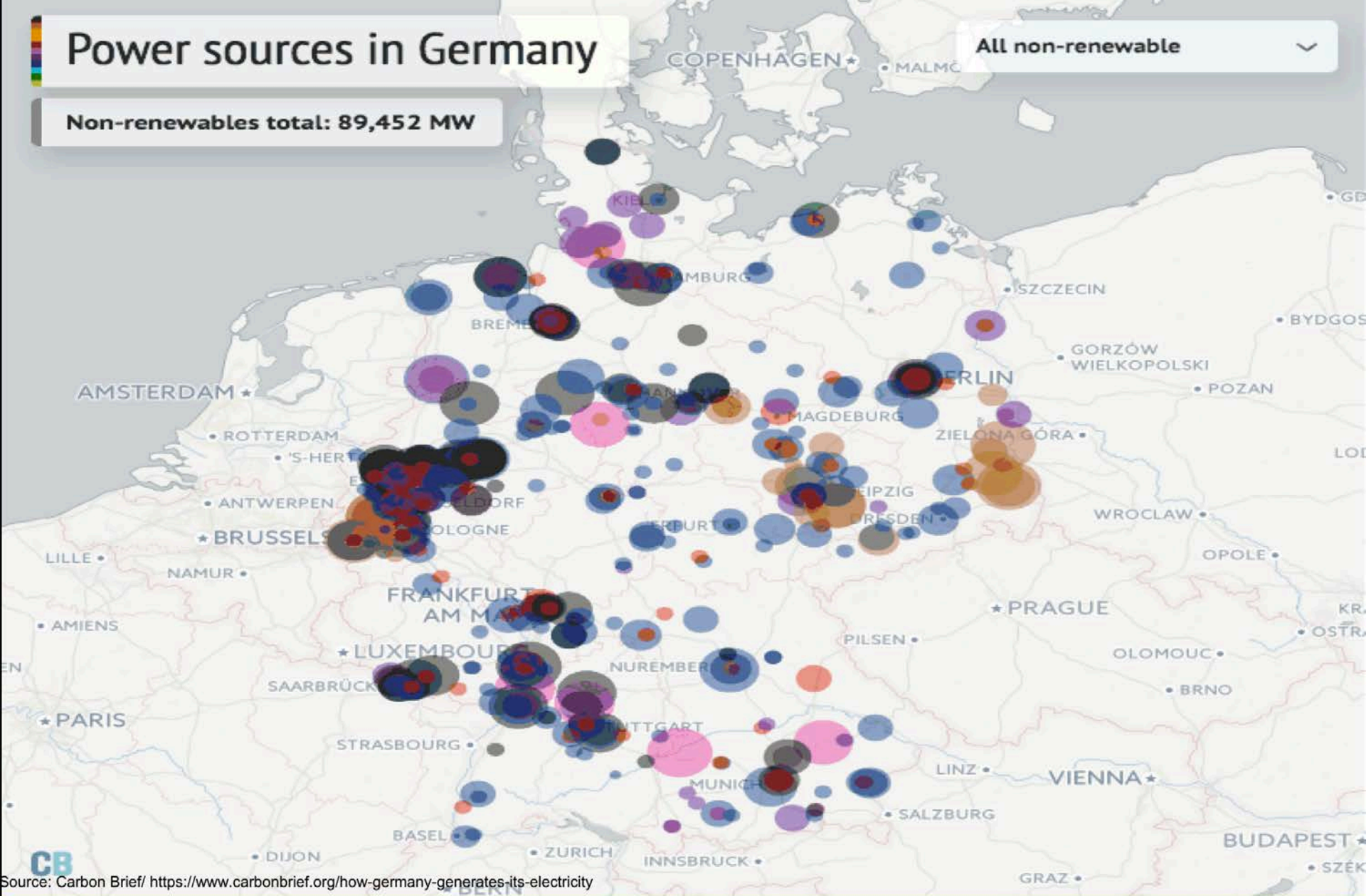
Stefan Schurig – Director Climate Energy – Tokio, 10th March 2017

Thesis #1: current energy markets are subject of a transformation from a vertical structure into a horizontal structure.

Power sources in Germany

Non-renewables total: 89,452 MW

All non-renewable



Source: Carbon Brief/ <https://www.carbonbrief.org/how-germany-generates-its-electricity>

