



renewable  
energy  
& energy  
efficiency  
partnership



SEMANTIC WEB COMPANY  
linking data to knowledge



# Linked Open Data in Use

Linked Open Data in Clean Energy & for Sustainable Development  
20.06. 2012, Using Open Data Workshop, W3C, Brussels

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@semwebcompany

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# Agenda

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## **Linked Open Data in Clean Energy**

Potentials, Benefits, Real World Examples

## **reegle.info – we are open!**

The data hub for clean energy & sustainable development

## **(Linked Open) Controlled Vocabularies**

What is this & what is this good for?!

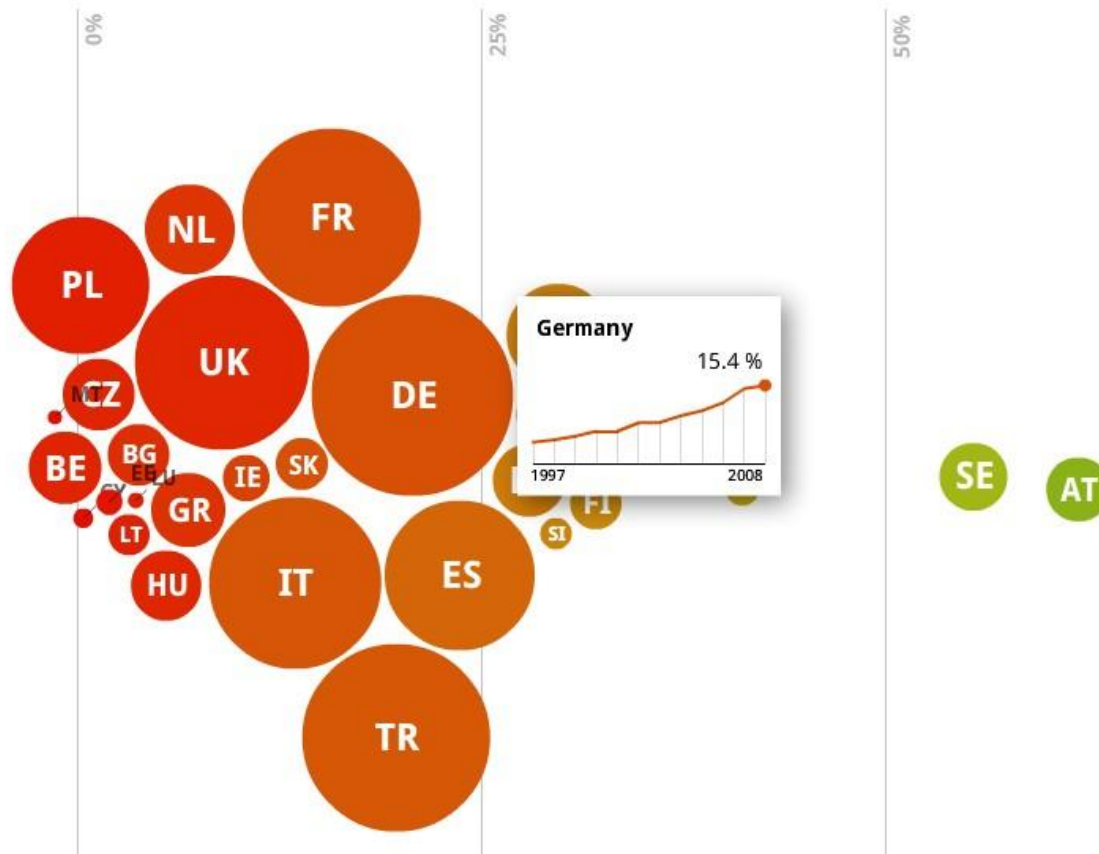
## **Linked Open Vocabularies in Use**

Open Data, Examples & Outreach

