EG2040 - Projects

https://en.wikipedia.org/wiki/File:LondonArray_Operational.png

Onshore wind farms

Wind farm	Current capacity (MW)	Country
Jaisalmer Wind Park	1,064	India
Alta Wind Energy Center	1020	USA
Shepherds Flat Wind Farm	845	USA
Roscoe Wind Farm	781.5	USA
Horse Hollow Wind Energy Center	735.5	USA
Capricorn Ridge Wind Farm	662.5	USA
Fântânele-Cogealac Wind Farm	600	Romania
Fowler Ridge Wind Farm	599.8	USA
Sweetwater Wind Farm	585.3	USA
Cedar Creek Wind Farm	551	USA

Source: https://en.wikipedia.org/wiki/List_of_onshore_wind_farms

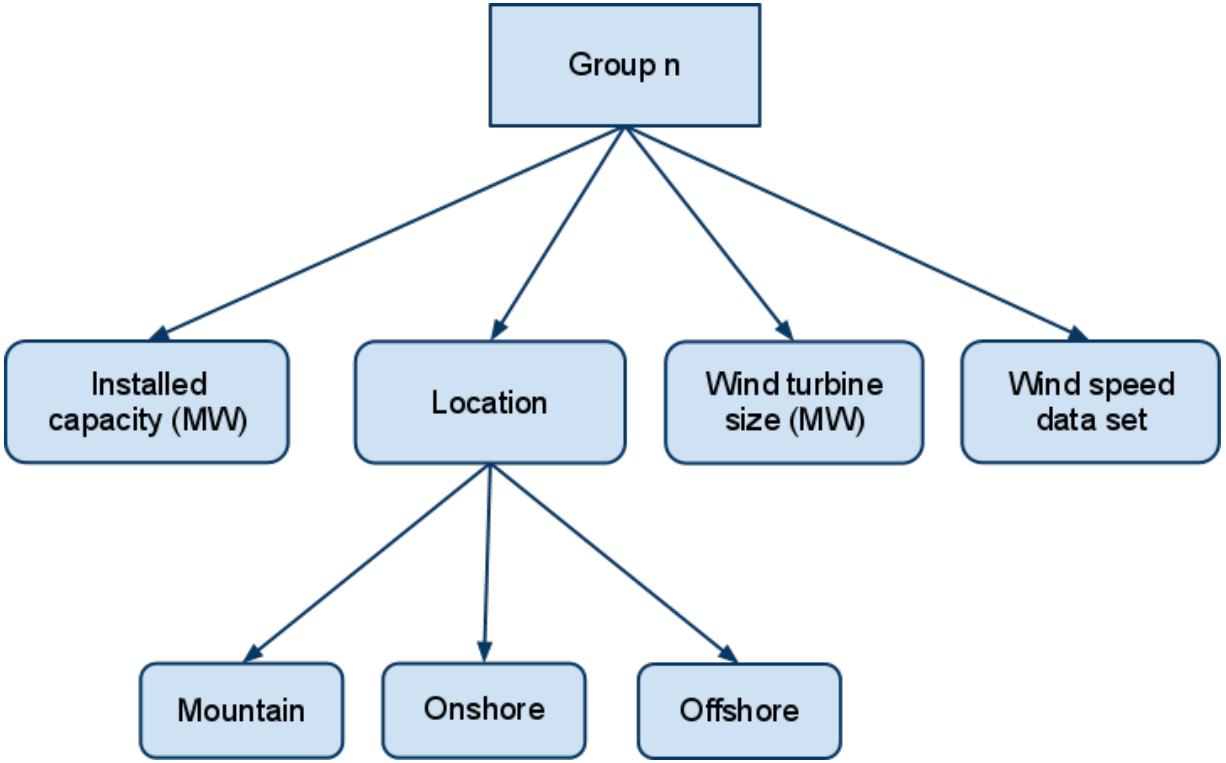
Offshore wind farms

Wind farm	Total (MW)	Location	Site coordinates	Turbines & model	Commissioning Date
London Array	630	United Kingdom	51°38′38″N 01°33′13″E	175 × Siemens 3.6-120	2012
Greater Gabbard	504[5]	United Kingdom	51°52′48″N 1°56′24″E	140 × Siemens 3.6-107	2012
Anholt	400	Denmark	56°36′00″N 11°12′36″E	111 × Siemens 3.6-120	2013