VOICE OF FUTURE GENERATIONS



VOICE OF FUTURE GENERATIONS



VOICE OF FUTURE GENERATIONS



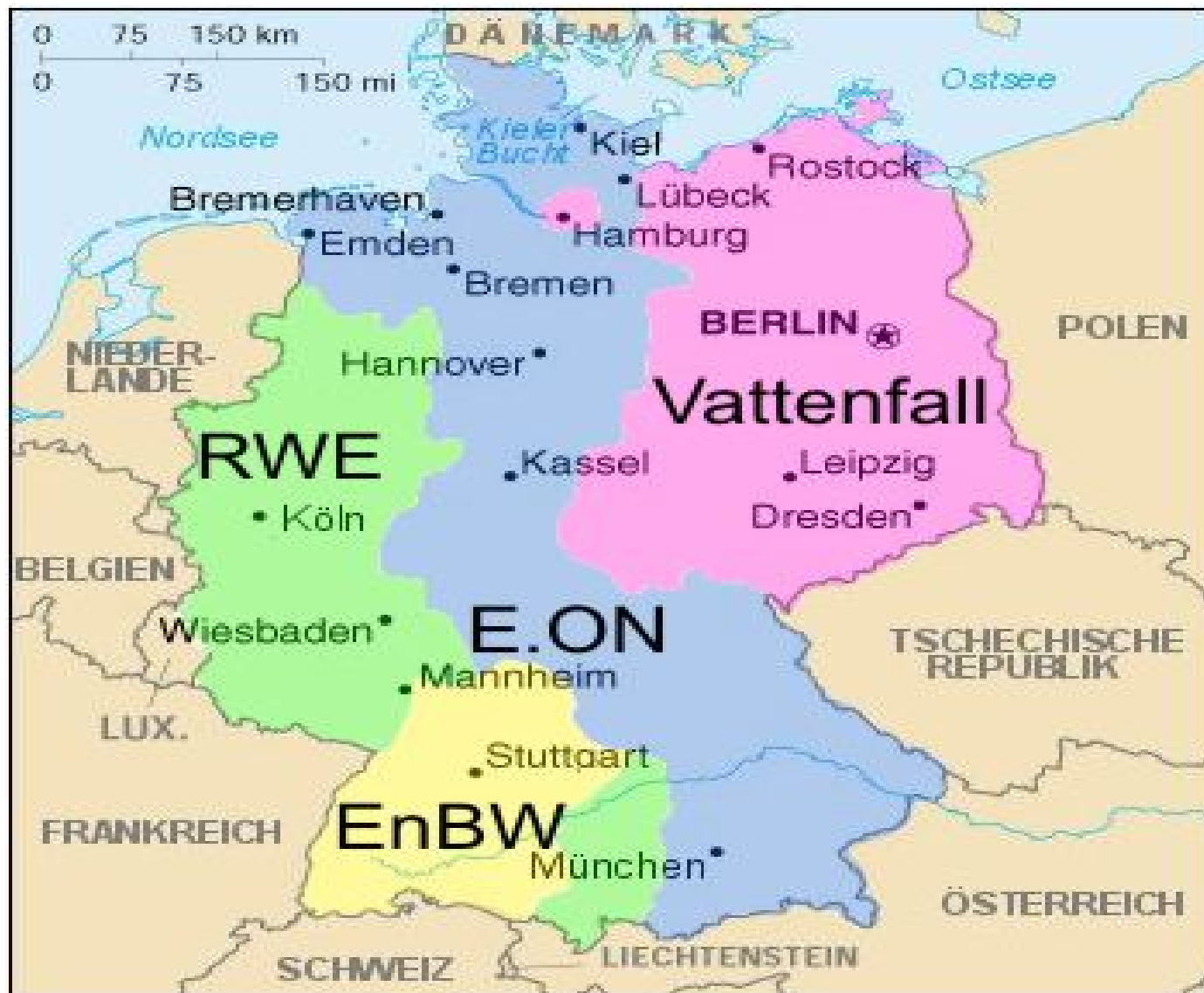
Copyright Leander Schiefer

VOICE OF FUTURE GENERATIONS



bawerpower

VOICE OF FUTURE GENERATIONS



VOICE OF FUTURE GENERATIONS

Growth of 860,000 PV Installations in Germany

Jan 2009 - Jan 2013

Data from:
bundesnetzagentur.de

Visualization by:

