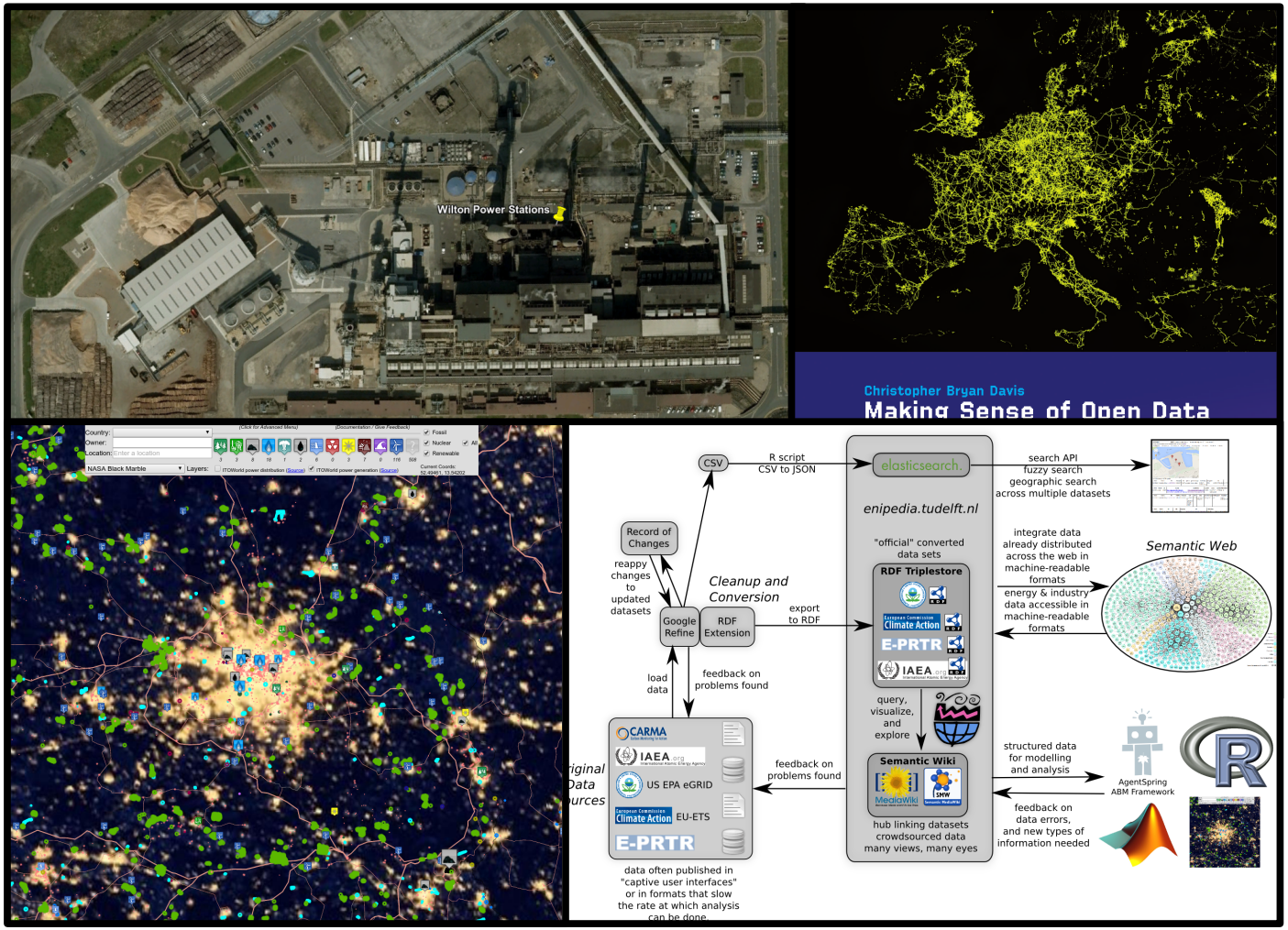
Open Electricity Data



Chris Davis - @cbdvs

http://enipedia.tudelft.nl

c.b.davis@rug.nl

Who am I?

- Assistant Professor Energy Informatics, University of Groningen
- Focus on Open Data, Agent Based Modeling, Visualization, Data Analytics

Enipedia.tudelft.nl

Enipedia

(Redirected from Main Page)

Enipedia is an active exploration into the applications of wikis and the semantic web for energy and industry issues. Through this we seek to create a collaborative environment for discussion, while also providing the tools that allow for data from different sources to be connected, queried, and visualized from different perspectives.

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- SPARQL Endpoint
- Videos
- Recycling
- Integration in Energy Systems
- Power Plants
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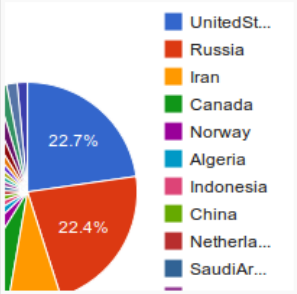
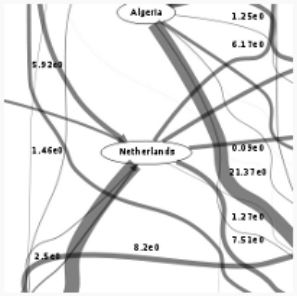
Natural Gas Overview



Overview of natural gas production, consumption, reserves, infrastructure and trade networks worldwide.

