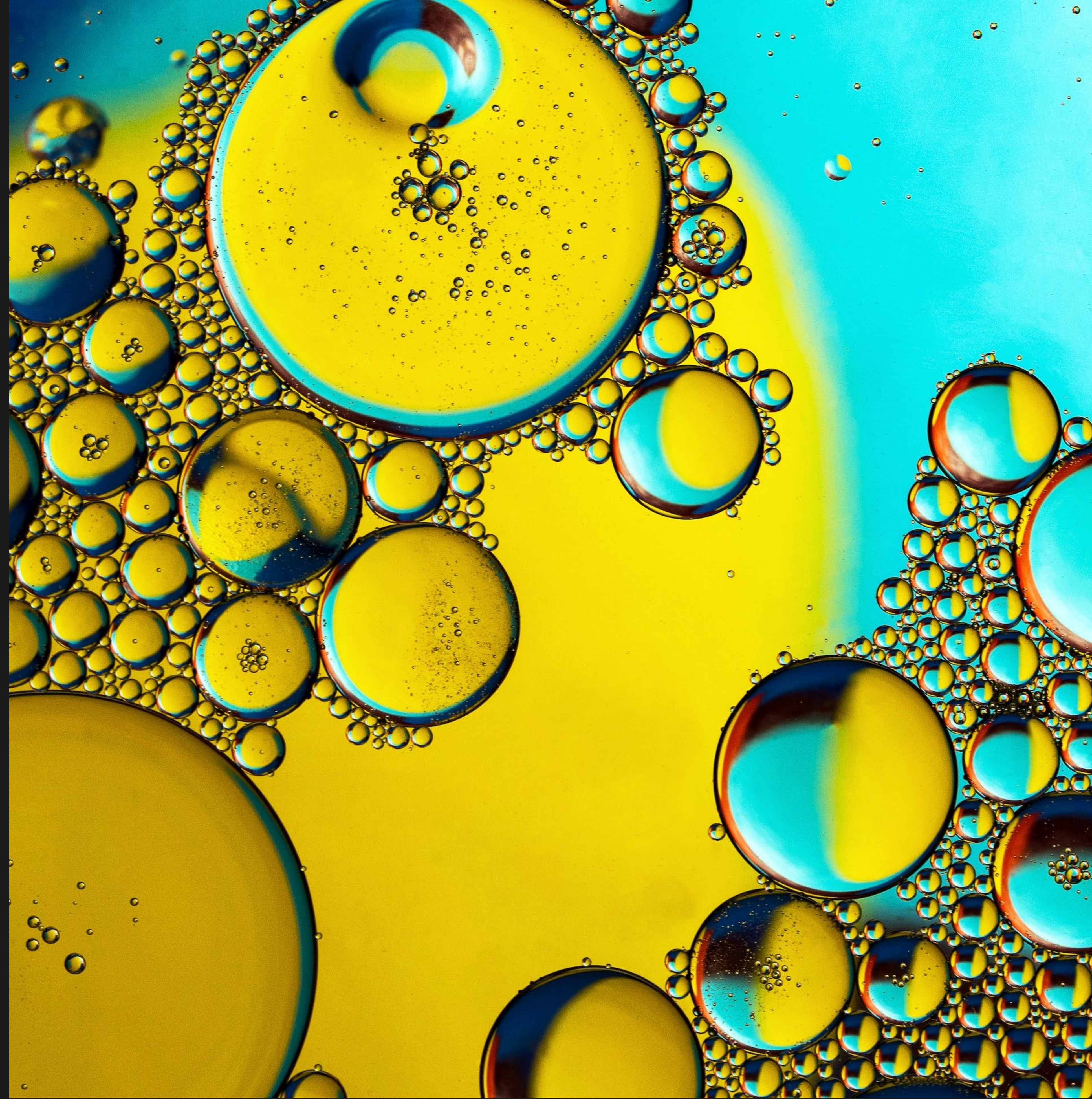


Mapping the network of Norwegian oil and gas interests



A Social Network Analysis of oil- and gas interests in Norway 2021-2022.

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3/11/2023

Preface

Norway is Europe's largest producer of oil and gas, and the oil and gas industry is one of Norway's biggest industries, employing roughly 60 000 people directly and 96 000 people indirectly [1].

Studies have shown that Norway and Norwegians differs from other European countries in their beliefs in technology and if climate change is man-made or not. A study conducted in 6 European countries from 2022 finds that Norway has the highest number of people who don't believe that climate change is caused by human behaviour [2] and a study from 2023 finds that Norwegians have significantly more faith in new technologies solving the climate crisis than the population in other European countries [3].

With this as a backdrop, we wanted to map out the potential influence that oil and gas interests might have on *other* influential stakeholders in Norway and see if it was possible to create a map of the most well connected and presumably both well positioned and powerful actors among Norwegian oil and gas interests.

In this report we look at how well-connected oil and gas interests are within in a highly synthesized network of very well-connected individuals and organizations in Norway, in the period 2021-2022.

Understanding and mapping out the connections of the oil and gas interests, in terms of who they serve on boards with, and what sectors they overlap with, provides transparency in terms of how the sector operates and thus what potential influence it has in the Norwegian society at large. We are at a crossroads in time, where our society must transition itself away from oil and gas – this also includes Norway. We hope this power mapping will bring more transparency in the future discussions around oil and gas in Norway.

This report has been commissioned by Oil Change International. Oil Change International is a research, communications, and advocacy organization focused on exposing the true costs of fossil fuels and facilitating the ongoing transition towards clean energy. The project is funded by the Energy Transition Fund.

Summary and findings

The goal of this project has been to map out the potential influence that oil and gas interests might have on other influential stakeholders in Norwegian society. To do so, we have utilized social network analysis (SNA) to map the network that oil and gas companies and interest organizations have within the broader Norwegian society.

We measure formal power – the control of businesses, organizations and political parties alike. As such we measure both network, formal influence and co-governance. Our analysis is based on data on board participation, executive management, membership in government and parliament, as well as participation in networks, state appointed boards, councils or committees.

We define oil and gas interests as individuals that represent organizations that have a vested interest in the continuation of oil- and gas exploration and extraction (see page 6). We find that oil and gas interests are well-connected within a network of very well-connected individuals and organizations overall in Norway.

In the period 2021–2022 we find that:

- A relatively small number of oil- and gas interests have an impressive reach: 21% of individuals within a condensed network of 1000 highly interconnected organizations are connected to oil and gas interests
- When we condense the overall network to the top 100 connected organizations in Norway, this share increases to 25%
- The number one well-connected individual in Norwegian society is an oil and gas interest, and of the 100 most well-connected 13 are oil- and gas interests
- Two specific oil and gas interests' organizations – KonKraft and Offshore Norway – have a great network of influence
- We find that the oil and gas interests are connected with trade unions, business and industry organizations, as well as political parties

Data

This analysis builds on data from various sources for the years 2021 and 2022:

- Data on Norwegian registered organizations and their board members from the official Brønnøysund Register Centre [4]
- Members of government and parliament
- Participation in state appointed boards, councils, and committees (SRU)
- Oil-related networks and forums

Data was collected through 2022 and 2023. The analysis builds on data about 577 393 organizations and related members. Norwegian businesses accounts for 72% of these organizations.

Data enrichment and filtering

Merging of data between sources has been done using full name and birth year if available. Fuzzy string-matching algorithms has been used to account for incorrect spelling or changes in names.

Because we are looking for well-connected individuals and organizations, the method can be prone to over-emphasizing individuals and organizations that have many roles in organizations with a high overlap of the same board members. Therefore, we remove so-called superlinkers which have more than 70 positions in the dataset. These are typically CEOs or chairman of the board to a number of subsidiaries to a parent or holding company. We also merge and filter out organizations which have overlapping memberships to reduce this potential bias.

Oil and gas interests

Defining the oil and gas sector

We use the Standard Industrial Classification 2007 [5] to classify relevant companies as belonging to the oil- and gas sector. Here, we follow the classification of Statistics Norway which includes 7 NACE codes (06.100, 06.200, 09.101, 09.109, 30.113, 30.116, 52.223). In total, there are 1 036 companies that have one of these classification codes in our dataset for 2021–2022.

Additionally, we have manually identified 14 companies as suppliers to the offshore oil and gas industry and two interests' organizations for the oil- and gas industry. We have also collected information on C-level executives for the companies with the highest number of operating license on the Norwegian Continental Shelf.

Finally, we have identified three network groups and forums that we have manually collected information on roles and memberships for.

Our definition of oil and gas interests

In this report, we define and understand *oil and gas interests* as individuals who are either:

- Board member, C-level executives or Power of Attorney (POA) in oil- and gas companies with 45 or more employees
- Chairman, vice-chairman, C-level executives or POA in oil- and gas companies with 5 or more employees
- Members of oil and gas related network groups and forums

Common for these is that they represent organizations that have a vested interest in the continuation of oil- and gas exploration and extraction.

Method

The goal of this project has been to map out the potential influence that oil and gas interests might have on other influential stakeholders in Norway.

To map out the influence of oil and gas interests in Norway, we have utilized social network analysis (SNA) to be able to analyze large amount of membership data.

Social network analysis has been used for this purpose for more than four decades. Our work builds on the use of K-core decomposition, where the goal is to find the largest subgraph of a network where each node has at least k neighbours within the subgraph.

In 1983, Stephen B. Seidman proposed an algorithm which distils a network by recursively removing nodes that have a degree less than k [6]. This has been a widely adopted technique when working with SNA to uncover the most densely connected parts of a network [7].

Our analysis is based on a revised edition of the K-core algorithm called K-circles. This method is currently described in an unpublished working paper by Anton Grau Larsen, Jacob Aagaard Lunding and Christoph Houman Ellersgaard. It builds on their work with identifying power elites within heterogeneous affiliation networks [8].

In the following, we provide an excerpt from the paper, which describes the K-circles method in more detail.