Chris Davis
&
Alfredas
Chmieliauskas

enipedia.tudelft.nl

VOICE OF FUTURE GENERATIONS

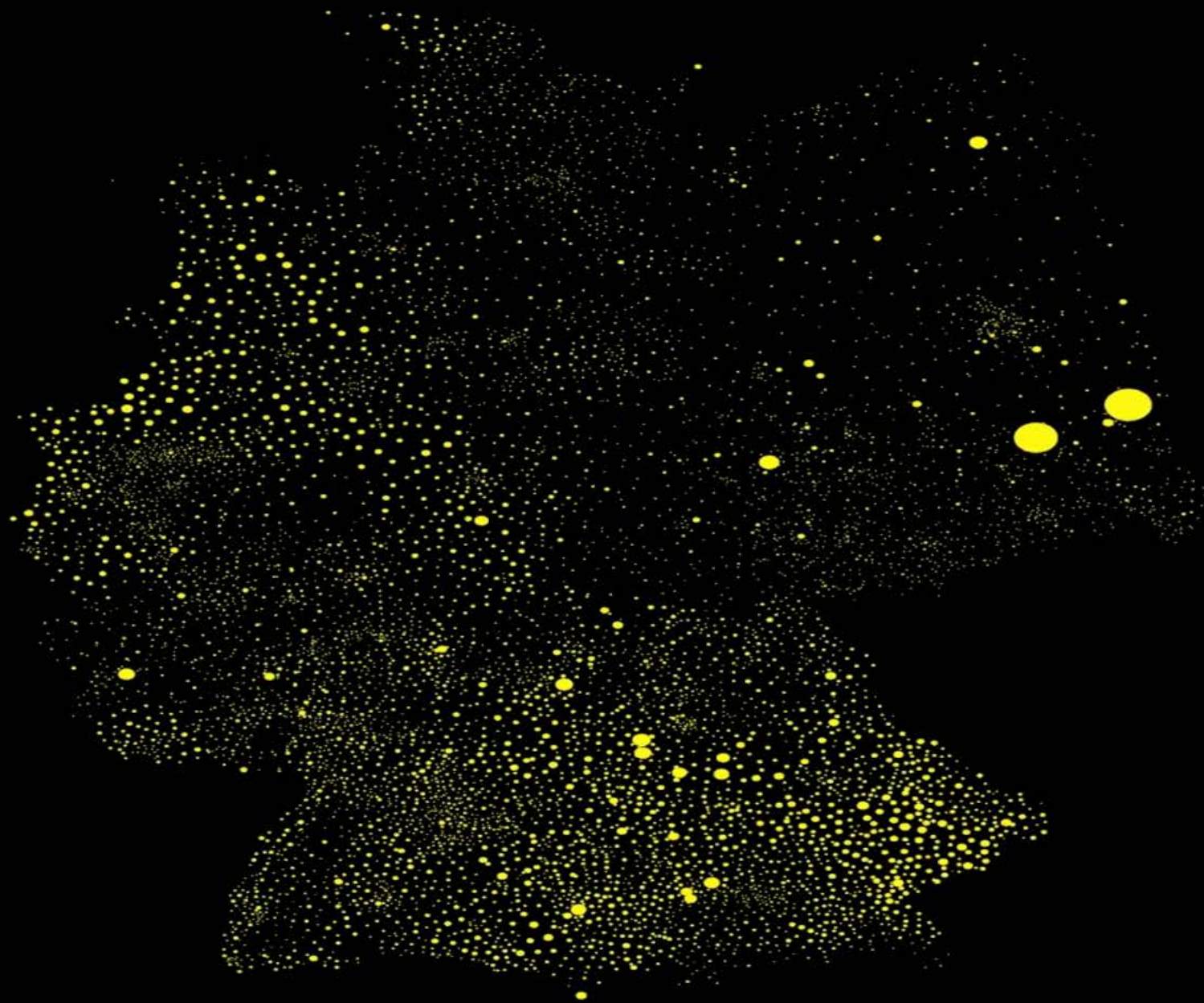
2009-04-04 - 86.0 MW



2009-07-20 - 717.7 MW



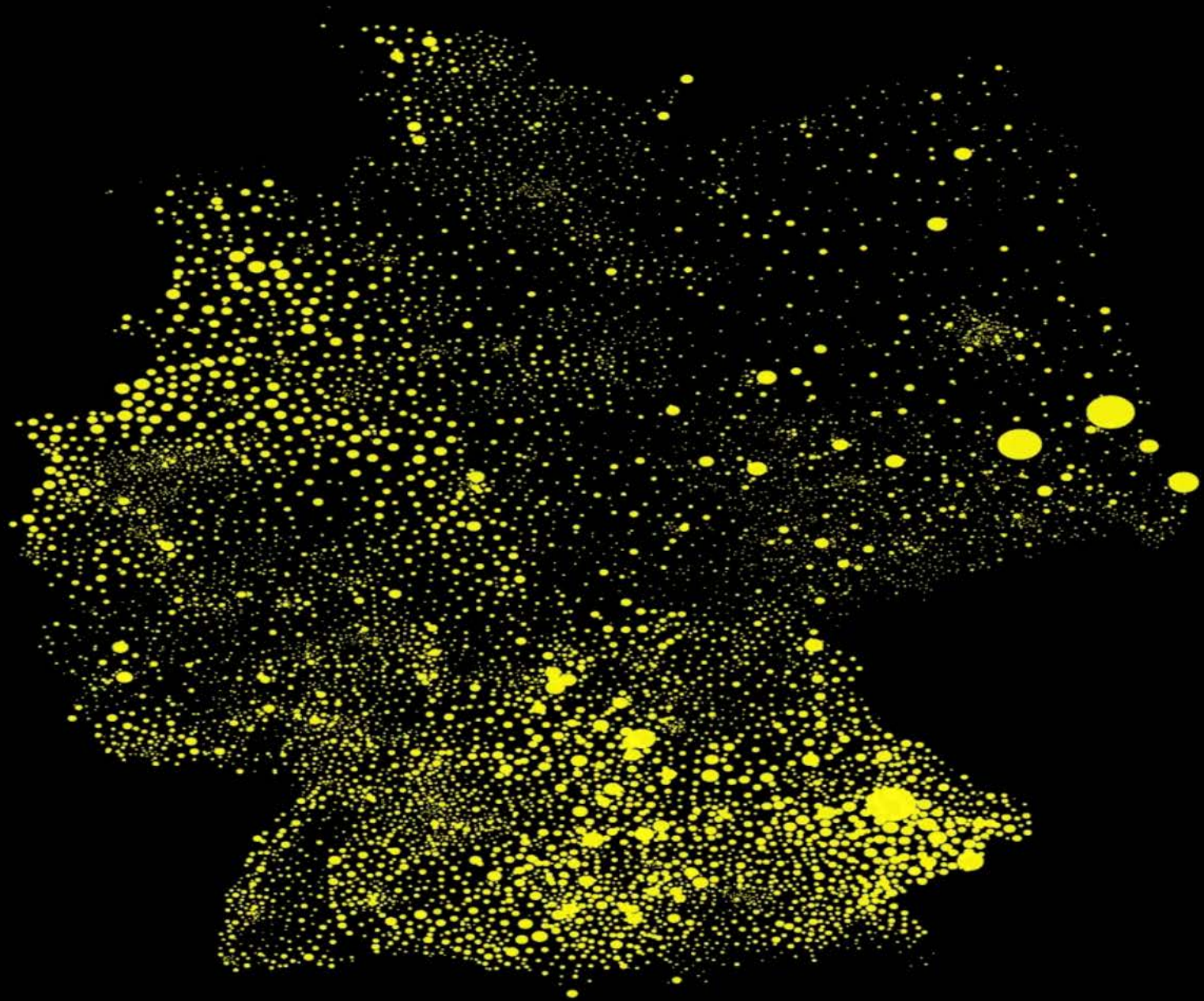
2009-09-30 - 1470.8 MW