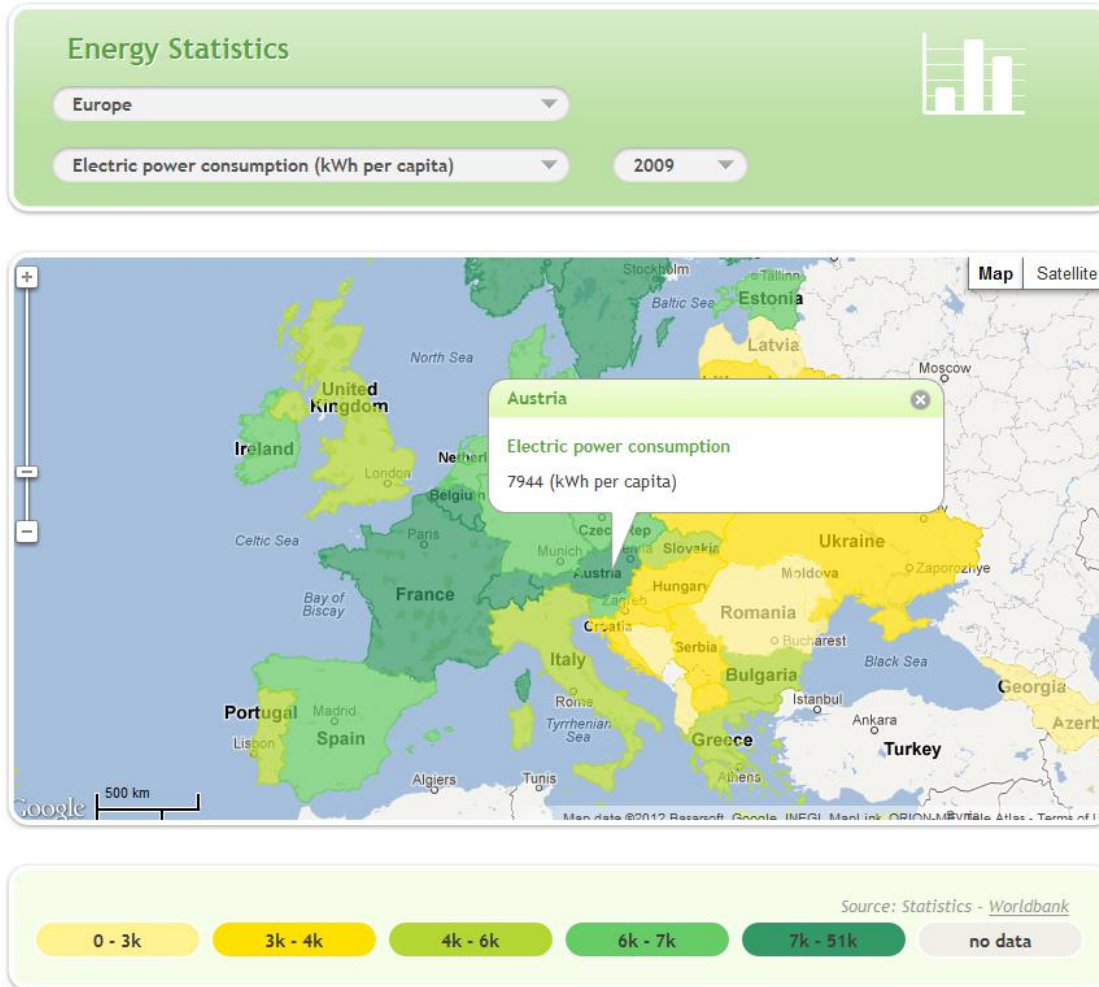
# LOD in Clean Energy

## Electricity Generated from Renewable Sources

Percent of gross electricity consumption



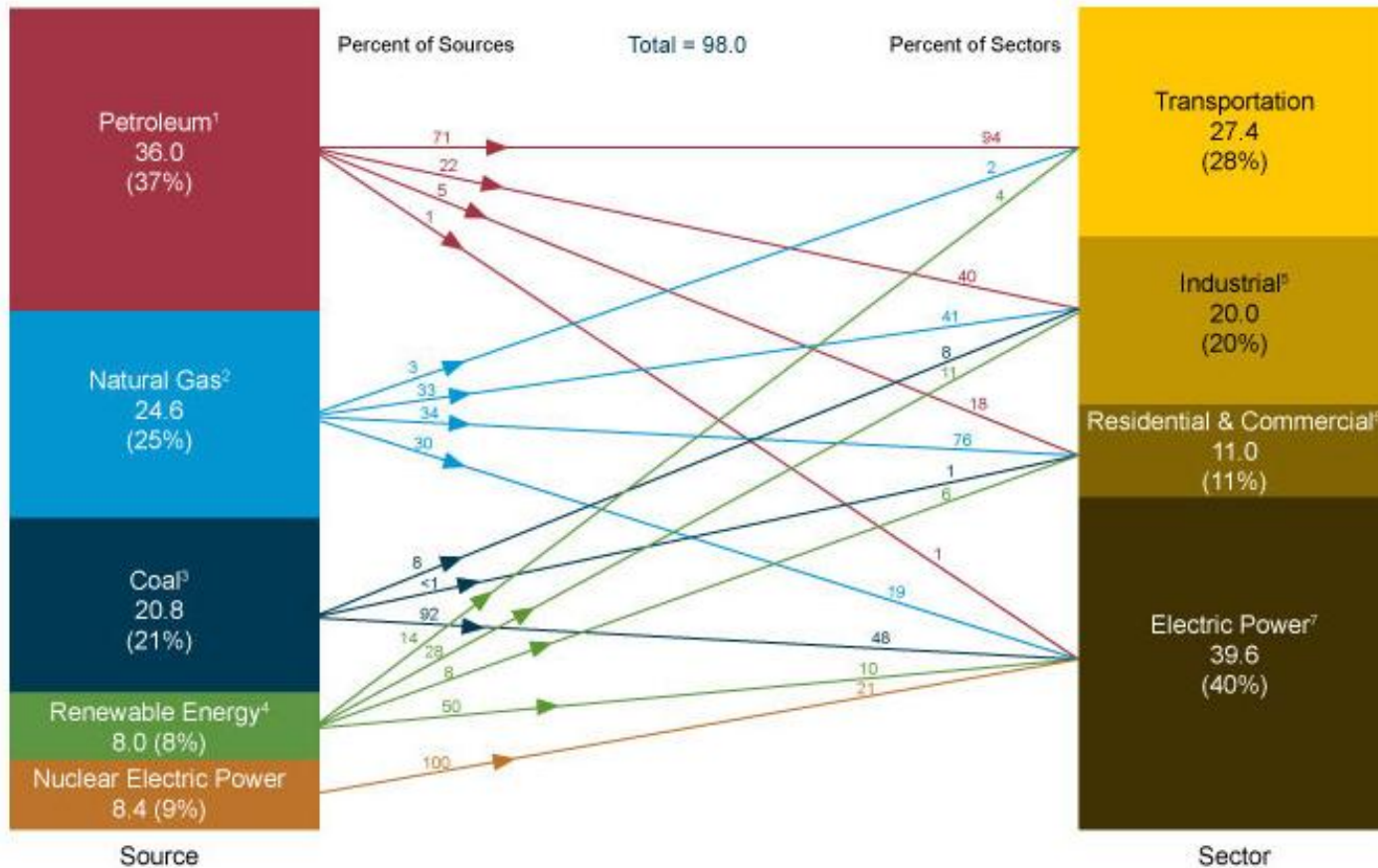
# LOD in Clean Energy



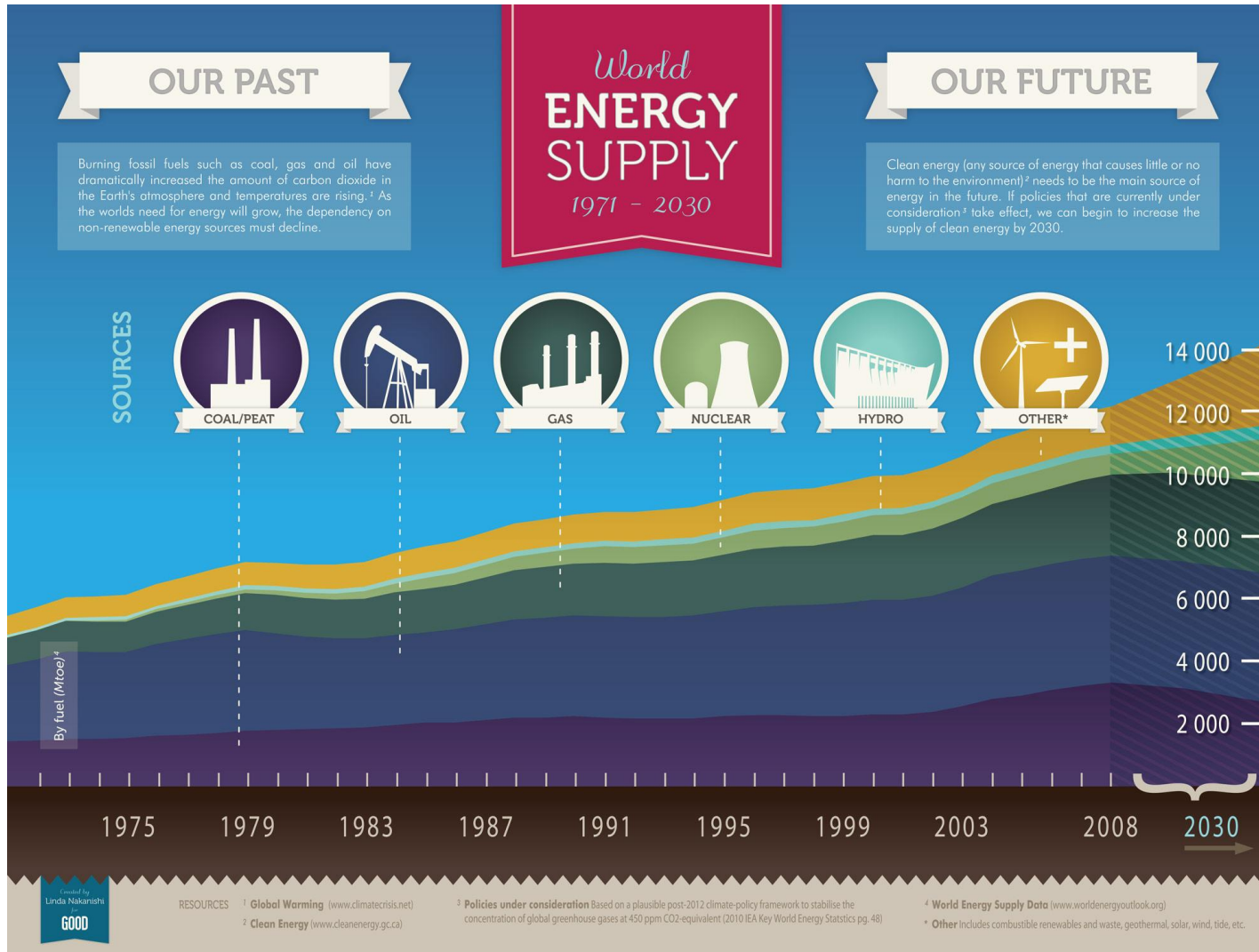
reegle.info – energy statics

# LOD in Clean Energy

 PRIMARY ENERGY CONSUMPTION BY SOURCE AND SECTOR, 2010 (QUADRILLION BTU)