Worldwide Flows of Natural Gas



Natural gas world trade network - dynamically generated from country level data.

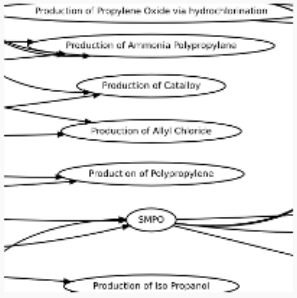
Exploring Global Electricity Production

Learn about global electricity production, based on data linked together from sources such as Carma.org and eGRID. Browse the fuel sources and power outputs for 50,000 power plants using a KML file for Google Earth.

Natural Gas Infrastructure

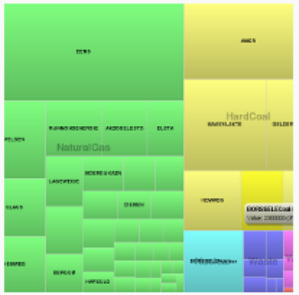
Compilation of natural gas infrastructure world wide: major pipelines, LNG terminals, cross-border points - all located on map.

Industrial Production Chains



Semantic wiki technology is used to document the different chains that convert raw resources into products. This can set the basis for a collaborative approach in documenting processes for a Life Cycle Assessment.

Electricity Production by Fuel Type in NL



Data sourced from Carma.org is combined with information collected on fuel sources to show how the Netherlands generates most of its power.

Timeline of Investments in the Port of Rotterdam

Energy Calculations from CIA World Factbook

Facilities in the Port of Rotterdam

Amer Powerplant

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*You can **edit this page** and help us improve the information here.*

General

Operator: Essent N.V.
Year first built: 1980
Owner company: Essent N.V.
Other names:
Status: Operational
Depreciated entry: No

Data Links

Search other databases *(experimental)*
Carma.org ID: 1339. (original data source)
Wikipedia: Amercentrale
DBpedia: Amercentrale
Wikimapia: Amercentrale-powerplant
OpenStreetMap: way/220122487
way/220122486
Industry About: 4710-amer-coal-power-plant
EU ETS: 172

Location

Maps

See also:

- **Interactive Full Map**
- **Google Earth KML file**
- **Search other databases** *(experimental)*

View same area on ITO Map Electricity generation, OpenStreetMap, Wikimapia, Wikipedia, or Bing

Energy

Edit Powerplant: Amer Powerplant

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Power plant

General

Operator: Essent N.V.

Wikipedia page: http://en.wikipedia.org/wiki/Amercentrale

Year first built: 1980

Owner company: Essent

- Deutsche **Essent** Gmbh
- **Essent** Milieu
- **Essent** N.V.

Status:

CarmaID (id used on carma.org)

EU ETS ID 868

Location

City: Geertruidenberg

Metro area:

State: Noord-brabant

County:

Zip code:

Country: Netherlands

Power Conversion Units

Details about individual power conversion units (e.g. units composed of their own set of boilers, turbines, generators) can be specified in more detail by clicking on save, and then following the instructions on the "Power Conversion Units" section of the wiki page.

Type in an address, or click on the map to move the marker

Coordinates:

51.710730368168, 4.8433399200439 Update map

Enter address here Look up coordinates

Energy

Fuel type: **Cooling method:** **Power plant use:**

Fuel consumption

Electricity production (Source: carma.org)

MWh	year
8,280,460.00	2000
8,942,400.00	2007
19,200,000.00	2020

Emissions (Source: EU ETS)

name	trend	2005	2006	2007	2008	2009	2010
Essent N.V. Amercentrale		5,828,900	5,398,310	5,193,890	4,348,650	5,760,410	5,284,700

Emissions (Source: carma.org)

name	emissions_kg	year
Carbon Dioxide	8,168,340,000.00	2000
Carbon Dioxide	8,763,120,000.00	2007
Carbon Dioxide	17,236,500,000.00	2020

References and notes

reference	notes
http://www.essent.nl/content/overessent/activiteiten/centrales/amercentrale/index.html	The site of the owner
http://www.essent.nl/content/overessent/het_bedrijf/mvo/feiten_en_cijfers/index.html	Contains pdf reports with good data on this and other power stations owned by Essent. The mentions the power production, heat output, CO2, NOx, SO2, etc.
http://www.omroepbrabant.nl/?news/216600462/Geen%2Bgewonden%2Bbij%2Bexplosie%2Ben%2Bbrand%2BAmercentrale%2Bin%2BGeertruidenberg.aspx	In 2014 there was a large fire in the Amer Power plant.
http://www.bioenergytrade.org/downloads/leafletamerplant.pdf	