2009-12-15 - 2843.9 MW



2010-02-08 - 4072.3 MW



2010-06-08 - 5734.8 MW



2010-08-13 - 8483.6 MW



2010-10-21 - 10086.5 MW



2012-01-18 - 19524.9 MW

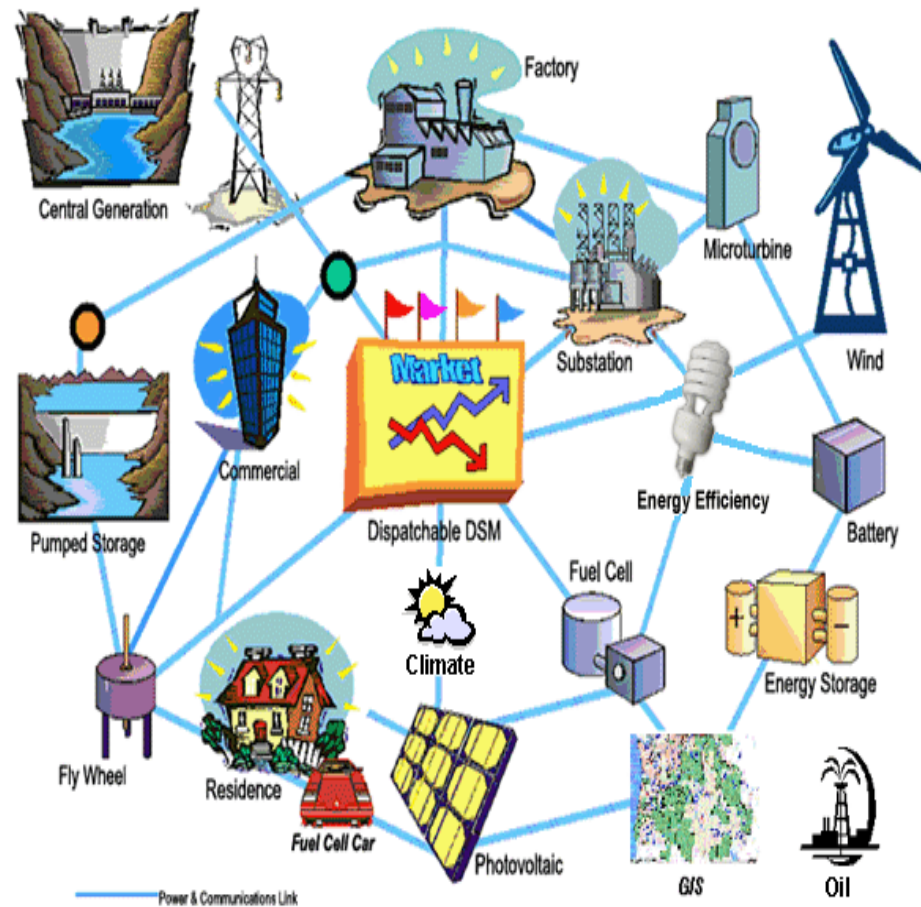
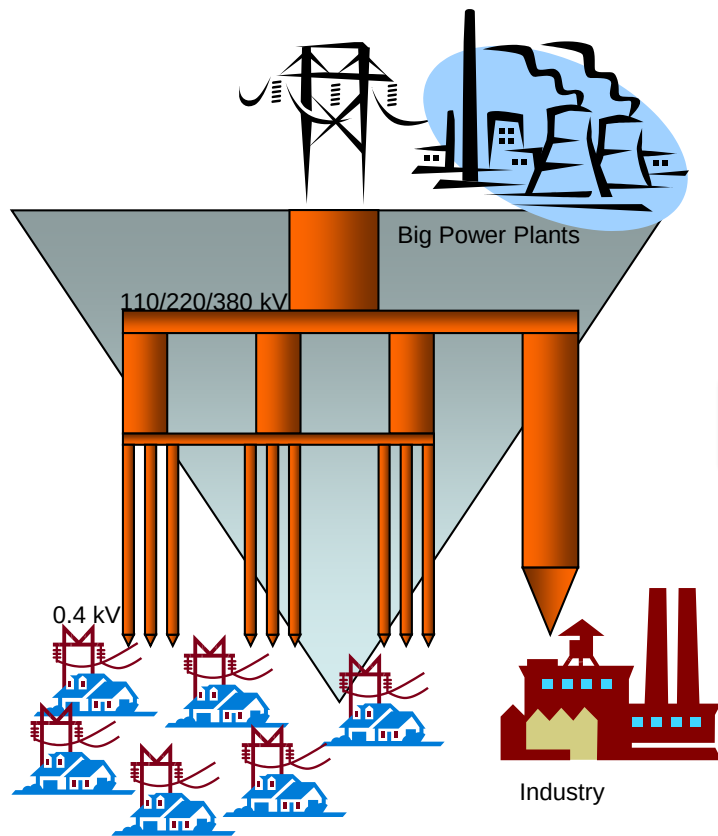