# LOD in Clean Energy

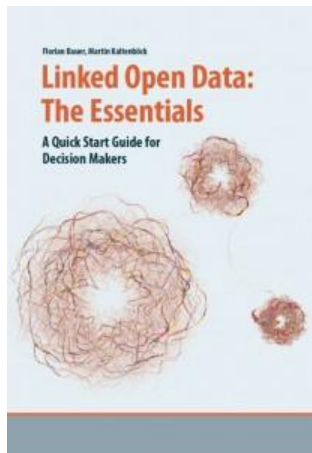


<http://awesome.good.is/transparency/web/1012/energy-submissions/linda-nakanishi/flat.html>

# LOD for policy & decision-makers

It is often difficult to explain ...

- Held a workshop for decision-makers in the clean energy field in Abu Dhabi , Jan 2012



- Published book ,Linked Open Data: The Essentials‘

PDF – available for free:

<http://www.semantic-web.at/LOD-TheEssentials.pdf>

# Without Linked Open Data



- **Stores all information in its own database**
- Other sites have similar design pattern  
=> Duplication of effort and information
- **Both sites responsible for updating information**  
=> Potential for online community to be presented with conflicting information

Source: Jon Weers, NREL



## Without Linked Open Data



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Using data from another site requires you to download a copy of it to install into your database.

## Without Linked Open Data



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=> Potential for online community to be presented with conflicting information

Source: Jon Weers, NREL

If the original site updates its data, the two sites become out of sync. How does the online community know which site is more accurate?

## With Linked Open Data



- **Datasets are shared behind the scenes**  
=> Each site can focus on key data and import supplemental data
- **Imported data updates automatically**  
=> Provides users with consistent information across multiple sites
- **Other Websites can consume LOD**  
resources to present new content in exciting and unanticipated ways

Source: Jon Weers, NREL

## With Linked Open Data



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Data is shared at the database level. Updates to a linked database appear instantly on partner sites.

## With Linked Open Data



- **Datasets are shared behind the scenes**  
=> Each site can focus on key data and import supplemental data
- **Imported data updates automatically**  
=> Provides users with consistent information across multiple sites
- **Other Websites can consume LOD** resources to present new content in exciting and unanticipated ways

Source: Jon Weers, NREL

Third party websites can combine (or “mashup”) linked open data to form innovative content, or new data.

# Summary: Why LOD in Clean Energy

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## **There is a need to focus efforts**

- We want to display all relevant information about a topic but need to focus on providing only the information we are subject matter experts

## **We need to avoid replication**

- Re-using existing datasets avoids replication of work already done and saves costs

## **We want to reduced maintenance and effort**

- Updates to linked open data are propagated instantly

## **Our aim is to move towards semantic linkages and interoperability**

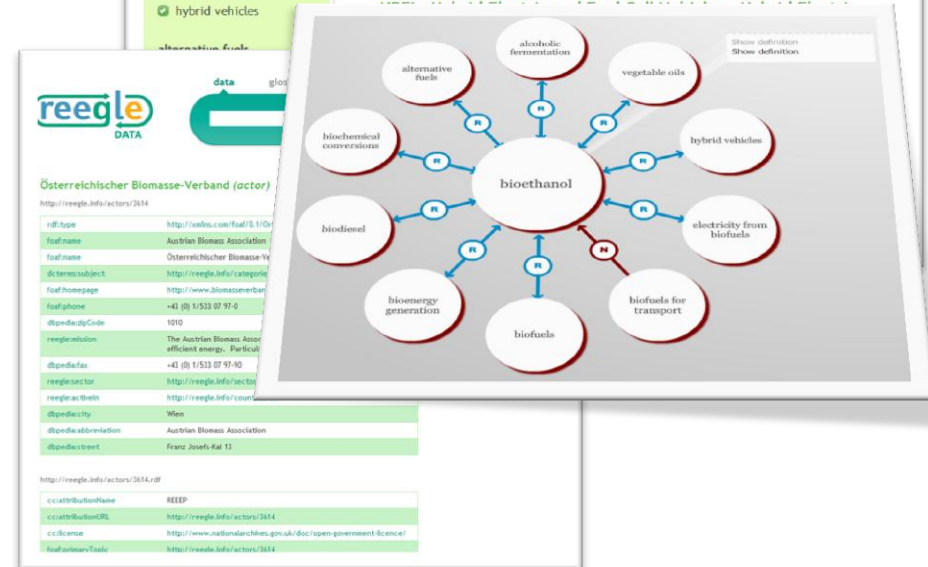
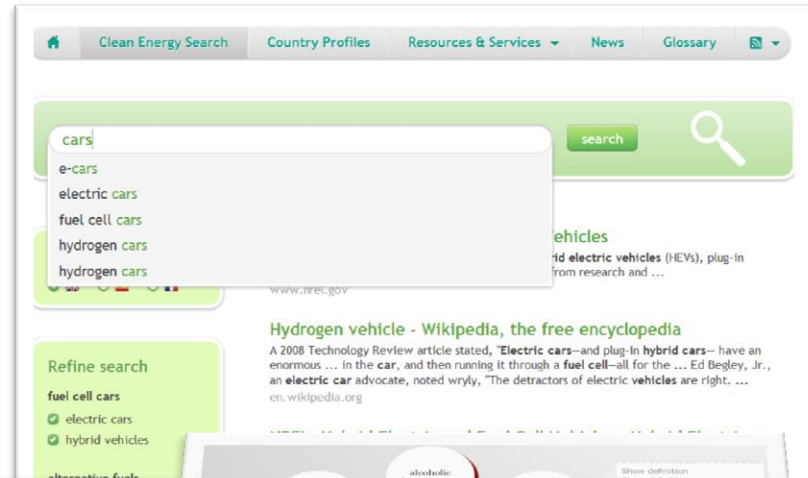
- Concepts become part of the semantic web
  - Data mash-ups and utilizations never before imaged
  - SPARQL queries can span multiple data sources