Finding the core with K-circles

In their working paper, “Overlapping social circles in historical elite career networks: Using ‘k-circles’ as a minimal members decomposition approach”, Anton Grau Larsen, Jacob Aagaard Lunding and Christoph Houman Ellersgaard writes:

K-circles assigns a k-circle score to all members and affiliations in a network and identifies a densely connected set of overlapping circles in a graph, by iteratively removing affiliations and members that have below the thresholds for members and memberships.

The procedure iteratively removes affiliations and members that fall below an increasing threshold, k . For affiliations the threshold is the minimal number of members, k , and for members it is the minimum number of affiliation memberships, j . For each iteration k increases while the value of j remains constant. But j is calculated within the remaining set of affiliations in each iteration and is therefore also increasingly rare.

In other words, j is the definition of a linker, e.g. a person with two or more memberships in linking affiliations. k is the definition of a linking affiliation. The k-score is then the number of linking members in the remaining set of linking affiliations. Interpreting the k-circle score is therefore fairly straightforward.

Imagine that in a network of 50 affiliations and 100 people; 5 affiliations and 12 people have a k-circle score of 3. That means that the 5 affiliations have at least 3 members with at least 2 memberships in those 5 affiliations. For the people it means that they have at least 2 memberships in those 5 affiliations.

Finding the core with K-circles

In Figure 1 we see the iterative process for a graph with 7 affiliations (O) and 29 individuals (X). Grey nodes are removed and red nodes continue to the next iteration. The *j-value*, the definition of a linker, is 2 affiliation memberships in this case. In the first iteration on the left - from k-score 1 to 2 all the hanging nodes and the chain of hangers are removed. In the second iteration from k-score 2 to 3, we end up with the two affiliations and the three individuals with the highest overlap of linking members.

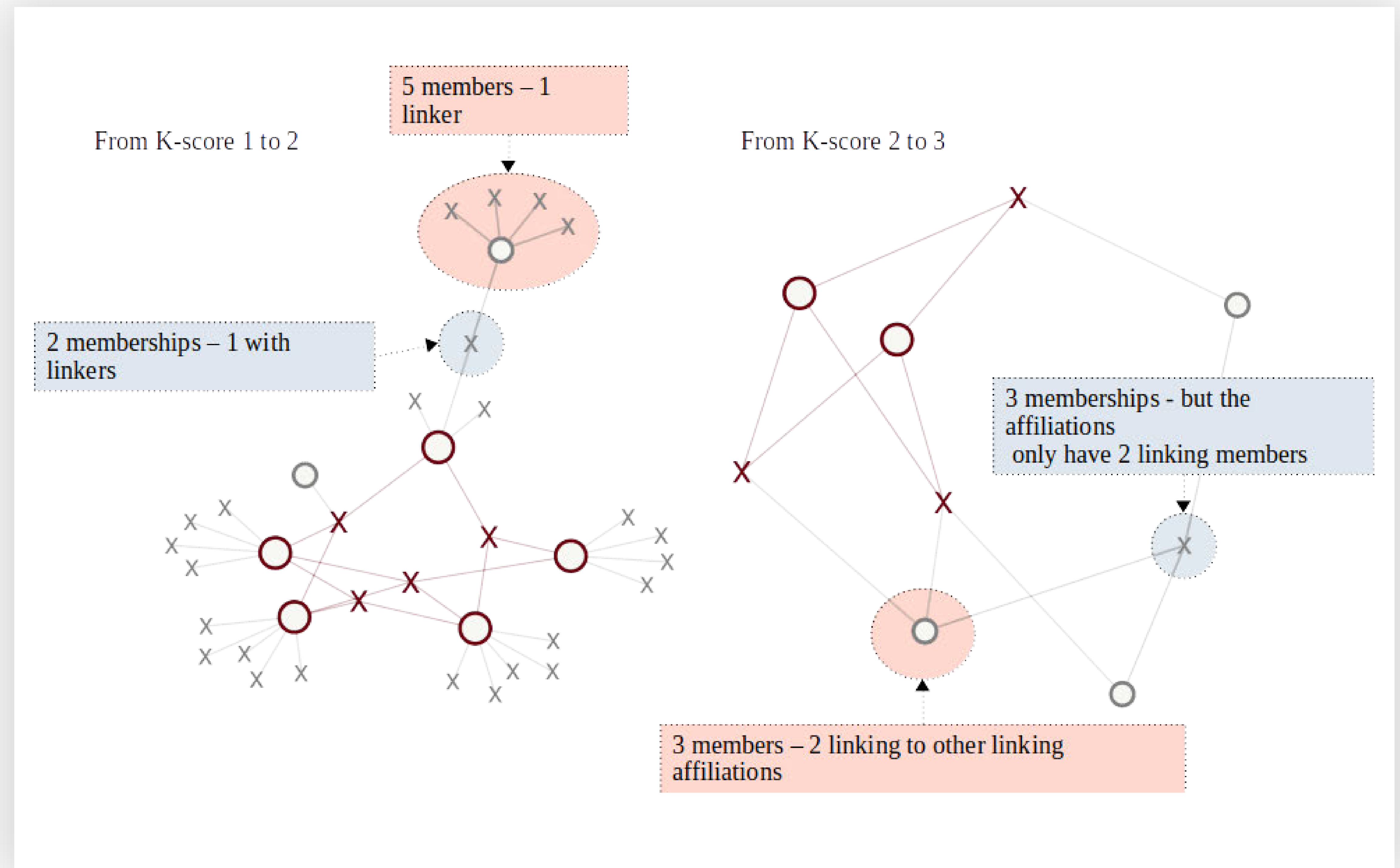


Figure 1: Example of how a network is pruned using K-circles and K-score. Figure from the unpublished working paper of Anton Grau Larsen, Jacob Aagaard Lunding and Christoph Houman Ellersgaard

