

# **Urenco:**

**Gronau uranium enrichment plant**

**and**

**Jülich centrifuge research center**

**Threat to**

**Nuclear Phase-out and Peace**

**Sofa (Immediate nuclear phase-out) Münster  
March 2021**

## Contents:

0. Initial Situation:.....	2
I. Who is Urenco?.....	3
II. The Gronau Uranium Enrichment Plant.....	4
III. The Urenco subsidiary ETC in Jülich.....	6
IV. Hazards of uranium enrichment.....	8
V. Urenco's problematic customer base.....	10
VI. Militarization of uranium enrichment.....	14
VII. Nuclear waste problem.....	19
VIII. Illegal uranium exports to Russia.....	21
IX. Uranium transports through NRW.....	27
X. Explosive incidents at Urenco and ETC.....	28
XI. Urenco and new nuclear reactors.....	29
XII. Conclusion – Shutdown of the Gronau uranium enrichment plant.....	31

## 0. Initial Situation:

**Fukushima:** Following the Fukushima reactor disaster exactly ten years ago, the German government and Bundestag decided in 2011 to end the use of nuclear energy in Germany by December 31, 2022, due to the considerable and universally undisputed dangers of nuclear energy, and to shut down commercial nuclear power plants by then. From that date, therefore, neither enriched uranium nor fuel elements will be needed for domestic nuclear power plants in Germany. The Federal Republic of Germany is also under no obligation whatsoever to supply foreign nuclear power plants with nuclear fuel processed in Germany.<sup>1</sup>

**Nuclear phase-out:** Unfortunately, the 2011 nuclear phase-out law has a clear gap because it has omitted the obvious futility and danger of continued uranium enrichment in Gronau – as well as fuel element fabrication in Lingen, Lower Saxony – after the last German nuclear power plants have been decommissioned. Since these two nuclear facilities are used to operate nuclear power plants, they are an indispensable part of the electricity production chain and cannot be separated from it. In addition, the Gronau uranium enrichment plant in particular produces a considerable amount of radioactive waste for which there is as yet no secure disposal in Germany. Moreover, uranium enrichment and the centrifuge technology required for it are always associated with the military use of nuclear energy and considerable proliferation risks. Unfortunately, the militarization of uranium enrichment in particular is currently progressing considerably.

Exports of depleted uranium from Gronau to Russia (or to other countries) do not appear justified under any circumstances, if only because they contradict the polluter pays principle. This means that each country should pay for the environmental consequences of the locally produced nuclear material itself. In addition, the exports also violate existing laws and EU regulations – and are therefore illegal.

---

<sup>1</sup> This short study is based on an expert statement by Sofa Münster dated February 16, 2021 for a hearing in the NRW state parliament on the motion by Bündnis 90/Die Grünen "Urananreicherung in NRW beenden, illegale Urantransporte stoppen!"

Sofa statement: <https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMST17-3624.pdf>;  
Greens motion: <https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD17-11616.pdf>

It would therefore be factually and politically appropriate and legally consistent if the Gronau uranium enrichment plant were also shut down by December 31, 2022 at the same time as the last German nuclear power plant as part of the nuclear phase-out. Two expert reports by Prof. Dr. Wolfgang Ewer and Dr. Tobias Thienel, as well as by Dr. Sabine Konrad, commissioned by the German Federal Ministry for the Environment in the fall of 2017, provided detailed evidence that this is legally possible.<sup>2</sup>

Prof. Ewer and Dr. Thienel conclude in their expert report on p. 232:

*"A law to end uranium enrichment and fuel fabrication would most likely be constitutional."*

The onus is thus on the legislature to close the loophole in the 2011 Nuclear Phaseout Act.

## I. Who is Urenco?

**a) Urenco structure:** the operator of the Gronau uranium enrichment plant is Urenco Deutschland GmbH, which is a wholly owned subsidiary of Urenco Ltd. based in the UK. Urenco Ltd. is the actual control center of the group (see point V).

**b) Shareholders:** The shareholders of the uranium enricher are the British and Dutch governments, one third each. The German third is owned half by RWE and half by E.ON – two energy companies based in NRW (North Rhine-Westphalia).

All shareholders are prominently represented on the nine-member board of directors of Urenco Ltd: RWE is currently represented by Frank Weigand, head of RWE Power. Senior Vice President Alan Bevan sits on the Urenco board of directors for E.ON.<sup>3</sup>

**c) Uranium enrichment plants:** Urenco operates four uranium enrichment plants: in Gronau (see point II), Almelo/NL, Capenhurst/UK and Eunice/USA.

**d) Size on the world market:** With around 18,600 t of uranium separation work/year, Urenco is regarded as the world's second-largest uranium enricher – after the state-run Russian nuclear corporation Rosatom. Urenco says it serves 50 customers in 19 countries<sup>4</sup> and, according to the German government, supplies more than 30% of the world market for enriched uranium.<sup>5</sup>

---

<sup>2</sup> Note: All links used here were retrieved in January and February 2021, respectively.

The two reports can be found on the website of the German Federal Ministry for the Environment:

[https://www.bmu.de/fileadmin/Daten\\_BMU/Download\\_PDF/Nukleare\\_Sicherheit/urengo\\_gutachten\\_wolfgang\\_ewer\\_bf.pdf](https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Nukleare_Sicherheit/urengo_gutachten_wolfgang_ewer_bf.pdf);

[https://www.bmu.de/fileadmin/Daten\\_BMU/Download\\_PDF/Nukleare\\_Sicherheit/urengo\\_gutachten\\_sabine\\_konrad\\_bf.pdf](https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Nukleare_Sicherheit/urengo_gutachten_sabine_konrad_bf.pdf)

<sup>3</sup> <https://www.urengo.com/investors/corporate-governance/board-of-directors>

<sup>4</sup> For all company information on Urenco, see the company website: <http://www.urengo.com/>

<sup>5</sup> <https://dserver.bundestag.de/btd/18/085/1808582.pdf>

**e) Centrifuge subsidiary ETC:** Together with the French nuclear group Orano (formerly Areva), Urenco operates the subsidiary ETC (Enrichment Technology Company) as a joint venture – with a branch in Jülich (see point III). ETC is the technological heart of Urenco, because it is responsible for the research and production of gas centrifuges as well as for the construction of uranium enrichment plants.

**f) U-Battery/Mini-Reactors:** Urenco has established the U-Battery consortium to develop its own mini-reactors (see item VI, XI).

**g) Political control:** Urenco's corporate construct is complicated by the fact that uranium enrichment is a highly explosive military technology that requires intensive political control. Thus, as early as 1970, the **Treaty of Almelo**<sup>6</sup>, the founding treaty of Urenco, established a **Joint Committee** of the governments of Great Britain, the Netherlands and the Federal Republic of Germany. Through this committee, the German government is involved in the political supervision and control of Urenco.

**Sale:** The complexity and militarily explosive nature of the company network was also demonstrated by the fact that the two German shareholders RWE and E.ON unsuccessfully attempted to sell their shares in the company between 2011 and 2016 (see point IV).<sup>7</sup>

**Brexit:** The Brexit brings a further complication: The company headquarters in the UK are now located outside the EU, as are the two uranium enrichment plants in the UK and the USA. This shifts the overall weight of the Group further and further outside the EU.

**h) Nuclear supervision NRW:** The NRW state government exercises concrete nuclear supervision over the Gronau uranium enrichment plant and the associated uranium transports.

## II. The Gronau Uranium Enrichment Plant

**a) History:** The Gronau uranium enrichment plant (UAA) went into operation in 1985. The expansion took place in several partial steps. The last expansion permit was issued by the NRW state government in 2005.

**b) Capacity:** In 2005, the state of NRW approved an annual capacity of up to 4500 t uranium separation work/year [4.5 million SWU/a] for Urenco at the Gronau UAA. However, this maximum was never reached due to the Fukushima reactor disaster in 2011. According to Urenco, capacity has been declining slightly for several years and currently stands at around 3850 t uranium separation work/year.<sup>8</sup> This is partly due to the faltering demand for nuclear

---

<sup>6</sup> Vertragstext im Bundesgesetzblatt:

[https://www.bgbl.de/xaver/bgbl/start.xav?start=%2F%2F%5B%40attr\\_id%3D%27bgbl294s3576.pdf%27%5D#\\_bgbl\\_%2F%2F%5B%40attr\\_id%3D%27bgbl271s0929.pdf%27%5D\\_1612194306505](https://www.bgbl.de/xaver/bgbl/start.xav?start=%2F%2F%5B%40attr_id%3D%27bgbl294s3576.pdf%27%5D#_bgbl_%2F%2F%5B%40attr_id%3D%27bgbl271s0929.pdf%27%5D_1612194306505)

<sup>7</sup> <https://www.reuters.com/article/us-nuclearpower-urencoidUSKBN12W3YU>;

<https://www.sueddeutsche.de/wirtschaft/urenco-atomfirma-im-angebot-1.2274942>;

<http://dipbt.bundestag.de/dip21/btd/17/146/1714668.pdf>

<sup>8</sup> [https://www.urencocom/cdn/uploads/supporting-files/UD\\_Environmental\\_Report\\_Sept2020\\_web.pdf](https://www.urencocom/cdn/uploads/supporting-files/UD_Environmental_Report_Sept2020_web.pdf)

power worldwide, and partly to the drastic expansion of the company's own uranium enrichment plant in the USA.