Category: Powerplant

Facts about Amer Powerplant

Annual Carbonemissions2000 kg	8,168,342,282.257 kg (8,168,342.282 tonne)
Annual Carbonemissions kg	8,763,124,355.162 kg (8,763,124.355 tonne)
Annual Carbonemissionsnextdecade kg	17,236,510,230.821 kg (17,236,510.231 tonne)
Annual Energyoutput2000 MWh	8,280,460 MWh
Annual Energyoutput MWh	8,942,401 MWh
Annual Energyoutputnextdecade MWh	19,200,000 MWh
Availability	0.9
CarmaId	1339
City	Geertruidenberg
Cooling method	cooling tower and fresh water
Country	Netherlands
DBpedia Page	http://dbpedia.org/resource/Amercentrale
Depreciated entry	false
EU ETS ID	868
Fuel type	Hard Coal
Generation capacity electrical MW	1,285 MW
Generation capacity thermal MW	600 MW
Industry About link	http://www.industryabout.com/europe/netherlands/621-netherlands-fossil-fuels-energy/4710-amer-coal-power-plant
Intensity2000 kg CO2 per MWh elec	986.564 kg (0.987 tonne)
Intensity kg CO2 per MWh elec	979.76 kg (0.98 tonne)
Intensitynextdecade kg CO2 per MWh elec	900.835 kg (0.901 tonne)
Latitude	51.711
Longitude	4.843
OpenStreetMap link	http://www.openstreetmap.org/browse/way/220122487 and http://www.openstreetmap.org/browse/way/220122486
Operating cost	2.5EUR
Operating efficiency	40
Operator	Essent N.V.
Owl:sameAs	http://dbpedia.org/resource/Amercentrale
Ownercompany	Essent N.V.
Point	51.710730368168 N, 4.8433399200439 E
Power plant type	electricity only and special cogen
Primary fuel type	Hard Coal
State	Noord-brabant
Status	Operational
Wikimapia link	http://wikimapia.org/1441417/Amercentrale-powerplant
Wikipedia page	http://en.wikipedia.org/wiki/Amercentrale
Year built	1980

Essent N.V.

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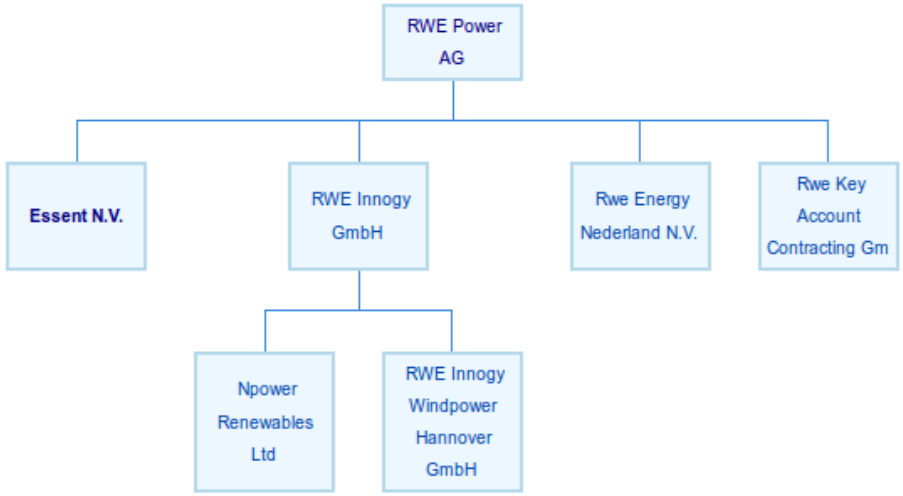
Links

Click *here* to update the information below

- Website: http://www.essent.nl
- Wikipedia Page: https://nl.wikipedia.org/wiki/Essent
- Subsidiaries: *None known*
- Parent Company: RWE Power AG



Summary

Total annual production: 30,417,802 [MWh]

Total production facilities owned or operated: 59

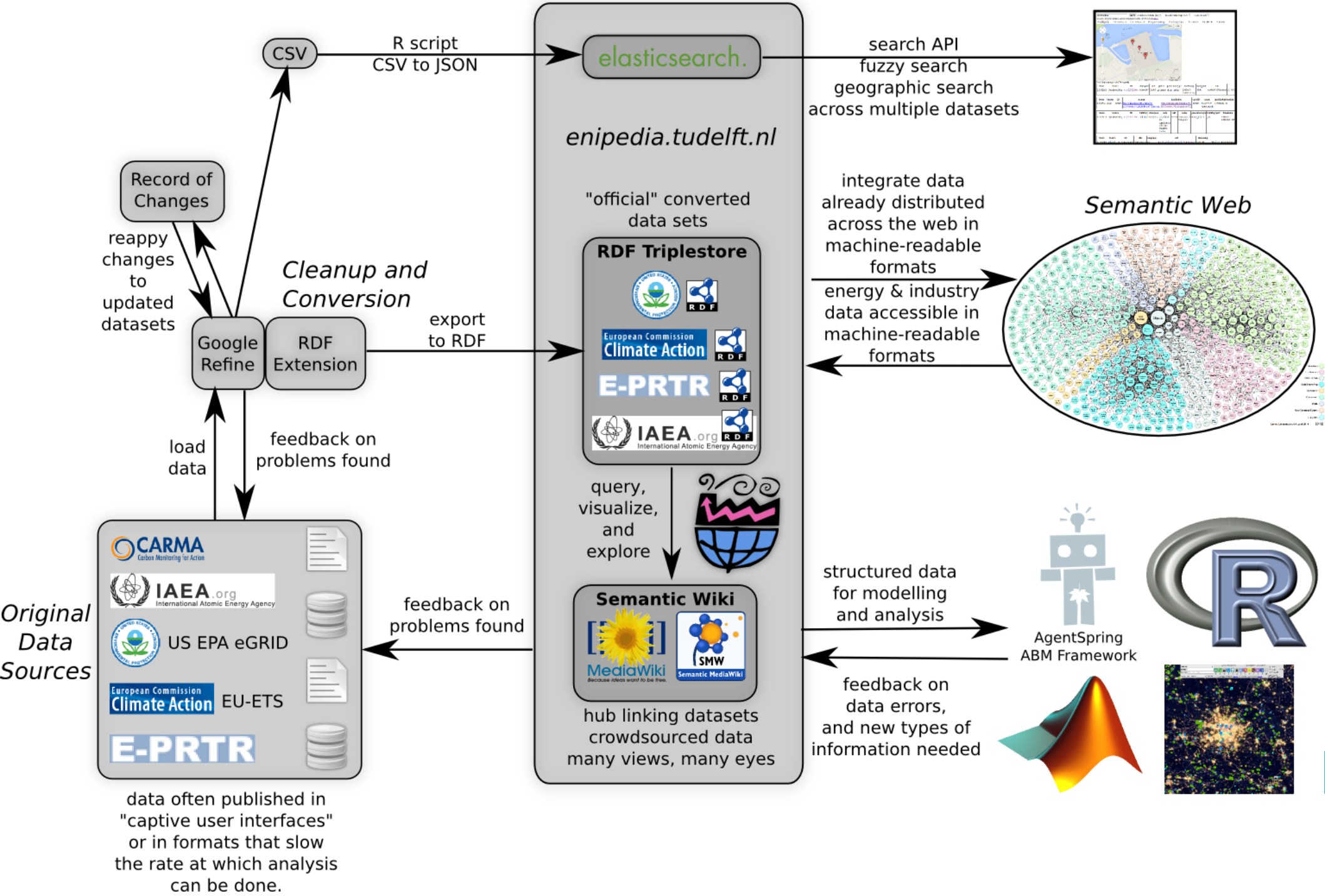
Power Plants owned or operated by Essent N.V.