BARD Offshore 1	400	Germany	54°22′N 5°59′E	80 × BARD 5.0	2013
Walney (phases 1&2)	367.2	United Kingdom	54°02′38″N 3°31′19″W	102 × Siemens SWT-3.6-107	2011 (phase 1) 2012 (phase 2)
Thorntonbank (phases 1-3)	325	Belgium	51°33′00″N 2°56′00″E	6 × REpower 5MW, 48 × REpower 6.15MW	2009 (phase 1) 2012 (phase 2) 2013 (phase 3)
Sheringham Shoal	315	United Kingdom	53°7′N 1°8′E	88 × Siemens 3.6-107	2012
Thanet	300	United Kingdom	51°26′N 01°38′E	100 × Vestas V90-3MW	2010
Lincs	270	United Kingdom	53°11′00″N 00°29′00″E	75 × 3.6MW	2013
Horns Rev 2	209.3	Denmark	55°36′00″N 7°35′24″E	91 × Siemens 2.3-93	2009

Source: https://en.wikipedia.org/wiki/List_of_offshore_wind_farms

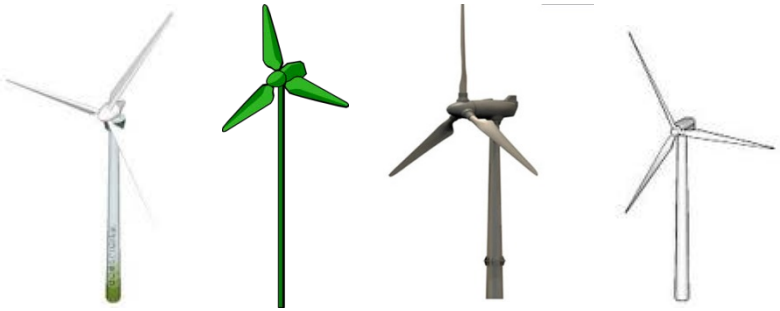
Requirements

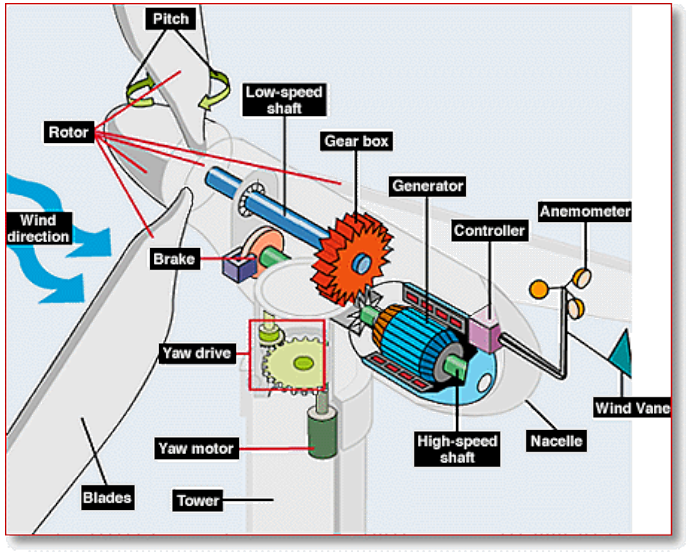
https://www.kth.se/social/course/EG2040/page/project/



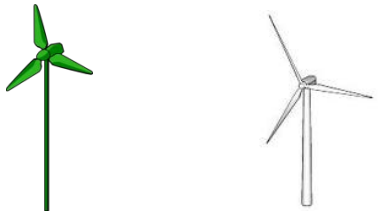
Task A: Analysis of wind turbine technology

- Input: Four different wind turbine models.