Finding the core with K-circles

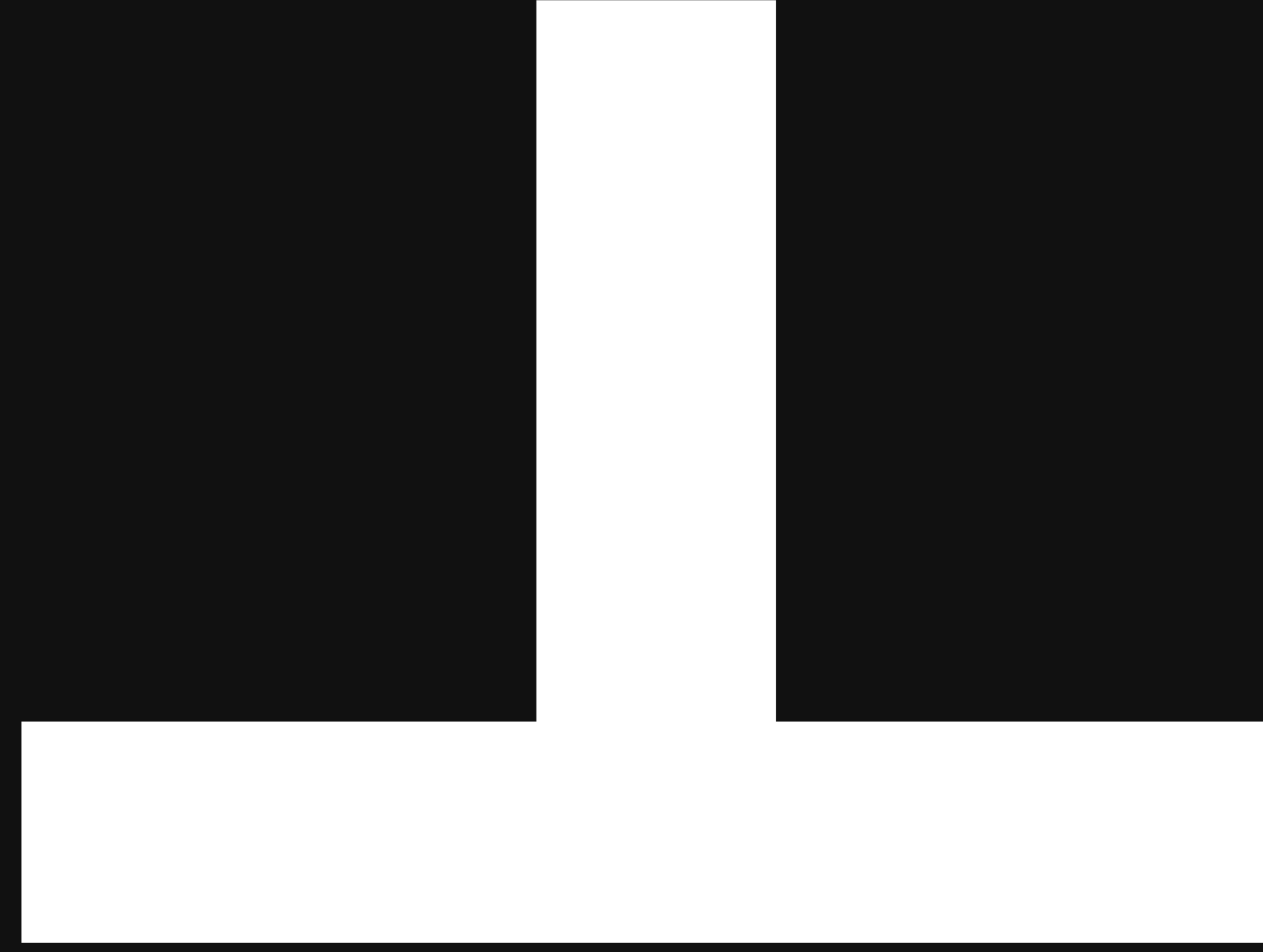
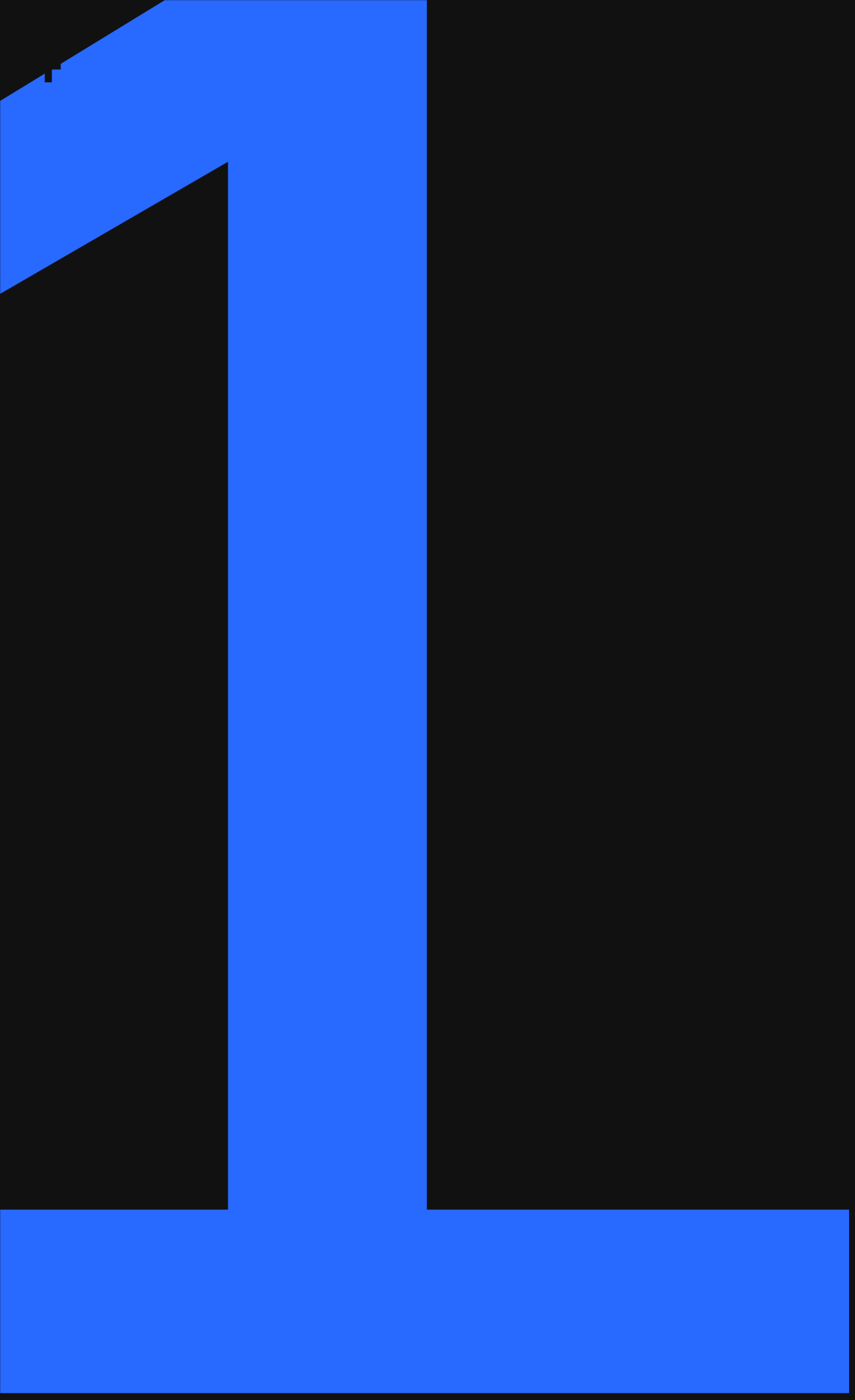
If we let k and j increase for each iteration the method is exactly similar to a k -core (Doreian and Woodard 1994; Seidman 1983) on a two-mode graph. But this approach assumes that the distribution of memberships and members are comparable. For most affiliation networks affiliations will on average have more members than their members have memberships. In that case increasing j along with k is too prohibitive and will essentially only identify places linked by “super-linkers”. A k -circle is the same as a k -core on a two-mode network where the k -score is constant for one of the modes of nodes in the two-mode network.

k-sum

This approach gives us the k -score for all members and all affiliations - but no natural cut point that could be used to demarcate the boundaries of the core. The k -score of a member is based solely on his memberships in j affiliations and disregard the centrality of their other affiliations. In order to assess the importance of a member we therefore propose the *k-sum* - which is the sum of the k -scores of all the affiliations an individual has minus the number of affiliation memberships.

So, an individual with 5 memberships, where the affiliations have k -scores of 1, 1, 2, 5 and 5 will have a k -sum of 9. The k -sum is therefore a continuous centrality measure. Similarly, we can calculate the k -sum for organizations, which is the sum of the k -scores of its members minus the number of members. Because the k -sum is the sum of the k -scores of his or her affiliation memberships, the k -sum is a measure of the centrality or success of the other members of his or her affiliations. The k -sum of an affiliation can be negative if it has more members and cumulated k -score - and thus it will be detrimental to the k -sum of its own members. To get a high k -sum a person needs to have been affiliated with several successful affiliations and not be affiliated with “dead ends”.

This process produces a network with the most densely connected entities – which we call the core in this report. In the report we refer to the ***k-sum score*** as a measure of how successful an individual or organization is, in terms of having a network with other well-connected entities.



Results

The best-connected organizations in Norway

Our analysis of the network of Norwegian oil and gas interests is based on a broader analysis of the Norwegian society in general.

For this purpose, we have mapped out a broader network of the most well-connected individuals and organizations overall in Norway.

It's important to highlight that this is not necessarily a list of the most powerful organizations in Norway, but the best-connected organizations based on registry data on Norwegian companies and organizations, membership in government and parliament as well as state appointed boards, councils, and committees.

Organization	K-sum score
LABOUR PARTY PARLIAMENT GROUP	420
CENTRE PARTY PARLIAMENT GROUP	242
CONSERVATIVE PARTY PARLIAMENT GROUP	219
PROGRESS PARTY PARLIAMENT GROUP	161
CONSERVATIVE PARTY	156
FISKARLAGETS SERVICEKONTOR AS	137
LABOUR PARTY IN GOVERNMENT	136
KS-HOLDING AS	126
CENTERE PARTY IN GOVERNMENT	108
CENTRE PARTY	101
NORGES RÅFISKLAGE SA	95
SOCIALIST LEFT PARTY PARLIAMENT GROUP	92
SAMARBEIDENDE SPAREBANKER UTVIKLING DA	91
FOUNDATION LO MEDIA	89
LANDSSAMANSLUTNINGA AV VASSKRAFTKOMMUNAR	87

Table 1: The 15 best-connected organizations in Norway overall, 2021-2022.

Organization	K-sum score
KONKRAFT (network)	71
AKER SOLUTIONS AS	62
KVÆRNER AS	58
AKER ASA	53
AKER SOLUTIONS ASA	48
OFFSHORE NORWAY	46
AKASTOR ASA	42
CCB AS	40
FOUNDATION OFFSHORE NORTHERN SEAS	39
ISTAD AS	37
WESTCON POWER AND AUTOMATION AS	31
EQUINOR ASA	29
AIBEL AS	28
AKER KVÆRNER HOLDING AS	27
NORSK INDUSTRI OIL & GAS (network)	26

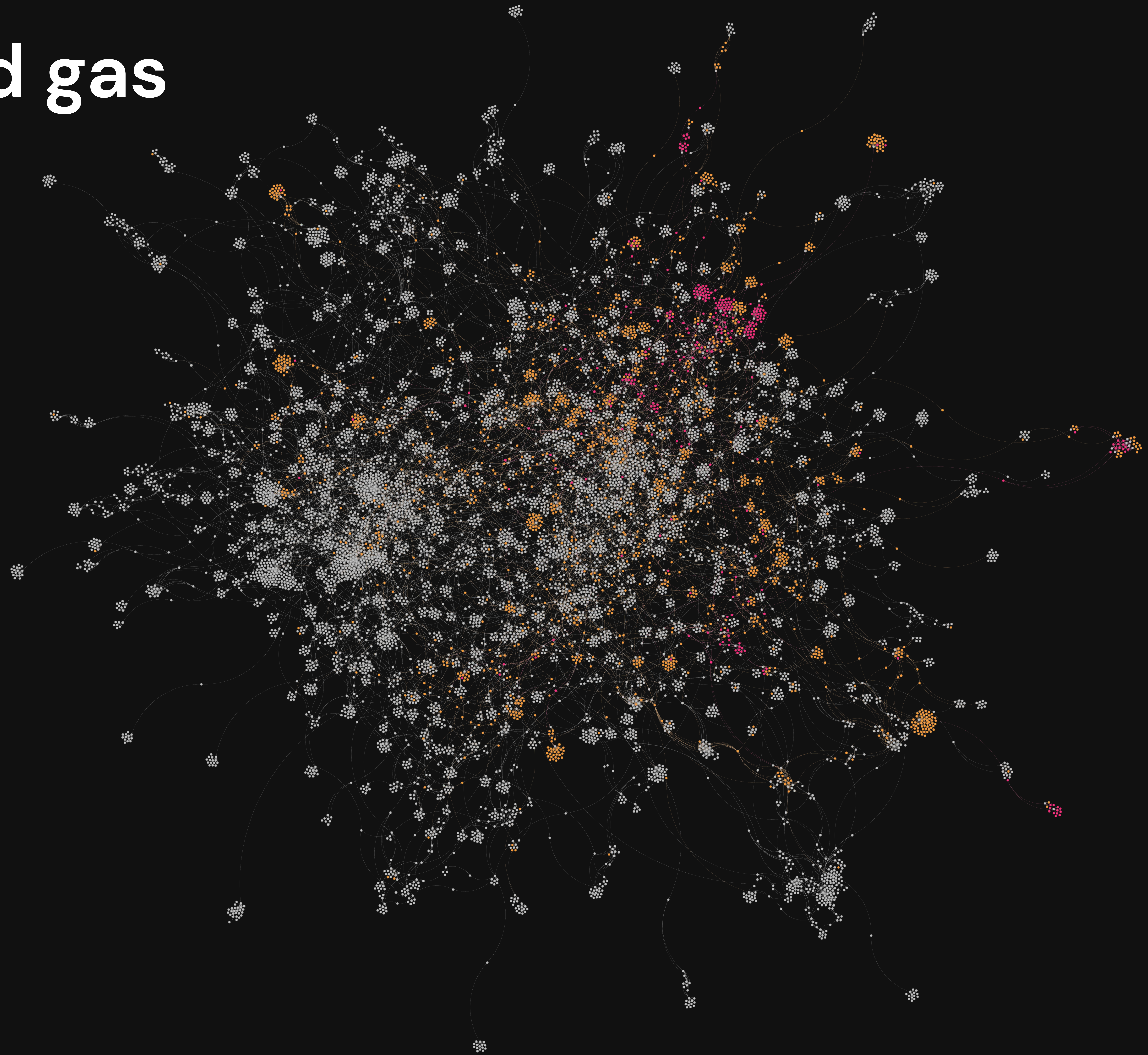
Table 2: The 15 best-connected oil and gas organizations in Norway, 2021-2022.