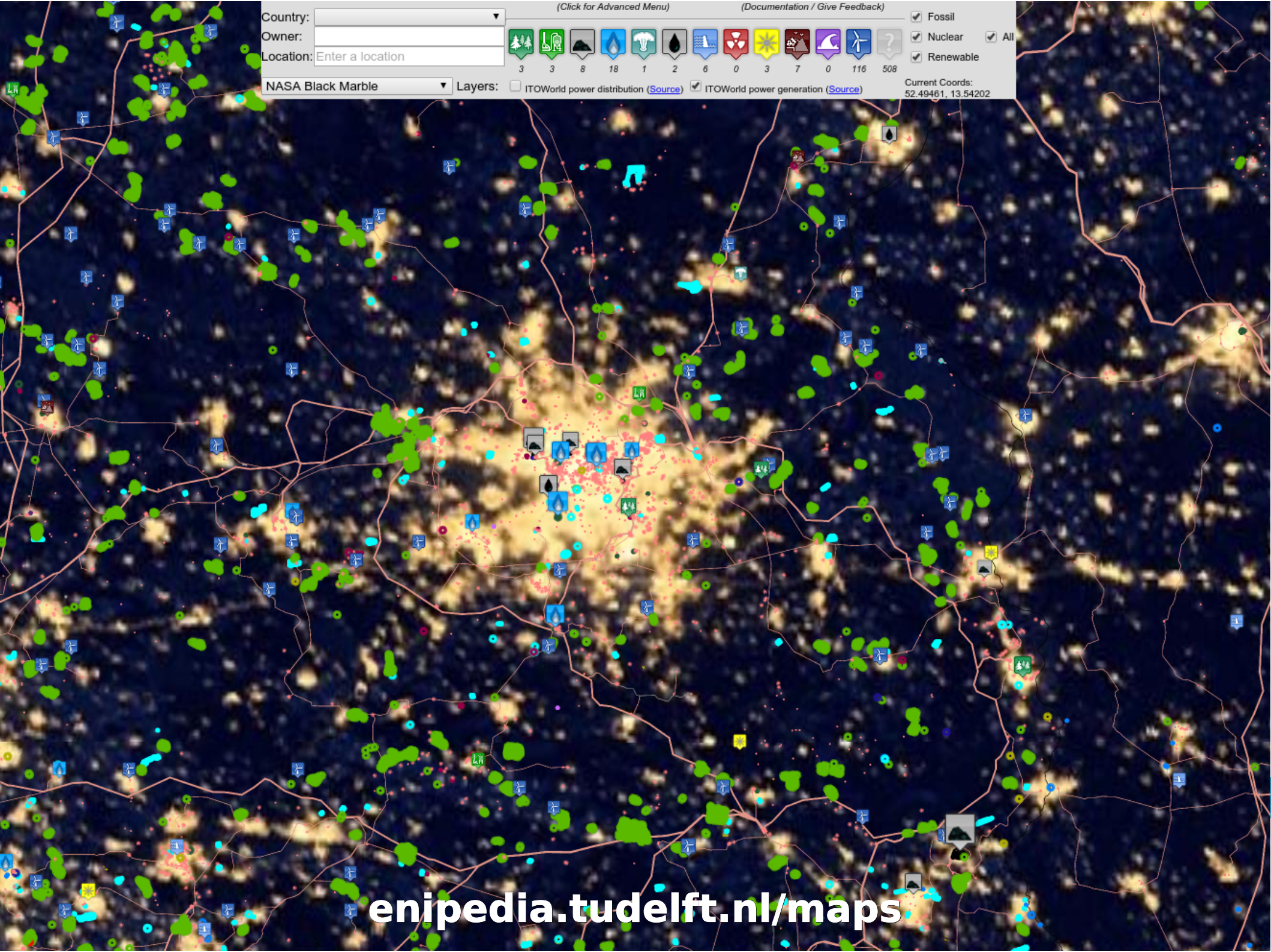
Icons indicate fuel types, with a question mark (❓) indicating unknown fuel type.
*See also our **interactive full map** to explore all power plants in Enipedia.*
On Portal:Power Plants a KML file for Google Earth is also available.