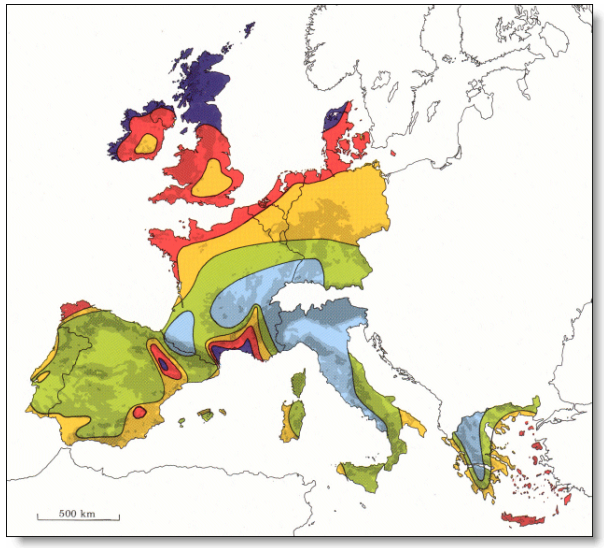


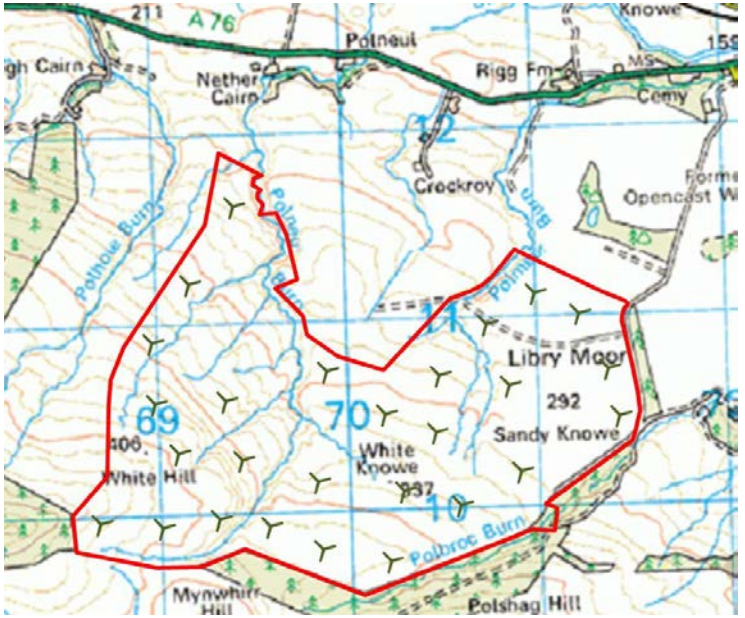
- Output: Compare and choose two of them.