2012-05-18 - 21638.1 MW



2012-11-29 - 26370.0 MW





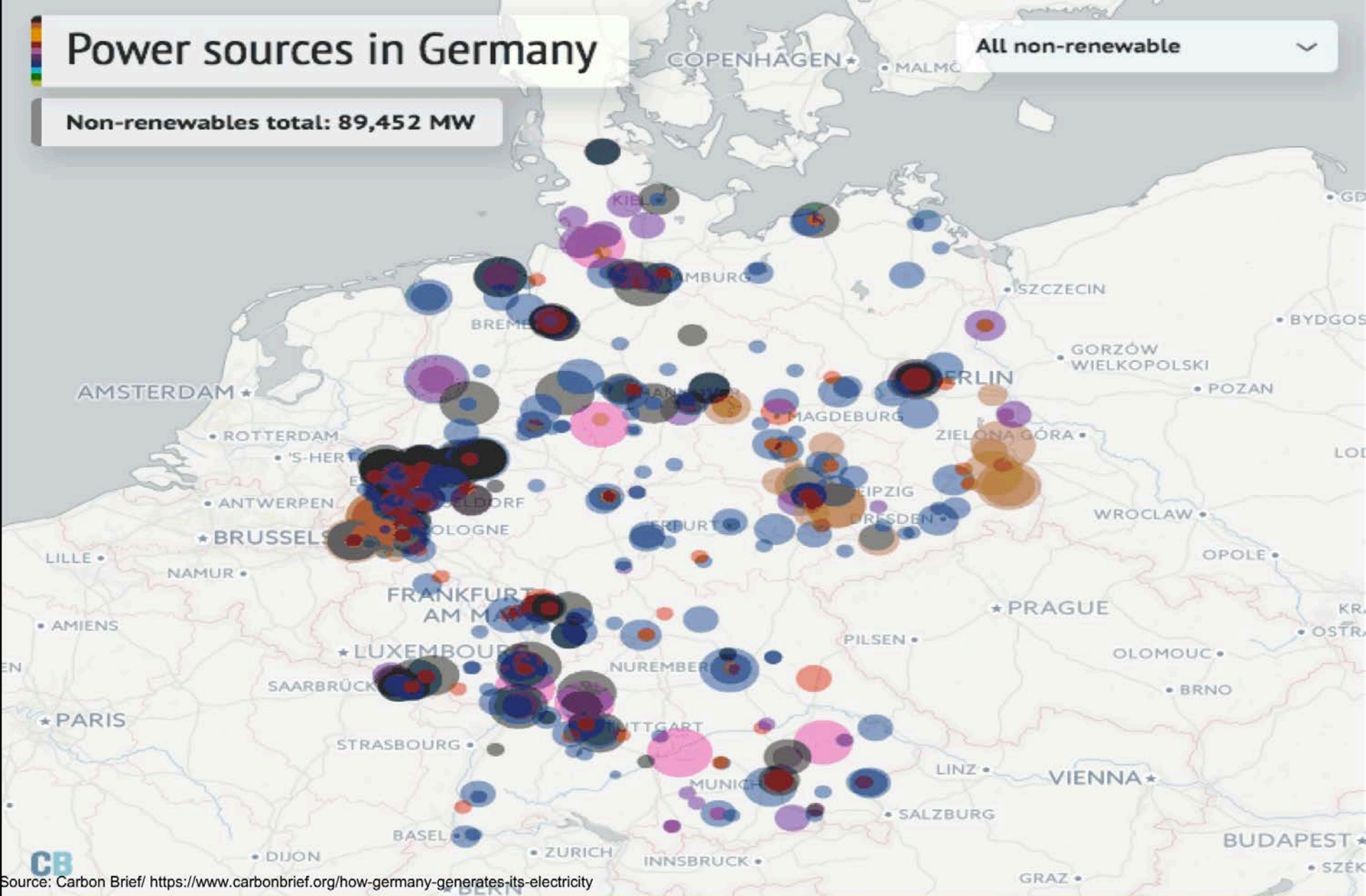
Source: EnergyWeb@2010,
www.bpa.gov

VOICE OF FUTURE GENERATIONS

Power sources in Germany

Non-renewables total: 89,452 MW

All non-renewable



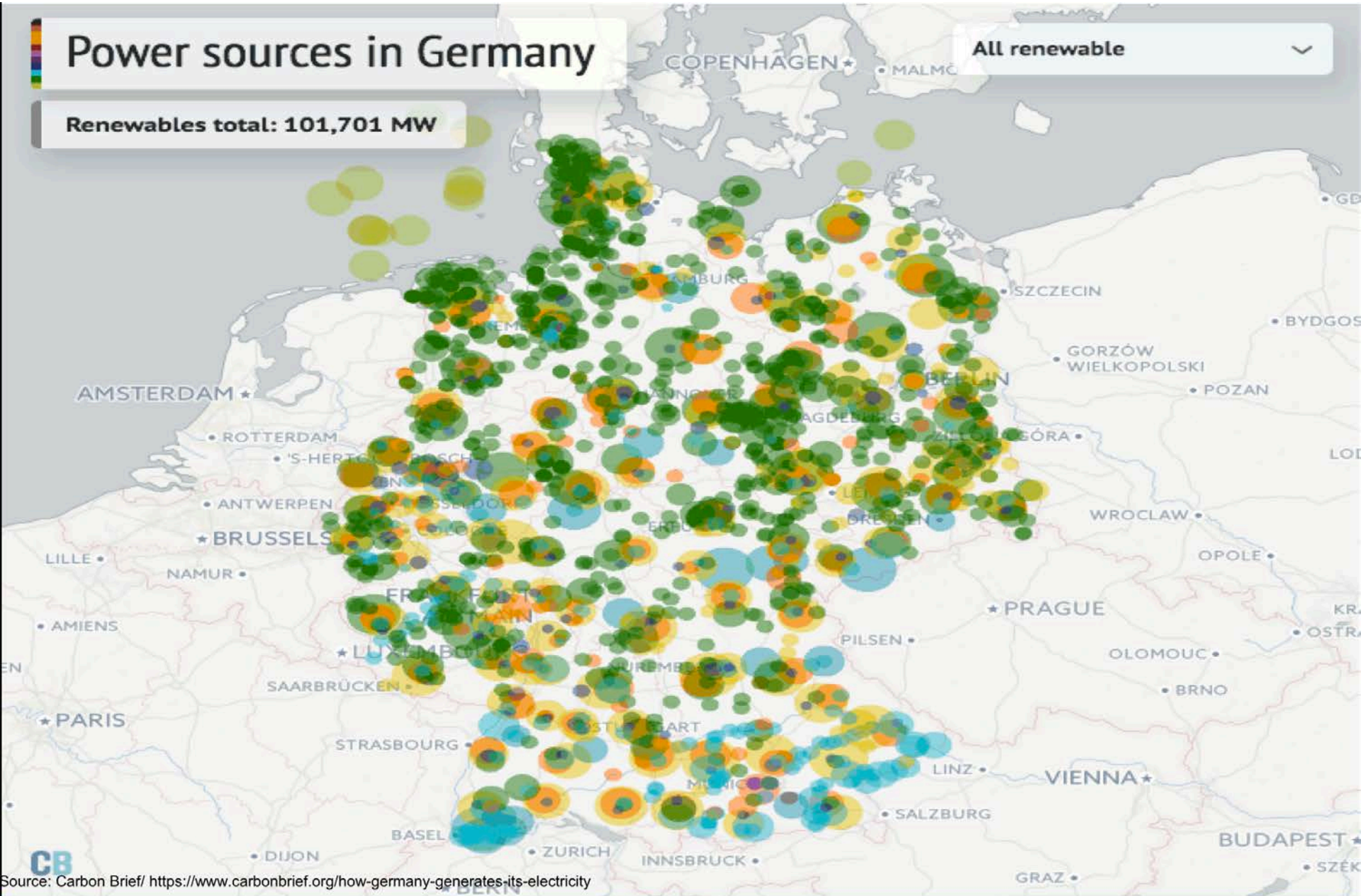
Source: Carbon Brief/ <https://www.carbonbrief.org/how-germany-generates-its-electricity>