Emissions

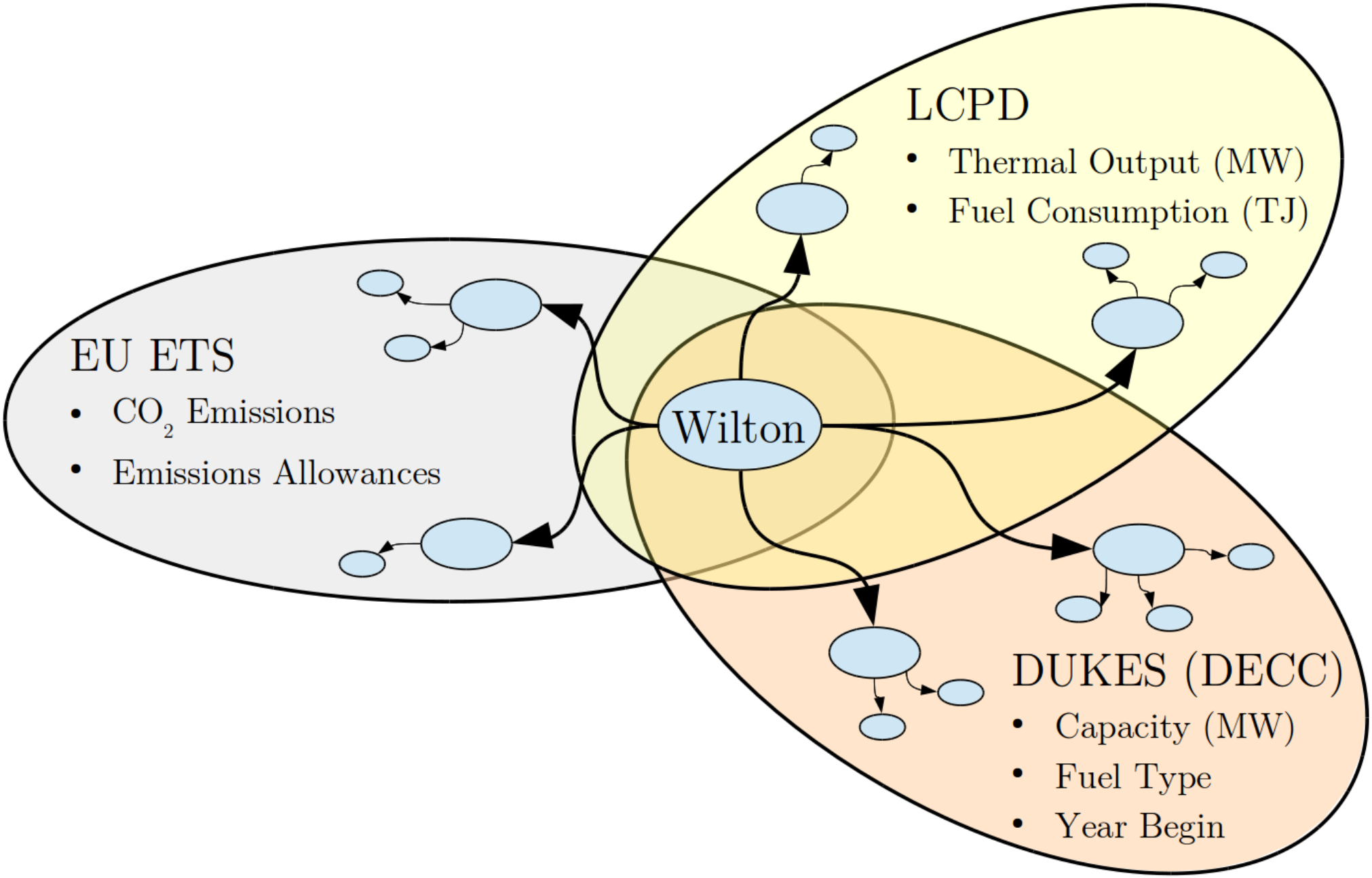
Emissions of facilities according to the EU ETS. In this dataset, the company is listed as "Essent". See EU-ETS Linked Data for more info on how you can query this data.