The reach of oil and gas in the core

Of the top ~1000 well-connected organizations and forums in Norway overall, we find that oil and gas interests are connected to 15% of the organizations.

They have an impressive reach in Norwegian society. In total, 2059 people either themselves represents, or meets a person representing, oil and gas interests. That amounts to 21 % of all the people represented in this network graph.

The oil and gas interests (303) are marked with a purple color. Individuals who meet these through overlapping membership are marked with an orange color. The network shows both organizations and individuals.



The core – top 500

When we continue to filter down the inner core of interconnected organizations, the presence of oil and gas interests persists. Here we find that oil and gas interests are connected to 18% of the remaining organizations (500).

1450 people either themselves represents, or meets a person representing, oil- and gas interests. That amounts to 24 % of all the people represented in this network graph.

The oil and gas interests are marked with a purple color. Individuals who meet these are marked with an orange color.

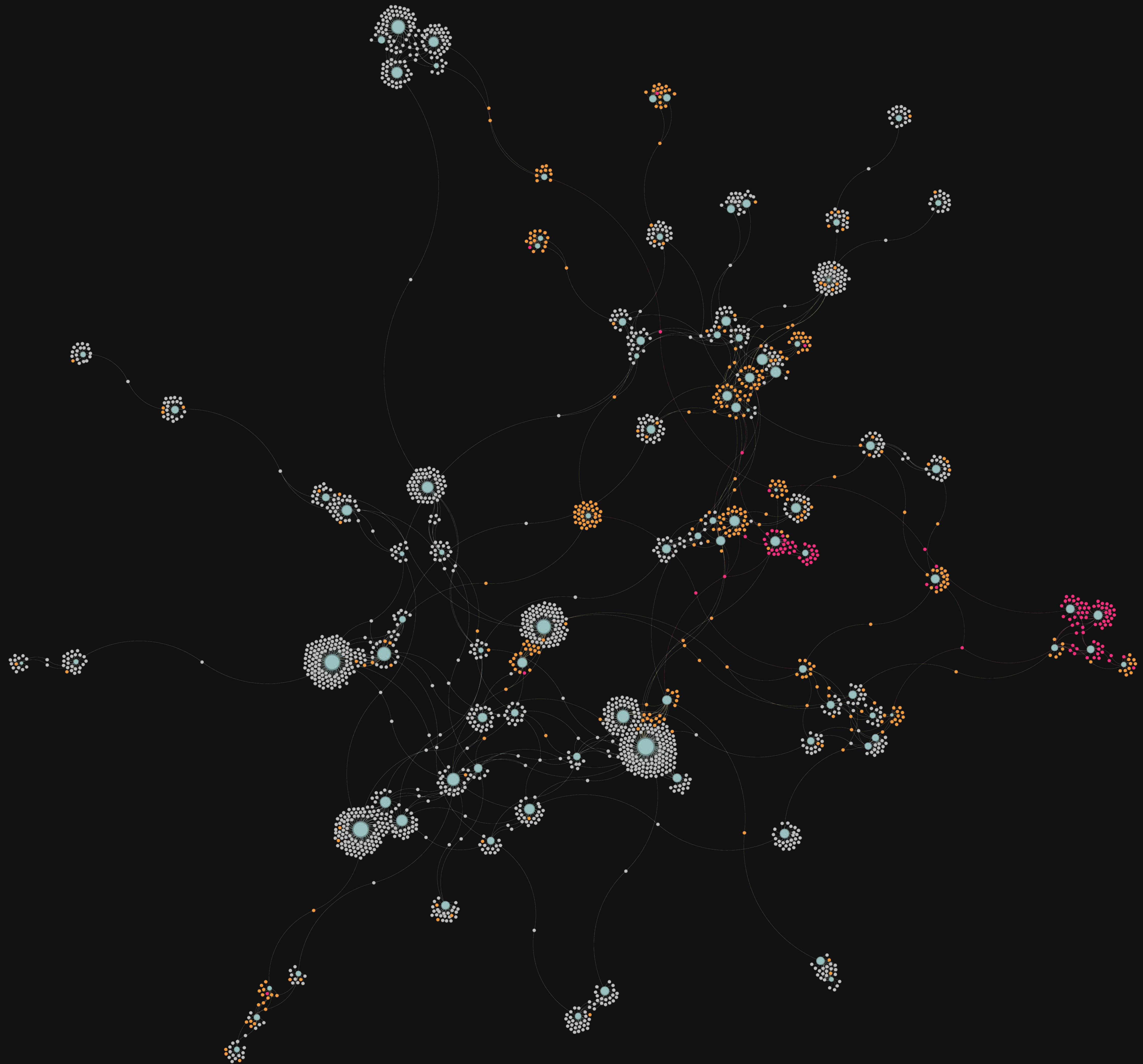


The core – top 100

Even when we boil down the center of the core to the 100 most interconnected organizations, we find that oil and gas interests are still prevalent.

27% of the organizations are connected with oil and gas interests. 528 people either themselves represents, or meets a person representing, oil and gas interests. That amounts to 25 % of all the people represented in this network graph.

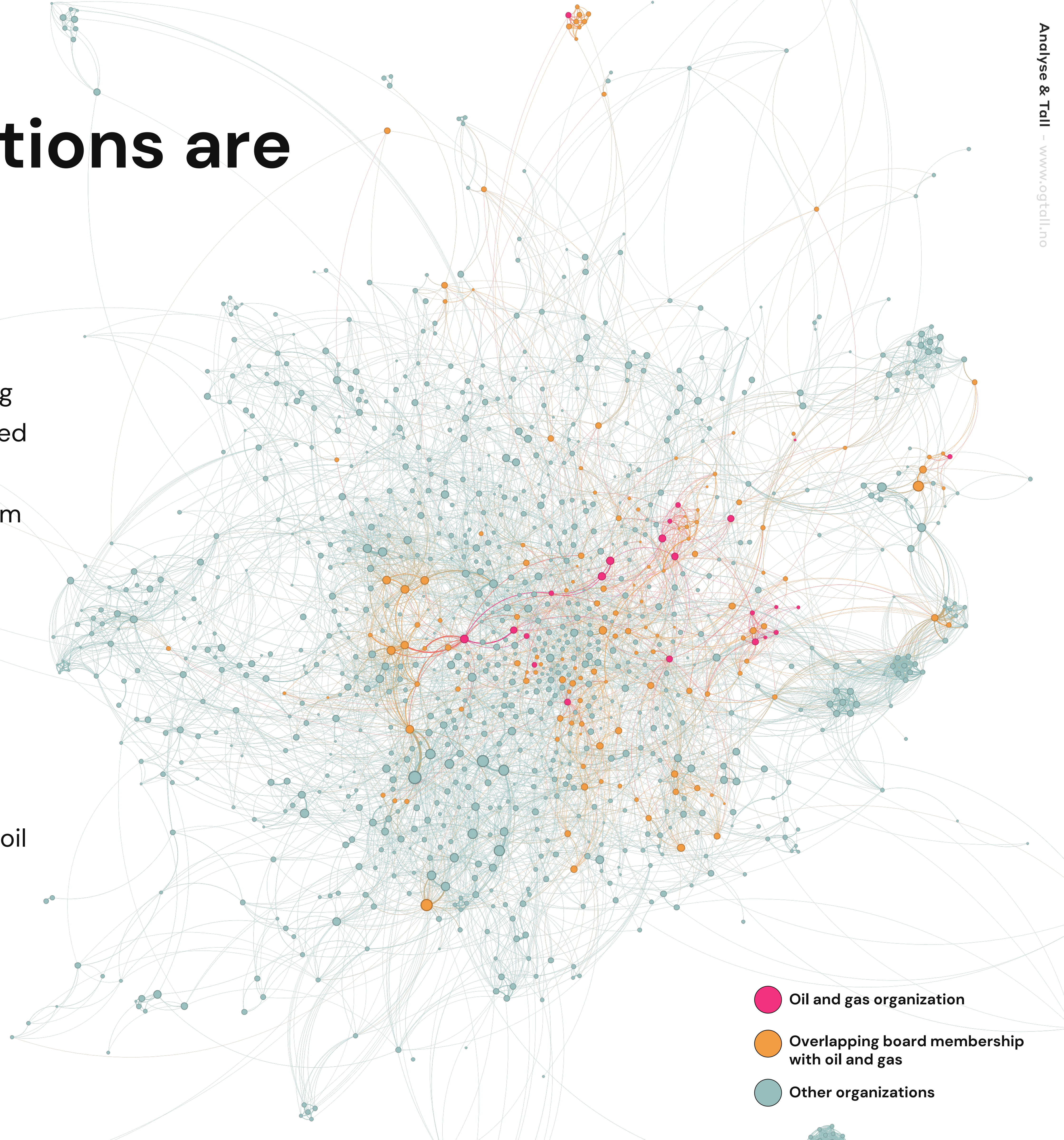
The oil and gas interests are marked with a purple color. People who meet these oil interests are marked with an orange color. The organizations are colored light green, and the size is based on their *k-sum* score.