According to information provided by Urenco in its Environmental Statement for 2019 (p. 21), capacity and production in Gronau have been in slight continuous decline since 2012.<sup>9</sup>

**c) Workforce:** Approximately 290 people are employed in Gronau.<sup>10</sup> The Bad Bentheim technology site was dissolved in 2017 and has since operated under the name Central Technology Group (CTG) with its approximately 40 employees on the site of the Gronau UAA.

**d) CO<sub>2</sub> impact:** According to the Environmental Statement for 2019, Urenco consumed about 116.5 GWh of electricity to operate the Gronau UAA (p. 26/27). This accounts for a CO<sub>2</sub> equivalent of 44,387 t. In addition, there are CO<sub>2</sub> burdens from the use of natural gas, diesel and heating oil, among other things, so that the total CO<sub>2</sub> emissions amount to an equivalent value of 50,640 t.<sup>11</sup>

Thus, a CO<sub>2</sub>-free or even low-CO<sub>2</sub> operation of the UAA does not take place.

**e) Uranium storage:** On the 76 ha site of the Gronau UAA, there is also an extensive open-air storage facility for uranium hexafluoride (UF<sub>6</sub>, see item VII) as well as a storage hall for depleted uranium oxide (U<sub>3</sub>O<sub>8</sub>), which was completed in 2014 but is still empty (see item VII).

**f) Integration into Urenco Group:** The Gronau UAA is fully integrated into the overall worldwide operations of the Urenco Group, so that there is no independent business operation by Urenco Germany (see point V).

**g) Uranium exports:** According to the transport lists of the State of North Rhine-Westphalia published on the website of the State Parliament (see point IX), in recent years more than 50% of the uranium enriched in Gronau went first to the USA. Further exports went to France, Great Britain, Sweden, Brazil, South Korea, China and Japan (see point V).

**h) Protests:** Since the Gronau site was unveiled in the late 1970s, there have been regular protests against uranium enrichment. Here is a brief overview:

Since the Chernobyl reactor disaster in 1986, a Sunday walk at the Gronau UAA has been held every first Sunday of the month at 2 p.m. – by now one of the longest-running continuous protest actions in the Federal Republic.

In the licensing procedures for the construction and the later expansions of the uranium enrichment plant, numerous objections were collected nationwide and in the Netherlands and submitted at discussion meetings, some of which lasted several days. Repeated complaints

---

<sup>9</sup> [https://www.urencogroup.com/cdn/uploads/supporting-files/UD\\_Environmental\\_Report\\_Sept2020\\_web.pdf](https://www.urencogroup.com/cdn/uploads/supporting-files/UD_Environmental_Report_Sept2020_web.pdf)

<sup>10</sup> Ibid.

<sup>11</sup> Ibid.

were also filed against operating licenses. In the mid-1990s, around 3,000 Gronau residents called for a local citizens' petition against the Gronau UAA. However, this petition was not admitted.

For a long time, uranium enrichment was not in the national spotlight, partly because the plant was initially very small. This changed after 2005 due to the drastic expansion of the UAA and the uranium exports to Russia. From then on, there were also regular actions that attracted national and international attention, such as blockades (see also point VIII.). In 2011, around 15,000 people demonstrated for the decommissioning of the UAA immediately after Fukushima. In 2016, the UAA was blocked for 36 hours,<sup>12</sup> and in 2017, a uranium train was held up near Gronau for more than 15 hours.<sup>13</sup>

Since 2010, Easter marches have been held regularly at the Gronau UAA and repeatedly at ETC Jülich in cooperation with the peace movement. Further protests with the peace movement and Japanese-German groups take place around the anniversary of the atomic bombs dropped on Hiroshima and Nagasaki to point out the military usability of uranium enrichment on the way to the atomic bomb.

There is very close networking with initiatives in the Rhineland and Lower Saxony. A special feature of the protests is their cross-border character between Germany and the Netherlands and the networking with Russian, French, Belgian, Scandinavian and Japanese initiatives. There are also contacts with initiatives in several African countries where uranium is mined.

In the Bundestag [Lower House of the German parliament] and in the NRW state parliament, members of various parliamentary groups have been active for many years in favor of shutting down the UAA. In 2018, for example, the Left Party and the Greens in the Bundestag called for the decommissioning of the UAA and the Lingen fuel element plant. There was a hearing in the Environment Committee. The motion was rejected by the other parliamentary groups.<sup>14</sup>

Another level of protest since 2007 has been active participation at the annual general meetings of Urenco shareholders RWE and E.ON to demand the shutdown of the Gronau UAA.

### III. The Urenco subsidiary ETC in Jülich

**a) Centrifuge technology:** Technologically, the operation of Urenco's uranium enrichment facilities is based on centrifuge technology. This technology is now also used in Pakistan and Iran as a result of the infamous theft at Urenco Almelo (see points IV, VI and X). In Pakistan,

---

<sup>12</sup> <https://www.waz.de/region/atomkraftgegner-blockieren-weiter-urananreicherungsanlage-id12000550.html>;  
<https://www.wn.de/Muensterland/Kreis-Borken/Gronau/2016/07/2457120-Raeumung-verlaeuft-gewaltlos-Polizei-beendet-Urenco-Blockade>

<sup>13</sup> <https://www.wn.de/Muensterland/Kreis-Steinfurt/Metelen/3010682-Atomprotest-Antiatom-Aktivisten-blockieren-Uranzug-von-zwei-Seiten>

<sup>14</sup> [https://www.bundestag.de/ausschuesse/a16\\_umwelt/oeffentliche\\_anhoerungen?url=L2F1c3NjaHVlc3NIL2ExNI91bXdlbHQvb2VmZmVudGxpY2hlX2FuaG9lcnVuZ2VuL29lZmZlbnRsaWN0ZS1hbmhvZXJ1bmctMjAtc2l0enVuZy1hdG9tZ2VzZXR6LTU3MTE5OA==&mod=mod544426](https://www.bundestag.de/ausschuesse/a16_umwelt/oeffentliche_anhoerungen?url=L2F1c3NjaHVlc3NIL2ExNI91bXdlbHQvb2VmZmVudGxpY2hlX2FuaG9lcnVuZ2VuL29lZmZlbnRsaWN0ZS1hbmhvZXJ1bmctMjAtc2l0enVuZy1hdG9tZ2VzZXR6LTU3MTE5OA==&mod=mod544426)

the espionage success helped build the atomic bomb. In the case of Iran, it is feared that the country is also striving to achieve this goal.

**b) ETC history:** ETC is a joint venture between Urenco and Orano (formerly Areva), based at the Capenhurst UAA site in the UK. ETC was founded in 2003 as a spin-off from Urenco. The reason for this restructuring was the desire to give France a share in the ownership of centrifuge technology and in the construction of uranium enrichment plants using this technology. In 2005, the Cardiff Agreement was concluded between the German government, the Netherlands, Great Britain and France.<sup>15</sup>

Until the ETC was founded, the Jülich site was an integral part of the Urenco Group. Until the commissioning of the Gronau UAA in 1985, Jülich was even the only Urenco site in Germany.

The Jülich centrifuge site emerged from the federally owned Gesellschaft für Kernverfahrenstechnik (GKT), which laid the foundation for the promotion of centrifuge technology in Germany from 1964 with the participation of Dr. Gernot Zippe (Point VI). According to the German government, know-how from Degussa was also taken over in the process.<sup>16</sup>

The Jülich site and ownership of the centrifuge technology secured the Federal Republic of Germany's equal participation in the establishment of the Urenco Group in the 1970s. According to the German government, plenty of public money also flowed into the process: *"Between 1970 and 1992, the Federal Republic of Germany supported the development of enrichment using the gas centrifuge process and the establishment and operation of enrichment activities under the international treaty of Almelo with approximately DM 1.16 billion."*<sup>17</sup>

The state-owned GKT eventually merged into the private Uranit GmbH, which officially took over the German shares in Urenco.<sup>18</sup> Uranit, in turn, received about DM 139 million (about 70 million euros) in federal public funds to support the construction of the uranium enrichment plants in Almelo and Capenhurst until 1979, according to the German government.

**c) ETC sites:** In addition to Jülich and Capenhurst, ETC is also represented at the UAA site in Almelo/NL and in Tricastin/France.<sup>19</sup> The ETC site in Gronau was closed several years ago due to a lack of demand for new uranium enrichment plants and centrifuges.