VOICE OF FUTURE GENERATIONS

Power sources in Germany

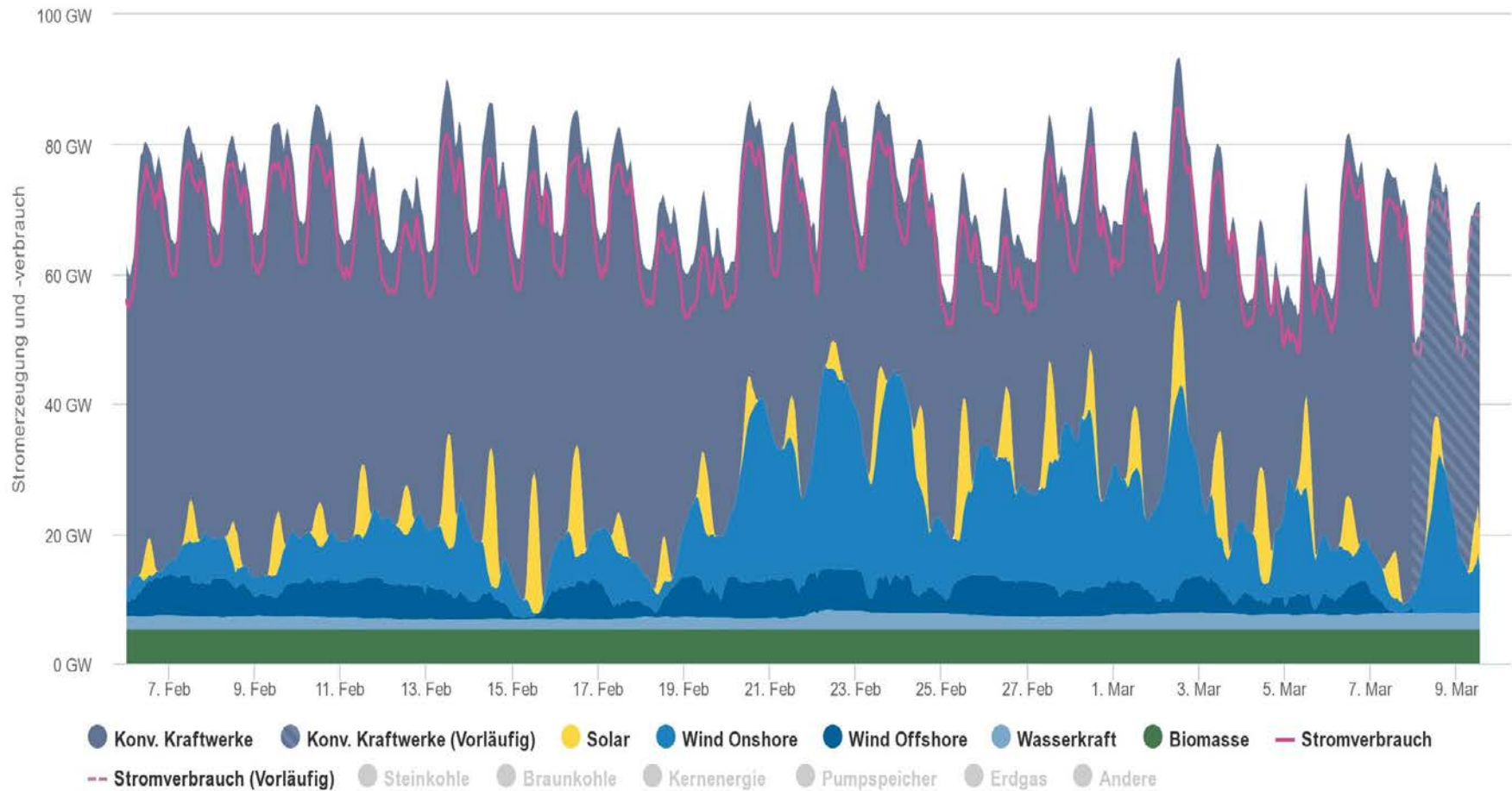
All renewable

Renewables total: 101,701 MW



Source: Carbon Brief/ <https://www.carbonbrief.org/how-germany-generates-its-electricity>

VOICE OF FUTURE GENERATIONS



Agora Energiewende; Stand: 09.03.2017, 15:10

VOICE OF FUTURE GENERATIONS

Thesis #1: current energy markets are subject of a transformation from a vertical structure into a horizontal structure.

Thesis #2: Clear targets for this transformation facilitate cooperation and communication

THE POWER OF TARGET SETTING

- 1) **demonstrates and communicates political will**, commitment, leadership and vision
- 2) **catalyzes change by streamlining** and providing an official mandate for action (mobilization of stakeholders)
- 3) helps **ensure a more efficient utilization and channeling** of technical, administrative, as well as financial resources
- 4) creates **investment security**