Oil and gas organizations are centrally located

Here, we take a different view on the network. By removing individuals, we can look at how organizations are connected (through individuals) to each other. Each circle is an organization, and their ties are individuals' connecting them to other organizations. Their placement indicates a closer or more distant relationship. The size of each node is the organizations' *k-sum* score.

We see that the 23 oil and gas organizations cut through the center of the network, underlining their strong centrality of the overall network. The 140 organizations, which share board membership with individuals from the oil and gas organizations, are marked in orange. They too are centrally located in the network.

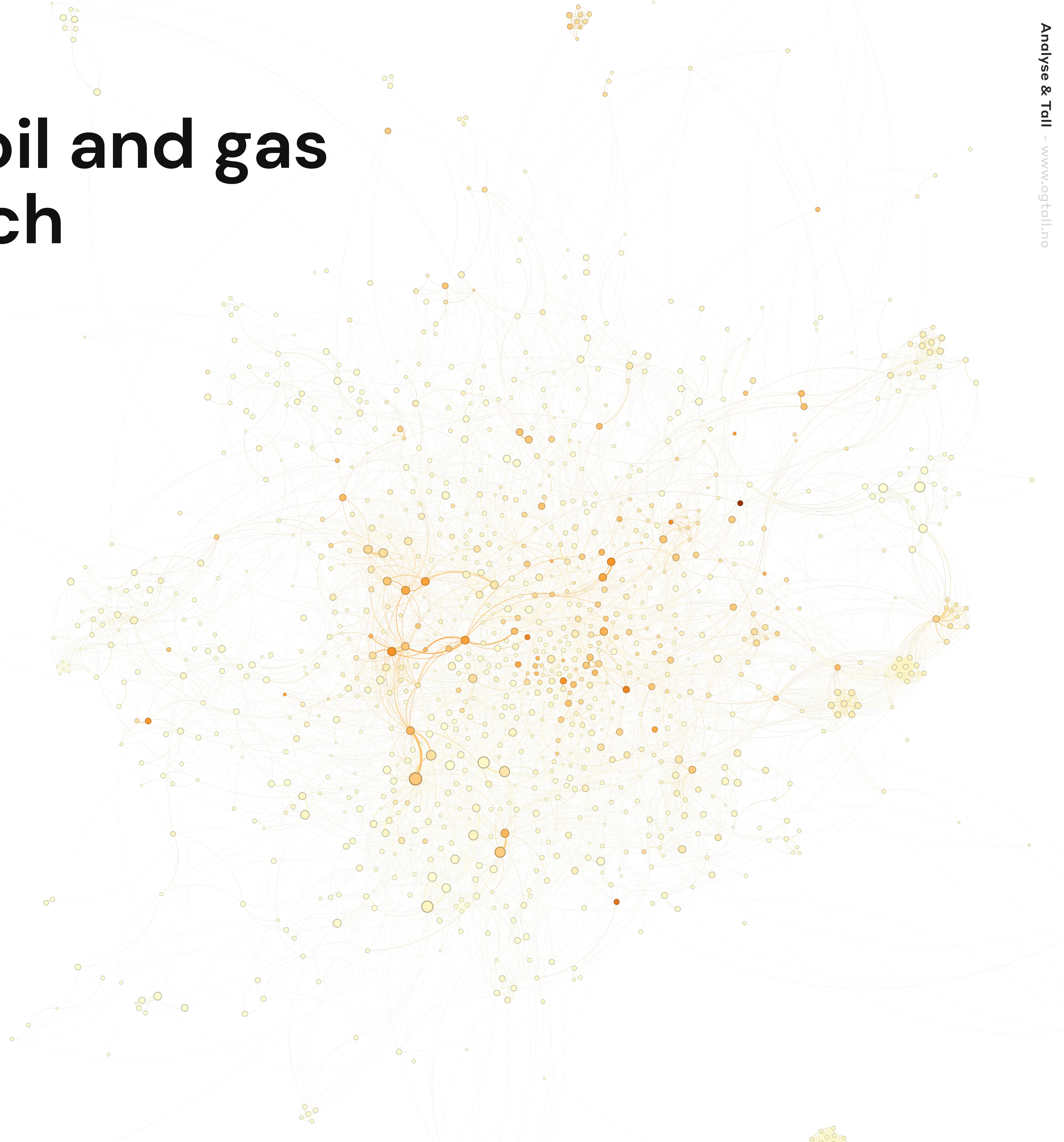


Organizations with oil and gas interests within reach

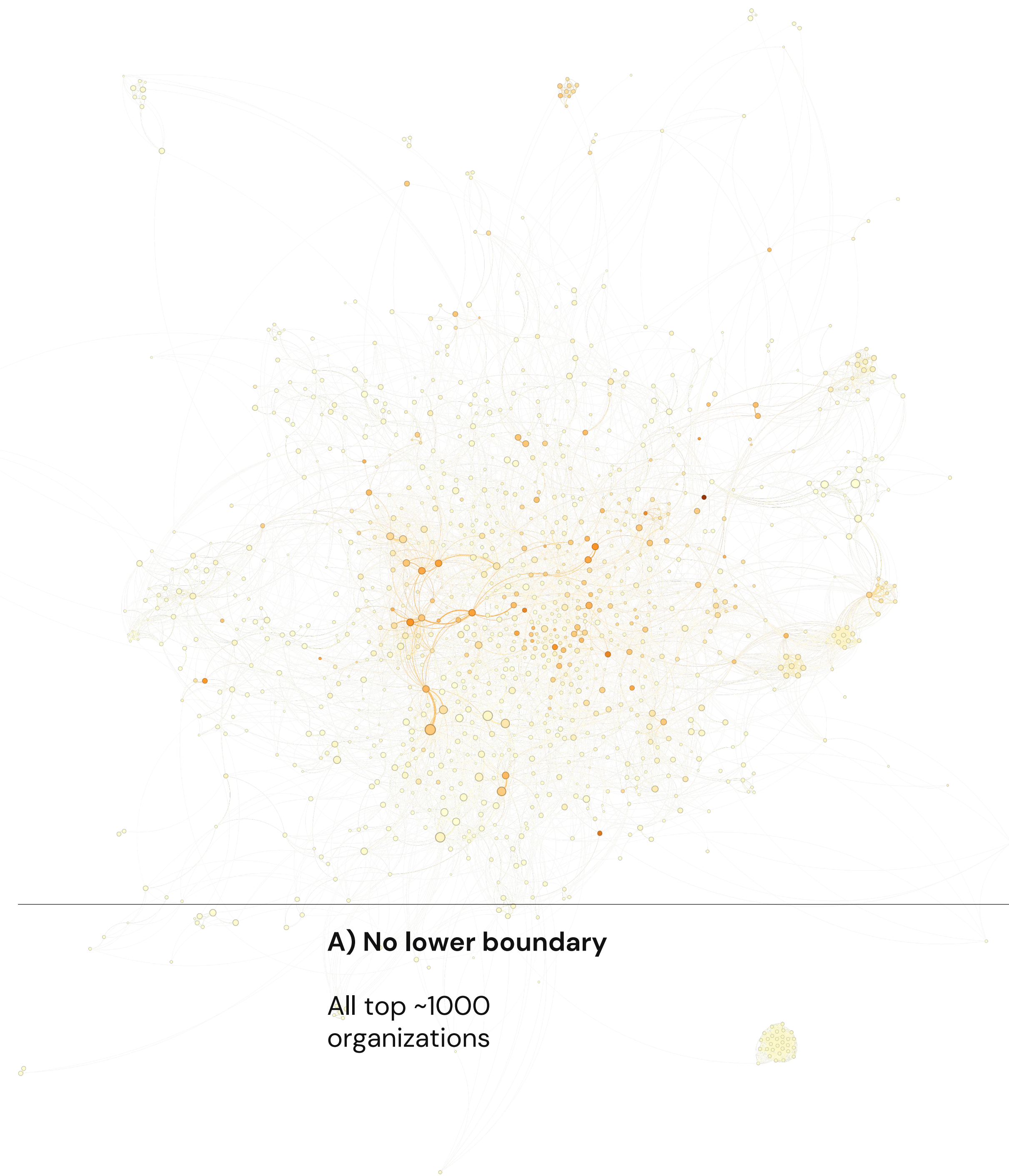
Here, we look at organizations that have oil and gas interests within reach. As opposed to the previous network view, where organizations with direct overlapping membership were colored orange, here we look at the potential connections to oil and gas in the third degree.

For example, a member A might not meet any oil and gas interests, but they might meet a member B, which does through another position.

We color the organizations from light yellow to dark orange, depending on how *many* oil and gas interests it has potential to meet like this. This shows that a larger portion of the network has the potential for connecting with oil and gas interests through their immediate overlapping memberships (and vice versa).