---

<sup>15</sup> Vertragstext im Bundesgesetzblatt:

[https://www.bgbl.de/xaver/bgbl/start.xav?start=//\\*/%5B@attr\\_id=%27bgbl206s0608.pdf%27%5D#\\_bgbl\\_%2F%2F%5B%40attr\\_id%3D%27bgbl206s0608.pdf%27%5D\\_1612193939373](https://www.bgbl.de/xaver/bgbl/start.xav?start=//*/%5B@attr_id=%27bgbl206s0608.pdf%27%5D#_bgbl_%2F%2F%5B%40attr_id%3D%27bgbl206s0608.pdf%27%5D_1612193939373)

<sup>16</sup> German Federal Ministry for Economic Affairs and Energy, 6/24/2014:

[https://www.bmwi.de/Redaktion/DE/Parlamentarische-Anfragen/2014/18-1540-kleine-frage-foerderung-und-forschung-fuer-urananreicherung-in-deutschland.pdf?\\_\\_blob=publicationFile&v=3](https://www.bmwi.de/Redaktion/DE/Parlamentarische-Anfragen/2014/18-1540-kleine-frage-foerderung-und-forschung-fuer-urananreicherung-in-deutschland.pdf?__blob=publicationFile&v=3)

<sup>17</sup> Ibid.

<sup>18</sup> According to the German government, the founding shareholders of Uranit were Gelsenberg AG in Essen and Nukem in Hanau, both in equal shares. This eventually led to the current participation of RWE and E.ON in Urenco.

<sup>19</sup> For this company information on ETC, see the company website: <http://www.enritec.com/>.

**d) ETC Jülich:** The central research and development of centrifuge technology takes place at the Jülich site, as well as part of the centrifuge production.

## IV. Hazards of uranium enrichment

The dangers of uranium enrichment are manifold: they start with uranium mining, range from the radiological and toxic dangers from the normal operation of the Gronau UAA and the associated uranium transports, to the dangers of incidents, airplane crashes and terrorist attacks, to sabotage, espionage and proliferation risks, as well as direct use for military purposes.

The continued operation of such a high-risk nuclear facility should therefore be fundamentally prohibited in NRW, especially since there will also be no domestic nuclear power plants as end customers from the end of 2022.

**a) Uranium mining and delivery:** The dangers of uranium enrichment start right at the beginning of the nuclear spiral. Uranium mining is considered a very environmentally and health damaging mining activity, carried out in uranium mines around the globe. In the former GDR, for example, uranium mining by Wismut resulted in several thousand recognized operational health injuries among uranium miners.<sup>20</sup> The remains of uranium dumps were cleaned up by the state after 1990 at a cost of several billion euros.

The largest uranium mining countries are currently Kazakhstan, Canada and Australia. However, countries such as Niger, Namibia, Uzbekistan and the USA also mine uranium. The exact countries of origin of the uranium for the Gronau uranium enrichment plant have not been disclosed in recent years, neither by Urenco nor by the German government – not even in response to questions in the Bundestag.

There are considerable global problems associated with uranium mining. A good overview of this is provided by the Uranium Atlas published by [environmental organization] BUND and the Nuclear Free Foundation in 2019.<sup>21</sup>

After mining, uranium is mostly transported to Europe as uranium ore concentrate by ship, often to the port of Hamburg. From there, it also travels by rail through NRW to the two main uranium processing plants in southern France: Narbonne-Malvési and Pierrelatte.

As uranium hexafluoride (UF<sub>6</sub>), the "natural uranium" then comes again mostly by rail across NRW to the uranium enrichment plant at Gronau. The uranium therefore already passes through and endangers NRW once or twice before it even arrives at the Gronau uranium enrichment plant.

**b) Normal operation/uranium hexafluoride:** Even during normal operation, the UAA releases radioactive radiation into the environment. In addition, the uranium hexafluoride

---

<sup>20</sup> <https://dip21.bundestag.de/dip21/btd/19/112/1911294.pdf>;  
<https://www.aerzteblatt.de/archiv/217483/Mortalitaet-von-unter-Tage-Beschaeftigten-im-frueheren-Uranerzbergbau>

<sup>21</sup> <https://www.nuclear-free.com/uranatlas.html>

(UF<sub>6</sub>) used for uranium enrichment is a "highly volatile, extremely toxic, radioactive and corrosive compound" that reacts "very violently" when it comes into contact with water, i.e. even with atmospheric moisture (see also points IX and X).<sup>22</sup> Among other things, hydrofluoric acid (hydrogen fluoride = HF) is formed, which in turn can have a lethal effect even when it comes into contact with the skin or is inhaled.<sup>23</sup>

**c) Open-air storage of uranium hexafluoride:** see point VII.

**d) Uranium transports:** see point IX.

**e) Aircraft crash:** Due to the open storage of thousands of tons of UF<sub>6</sub> as well as the lack of protection of the operating halls of the Gronau UAA, an aircraft crash can have a greater impact than with corresponding active safety measures – e.g. an obligatory construction of correspondingly protected operating and storage halls. There is also no adequate protection against drone attacks at the Gronau UAA.

In recent years, it has unfortunately appeared that the best possible protection of the UAA and the UF<sub>6</sub> casks is not desired either by Urenco or by the state government. Reinforcing and protective construction measures are not to be seen or announced.

In 2002, Urenco admitted in a "Brief description of the final construction and the probable effects on the surroundings" of the Gronau UAA on p. 42 that in case of airplane crashes in the *"most unfavorable, very rarely occurring dispersion situation (...) on the outskirts of the city, severe health damage and even fatalities (can) occur due to the impact of HF and uranium."*<sup>24</sup>

In 2011, Urenco CEO Dr. Ohnemus confirmed that the UF<sub>6</sub> containers would not withstand airplane crashes; hydrofluoric acid (HF) could then also be produced. However, he succinctly declared the resulting hazard scenarios to be a "residual risk".<sup>25</sup> Such a business policy clearly disregards the justified protection interest of the population.

**f) Terrorism/sabotage:** Like any nuclear facility, the Gronau UAA can also become the target of terrorist attacks. The UAA is only "protected" by a double wire mesh fence. How easy it is, however, to simply get right past Urenco's security gates and smuggle weapons parts into the UAA, for example, was demonstrated in 2018 when a Urenco employee was caught processing weapons parts for himself privately at the UAA. The Osnabrück public prosecutor's office described the man as a "weapons nut." Reportedly, the Urenco employee,

---

<sup>22</sup> <https://www.chemie.de/lexikon/Uranhexafluorid.html>

<sup>23</sup> <https://www.chemie.de/lexikon/Fluorwasserstoff.html>; [https://www.uni-kassel.de/intranet/fileadmin/datas/intranet/bau\\_technik\\_liegenschaften/vc/02\\_arb/Flusssaure/flusssaure\\_uva10\\_1\\_17-1.pdf](https://www.uni-kassel.de/intranet/fileadmin/datas/intranet/bau_technik_liegenschaften/vc/02_arb/Flusssaure/flusssaure_uva10_1_17-1.pdf)

<sup>24</sup> Urenco brief retrieved from: <https://umweltfairaendern.de/wp-content/uploads/2013/01/URENCO-Kurzbeschreibung-Endausbau-voraussichtliche-AuswirkungenUmgebungDez2002.pdf>

<sup>25</sup> <https://www.wn.de/Muensterland/2011/03/Brennelemente-Zwischenlager-Atomaufsicht-prueft-Urenco>

who was then dismissed, was given a suspended sentence of several months by the Nordhorn District Court in early 2019.<sup>26</sup>

The ease with which nuclear facilities such as the UAA can also fall victim to dangerous cyber attacks has been demonstrated in recent years by the example of Iran.<sup>27</sup>

**g) Espionage/proliferation:** Centrifuge technology is an extremely explosive military technology that has attracted a great deal of criminal attention since its development. Urenco in particular is a notoriously bad example in this regard because in the 1970s the theft of relevant Urenco Almelo documents by Pakistani scientist Abdul Qadir Khan triggered a previously unprecedented wave of proliferation. The theft enabled Pakistan to build atomic bombs and subsequently also gave Iran and North Korea considerable headway along this path (see point VI).

In the 1980s/1990s, there were also attempts to smuggle centrifuge technology from Germany to Iraq. There was at least one conviction for this as well.<sup>28</sup>

In recent years, the plans of the Urenco shareholders to sell their shares also posed a considerable proliferation risk, because new owners could inevitably also gain access to this militarily explosive technology. For this reason, too, the sale plans failed after extra-parliamentary protests and controversial parliamentary debates in the Netherlands, the Bundestag and the NRW state parliament.<sup>29</sup>

It can be assumed that the mere existence of the Gronau UAA and ETC Jülich will lead to continued attempts at espionage and proliferation. Urenco has unfortunately earned an extremely bad reputation for this in recent decades, as the examples of Pakistan, Iran and North Korea demonstrate to a frightening extent.

## V. Urenco's problematic customer base

**a) Global Business:** Uranium enrichment is a global business that has shown no growth rates in recent years, especially after Fukushima. As a result, Urenco clings to existing customers regardless of the fact that their nuclear power plants are visibly aging and therefore becoming an increased risk. New customers are now rare and often very critical in themselves for safety reasons, but also for peace policy considerations. Urenco regularly delegates responsibility for safety deficits or peace policy problems to the governments and operators of the countries concerned.