<http://www.reegle.info>

- Well established information gateway for high quality information on renewable energy, efficiency and climate compatible development
- More than 220,000 users per month
- Data portal [data.reegle.info](http://data.reegle.info) launched in 2011

## Available as Linked Open Data:

- key datasets including energy statistics
- over 1,700 stakeholders worldwide
- extensive glossary enriched with DBpedia linked data
- country energy profiles including policy & regulation data



# reegle.info – clean energy info portal



## Energy Profile Germany

Germany, officially the Federal Republic of Germany, is a federal parliamentary republic in Europe. The country consists of sixteen states while the capital and largest city is Berlin. It covers an area of 357,021 km and has a largely temperate seasonal climate. With 81.8 million inhabitants, it is the most populous member state and the largest economy in the European Union. It is one of the major political powers of the European continent and a technological leader in many fields. A region named Germania, inhabited by several Germanic peoples, was documented before AD 100. During the Migration Age, the Germanic tribes expanded southward, and established successor kingdoms throughout much of Europe. Beginning in the 10th century, German territories formed a central part of the Holy Roman Empire of the German Nation. During the 16th century, northern German regions became the centre of the Protestant Reformation while southern and western parts remained dominated by Roman Catholic denominations, with the two factions clashing in the Thirty Years' War. Occupied during the Napoleonic ... [read more](#)

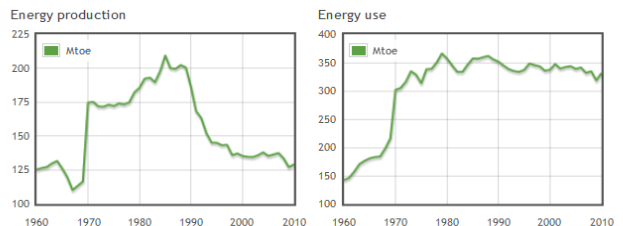
Source: [dbpedia](#)

Capital	Berlin
ISO Code	DE, DEU
Area	357.021 km <sup>2</sup>
Population	81.799.600 (2010)
GDP, PPP	3.044.241.583.883,- current international \$ (2010)

Events	
23.04.2012	<a href="#">Hannover Messe Industrial Greentec</a>
15.07.2012	<a href="#">Sustainable Energy Finance Summer Academy</a>

### Key Statistic Charts (26)

#### Energy production and use



### Legal sources on support schemes and grid issues

### Project Outputs (28)

### Stakeholders (104)

- Source: [reegle Actors](#)
- ⇒ [500 PPM GmbH \(500 PPM GmbH\)](#)
  - ⇒ [Abo Wind](#)
  - ⇒ [AeroCratf Energietec](#)
  - ⇒ [Aircon International](#)
  - ⇒ [Aufwind](#)
  - ⇒ [BioKraftstoff](#)
  - ⇒ [BioStrom Energie System](#)