name	trend	2005	2006	2007	2008	2009	2010
Essent N.V. Amercentrale		5,828,900	5,398,310	5,193,890	4,348,650	5,760,410	5,284,700
Essent Energie Productie Clauscentrale		1,261,840	1,434,680	1,715,050	1,727,220	988,065	568,134
Essent N.V. WKC Moerdijk		647,830	525,388	590,360	666,234	564,408	685,320
Essent WKC Enschede		119,421	109,459	93,376	110,308	144,539	156,242
Essent N.V. WKC Helmond 1/2		98,779	103,230	105,669	99,390	126,853	124,830
Essent N.V. Dongecentrale		85,749	96,953	126,222	92,028	111,364	31,660
Essent N.V. WKC Eindhoven		73,460	66,485	78,188	76,139	98,500	101,558
Essent N.V. WKC Klazienaveen		41,907	44,110	55,217	55,115	80,645	59,112
Essent N.V. WKC Erica		40,295	54,884	62,218	58,561	78,942	41,056
Essent N.V. WKC Heineken		76,861	71,949	19,561	18,586	47,733	72,121
Essent N.V. WKC Bergen op Zoom		71,248	22,202	20,615	18,327	35,719	38,507
Essent N.V. Helmerhoek		1,226	3,618	3,932	6,920	5,596	10,836


CSV
R script
CSV to JSON
elasticsearch.
search API
fuzzy search
geographic search
across multiple datasets
enipedia.tudelft.nl
"official" converted
data sets
RDF Triplestore
Record of
Changes
reappy
changes
to
updated
datasets
Cleanup and
Conversion
Google
Refine
RDF
Extension
export
to RDF
integrate data
already distributed
across the web in
machine-readable
formats
Semantic Web
energy & industry
data accessible in
machine-readable
formats
load
data
feedback on
problems found
query,
visualize,
and
explore
Semantic Wiki
feedback on
problems found
Original
Data
Sources
CARMA
IAEA.org
International Atomic Energy Agency
US EPA eGRID
European Commission
Climate Action
EU-ETS
E-PRTR
structured data
for modelling
and analysis
AgentSpring
ABM Framework
feedback on
data errors,
and new types of
information needed
hub linking datasets
crowdsourced data
many views, many eyes
data often published in
"captive user interfaces"
or in formats that slow
the rate at which analysis
can be done.


(Click for Advanced Menu)
(Documentation / Give Feedback)
Country:
Owner:
Location: Enter a location
3 3 8 18 1 2 6 0 3 7 0 116 508
Fossil
Nuclear
All
Renewable
NASA Black Marble
Layers:
ITOWorld power distribution (Source)
ITOWorld power generation (Source)
Current Coords:
52.49461, 13.54202
enipedia.tudelft.nl/maps