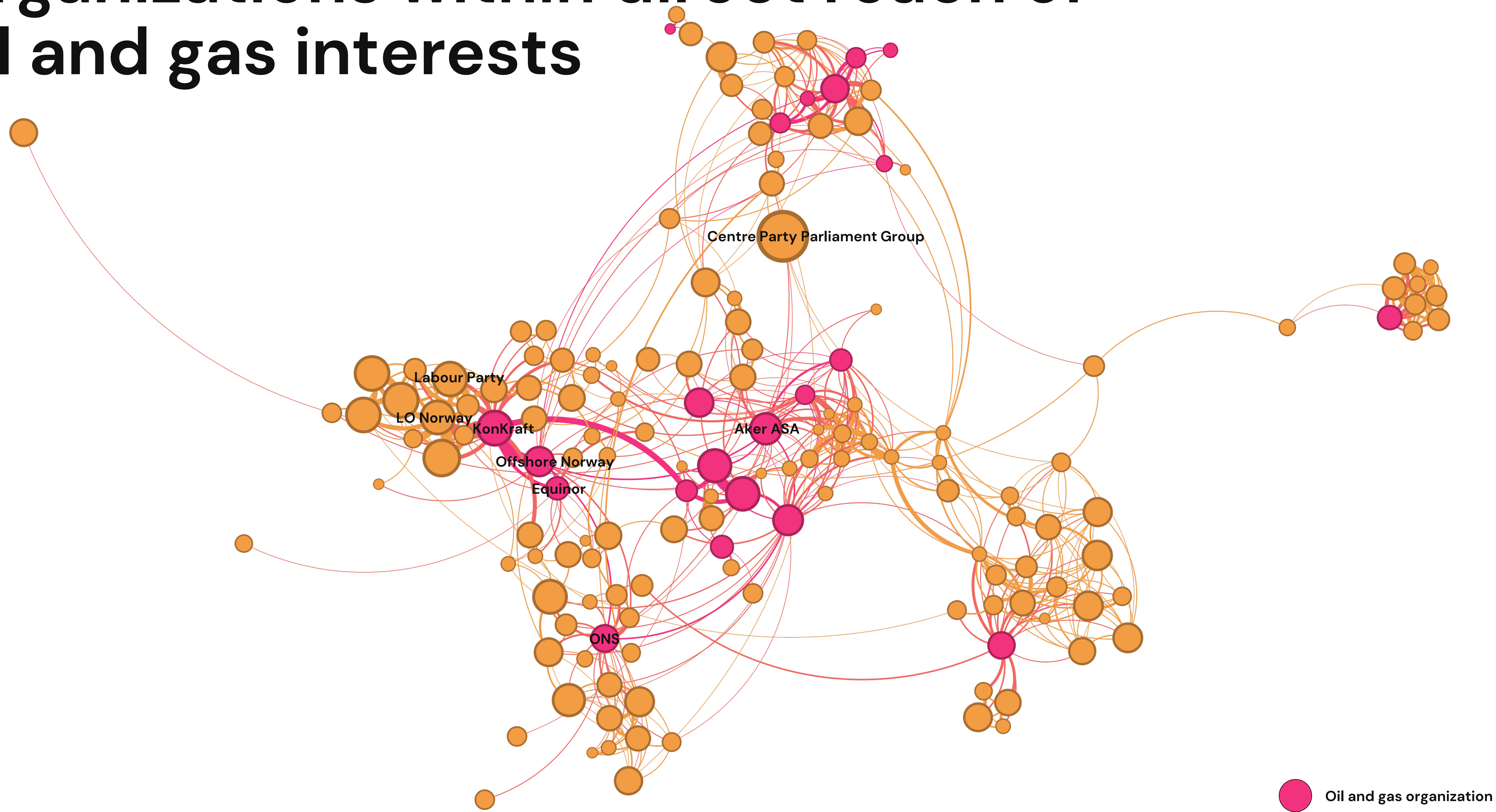


Organizations with oil and gas interests within reach



Filtering down the network based on the minimum number of oil and gas interests which an organizations has within reach. A) No lower boundary, B) Minimum 5, C) Minimum 10

Organizations within direct reach of oil and gas interests

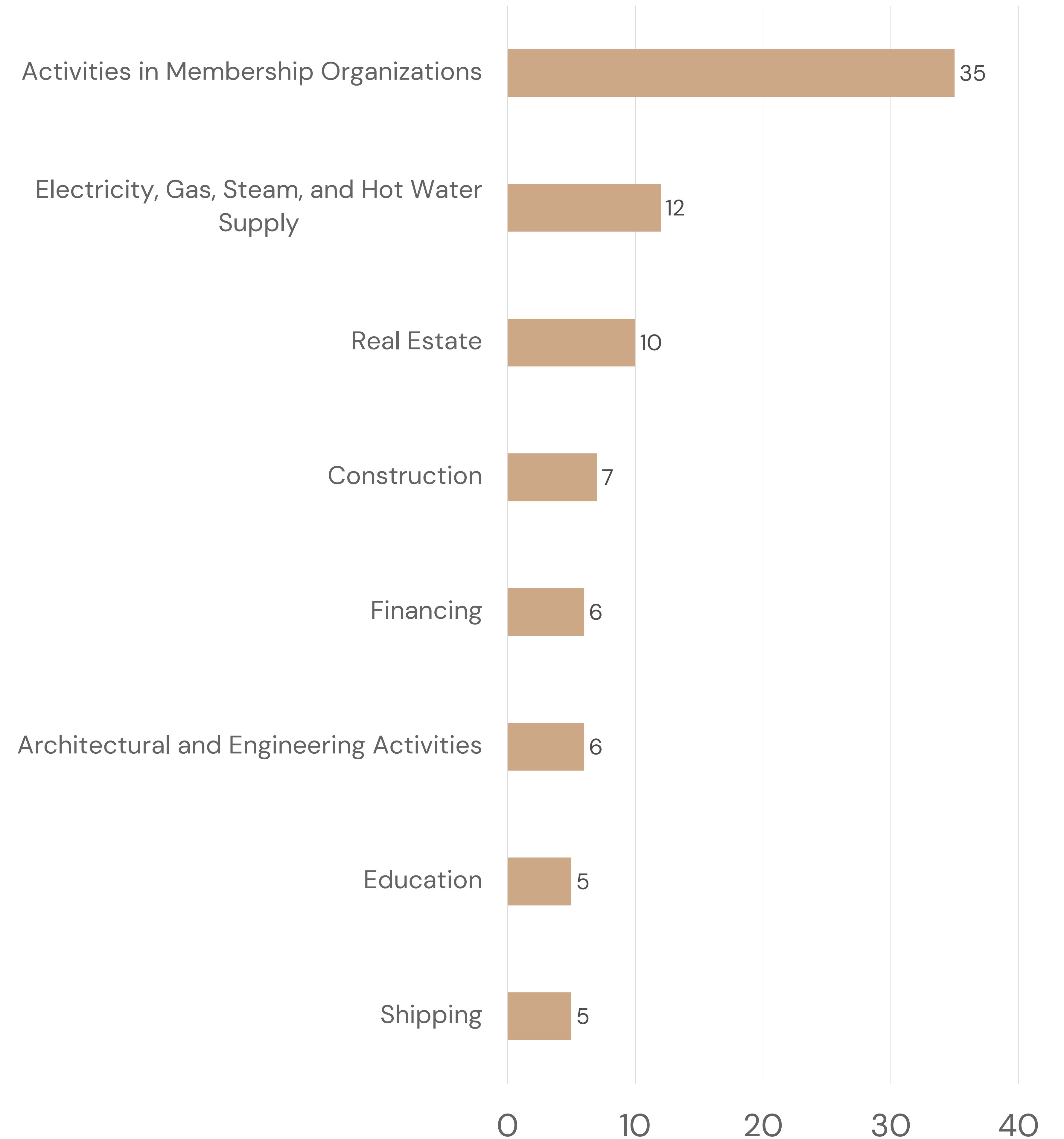


Overlapping sectors with oil and gas interests

The 23 oil and gas organizations are directly connected to 140 other organizations through overlapping board memberships. The main general type of organization are other businesses (81 of 140). But the single organization type is membership organizations (NACE code 94). Here we find trade unions, local and national business and industry organizations, as well as local, regional and national political parties.

This also includes foundations within sports and culture. Here we find the Football stadium in Molde (Aker), Molde Football club, Viking Football club and Foundation Vi which works to *“promote sports activities for people with disabilities, both at the elite and grassroots levels”*. We also find notable culture institutions like Stavanger Concert Hall, Stavanger Symphony Orchestra, Bergen International Festival and Molde International Jazz Festival.

Table 3: NACE groups which has 5 or more organizations



Two key stakeholders: KonKraft and Offshore Norway

KonKraft and Offshore Norway are two of the most important lobby forums (KonKraft) and organizations (Offshore Norway) for the Norwegian oil and gas industry, and in our analysis, we map out their extensive network.

KonKraft

KonKraft is a forum with representatives from Offshore Norway, Norwegian Industry, the Norwegian Shipping Association, the Norwegian Business Confederation (NHO) and the Norwegian Confederation of Trade Unions (LO), with the LO confederations Fellesforbundet and Industri Energi. The goal of KonKraft is to *“be a premise provider for national strategies for the petroleum sector, and work to maintain the competitiveness of the Norwegian continental shelf, so that Norway remains an attractive investment area for the Norwegian and international oil and gas industry, including supplier companies and the maritime industry.”* [9]

Offshore Norway

Offshore Norway, formally known as The Norwegian Oil and Gas Association, is an employer and interest organization for companies operating on the Norwegian continental shelf, and more than 100 companies linked to operations on the Norwegian continental shelf are members of Offshore Norway.

Both groups play an essential role in the development of the Norwegian oil and gas industry and have a big impact on decisions being made. When the Norwegian Parliament in the Summer of 2020 introduced temporary changes to the oil tax regime as part of a covid relief package, it happened despite huge protests from both environmental groups and economists [10].

The changes entailed significant subsidies to the petroleum industry and meant that the oil companies could write off all tax directly in the year of expenditure, and that they received a free income of 24 per cent on top of the depreciation, as an extra subsidy. The temporary changes also apply to all new projects where the development plan was submitted before 1 January 2023 and approved before 1 January 2024 [11].