---

<sup>26</sup> <https://www.wn.de/Muensterland/Kreis-Borken/Gronau/3435460-Wohnhaus-von-Urenco-Mitarbeiter-durchsucht-Waffenteile-in-Anreicherungsanlage>; <https://www.wn.de/Muensterland/Kreis-Borken/Gronau/3440598-Nach-Funden-bei-Urenco-Staatsanwaelte-ermitteln-wegen-Waffenrecht-Verstoessen>;

<sup>27</sup> <https://www.sueddeutsche.de/politik/virus-stuxnet-und-irans-atomprogramm-zentrifugen-die-sich-zu-schnell-drehen-1.1047249>

<sup>28</sup> <https://www.sueddeutsche.de/politik/aus-deutscher-hand-wie-die-gas-zentrifuge-entstand-1.918823>

<sup>29</sup> For statements by the NRW state government on the planned Urenco sale, see, among others: <https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD16-2564.pdf>; <https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD16-3566.pdf>; <https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD16-5791.pdf>

Urenco supplies customers around the globe from its four company sites. Assignment to individual company sites is an operational issue decided solely by Urenco Ltd. in the United Kingdom:

*"The Urenco Group, through its head office in the UK, decides independently at which of its European sites each enrichment contract will be served. As a rule, several sites serve one enrichment contract. Which sites service a contract depends, among other things, on logistical and operational characteristics of the individual enrichment facilities themselves."*<sup>30</sup>

**b) Public Transportation Information:** Shipments of enriched uranium do not occur from UAAs directly to nuclear power plants, but to fuel fabrication plants where the enriched uranium is used to produce fuel assemblies that are in turn shipped to nuclear power plants. Therefore, the relevant export and transport lists of the federal agencies BAFA and BASE often show only the locations of the fuel element factories and not those of the "end customers".

**c) Explosive customer list:** Urenco mostly tries to keep the actual NPP operators secret. A customer list cannot be found on Urenco's websites. For example, Urenco cannot be directly linked to any incidents or political problems in the respective countries.

Nevertheless, several contractual relationships have become public over the years:

#### **1. Japan:**

**Tepco/Fukushima:** Until the Fukushima reactor disaster on March 11, 2011, Urenco supplied the Japanese nuclear company Tepco, which also operated the two nuclear complexes in Fukushima. In the Spring 2007 issue (No. 27) of Urenco's magazine "Cascade," the headline "Focus on our Customers" on p. 17 stated:

*"Urenco is pleased to have played a part in TEPCO's nuclear power generation capability for more than 10 years and looks forward to continuing a strong relationship in the future."*

Specifically shown in the picture was the Fukushima-Daini nuclear power plant complex in the immediate vicinity of the damaged Fukushima-Daiichi nuclear power plant complex.

These exports became known in Germany a few days after the start of the reactor disaster. At the end of April 2011, around 15,000 people then demonstrated in Gronau for the immediate shutdown of the uranium enrichment plant.

**New Japan exports from Gronau:** In 2017, Urenco delivered enriched uranium from Gronau to Japan for the first time since the Fukushima reactor disaster, according to transport data published by the NRW state government.

- On Dec. 17, 2019, and then again on Dec. 17, 2020, Urenco was granted two export licenses by the German Federal Office of Economics and Export Control (BAFA) for enriched uranium from Gronau to a Japanese fuel fabrication plant in Tokaimura in Ibaraki Prefecture, about 120 km south of Fukushima and 120 km north of Tokyo. According to BAFA,

---

<sup>30</sup> <https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD16-11875.pdf>

Mitsubishi Nuclear Fuel is the recipient.<sup>31</sup> Tokaimura is considered "the heart of Japan's nuclear industry," according to IPPNW.<sup>32</sup>

**Tokaimura/Tokai:** Tokaimura was also affected by the tsunami in 2011, including the on-site Tokai NPP. It has therefore been shut down since then.<sup>33</sup> An international study with the participation of Helmholtz Zentrum München found elevated plutonium concentrations in the air in Tokaimura as a result of the Fukushima reactor disaster.<sup>34</sup>

A serious nuclear accident occurred at a JCO uranium conversion plant in Tokaimura in 1999, when an uncontrolled nuclear chain reaction was triggered by grossly faulty behavior. The severe accident received a very high level 4 on the INES scale, making it one of the most serious nuclear accidents in the world.<sup>35</sup> Numerous workers and residents were exposed to strong radioactivity, and several people subsequently died.<sup>36</sup>

This uranium plant was demolished in subsequent years, but Mitsubishi nearby operates its own fuel fabrication plant, which was allowed to continue operating regardless of the consequences of Fukushima.<sup>37</sup>

- On February 13, 2021, another major earthquake of magnitude 7.3 occurred off the east coast of Japan, so the significant dangers to nuclear facilities in this region, which is regularly shaken by earthquakes, are evident.<sup>38</sup>

To summarize here, despite the severe nuclear accidents at Fukushima and Tokaimura, Urenco is again regularly supplying enriched uranium to this very region on Japan's east coast. Ten years after the start of the Fukushima reactor disaster, this is a completely wrong signal that negates the experience of history.

**2. Belgium:** In 2016, the managing director of Urenco Germany, Dr. Joachim Ohnemus, confirmed to [radio/TV station] WDR research by anti-nuclear initiatives that the operators of the Belgian nuclear power plants Tihange and Doel, which are highly controversial in terms of safety, are also among Urenco's customers.<sup>39</sup>

Tihange 2 and Doel 3 have become known as "crack reactors" because several thousand cracks were found in the reactor pressure vessels. As a result, the NRW state parliament has called for the shutdown of the two reactors several times in recent years on safety grounds across all parliamentary groups.<sup>40</sup>

---

<sup>31</sup>

[https://www.bmu.de/fileadmin/Daten\\_BMU/Download\\_PDF/Nukleare\\_Sicherheit/ausfuergenehmigungen\\_brennelemente\\_bf.pdf](https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Nukleare_Sicherheit/ausfuergenehmigungen_brennelemente_bf.pdf)

<sup>32</sup> <http://www.ippnw.de/atomenergie/hibakusha-weltweit/tokai-mura.html>

<sup>33</sup> [https://en.wikipedia.org/wiki/T%C5%8Dkai\\_Nuclear\\_Power\\_Plant](https://en.wikipedia.org/wiki/T%C5%8Dkai_Nuclear_Power_Plant)

<sup>34</sup> [https://www.helmholtz-muenchen.de/fileadmin/ISS/PDF/Highlights/Shinonaga\\_es404961w.pdf](https://www.helmholtz-muenchen.de/fileadmin/ISS/PDF/Highlights/Shinonaga_es404961w.pdf)

<sup>35</sup> <https://www.iaea.org/sites/default/files/ines.pdf>

<sup>36</sup> <http://www.ippnw.de/atomenergie/hibakusha-weltweit/tokai-mura.html>; <https://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/tokaimura-criticality-accident.aspx>; <http://www-ns.iaea.org/downloads/iec/tokaimura-report.pdf>

<sup>37</sup> <https://www.world-nuclear.org/information-library/country-profiles/countries-g-n/japan-nuclear-fuel-cycle.aspx>

<sup>38</sup> <https://www.tagesschau.de/ausland/erdbeben-fukushima-103.html>

<sup>39</sup> WDR Westpol, 13.3.2016; see also

<https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD16-11875.pdf>

<sup>40</sup> e.g. 2017: <https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD17-849.pdf>

Doel 1 and 2 are also among the oldest operating nuclear power plants in Western Europe that would have been shut down in Germany long ago. In April 2018, a leak in Doel 1 led to a serious incident that required the reactor to be shut down for several months.<sup>41</sup>

Particularly in view of the situation in Belgium, the grand coalition at the federal level agreed on the following passage on p. 142 of its coalition agreement of March 12, 2018:

*"We want to prevent nuclear fuel from German production from being used in plants abroad whose safety is doubtful from a German perspective. We will therefore examine how we can achieve this goal in a legally secure manner."<sup>42</sup>*

**3. Ukraine:** In 2016, it was announced that Urenco was to take over the supply of enriched uranium to old Ukrainian nuclear power plants of Soviet design. The fuel assemblies for this were to be produced at the Swedish fuel assembly plant in Västerås.<sup>43</sup> Västerås is a major customer for Urenco Germany. In the last two years alone, export licenses were issued by BAFA in this regard for Urenco in Gronau on April 3, 2019, December 18, 2019, January 14, 2020, May 15, 2020, and December 14, 2020.<sup>44</sup>

Apart from the fact that investing in the switch to renewable energy would also make much more sense for Ukraine and Europe in the long term for climate protection and sustainability reasons, this supply contract is also so problematic because, for example, the Zaporozhye nuclear power plant site is located barely 200 km from the front line between Ukrainian armed forces and Russian-backed separatists in the east of the country.

The explosive nature of the situation beyond the front line was dramatically demonstrated by the downing of the MH 17 airliner in July 2014, which killed all 298 people on board.<sup>45</sup> If a similar missile attack were to hit Ukraine's nuclear power plants, the consequences would be devastating and would be felt as far away as Germany. The Chernobyl reactor disaster in 1986 proved this emphatically.

35 years after the Chernobyl worst-case scenario nuclear accident, Urenco's supply to the Ukrainian nuclear power plants is a highly questionable business that considerably prolongs the danger posed by the use of nuclear energy.