renewable energy & energy efficiency partnership

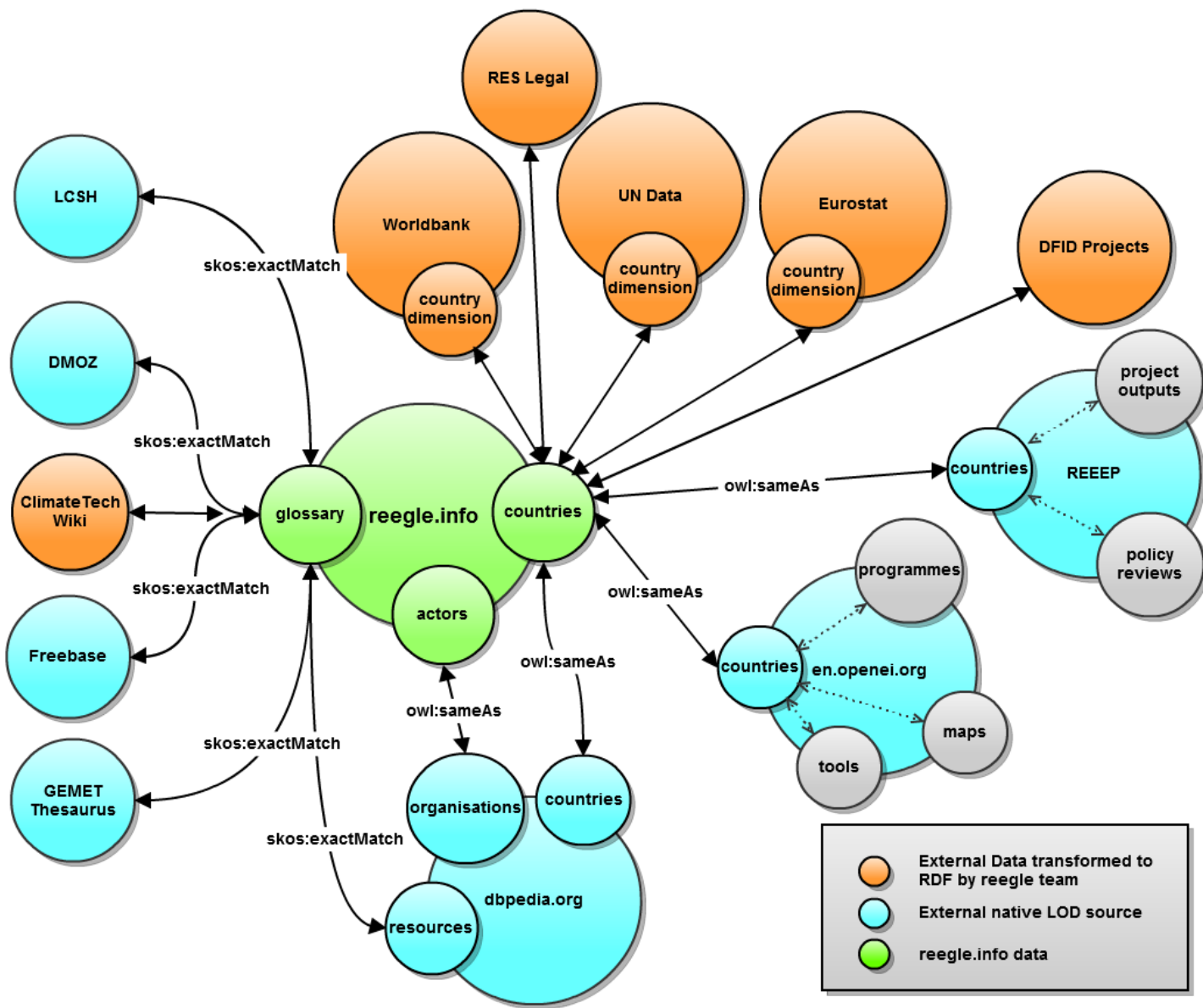


<http://reegle.info/countries>





# reegle.info LOD Clean Energy Cloud



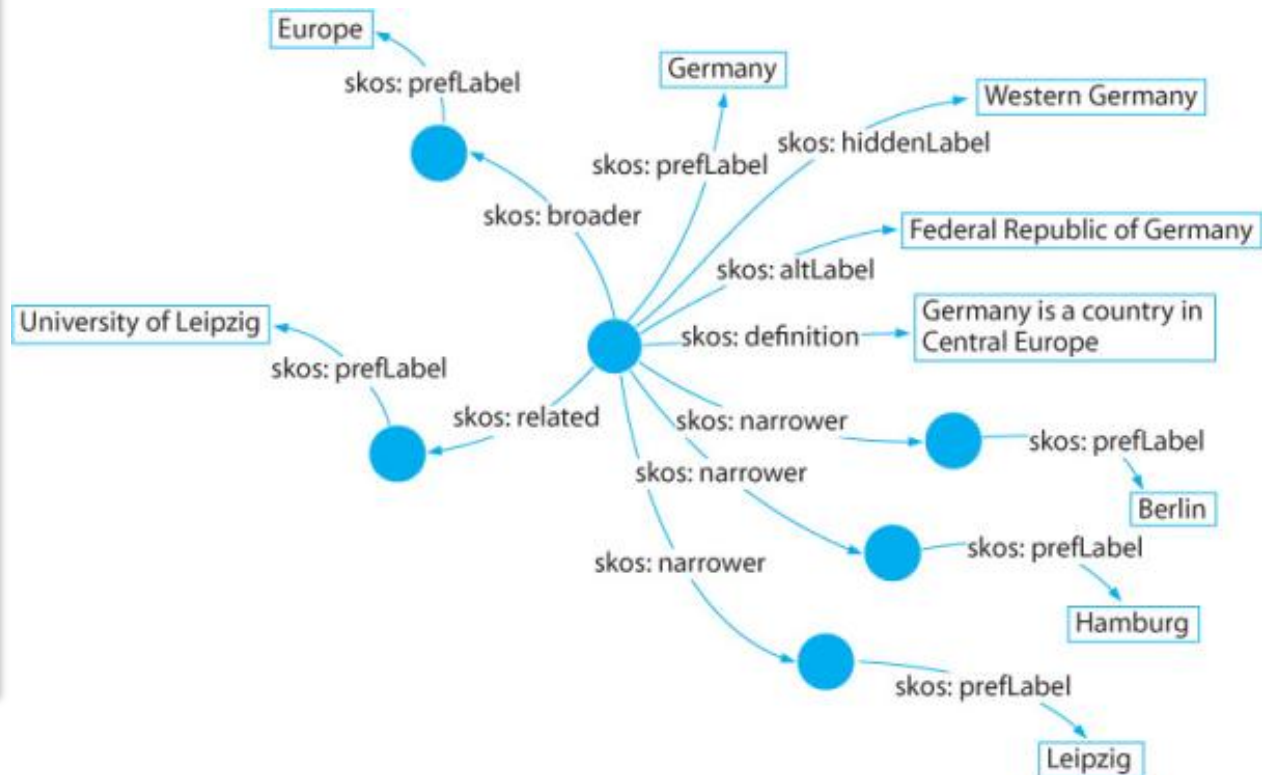
Clean Energy Information  
<http://reegle.info>

Open Data Portal  
<http://data.reegle.info>

# Controlled Vocabulary – what is this?

## SKOS (Thesaurus)

- W3C Standard since 2009
- Based on Semantic Web standards
- Open for linking with additional linked data



## What are the Benefits

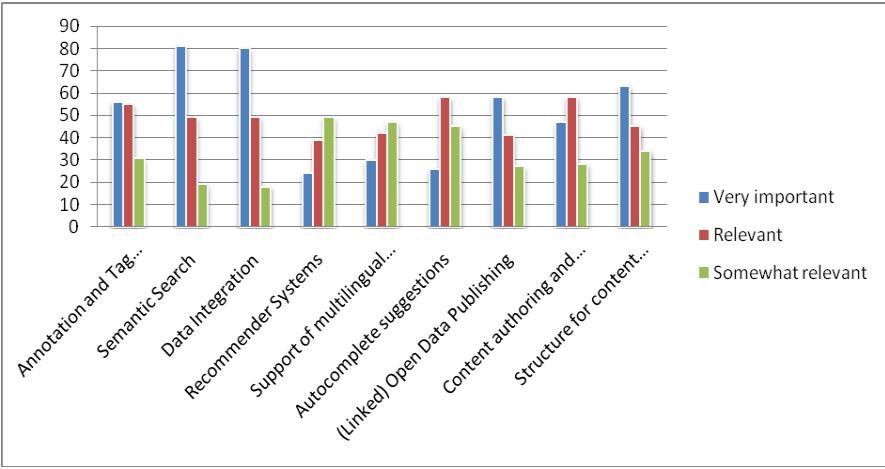
- Simple but powerful model of a terminology ( = vocabulary)
- Offering semantics = meaning, thereby enable interoperability