VOICE OF FUTURE GENERATIONS

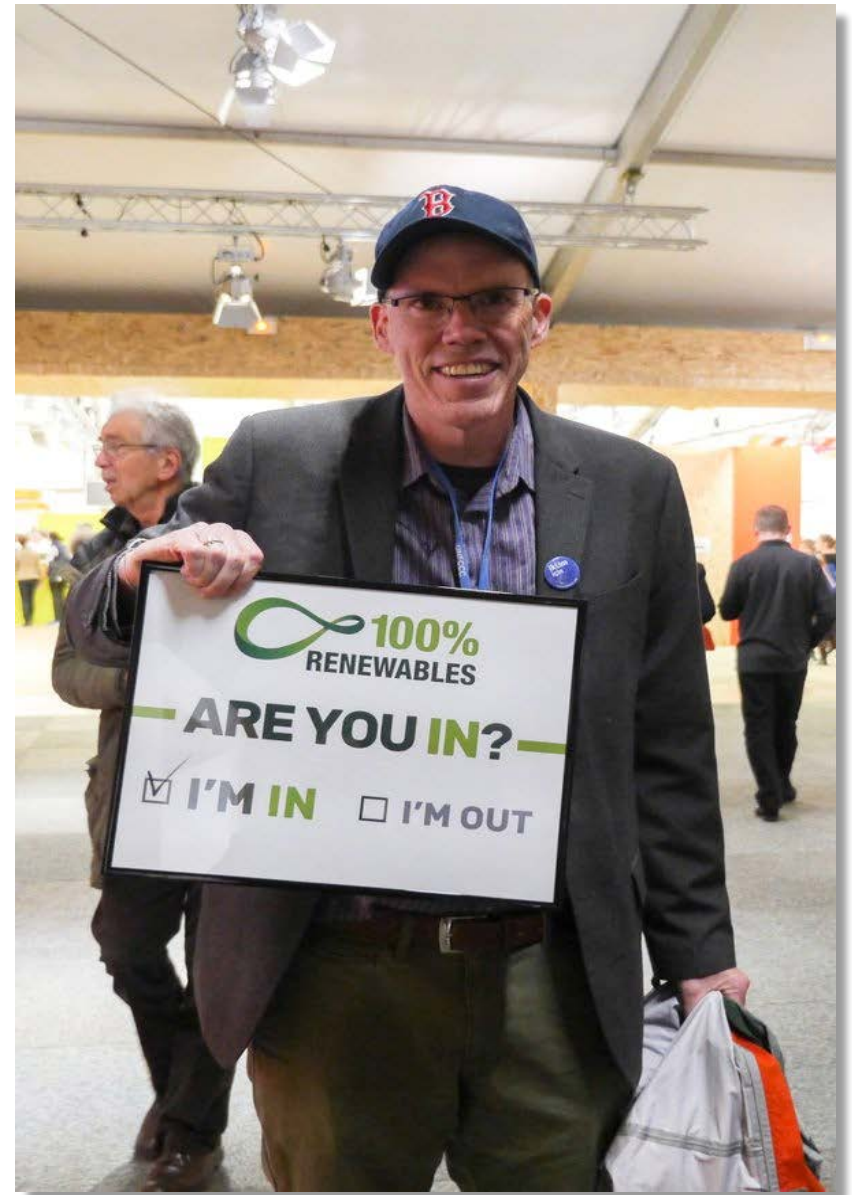



**100% RENEWABLE
ENERGY**
SILVER CLUB 100% RENEWABLES

VOICE OF FUTURE GENERATIONS



VOICE OF FUTURE GENERATIONS



VOICE OF FUTURE GENERATIONS



VOICE OF FUTURE GENERATIONS



100% Renewable Energy to stay below 1.5°C

VOICE OF FUTURE GENERATIONS

Cities & Communities

- Frankfurt am Main, Germany
- San Francisco, California

Regions & States

- Fukushima Prefecture, Japan
- Rhein-Hunsrück District, Germany

National Governments

- Cape Verde
- Denmark

Island Governments

- Tuvalu
- El Hierro, Spain

100% RENEWABLE ENERGY: A GLOBAL MOVEMENT

Countries with a 100% RE target

Denmark, Sweden, Cape Verde, Costa Rica, Iceland

Small-Island States with 100% RE target

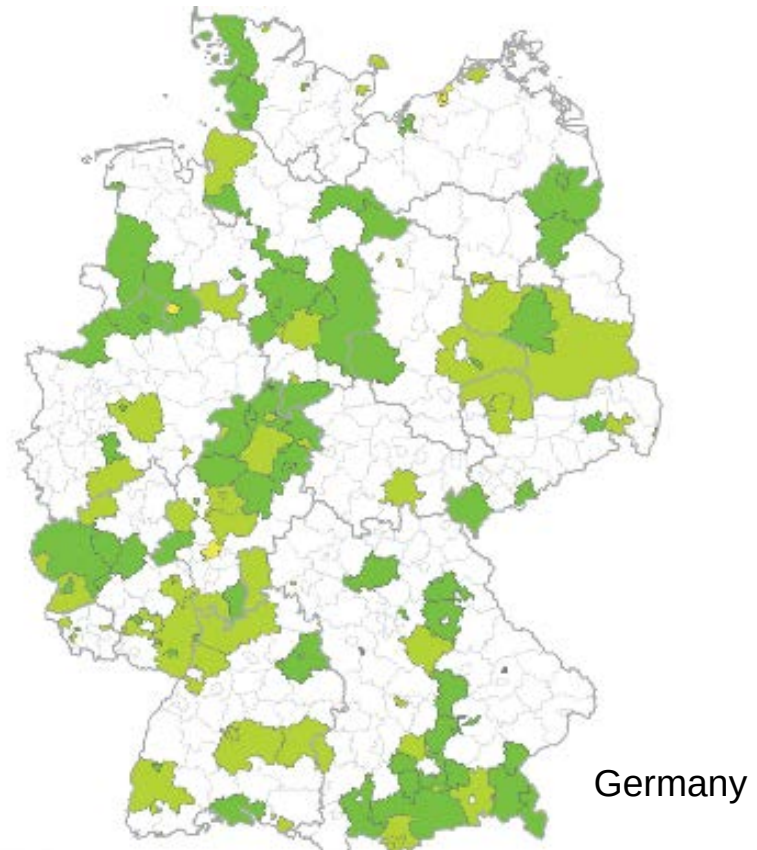
Islands of Tuvalu, Tokelau, Vanuatu, Maldives, Cook Islands, Samoa, Papua New Guinea...

Regions with a 100% RE target

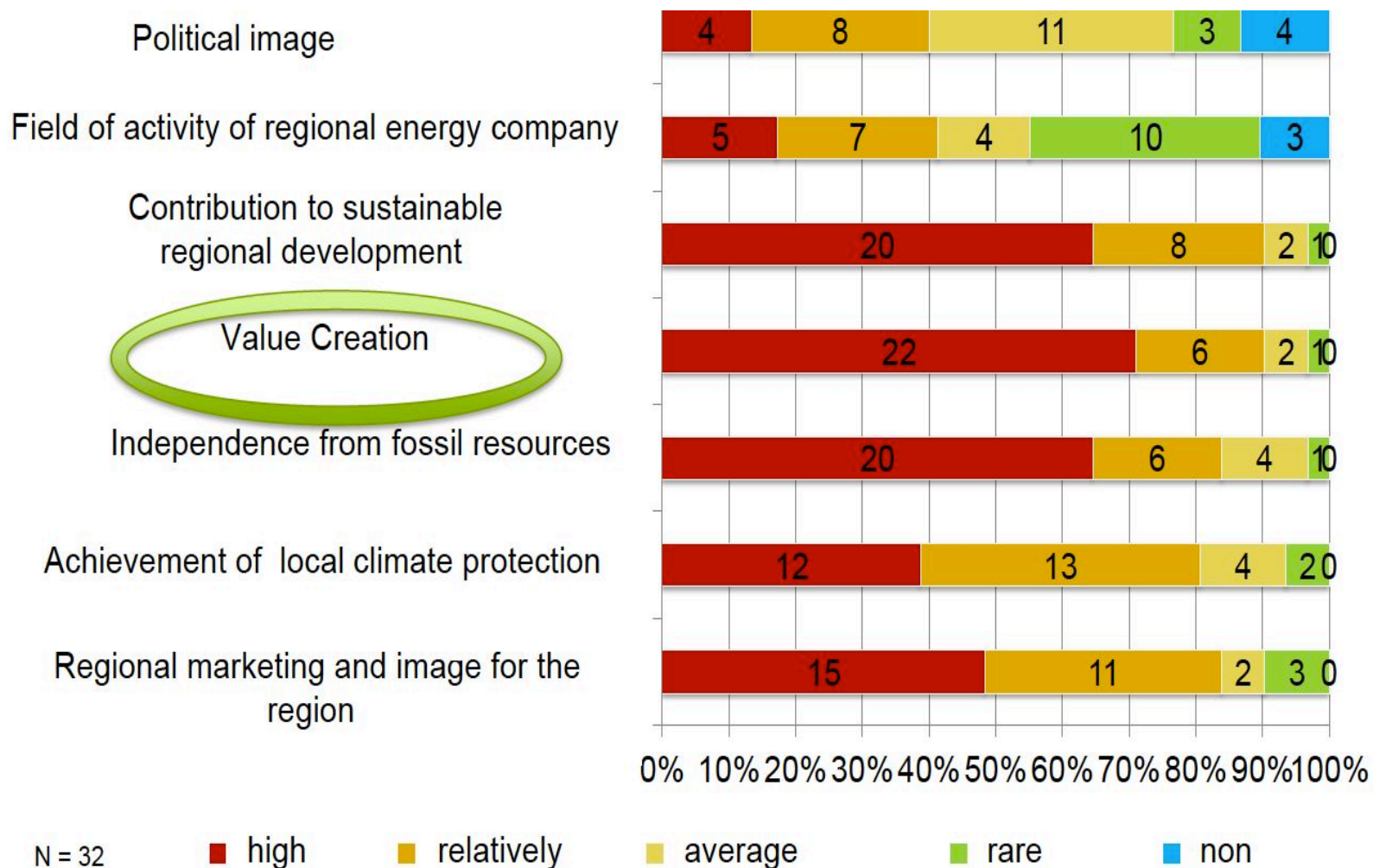
Scotland, Upper Austria, Fukushima Prefecture/ Japan, Jeju Province/ Korea, Kasese/ Uganda...