An oil and gas representative that was interviewed as part of a study conducted by Kristiania University College stated that: *“KonKraft really came into its own in this campaign. We managed to make it clear that this was not about our own sick mother, but all of us. We were going to lose the hub of the Norwegian economy and we mobilized people along the coast of Norway. It is clear that when the Shipping Association, Norwegian Industry and LO decide to do something together with us, it will be a hit.”* [12]

KonKrafts immediate reach

KonKraft has a *k-sum* score of 68, which ranks them at position 22 in the overall list of well-connected organizations in our analysis. In the network to the right, it's easy to see why.

Through its council members, KonKraft has an impressive immediate reach into political parties, finance and banking, labour organizations, business organizations, shipping and oil and gas companies.

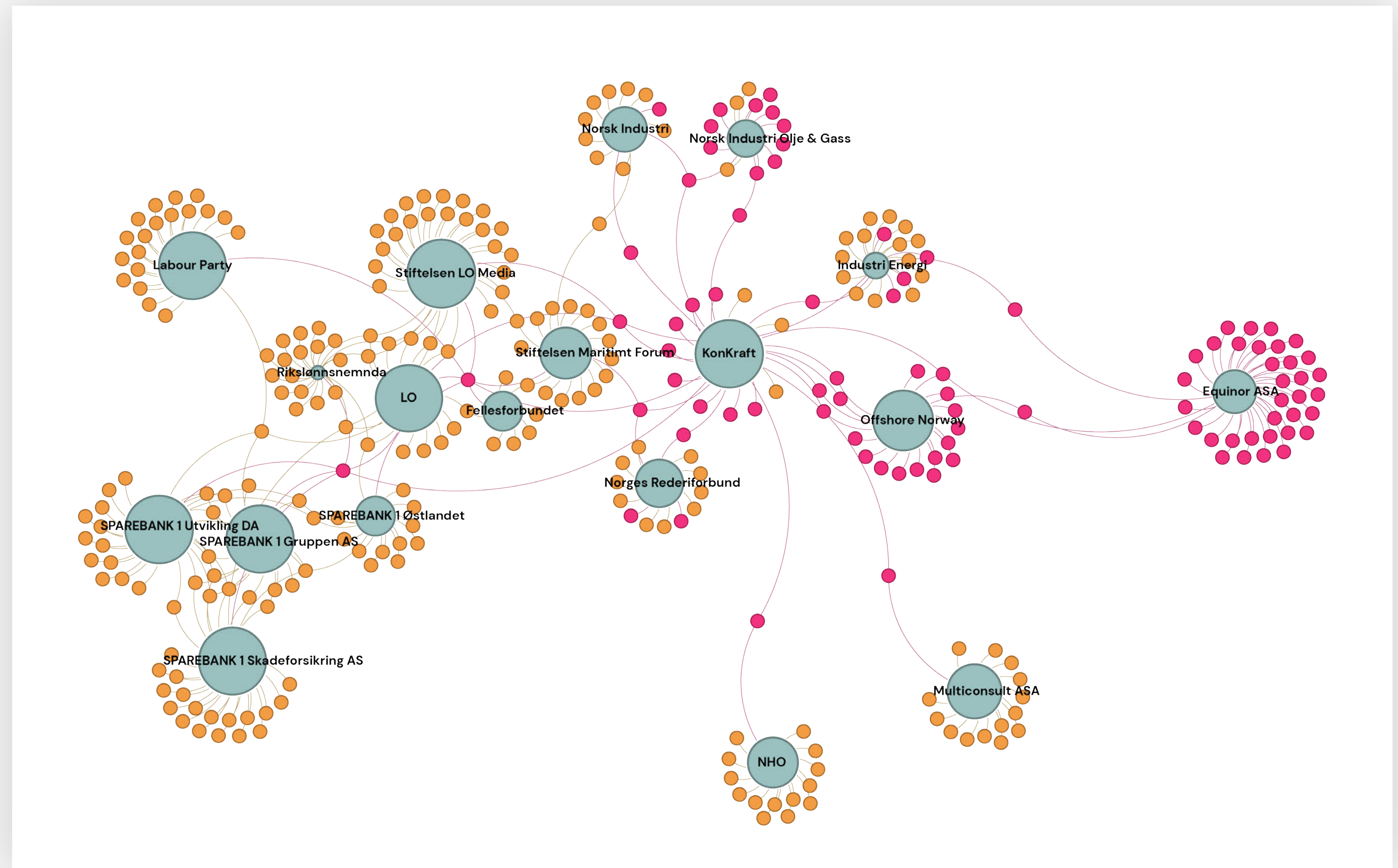


Figure: Green circles are organizations. Larger circle indicates higher *k-sum* score. Purple circles indicates oil and gas interests, orange circles indicates individuals meeting oil and gas interests.

The networks' best-connected individual

This network shows the immediate network of the person with the highest *k-sum* score in the network overall – Kjell Inge Røkke. Røkke is a Norwegian businessman who is the largest shareholder of Aker ASA which is an industrial investment company within oil and gas, shipping and marine biotechnology sectors [13].

The size of the organization's circles are based on their *k-sum* scores. We can see that Kjell Inge Røkke is connected to multiple oil and gas organizations which have high *k-sum* scores.