Task B: Siting, wind farm layout and energy yield

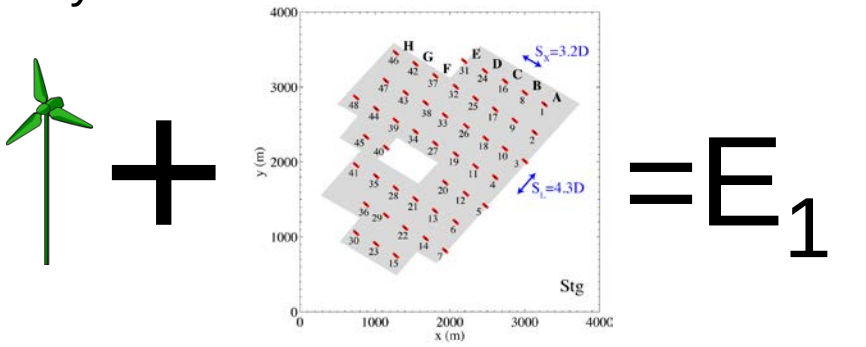
1. Find a site



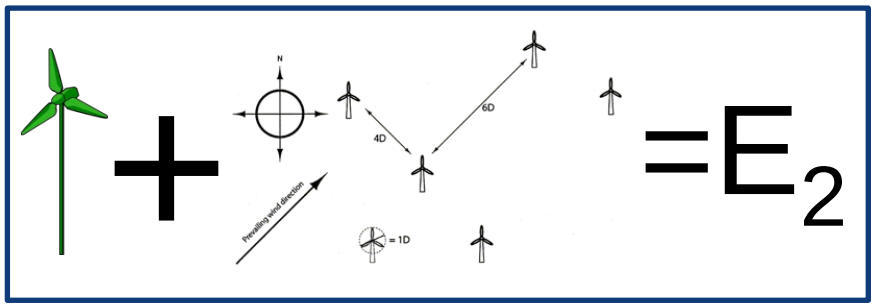


Task B: Siting, wind farm layout and energy yield

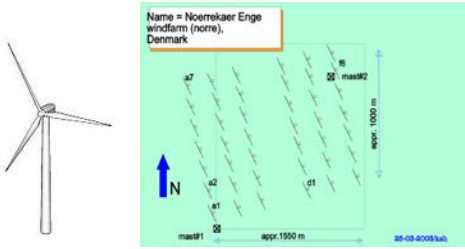
2. Choose two wind farm layouts for each wind turbine that fit the site you chose.
3. Compute the expected yearly energy yield for each combination wind turbine + layout.



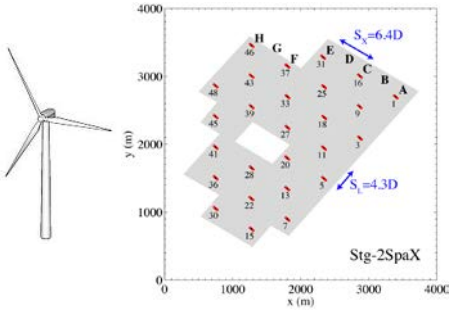
$=E_1$



$=E_2$



$=E_3$



$=E_4$

Task C: Network integration issues

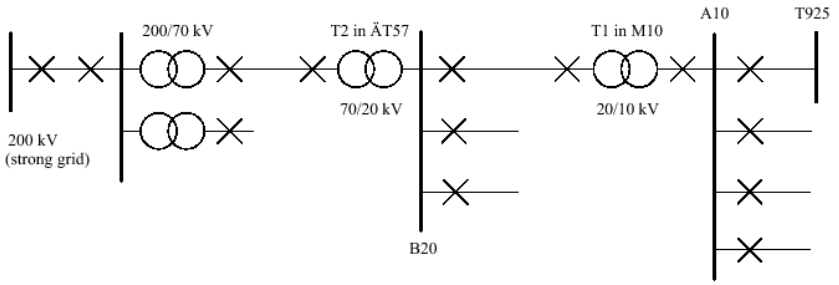
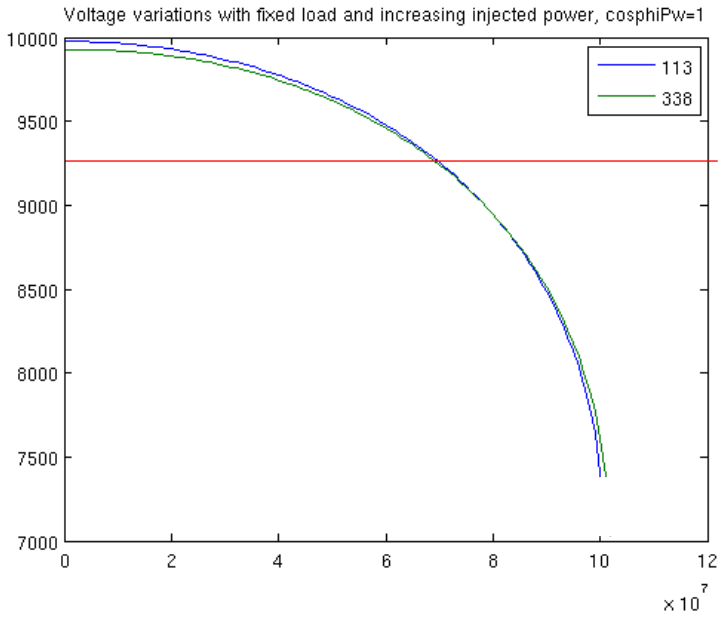