Cities with 100% RE target

Frankfurt, Munich, Vancouver, San Francisco, Copenhagen, Malmö, Sydney, Masdar City...



VOICE OF FUTURE GENERATIONS



SAMSÖ - DENMARK



VOICE OF FUTURE GENERATIONS

SAMSO: THE ENERGY SELF-SUFFICIENT ISLAND

The first island to become completely energy self-sufficient in 10 years?

11 ONSHORE WIND TURBINES

1 turbine generates enough electricity to power **630 houses**.

The turbines transmit electricity to the mainland when more electricity than the island can consume is generated.



OFFSHORE WIND TURBINES

10 103m high offshore wind turbines constructed in 2003 produce more energy than the island uses for transport



11 1MW onshore wind turbines generate 28,000 MWh, that's more electricity than the island's total consumption and the equivalent of 690,000 gallons of oil.

3 x STRAW FIRED PLANTS

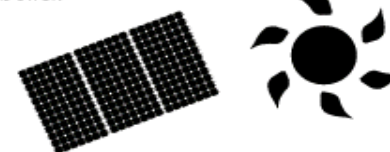
-  Tranebjerg
Heats **263** households
-  Ballen / Brundy
Heats **232** households
-  Onsbjerg
Heats **76** households

SAMSO: ISLAND FACTS

Area: 114 km²
Population: 4,000
Investment: DKK 368 million

SOLAR PLANT

One of the heating plants receives heat from **2500 m²** of solar panels. This is combined with a **900 KW** wood chip fired boiler.



EXCESS ENERGY

Excess electricity produced from offshore wind farms is invested in new energy projects.



VOICE OF FUTURE GENERATIONS

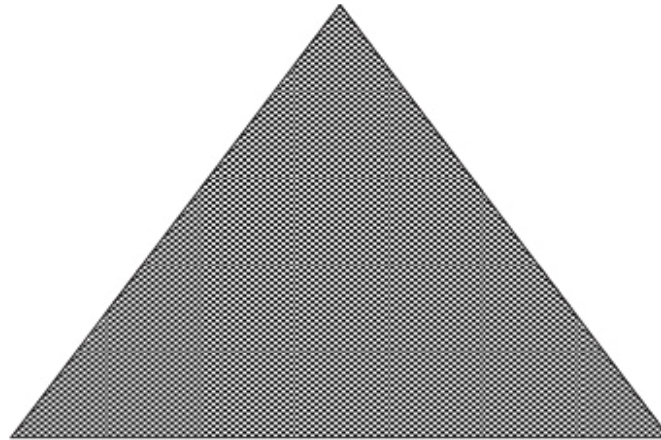
Thesis #1: current energy markets are subject of a transformation from a vertical structure into a horizontal structure.

Thesis #2: Clear targets for this transformation facilitate cooperation and communication

Thesis #3: only a people centered approach will help to overcome barriers and increase acceptance

Socio-political acceptance

- Of technologies and policies
- By the public
- By key stakeholders
- By policy makers



Community acceptance

- Procedural justice
- Distributional justice
- Trust

Market acceptance

- Consumers
- Investors
- Intra-firm

Source: Rolf Wüstenhagen, Maarten Wolsinkb, Mary Jean Burer, 2007

VOICE OF FUTURE GENERATIONS



VOICE OF FUTURE GENERATIONS



community

VOICE OF FUTURE GENERATIONS

WorldFutureCouncil

ACTIVATE LOCAL RESOURCE POTENTIAL

Mobilize Local Resources; Identify Programs for Support and Assistance; Perform Preliminary Assessments

FORMALIZE AIMS AND FUNCTIONS

Fix Binding Targets; Set Comprehensive Legal and Regulatory Frameworks; Establish Relevant Institutionalized Bodies

DEVELOP THE 100% RE BLUEPRINT

Define the 100% RE Target; Develop a 100% Renewable Energy Scenario Estimate the Potential Economic, Environmental and Social Benefits

IDENTIFY FINANCIAL RESOURCES

Introduce Innovative and Alternative Financing Mechanisms; Implement New Mechanisms to Internalize Externalities; Establish Stable, Long-Term Support Schemes

ENGAGE IN NETWORKS

Form and Engage in Local and Regional Networks; Participate in International Networks

PROMOTE KNOWLEDGE GENERATION AND CAPACITY BUILDING

Generate and Disseminate Specific Knowledge; Make Knowledge and Data Accessible; Promote Capacity Building and Training

VOICE OF FUTURE GENERATIONS

SUPPORT DECENTRALIZATION AND INCLUSION

*Ensure Accountability and Transparency;
Promote Inclusive Communication and Outreach; Empower a Decentralized and Diversified Energy Transition ; Safeguard a Socially Just Transition*

FOSTER VERTICAL AND HORIZONTAL COOPERATION

Further Vertical Cooperation; Cultivate Horizontal Cooperation

PROMOTE ENERGY CONSERVATION AND EFFICIENCY

Change Human Behaviour; Retrofit Existing Built-Environments; Upgrade Infrastructures and Support New Technologies

INCREASE AND INTEGRATE RE ACROSS SECTORS

Increase Renewable Electricity Generation; Tackle the Built Environment Challenge (heating/cooling); Tackle the Mobility and Transport Challenges; Modernize the Grid and Other Infrastructure

VOICE OF FUTURE GENERATIONS



“Our future will hold greater prosperity and justice when we are free from the grip of fossil fuels. Now to get there, we must act. We must finally leave behind the inefficient technologies of another century and the business models that they have created.”

VOICE OF FUTURE GENERATIONS



“So to all the mayors and governors in this room today, I implore you to join with your peers to commit to moving to no less than 100 percent [renewable energy](#) as soon as possible. Do not wait another day.

VOICE OF FUTURE GENERATIONS



World Future Council

Dipl. Ing. Stefan Schurig |
Director Climate Energy |
stefan@worldfuturecouncil.org