**4. United Arab Emirates:** Since 2014/15, Urenco has also been supplying the United Arab Emirates in the Persian Gulf with enriched uranium for the new Barakah nuclear power plant site, as revealed in a 2012 announcement. In this context, the uranium enriched by Urenco will initially be supplied to the South Korean nuclear company Kepco for fuel fabrication.<sup>46</sup> In

---

<sup>41</sup> [https://www.t-online.de/nachrichten/deutschland/id\\_83695936/belgien-schaltet-atomreaktor-doel-1-ab-leck-im-notkuehlkreislauf.html](https://www.t-online.de/nachrichten/deutschland/id_83695936/belgien-schaltet-atomreaktor-doel-1-ab-leck-im-notkuehlkreislauf.html)

<sup>42</sup> <https://www.bundesregierung.de/resource/blob/656734/847984/5b8bc23590d4cb2892b31c987ad672b7/2018-03-14-koalitionsvertrag-data.pdf>

<sup>43</sup> <https://www.nuklearforum.ch/de/aktuell/e-bulletin/urencolieferturan-dieukraine>; <https://taz.de/Atomkraft-in-der-Ukraine/!5326506/>

<sup>44</sup>

[https://www.bmu.de/fileadmin/Daten\\_BMU/Download\\_PDF/Nukleare\\_Sicherheit/ausfuergenehmigungen\\_brennelemente\\_bf.pdf](https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Nukleare_Sicherheit/ausfuergenehmigungen_brennelemente_bf.pdf)

<sup>45</sup> <https://www.mdr.de/nachrichten/osteuropa/politik/dossier-mh-siebzehn-absturz-ukraine-100.html>

<sup>46</sup> <https://media.urenconline.com/corp-website/74/urencolieferturan-dieukraine>, p. 18f.

<https://www.nuklearforum.ch/de/aktuell/e-bulletin/vae-barakah-brennstoffversorgung-sichergestellt>

the last two years, Urenco Germany received export licenses from BAFA for uranium deliveries to Kepco Nuclear Fuel on December 17, 2019, and December 14, 2020.<sup>47</sup>

The first of four planned nuclear power plants at the Barakah site came on line in 2020. The nuclear power plant project is highly controversial in terms of safety and peace policy, as British nuclear expert Paul Dorfman and others pointed out in 2020.<sup>48</sup>

As is well known, the Persian Gulf is one of the most unstable regions in the world, with a multitude of militarily highly armed actors that repeatedly threaten each other over the years. Military conflicts are the order of the day, including both small and large-scale attacks or covert military operations. Oil and nuclear facilities in particular are repeatedly targeted – in Iran, but also in Saudi Arabia, for example.<sup>49</sup>

The commissioning of the Barakah nuclear power plant complex increases tensions and nuclear ambitions in the region enormously: Saudi Arabia, for example, is already demanding the right to its own uranium enrichment.<sup>50</sup> Moreover, the Barakah nuclear power plant could itself become the target of terrorist or military strikes, which would trigger an ecological catastrophe of enormous proportions and at the same time bring with it the danger of uncontrollable military reactions.

The fact that Urenco is participating in such a peace-threatening project with its supplies testifies to the fact that the company apparently accepts a destabilization of the extremely unstable Persian Gulf region in order to expand its customer base.

## VI. Militarization of uranium enrichment

**a) Military usability:** The centrifuge technology on which Urenco's uranium enrichment is based cannot in principle be divided into a civilian and a military technology. From a technical point of view, anyone who has the necessary centrifuges, the know-how for uranium enrichment and the sufficient quantity of uranium hexafluoride can also enrich uranium-235 for military use without further ado. Uranium enrichment is therefore also seen as the "key to nuclear weapons," as the extensive international negotiations with Iran impressively demonstrate.

Wolfgang Liebert, a professor at the Vienna Institute for Security and Risk Science, stated in 2013, referring to the Gronau UAA:

*"Although it is very unlikely to happen at Gronau: If you change the circuitry for a smaller part of the centrifuges and do it cleverly, you could produce highly enriched uranium for one or more nuclear weapons within a few weeks. It might not even be noticed."<sup>51</sup>*

---

<sup>47</sup>

[https://www.bmu.de/fileadmin/Daten\\_BMU/Download\\_PDF/Nukleare\\_Sicherheit/ausfuergenehmigungen\\_brennelemente\\_bf.pdf](https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Nukleare_Sicherheit/ausfuergenehmigungen_brennelemente_bf.pdf)

<sup>48</sup> <https://theconversation.com/why-is-the-uae-where-solar-energy-is-abundant-about-to-open-four-nuclear-reactors-130248>

<sup>49</sup> <https://www.sueddeutsche.de/politik/saudi-arabien-drohnen-greifen-zwei-wichtige-oelanlagen-an-1.4600877;>  
<https://www.sueddeutsche.de/politik/virus-stuxnet-und-irans-atomprogramm-zentrifugen-die-sich-zu-schnell-drehen-1.1047249>

<sup>50</sup> <https://www.nzz.ch/international/das-atomprogramm-der-vereinigten-arabischen-emirate-ld.1548303>

<sup>51</sup> <https://www.freitag.de/autoren/felix-werdermann/atomdeal-mit-folgen>

Mind you, this is not about political or other probability, but solely about technical possibility.

**b) Military beginnings:** How closely the centrifuge technology for uranium enrichment has been linked to its military usability from the very beginning can be seen from its history: The "father" of the Urenco centrifuge technology was the nuclear scientist Dr. Gernot Zippe, born in the Habsburg Empire, who developed this technology immediately after the Second World War on behalf of the Soviet Union for the nuclear weapons program there. After successfully completing his mission, he was allowed to emigrate to the Federal Republic and passed the technology on to the USA, among others. His knowledge was also used to set up the corresponding site of the Gesellschaft für Kernverfahrenstechnik in Jülich, a predecessor of today's ETC (see point III). He also advised Urenco on its development.<sup>52</sup> His estate is administered by the Deutsches Museum in Munich.<sup>53</sup>

**c) Nuclear theft/non-proliferation:** Dr. Zippe's centrifuge technology has always been in hot demand because of its military utility. Thus, in the 1970s, the Pakistani nuclear scientist Abdul Qadir Khan stole sufficient documentation from Urenco Almelo to later become the "father of the Pakistani atomic bomb." Khan then also passed on the relevant plans to Iran and North Korea – the effects on international politics were and are enormous (see also point IV).<sup>54</sup>

**d) De-limitation of civilian use:** The Treaty of Almelo (1970) actually only allowed Urenco to enrich uranium to a maximum of around 5% uranium-235 – in the meantime, this has risen to 6% in Gronau. Currently, however, Urenco and its shareholders as well as the three controlling governments in Berlin, The Hague and London are planning a drastic softening of this "civil clause" on three levels:

**1. HALEU/new reactors:** On the one hand, Urenco announced on February 5, 2019, that it intends to increase the enrichment level in a new production line at the company's own UAA in the USA to up to 19.75% uranium-235.<sup>55</sup> The reason for this is the production of so-called HALEU (*high assay low enriched uranium*). The enrichment level of just under 20 % is due to the fact that from 20 % upwards it would officially already be highly enriched uranium, which is assigned to the strictly regulated military sector.

As emphasized by the example of Iran, uranium enrichment on the way to nuclear weapons-grade uranium-235 is already more than half complete at an enrichment level of 20%.<sup>56</sup> That is, in terms of potential usability of enriched uranium-235 for nuclear weapons, Urenco is

---

<sup>52</sup> For Dr. Zippe's curriculum vitae, see <https://www.sueddeutsche.de/politik/aus-deutscher-hand-wie-die-gas-zentrifuge-entstand-1.918823>.

<sup>53</sup> [https://www.deutsches-museum.de/fileadmin/Content/010\\_DM/040\\_Archiv/PDFs/Archiv\\_info/arch\\_in1002.pdf](https://www.deutsches-museum.de/fileadmin/Content/010_DM/040_Archiv/PDFs/Archiv_info/arch_in1002.pdf)

<sup>54</sup> <https://programm.ard.de/TV/Programm/Sender/?sendung=2872214474535501>; <https://www.welt.de/print-welt/article687779/Holland-liess-Vater-der-pakistanischen-Atombombe-Khan-auf-CIA-Bitte-laufen.html>

<sup>55</sup> <https://www.urencocom/news/articles/urencocom-announces-next-step-haleu-activities> (Author's note: This Urenco PM of Feb. 5, 2019, was no longer available on the Urenco corporate website on Feb. 12, 2021); therefore see: <https://world-nuclear-news.org/Articles/Urenco-USA-announces-HALEU-activities>

<sup>56</sup> <https://www.handelsblatt.com/politik/international/nuklearforschung-staatsmedien-iran-hat-anreicherung-von-uran-auf-20-prozent-begonnen-/26766554.html?ticket=ST-5224417-htO3tVScK0mOzLXavRU4-ap6>; <https://www.sueddeutsche.de/politik/iran-atomkonflikt-uran-usa-1.4514714>

planning for an advanced production status – this alone is very worrisome from a peace policy perspective.