- To put things in context by a semantic layer
- Easy to realise multilingualism ( = translated vocabularies)
- Provide common understanding
  - Different terminology used but 1 meaning (e.g. synonyms)
  - Same terminology used but different meaning (e.g. Apache)

## What is it good for – Use Cases

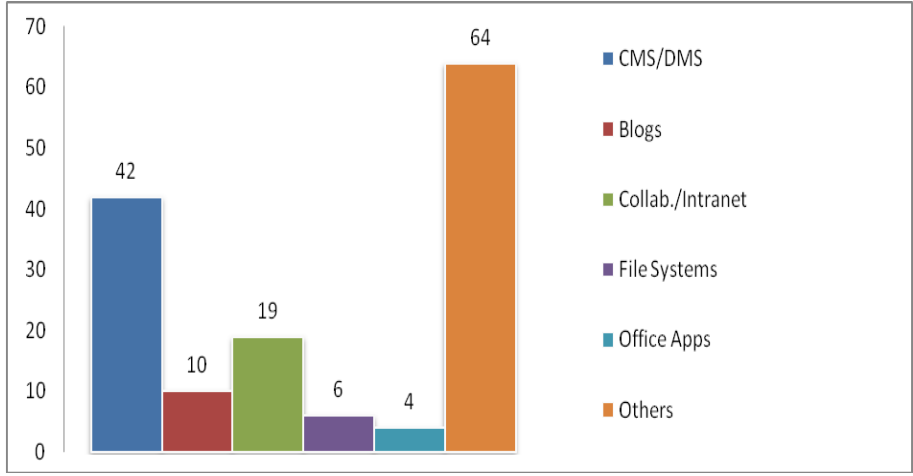
- Powerful categorisation and tagging mechanisms
- Powerful multilingual (semantic) search applications
- Thereby connecting islands (e.g. open data catalogues)
- Smart Glossary Services for better common understanding
- Linked Open Data publishing for re-use of a vocabulary
- Creating network effects by using same vocabularies
- Precise recommender services