A tale of one (or four?) power stations and seven data sets

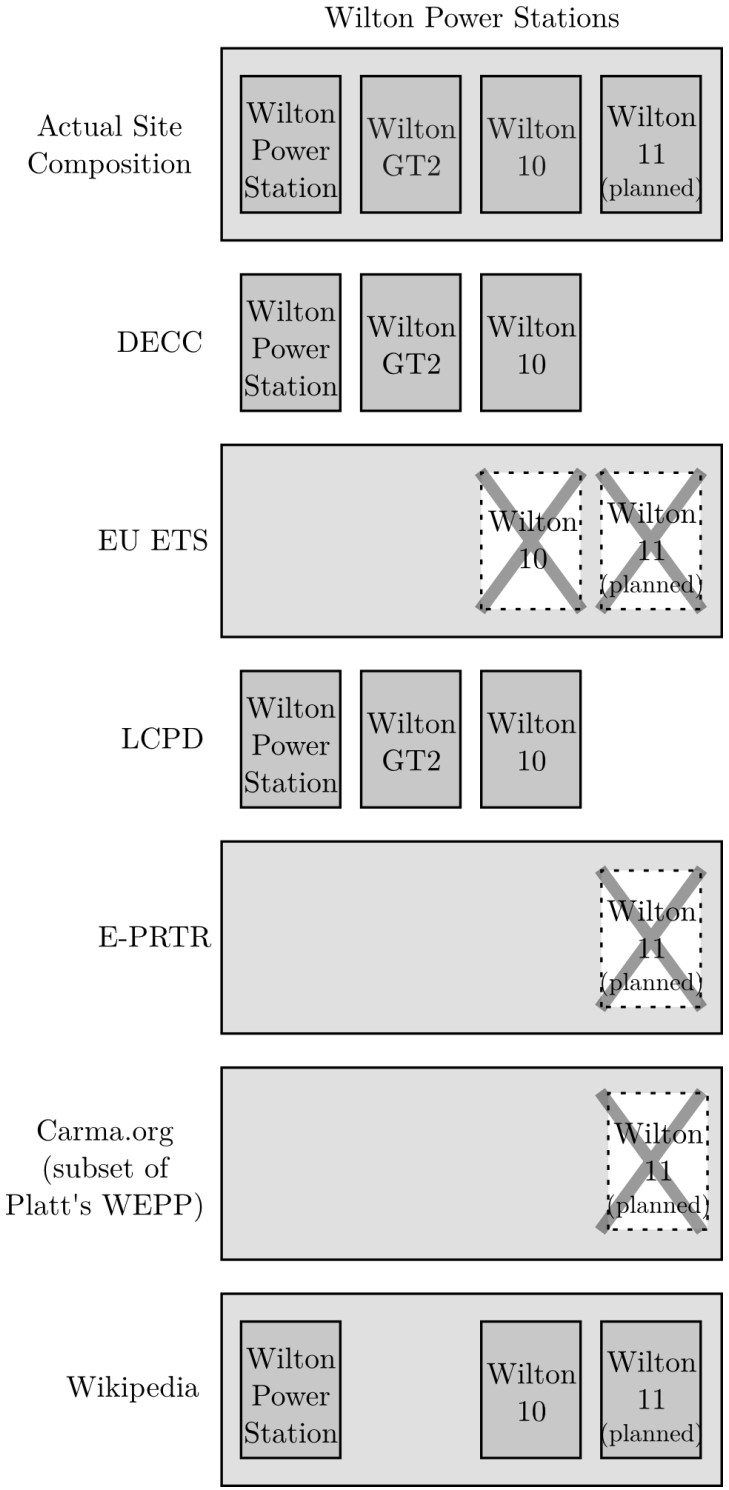

LCPD
• Thermal Output (MW)
• Fuel Consumption (TJ)
EU ETS
• CO_2 Emissions
• Emissions Allowances
Wilton
DUKES (DECC)
• Capacity (MW)
• Fuel Type
• Year Begin

How the European Commission manages data

Year	Plant Number	Plant name	Plant location	MWth	Biomass (TJ)	Other solid fuels (TJ)	Liquid fuels (TJ)	Natural gas (TJ)	Other gases (TJ)	SO2 (t)	NOx (t)	Dust (t)
2007	94	Wilton	SembCorp Utilities, Wilton P Stn		418.598	5576.306	143.159	606.001	0	5303.3	3446.1	129.4
2008	60	Sembcorp Utilities U.K Ltd Wilton	England	714	0	8302.55	10.214	1161.335	0	2570	1456.2	211.7
2008	204	Sembcorp Utilities U.K Ltd Wilton	England	100	2139	0	0	88.492	0	1.1	135.1	4.6
2008	205	Sembcorp Utilities U.K Ltd Wilton	England	100	0	0	0	50.672	0	0.01	0.1	0.02
2009	74	Sembcorp Utilities U.K Ltd Wilton	England	714	0	4246.646	3.562	5647.128	0	1164.2495795525	992.0418719788	87.9914050096
2009	268	Sembcorp Utilities U.K Ltd Wilton 2	England	100	2669	0	0	100.07	0	2.01	193.6	1.07
2009	269	Sembcorp Utilities U.K Ltd Wilton 3	England	100	0	0	0	204.3	0	0.17	0.17	0.29

Large Combustion Plants Directive
http://ec.europa.eu/environment/air/pollutants/stationary/lcp/legislation.htm

Entity	Data Sources						
(based on most commonly encountered name)	SembCorp Website	UK Department of Energy and Climate Change	EU ETS	E-PRTR	Large Combustion Plant Directive	Carma.org (subset of WEPP)	Wikipedia
(entire site, data for all units aggregated together)							
Wilton Power Stations			• SembCorp Utlilities Teesside Power Station *(This is likely without Wilton 10 as it burns biomass. Without the inclusion of the owner name, this could be confused with the other Teesside Power Station)*	• Sembcorp Utilities (uk) Ltd • Sembcorp Utilities (uk) Ltd Wilton 10 Power Station • Sembcorp Utilities (uk) Ltd, Wilton Power Station *(There's only one entry for a facility named Wilton that is owned by SembCorp. The labeling of this as Wilton 10 is likely wrong as mentioned in the discussion below)*		• Wilton Cogen *(aggregation not clear, are other units included?)*	• Wilton power stations • (a.k.a. SembCorp power station)
(Power stations within the site)							
Wilton Power Station *(main station)*	• Wilton Power Station	• Wilton Power Station			• Sembcorp Utilities U.K Ltd Wilton		• Wilton Power Station
Wilton GT2	• Wilton GT2	• Wilton GT2			• Sembcorp Utilities U.K Ltd Wilton • Sembcorp Utilities U.K Ltd Wilton 3		
Wilton 10	• Sembcorp Biomass Power Station • Wilton 10	• Wilton 10			• Sembcorp Utilities U.K Ltd Wilton • Sembcorp Utilities U.K Ltd Wilton 2		• Wilton 10
Wilton 11 *(planned)*							• Wilton 11 *(planned)*


Wilton Power Stations
Actual Site Composition
Wilton Power Station
Wilton GT2
Wilton 10
Wilton 11 (planned)
DECC
Wilton Power Station
Wilton GT2
Wilton 10
EU ETS
Wilton 10
Wilton 11 (planned)
LCPD
Wilton Power Station
Wilton GT2
Wilton 10
E-PRTR
Wilton 11 (planned)
Carma.org (subset of Platt's WEPP)
Wilton 11 (planned)
Wikipedia
Wilton Power Station
Wilton 10
Wilton 11 (planned)

http://enipedia.tudelft.nl/Elasticsearch.html

Amercentrale search Number of Results: 10 Search within Map View Fuzzy Search

Further documentation and development notes can be found here.