Urenco's CEO at the time, Haerberle, emphasized the civilian character for customers in "industry, medicine and research" when presenting the plans (see also item XI).

**2. Pentagon shows interest:** However, there has not yet been much public evidence of potential civilian customers for Urenco's higher-enriched HALEU uranium. The only customer to have spoken publicly so far is, of all customers, the U.S. Pentagon: according to a report in the U.S. professional journal *Physics Today* in January 2020, the U.S. Department of Defense expressed interest in uranium supplies from Urenco for "military electricity production" as early as 2018 because they were comparatively cheap and quickly available. The United States no longer has a uranium enrichment facility owned by a U.S. company.<sup>57</sup>

A few months after this Pentagon report, the U.S. Department of Defense (DOD) made an official announcement in January 2019 that it was interested in mobile mini-reactors. It cited "*rapid response scenarios*" as possible areas of use. The designs were to be "inherently safe" and necessarily fueled by HALEU uranium. A core meltdown should be "physically impossible" and the "additional proliferation risk" should be "minimized". According to this media report, corresponding initial proposals were expected by February 8, 2019.<sup>58</sup>

Apparently as a direct reaction, Urenco published the above-mentioned announcement of its intention to enter into HALEU production on February 5, 2019 – three days before the deadline. Obviously, Urenco felt encouraged by the Pentagon's interest.

The extent of the interest in "mini" reactors that can be used for military purposes is also shown by this executive order issued by the U.S. government in mid-January 2021: *"It is the policy of the United States to promote advanced reactor technologies, including small modular reactors, to support defense installation energy flexibility and energy security, and for use in space exploration (...)."*<sup>59</sup>

In the aforementioned 2018 Pentagon report, a purchase of Urenco or parts of the company was even considered, according to *Physics Today*. The background to these considerations is the previous restriction in the USA that only uranium from the USA or from US companies may be used for military purposes. However, since there is only Urenco left in the USA as a uranium enricher, the US military currently has no choice but to approach Urenco.<sup>60</sup> This increases the risk of military proliferation on the part of Urenco enormously.

NRW is directly affected by this alarming military development because a) as explained above, about 50% of Gronau's uranium is exported to the USA and b) the research and development of the necessary centrifuges takes place at Urenco's subsidiary ETC in Jülich (see point III d). This means that NRW could be extensively involved in this uranium program.

---

<sup>57</sup> <https://physicstoday.scitation.org/doi/10.1063/PT.3.4385>

<sup>58</sup> <https://www.world-nuclear-news.org/Articles/US-clears-way-for-HALEU>

<sup>59</sup> <https://www.world-nuclear-news.org/Articles/US-order-promotes-SMRs-for-space-exploration-and-d>

<sup>60</sup> In the USA, the company Centrus Energy has been trying for several years to reestablish a US-owned uranium enrichment plant. This is currently the only known potential competitor to Urenco in the US. According to its own information, Centrus Energy is currently being supported in this by the U.S. Department of Energy (DOE): <https://www.centrusenergy.com/>

**3. Direct supply to the U.S. nuclear weapons program:** in 2017, U.S. media reported that Urenco had offered to supply the U.S. with reactors operated by TVA, which produce tritium for U.S. nuclear warheads, among other things.<sup>61</sup> As early as 2014, a U.S. government report to the U.S. Congress had revealed the situation and a corresponding offer by Urenco.<sup>62</sup> Urenco had already issued a legal opinion in 2005 that the use of Urenco uranium in reactors producing tritium for the U.S. nuclear weapons program did not violate the civil clause in the Washington Treaty relevant here. In other words, according to this report, Urenco has offered itself to U.S. authorities.

In an answer to a minor question in the Bundestag, however, the German government denied knowing about this process and also that Urenco uranium was used to produce tritium for US nuclear warheads. However, the Federal Government confirmed that TVA was supplied by Urenco Ltd.<sup>63</sup> The Federal Government did not make an allocation to Urenco's production sites, but the Gronau UAA supplies approx. 50% of its own uranium to the USA, as explained above.

**4. EU and UK delimit civil uranium enrichment:** In the wake of the UK's exit from the EU and the associated withdrawal from Euratom, the EU and the UK concluded a new framework agreement on nuclear cooperation at the end of 2020. On the one hand, this includes an agreement that the Almelo and Cardiff contracts, which are fundamental for Urenco and ETC, remain unaffected.

In Article 10, however, there is a far-reaching de-limitation in the area of uranium enrichment:

*"Article 10 Enrichment*

*Before a Party enriches nuclear material covered by this Agreement to 20% or more of uranium-235, it shall obtain written consent from the other Party. Such consent, if given, shall describe the conditions under which the uranium enriched to 20% or more may be used. Such further provisions as may be necessary to facilitate the implementation of this provision may be specified in the administrative arrangements referred to in Article 15 [Administrative Arrangements]*"<sup>64</sup>

In other words, for the first time, the EU and the UK are also officially allowing uranium enrichment well beyond 20% uranium-235. As there is only Urenco as enricher in the UK and additionally only the French Orano in the EU, this paragraph can also be called "Lex Urenco" according to the current state of knowledge.

In view of the relevant nuclear projects known so far, enrichment above 20% uranium-235 can in principle only be used for military purposes, or at least for civil-military purposes. There is also no exclusion of military projects in the treaty – a pure information and consent procedure is planned. This is extremely worrying. For comparison, consider the extremely justified international furor over Iran's enrichment plans for up to 20% uranium-235.

---

<sup>61</sup> <https://www.defensenews.com/opinion/commentary/2017/03/06/commentary-the-looming-crisis-for-us-tritium-production/>

<sup>62</sup> <https://www.gao.gov/assets/670/666505.pdf>

<sup>63</sup> <http://dip21.bundestag.de/dip21/btd/18/133/1813305.pdf>

<sup>64</sup> [https://eur-lex.europa.eu/legal-content/DE/TXT/PDF/?uri=CELEX:22020A1231\(04\)&from=EN](https://eur-lex.europa.eu/legal-content/DE/TXT/PDF/?uri=CELEX:22020A1231(04)&from=EN)

It is incomprehensible that the EU is opening the floodgates so widely and without restriction in this sensitive area. It is to be feared that the civilian clauses in the Treaty of Almelo will (should) be softened and that Urenco will orient itself even more strongly towards military customers – precisely because demand is currently so high there. Urenco Deutschland in Gronau and ETC in Jülich will not be able to detach themselves from this development within the company.

The German government, which as explained above is a member of the Almelo Control Committee, has so far only made very general statements in response to questions in the Bundestag, most recently on January 28, 2021.<sup>65</sup> This is a disturbing fact.

**e) Non-proliferation:** Non-proliferation must not mean that all parties involved try, for example, to keep their uranium centrifuges in perpetuity. Non-proliferation in times of increasing international conflict means that countries, like Germany, that have the centrifuges and the technology, voluntarily decommission them in a way that can be verified internationally. Such action would make the Federal Republic of Germany a pioneer in the abolition of nuclear weapons in connection with accession to the new UN Treaty on the Prohibition of Nuclear Weapons. This would give the Federal Republic a significantly enhanced international and diplomatic standing.

If the Federal Republic of Germany retains a uranium enrichment plant like the one in Gronau, it would still be possible in the future to enrich enough uranium in Germany for use in nuclear weapons within a very short time. Under changed political conditions, this could quickly become a very serious problem. The potential danger to peace policy that Germany could then reach for the atomic bomb cannot be emphasized clearly enough.

**f) Criticism from Nobel Peace Prize laureates:** In recent years, internationally renowned Nobel Peace Prize laureates, such as IPPNW and ICAN, have also sharply criticized the military dimension of uranium enrichment.

On May 17, 2017, for example, Dr. Alex Rosen, the chairman of IPPNW Germany, stated with regard to Urenco's deliveries to TVA in the U.S. that have come to light (item VI d): *"The case shows once again that a separation between civilian and military use of uranium is not possible. The German government makes itself untrustworthy in terms of disarmament policy if it allows Urenco to deliver enriched uranium to the USA when it can also be used for military purposes."*

And IPPNW European Chair Dr. Angelika Claußen added:

*"The German government must finally decide to end the operation of the uranium enrichment plant in Gronau – the key to the military and civilian use of nuclear energy."*<sup>66</sup>

On April 23, 2019, Felix Werdermann, board member of ICAN Germany, also called for: *"We continue to advocate for the closure of the plant here in Gronau. If Germany becomes the first major industrialized nation to voluntarily renounce uranium enrichment, this would*

---

<sup>65</sup> <https://www.hubertus-zdebel.de/wp-content/uploads/2021/02/Atomabkommen-EU-und-GP-Uran235-ueber-20-Pozent-1-376-Zdebel.pdf>

<sup>66</sup> Both quotes: <https://www.ippnw.de/atomenergie/sicherheit/artikel/de/urananreicherung-beenden-keine-unte.html>

*be a significant peace and disarmament policy signal: We are giving a clear rejection to this technology and the option of producing nuclear weapons.*"<sup>67</sup>

## VII. Nuclear waste problem

**a) Situation:** The operation of the Gronau uranium enrichment plant currently generates about 4500 to 5000 t of depleted uranium hexafluoride (UF<sub>6</sub>) annually.