# Do controlled vocabularies matter?

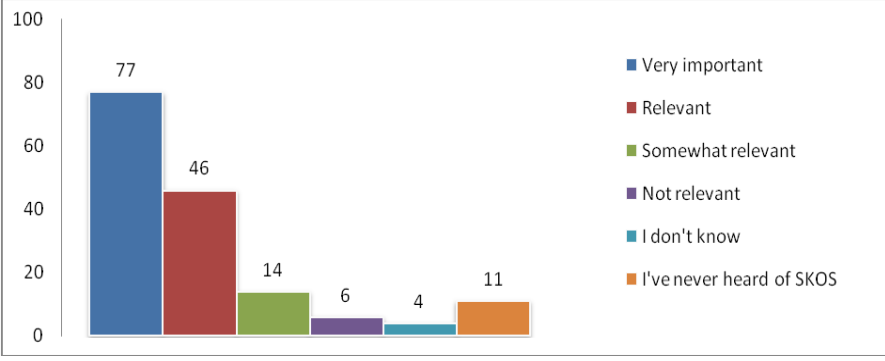
## .. why we use SKOS thesauri to optimise our services & system



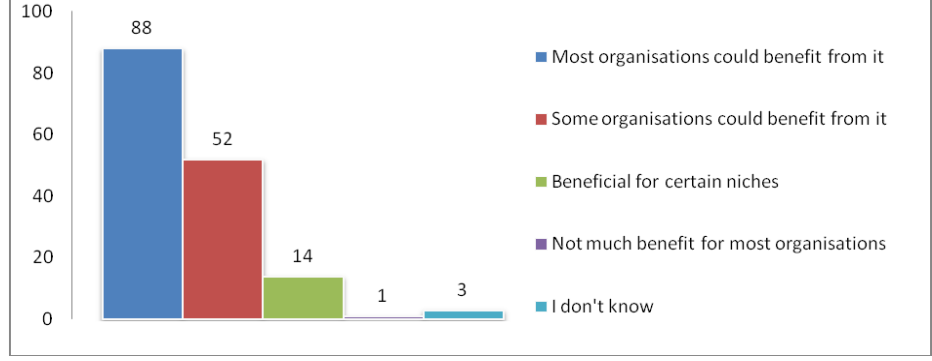
Important Services



For what applications



Importance of SKOS



Can enterprises benefit of linked data



## Open Data in Use

- Strong need for standardisation
- Strong need for interoperability
- Strong need for multilingual solutions
- Strong need for cross catalogue search

## Furthermore

- Publish and re-use of linked open vocabularies = open data

# Examples: Linked Open Vocabularies

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reeple.info clean energy portal - <http://www.reeple.info/glossary>



Wolters Kluwer Germany - <http://vocabulary.wolterskluwer.de/>



Education Service Australia - <http://scot.curriculum.edu.au/>



Geological Survey of Austria - <http://resource.geolba.ac.at/>



Coming soon: World Bank



## Test GUI Results

### Extracted Concepts ▲

Concept	Score
<a href="#">photovoltaic power</a>	<div style="width: 80%;"></div>
<a href="#">concentrated solar power</a>	<div style="width: 60%;"></div>
<a href="#">wind</a>	<div style="width: 20%;"></div>
<a href="#">IRENA</a>	<div style="width: 15%;"></div>
<a href="#">biomass</a>	<div style="width: 10%;"></div>
<a href="#">hydro power</a>	<div style="width: 10%;"></div>
<a href="#">conventional energy</a>	<div style="width: 5%;"></div>
<a href="#">bioenergy</a>	<div style="width: 5%;"></div>
<a href="#">forestry</a>	<div style="width: 5%;"></div>
<a href="#">clean energies</a>	<div style="width: 5%;"></div>

### Extracted Terms ▲

Term	Score
energy	<div style="width: 80%;"></div>
renewable	<div style="width: 60%;"></div>
power	<div style="width: 60%;"></div>
renewable energy	<div style="width: 50%;"></div>

### concentrated solar power

Synonyms: CSP, concentrating solar power,

#### Associated Top Concepts:

- ➔ solar thermal
- ➔ renewable energy - sources, generation and components

#### Containing Concept Schemes:

- ➔ Renewable Energy Thesaurus

URI: <http://reegle.info/glossary/1367>



# Infos & Kontakt



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<http://blog.semantic-web.at>

<http://poolparty.biz>

<http://lod2.eu>

<http://opendata.at>



OPEN GOVERNMENT DATA  
AUSTRIA



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