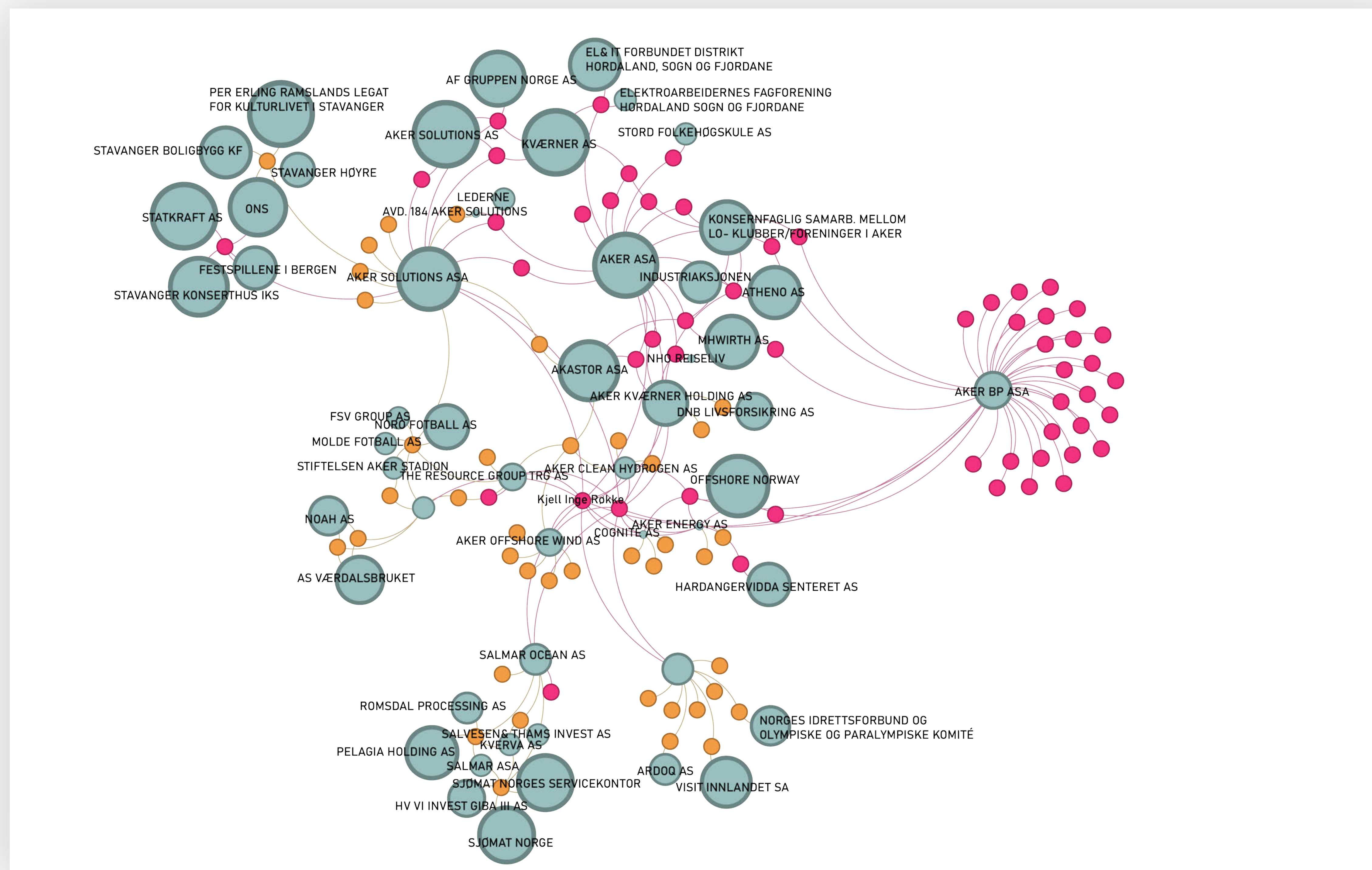


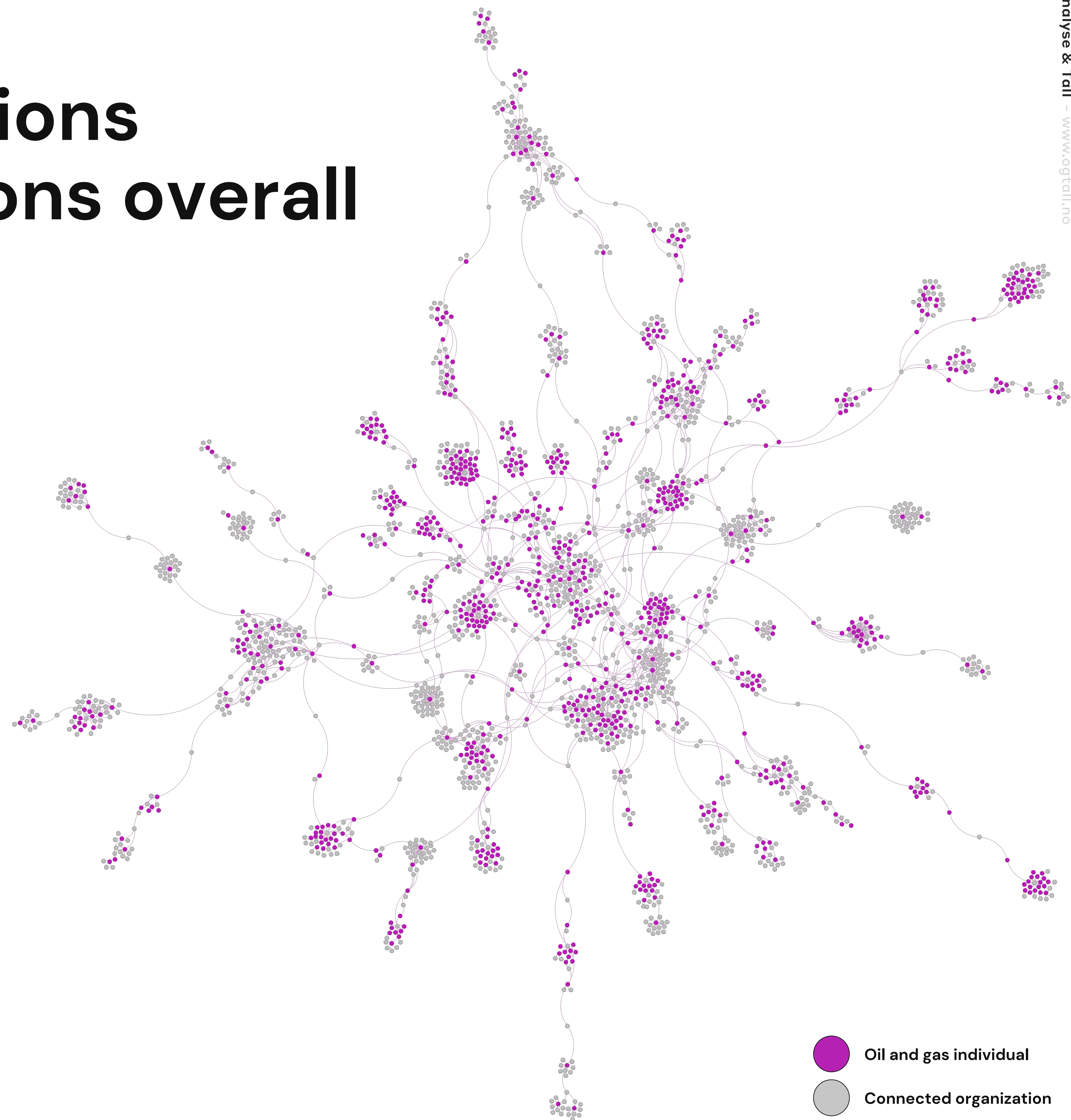
Figure: Green circles are organizations. Larger circle indicates higher *k-sum* score. Purple circles indicates oil and gas interests, orange circles indicates individuals meeting oil and gas interests.

Oil and gas organizations immediate connections overall

We have focused our analysis on how well oil and gas interest succeed in the overall synthesized network of the most interconnected organizations and individuals.

With this focus, we do however lose sight of the general networks that oil and gas organizations have. This illustration shows the results of a bottom-up analysis of the most interconnected oil and gas organizations and their immediate connections.

In this network, we find 182 oil and gas organizations that through 861 individuals have ties to 1280 *other* organizations.



How well-connected are the Norwegian Environmental NGOs?

We find that most of the Norwegian E-NGOs are not very well-connected. 8 out of 16 organizations have a negative or zero *k-sum* score, indicating that they are connected to “dead ends” and the periphery of the overall network.

The exception is WWF, which has a *k-sum* score of 17, ranking it at 1 225 place of the overall organizations in our analysis.

To compare, KonKraft has a *k-sum* score of 68 and Offshore Norway has a score of 46, ranking them at positions 22 and 73 in the overall list of well-connected organizations in our analysis.

Organization	K-sum score
WWF	17
ZERO	12
Miljøagentene	10
NNV	9
FNF	7
FIVH	4
Folkeaksjonen LoVeSe	2
Bellona	1
Extinction Rebellion Norge	0
NU	-2
Sabima	-2
Besteforeldrenes klimaaksjon	-3
Changemaker	-4
Spire	-5
NMF	-6
Greenpeace	-6

Table 4: K-sum score for Norwegian Environmental NGOs.

Limitations and methodological weaknesses

Measures of formal power

Our analysis is based on measuring formal power – the control of businesses, organizations and political parties. As such we measure both network, formal influence and co-governance (overlap in control between organizations and sectors). This measure provides interesting perspectives on the potential for economic power, political power and social influence, but it's not necessarily a measure which can account for all of them combined.

Defining oil- and gas interests

NACE-codes gives a limited view of the current oil- and gas industry in the Norwegian. In 2022, Statistics Norway estimated that 156 000 people were directly or indirectly employed in the oil- and gas sector. But the number is much lower (60 000) when only looking at directly employed. This discrepancy in what the 7 NACE codes encompasses obviously underestimates the real size, and in turn, reach of the sector. Additionally, it has been outside the scope of this work to define the level of exposure an individual has overall in the oil and gas sector.

Incomplete data

Our analysis builds on inherently incomplete data. The available data provides insight into formal relationships, but there are obvious blind spots of both formal and informal ties which our method does not capture. This includes, but is not restricted to, informal networks, lobbying activities and economic ownership. Norway does not have a central lobby register and publicly available data on economic ownership (eg bonds and stocks) is limited. These limitations more than likely compounds to our underestimates of the reach of Norwegian oil and gas interests.

About data from SRU

The data on state appointed boards, councils, and committees was a separate service in the years 2017–2022. This data source was not complete, as many entities never were entered into the database. Still, it has been the best available data source on this subject. The service was discontinued as a standalone service with effect from June 1, 2022.

Summary of findings

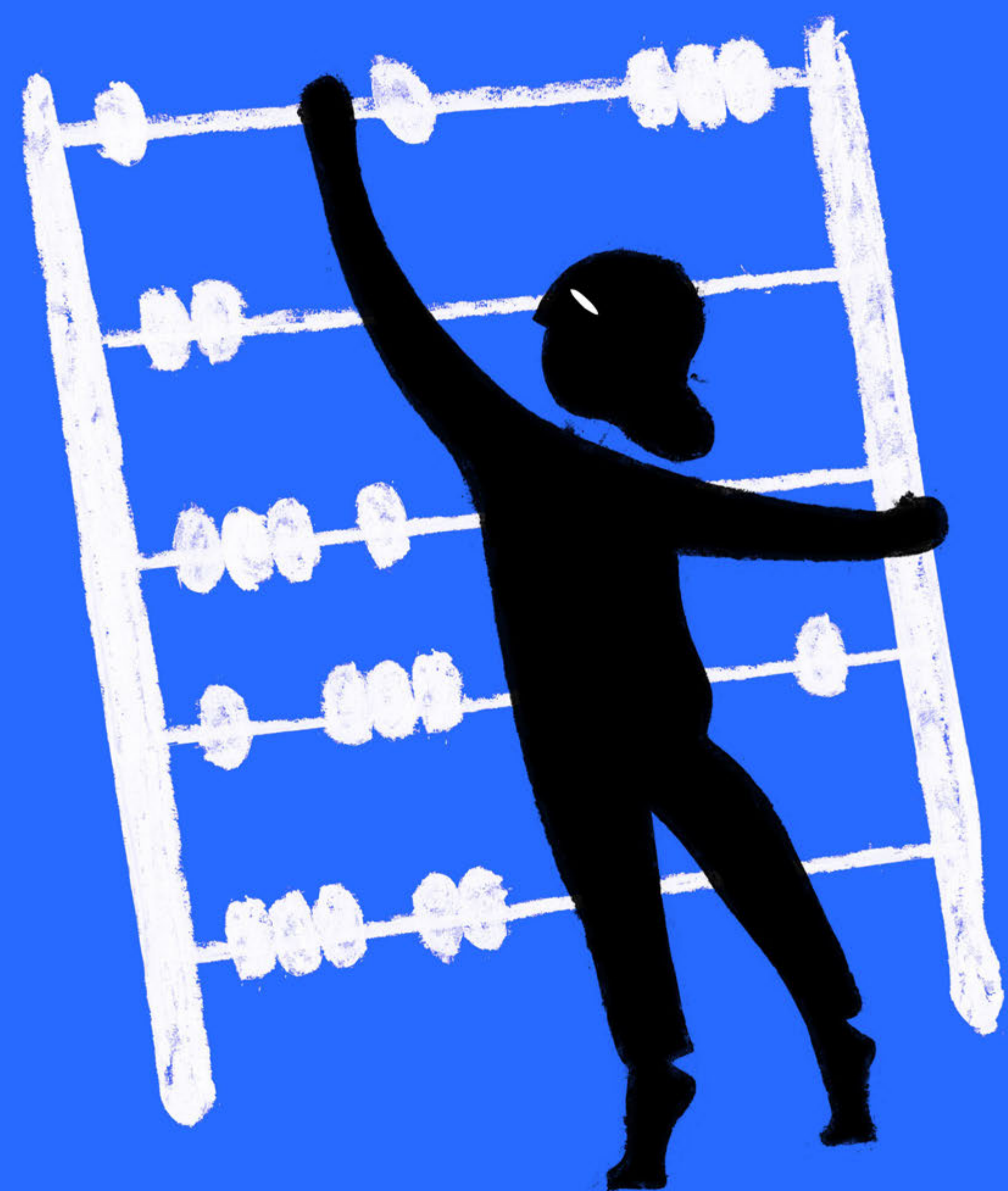
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Sources

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