Wikipedia CARMA v2 CARMA v3 OpenStreetMap IndustryAbout EU ETS E-PRTR LCPD

5 of 5 hits returned in 0.879 seconds

Score	Source	ID	changeset	uid	power	generator:type	timestamp	start_date	lon	
2.1512265	OpenStreetMap	way/220122486	16846647	36080	generator	steam_turbine	2013-07-06T10:01:24Z	1980	4.845097891666666	51.7077

Score	Source	ID	account	installation	euetsID	name	installationIdentifier
1.799764	euets	100933	http://enipedia.tudelft.nl/data/EU-ETS/country/NL/installation/172/account	http://enipedia.tudelft.nl/data/EU-ETS/country/NL/installation/172	100933	Essent N.V. Amercentrale	1.720000e+02

Score	Source	ID	building	changeset	note	uid	name	generator:type	building:part	timestamp
1.7923129	OpenStreetMap	way/220122487	industrial	16846647	also fueled by gasification of waste building	36080	Amercentrale Eenheid 9	steam_turbine	yes	2013-07-06T10:09:10Z

Modelling and analysis of large scale solar energy integration in the Moroccan power system

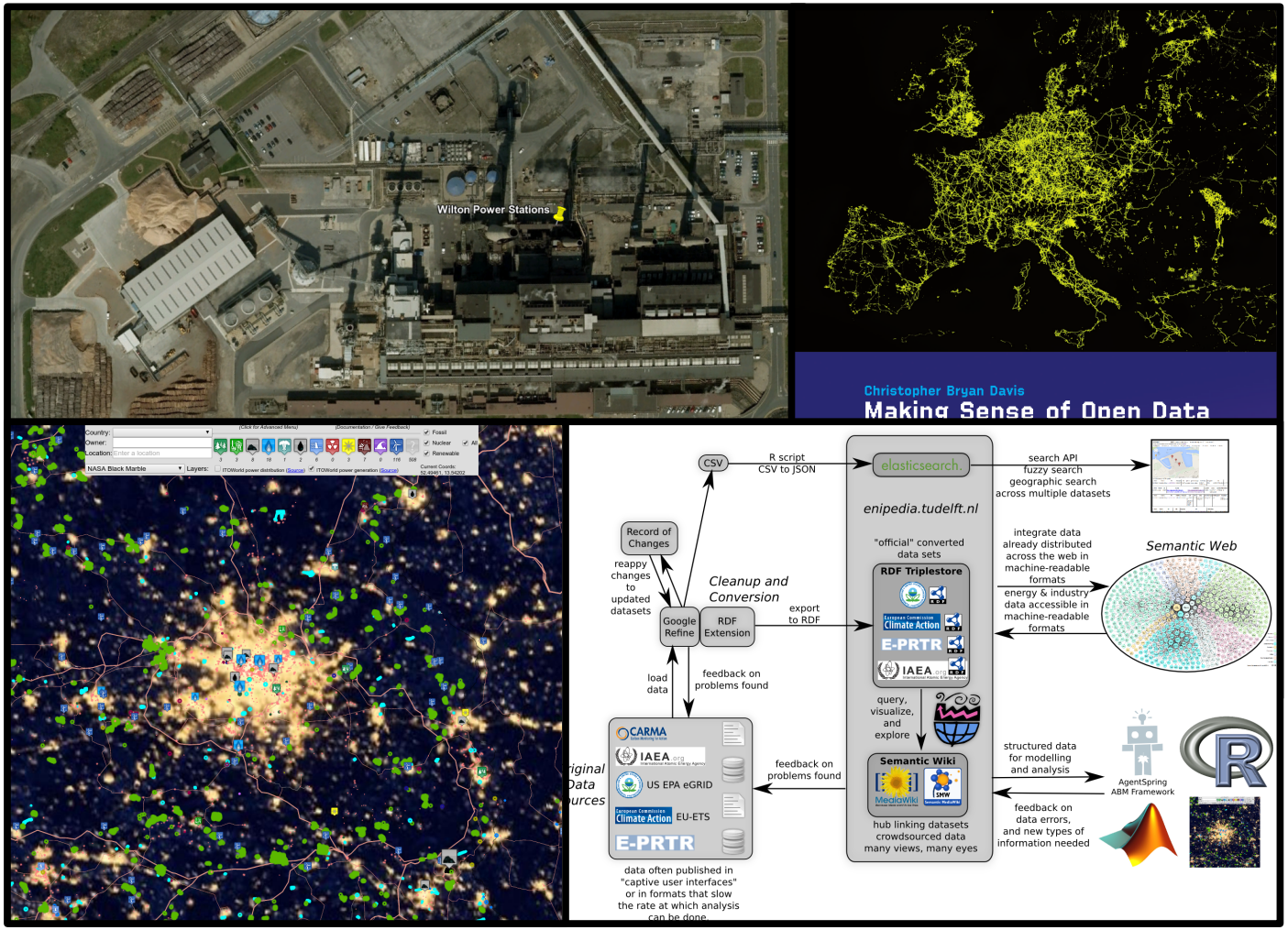
Harald G. Svendsen*, Ole Christian Spro*, Olav Alstad*, Khalid Loudiyi†, Aicha Slassi Sennou†
*SINTEF Energy Research, Norway
†Al Akhawayn University, Morocco

all generators in Tunisia and Algeria. Information about those generators, regarding capacity, type and location, is found from mainly Enipedia [13] and various lists on Wikipedia[2]. By using Enipedia, large generator datasets have been downloaded and processed before they are added to the model. Information about large power plants has been retrieved from Wikipedia and added manually. All the additional generators are placed in the closest existing node, and the capacity is superposed with existing capacity of the same generator type in the same node.

What's Needed...

- Social Aspects
  - Aligning interests
  - Getting data publishers to fix their data
- Technical Aspects
  - Dependency mapping of datasets/research areas
  - Data processing pipelines

Questions?



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