If all depleted UF<sub>6</sub> in Germany were to be disposed of safely as nuclear waste in accordance with Section 9a of the Atomic Energy Act, the 2015 National Waste Management Program estimated a total volume of around 100,000 m<sup>3</sup> that would ultimately have to be disposed of. This was confirmed to the NRW state parliament by the responsible federal agency BASE (formerly BfS or BfE.) at the beginning of 2021.<sup>68</sup>

For this considerable amount, a third repository would have to be sought if necessary, because the depleted uranium cannot be stored together with low- and intermediate-level radioactive material, for example, for reasons of water protection. The German government therefore announced as early as 2013:

*"The Konrad repository is not designed for the amount of depleted uranium in question."*<sup>69</sup>

NRW Economics Minister Duin additionally informed the state parliament in May 2017:  
*"In the context of the Commission's work, I advocated in a letter dated October 30, 2014, that the federal government consider the depleted uranium stored in Gronau as part of contingency planning in the search for a final repository for high-level radioactive waste in particular."*<sup>70</sup>

There are no final disposal plans in Germany for the depleted UF<sub>6</sub> exported to Russia, France and the Netherlands.

**b) Open-air storage for UF<sub>6</sub>:** The depleted uranium is initially stored in Gronau in the open-air storage facility of the UAA under the open sky. The open-air storage facility holds a maximum storage quantity of about 38,000 t of depleted UF<sub>6</sub>. The UF<sub>6</sub> casks lie on a concrete slab, they are quite visible from outside the plant and they are not protected against aircraft crashes or attacks (e.g. with drones) (see point VI e).

How such open-air storage, secured only by a double wire fence, can still be considered acceptable state of the art in terms of safety in the year 2021 is a complete mystery.

**c) Evaluation of nuclear waste/valuable material:** There has long been an intense dispute between Urenco on the one hand and anti-nuclear initiatives, environmental associations and

---

<sup>67</sup> <https://www.icanw.de/neuigkeiten/es-ist-zwei-vor-zwoelf/>

<sup>68</sup>

[https://www.bmu.de/fileadmin/Daten\\_BMU/Download\\_PDF/Nukleare\\_Sicherheit/nationales\\_entsorgungsprogrmm\\_aug\\_bf.pdf](https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Nukleare_Sicherheit/nationales_entsorgungsprogrmm_aug_bf.pdf); <https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMST17-3628.pdf>

<sup>69</sup> <https://dserver.bundestag.de/btd/17/135/1713598.pdf>

<sup>70</sup> <https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD16-15046.pdf>

various parties in Germany, the Netherlands and Russia on the other about the evaluation of depleted UF<sub>6</sub> and its further use or storage.

Urenco has been claiming for years that the depleted UF<sub>6</sub> is also a "valuable material" because there is still uranium-235 in the UF<sub>6</sub> that could be re-enriched if necessary.<sup>71</sup>

In its Environmental Statement 2020, Urenco makes the comparison with squeezed oranges on p. 12, which could also be squeezed further.<sup>72</sup>

It should be noted here that Urenco itself can decide at its own discretion when uranium waste is considered nuclear waste or rather a "valuable material". It is no wonder that the uranium enricher consistently opts for the second option, since Urenco is thus the only nuclear company that is practically "nuclear waste-free" even after 35 years of operation. According to this self-definition, the Gronau UAA is virtually a miracle operation. If every industrial enterprise should be free to decide whether its own waste has to be declared as waste or not, the decision would be very unanimous. This state of affairs alone is to be criticized and is in urgent need of change.

**d) No re-enrichment:** It is a fact that this theoretical possibility of re-enriching the residual uranium is not used by Urenco itself to any significant extent for economic reasons. In addition, re-enrichment of the residual uranium would not result in a reduction of the uranium waste quantity, but only in a further reduction of the uranium-235 content. Thus, re-enrichment does not offer a solution for nuclear waste disposal in any case.

Other possible uses are either not relevant in terms of quantity (e.g. in ship hulls) or highly problematic (use for armor-piercing ammunition). For the latter reason, depleted uranium is subject to strict export bans under the EU Dual-Use Regulation (item VIII e).

**e) Uranium Oxide storage hall:** In view of the enormous quantities of depleted uranium hexafluoride produced annually by uranium enrichment, the state government, in its 2005 expansion permit, required Urenco to build an additional storage hall for up to 59,000 t of uranium oxide (U<sub>3</sub>O<sub>8</sub>) on the UAA site. According to the NRW state government, these 59,000 t correspond to 50,000 t of depleted UF<sub>6</sub>.<sup>73</sup>

The storage capacity thus corresponds approximately to the accumulating UF<sub>6</sub> quantity of ten years of operation, measured in terms of current production. In other words, such a storage facility would have to be built in Gronau every ten years.

The background to the 2005 requirement is the fact that uranium hexafluoride is not a stable material for long-term storage (see point IV).

By means of a so-called deconversion, UF<sub>6</sub> is converted into uranium oxide and thus transformed into a more storable state. In Western Europe, there are currently only two such

---

<sup>71</sup> Current in a statement for the NRW state parliament dated Feb. 17, 2021:

<https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMST17-3625.pdf>

<sup>72</sup> [https://www.urencocom/cdn/uploads/supporting-files/UD\\_Environmental\\_Report\\_Sept2020\\_web.pdf](https://www.urencocom/cdn/uploads/supporting-files/UD_Environmental_Report_Sept2020_web.pdf)

<sup>73</sup> Cf. inter alia Landtag printed papers:

<https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD16-3074.pdf>;

<https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD16-11738.pdf>;

<https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD16-15046.pdf>

plants: in France and, since 2019, in Capenhurst at the Urenco UAA site.<sup>74</sup> However, the Urenco plant in Capenhurst primarily covers its own requirements on site – the further inflow from the UAAs in Gronau and Almelo cannot be covered in this way during regular operation.

The uranium oxide hall in Gronau was completed in 2014, but is currently still empty. In 2019, the BMU announced that Urenco was now planning to commission the facility no earlier than 2024. Currently, according to the BMU, there is still no application for commissioning.<sup>75</sup>

Why is this hall empty? The answer is simple: Once depleted UF<sub>6</sub> has been converted into uranium oxide, the illusion of a "valuable material" can hardly be maintained. Converting it back to UF<sub>6</sub> again for re-enrichment would be even more expensive and uneconomical than pure re-enrichment already is.

Urenco would therefore clearly be commissioning a nuclear waste storage facility – and would then have to build another such nuclear waste storage facility every ten years of operation, with all the associated licensing procedures. Urenco obviously wants to prevent this by all means.

Therefore, in 35 years of operation, Urenco has de facto pursued only one option in dealing with the depleted residual uranium from Gronau: export.

## VIII. Illegal uranium exports to Russia

**a) Export volume:** Urenco has regularly exported depleted uranium hexafluoride in Gronau since the start of operations in 1985. Between 1996 and 2009, about 27,300 t of depleted UF<sub>6</sub> were shipped to Russia,<sup>76</sup> and another 18,000 t of depleted UF<sub>6</sub> were shipped in 2019/2020, for a total of more than 45,000 t of UF<sub>6</sub>.

In 2019/20 alone, a total of 20 transport cycles took place for this from Gronau, first by rail/truck and then onward by ship.

In 2019, WDR researched that depleted uranium hexafluoride may have again been transported from Gronau to Russia via France and the UK since 2016.<sup>77</sup>

According to the relevant transport lists, which are published annually by the NRW state government in response to inquiries from various parliamentary groups in the state parliament,<sup>78</sup> around 24,600 t of UF<sub>6</sub> were exported from Gronau to France between 2010 and

---

<sup>74</sup> <https://www.world-nuclear.org/information-library/nuclear-fuel-cycle/conversion-enrichment-and-fabrication/conversion-and-deconversion.aspx>

<sup>75</sup> Letter from BMU to SOFA Münster dated February 1, 2021.

<sup>76</sup> <https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD17-7887.pdf>; <https://www.faz.net/aktuell/politik/illegale-atommuell-transporte-ab-nach-russland-mit-dem-radioaktiven-muell-1871828.html>; <https://dserver.bundestag.de/btd/17/002/1700253.pdf>

<sup>77</sup> <https://www.wn.de/Muensterland/Kreis-Borken/Gronau/4029015-Anti-Atom-Initiativen-entsetzt-Abgereichertes-UF6-geht-schon-seit-2016-wieder-nach-Russland>

<sup>78</sup> <https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD17-9652.pdf>; <https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD17-6334.pdf>; <https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD17-3373.pdf>;

2019, and a further 8250 t to the Almelo UAA. There is only limited information on further use from the federal government and the state. For example, around 12,700 t of Gronau UF<sub>6</sub> are said to have been "deconverted" into just under 10,000 t of uranium oxide (U<sub>3</sub>O<sub>8</sub>) in France.<sup>79</sup> What happened to the remaining UF<sub>6</sub> from Gronau in France and the Netherlands is unclear.