Figure 1: Network

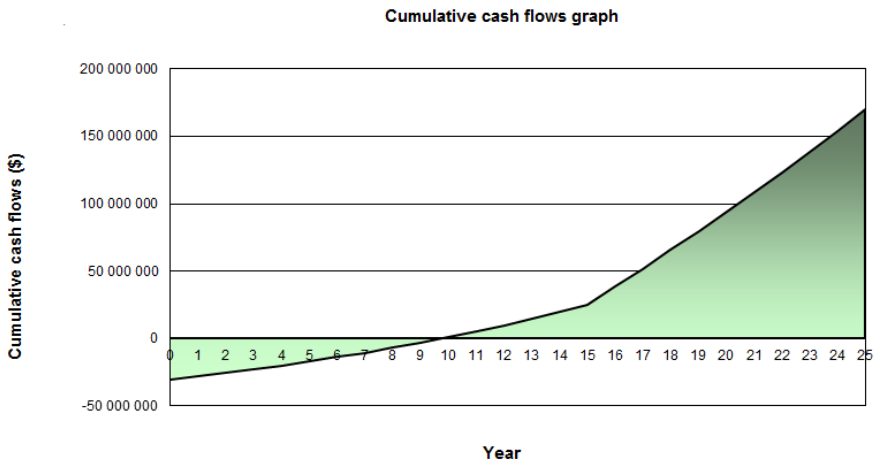
Table 1: Data for the possible connection points

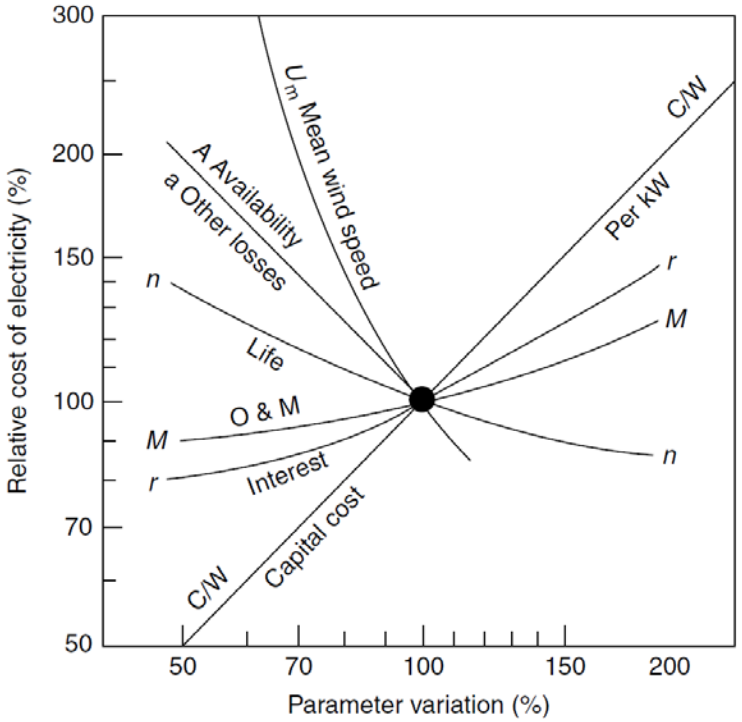
Point number	Connection point	Short-circuit capacity S_k (MVA)	Load/line/phase (A)	Number of lines
1	T925	50	80-180	1
2	A10	200	65-195	4
3	20 kV side of T1 in M10	450	150-370	2
4	B20	600	150-390	4
5	70 kV side of T2 in ÄT57	800	130-345	2
6	70 kV side of 200/70 kV transformer	1000	130-345	2
7	200 kV side of 200/70 kV transformer	1500	50-120	2
8	Strong grid	–	84-228	1



Economic analysis

For both wind turbines: Do the economic analysis to make your final choice.





Outcomes

- Report: 20 pages
- Presentation: 15 minutes
- Critical review of another team’s report

Time plan

- Next week: teams will be formed.
- 11 April: Hand in the written report.
- 11 April – 22 April: Do a critical review of another team's report.
- 22 April: Hand in the critical review.
- 22 April – 30 April: Revision of the reports based on critical reviews.
- 12 – 16 May: Presentations.

Project

- Pass/fail
- Gives you 1.5 hp
- **You must pass the project to complete the course (otherwise, you get only the 6 credits from the exam)**
- Old students that have already passed the project do not need to do it again
- Teams will be formed randomly
- **Email me if you don’t want to do the project**

For you to do

- Check the project description: https://www.kth.se/social/course/EG2040/page/project/
- Email me if you don’t want to do the project