The current storage location of the deconverted uranium oxide is also not fully known. In December 2019, the German government evasively stated:

*"As part of a uranium exchange with the English plant in Capenhurst, the deconverted U<sub>3</sub>O<sub>8</sub> was exchanged for UF<sub>6</sub> stored in England. Some of the U<sub>3</sub>O<sub>8</sub> deconverted at Pierrelatte is stored at the Capenhurst site."<sup>80</sup>*

The reasons for this "uranium swap" remain unmentioned. Whether, according to the above-mentioned WDR research, uranium from Gronau was ultimately exported from France via Great Britain to Russia as part of this "uranium exchange" in the form of a chain deal is not (yet) publicly known.

**b) Use in Russia:** The actual use of Gronau uranium in Russia is uncertain. Russian environmental organizations such as Ecodefense and Greenpeace Russia estimate the total stockpile inventory of the Russian nuclear industry in terms of depleted UF<sub>6</sub> to be over 1 million tons. That Russia would import the Gronau uranium for commercial re-enrichment purposes can therefore be considered impossible, given its own huge stockpiles.

The Russian state nuclear corporation Rosatom itself admitted at the end of 2019 that it had a massive problem. It wants to run down the mountains of UF<sub>6</sub> by 2080, for example, and plans include the construction of new fast breeder reactors – a construction project that famously failed in Kalkar in North Rhine-Westphalia because of the high safety risks.<sup>81</sup> In other words, even to eliminate the already existing mountains of UF<sub>6</sub>, Russia is relying on an expansion of the existing nuclear power plant park. A "harmless recycling" definitely looks different.

**c) Destinations in Russia:** Until 2009, the destinations of uranium waste exports were the nuclear facilities Novouralsk near Ekaterinburg, Seversk near Tomsk, as well as Angarsk at Lake Baikal. In 2019/20, only the Novouralsk uranium enrichment plant was targeted. The depleted UF<sub>6</sub> was transported from Gronau by rail via Münster and Hamm through the Ruhr region and the Rhineland to the port of Amsterdam in the Netherlands. On the other hand, further quantities of UF<sub>6</sub> also went by truck from Gronau via the autobahn to Amsterdam. From there, the UF<sub>6</sub> was then transported together by ship to St. Petersburg, or Ust-Luga to the west of St. Petersburg. Transport through Russia was again by rail.

---

<https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD16-14466.pdf>;

<https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD16-11283.pdf>;

<https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD16-8250.pdf>;

<https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD16-5200.pdf>;

<https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD16-3380.pdf>;

<https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD16-2181.pdf>

<sup>79</sup> <https://dserver.bundestag.de/btd/19/156/1915685.pdf>;

<https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMD17-8646.pdf>

<sup>80</sup> <https://dserver.bundestag.de/btd/19/156/1915685.pdf>

<sup>81</sup> <https://taz.de/Export-von-Atommuell/!5643910/>

Novouralsk is a so-called Closed City, which is surrounded by a fence and whose visit is possible only with special permission. The Closed Nuclear Cities date back to the Stalin era and have been directly linked to military nuclear projects.<sup>82</sup> Only Angarsk is an open city. According to his own information, Urenco CEO Ohnemus has visited there three times, allegedly even in the Closed Nuclear City of Novouralsk – but these visits took place about ten years ago now.<sup>83</sup>

Ohnemus claims not to have found any violations of safety precautions or damaged UF<sub>6</sub> containers on site. According to the [radio/TV station] SWR report from 2014, however, he was also unaware of official reports from Russian authorities on this matter.

This is surprising because as early as 2011, several Russian and German environmentalists met with Ohnemus in Gronau about precisely these storage problems in Angarsk and at the other Russian nuclear sites. They presented him with reports that substantiated the safety problems. But according to journalists present, these reports did not "impress" the Urenco chief. Instead, he told the Russian environmentalists that they should be more concerned with the Cold War legacy than with the "safe" Urenco drums.<sup>84</sup>

Russian environmentalists repeatedly point out that the uranium casks in the outdoor storage facilities in nuclear cities are rusting away due to the extreme temperature conditions. UF<sub>6</sub> is known to be corrosive (Point IV). Barrels that may have appeared intact in 2011 are likely to look quite different today. Russian nuclear authorities do not allow independent on-site inspections. Urenco's lack of interest in current and regular inspections is indisputable.

It is therefore not surprising that the head of Urenco Germany 2021, in his statement to the state parliament (see above), saw it as primarily the duty of the Russian environmentalists to present evidence of corrosion damage to the Urenco casks.

**d) Protests in Russia:** In Russia, there have been protests against imports of depleted uranium from Gronau and other Western European countries for many years. However, the shipments were initially completely unknown in Russia. Only protests in NRW and the Netherlands made the problem public. Russian environmental organizations were very pleased when the transports from Gronau were stopped in 2009.

The resumption of uranium waste transports from Gronau led to renewed protests in 2019/20. Russian environmental organizations Ecodefense and Greenpeace called the resumed exports of uranium waste from Gronau to Russia "immoral and cynical."<sup>85</sup>

Russian environmentalists organized protests on the ground in Russia under very difficult conditions throughout the years, but also came to Germany, for example, to demand a halt to exports at the general meetings of Urenco shareholders RWE and E.ON. In 2019, RWE explicitly rejected an offer of talks from Ecodefense.

At the end of 2019, there were protests in St. Petersburg, but for the first time also in the Closed City of Novouralsk. Three people were temporarily detained there.<sup>86</sup>

---

<sup>82</sup> On the situation in Novouralsk: <https://taz.de/Russischer-Atomkritiker/!5640137&s=Uran+Gronau/>

<sup>83</sup> <https://www.swr.de/-/id=13088070/property=download/nid=659934/1vctnjs/swr2-feature-20140430.pdf>; <https://www.kossawa.de/index.php/inland-ausland/179-atommuell-aus-deutschland-in-russland>

<sup>84</sup> <https://www.kossawa.de/index.php/inland-ausland/179-atommuell-aus-deutschland-in-russland>

<sup>85</sup> <https://taz.de/Billigentsorgung-von-Atommuell/!5638653/>

In January 2020, representatives of Greenpeace Russia and Ecodefense presented around 70,000 signatures from Russia against the uranium shipments from Gronau to the Federal Ministry for the Environment in Berlin – a very high number, especially considering the difficult human rights situation as well as the many restrictions on opposition groups in Russia.

The environmental organization Ecodefense is branded a "foreign agent" by the state. Co-chair Alexandra Koroleva went into exile in Germany in 2019 due to state pressure. Thus, unrestricted environmental work is not possible. Ultimately, Urenco's exports benefit from the poor human rights situation in Russia, which has again deteriorated significantly in recent years.

In June 2020, more than 45 Russian, Dutch and German environmental organizations published an Open Letter to German Chancellor Angela Merkel and Russian President Vladimir Putin to demand a halt to exports from Gronau.<sup>87</sup>

**e) Protests in Germany and the Netherlands:** Since 2005, there have been regular protests against uranium waste exports from Gronau to Russia. Initially, these were more regional protests in Münsterland, southern Lower Saxony, and the Enschede/Hengelo region.

Then in 2007, the [TV station] ZDF magazine Frontal 21 reported, which led to international attention, even the BBC came to Gronau. Finnish TV also reported because the uranium waste passes directly by Helsinki by ship. Also in 2007, there were protests in front of the E.ON headquarters in Düsseldorf and at the annual general meetings of RWE and E.ON. Then in 2008, there was a blockade of a uranium waste train for several hours by an abseiling action in Münsterland. This gave rise to nationwide media reports. As a result of the international protests, Urenco, Rosatom, RWE and E.ON stopped uranium waste exports for the time being in 2009.

After the secret resumption of exports in 2019, there were again multiple protests. Frontal 21 reported again, the media response to the report was very large. In November and December 2019, anti-nuclear activists blocked two uranium waste trains in Münsterland.<sup>88</sup> In December 2019, the uranium transport saw protest vigils spread over two days in a total of 18 locations between Gronau, Münster, Hamm, Mönchengladbach and Amsterdam.

In April 2020, the city of Münster demanded in writing for the first time that Urenco suspend the uranium waste transports due to the pandemic situation. Urenco continued anyway. In June 2020, 45 Russian, Dutch and German organizations jointly demanded an end to uranium waste exports in an open letter to Vladimir Putin and Angela Merkel.

In October 2020, the last uranium waste transport to date traveled from Gronau to Russia. It too was blocked near Münster for several hours.

---

<sup>86</sup> <https://taz.de/Deutscher-Atommuell-in-Russland/!5652915&s=Uran+Gronau/>

<sup>87</sup> [http://www.nuclear-free.com/files/assets\\_nuclear\\_free\\_foundation/de/download/Off\\_Appell\\_Merkel\\_Putin\\_IAEA\\_15Juni\\_NGOs.pdf](http://www.nuclear-free.com/files/assets_nuclear_free_foundation/de/download/Off_Appell_Merkel_Putin_IAEA_15Juni_NGOs.pdf)

<sup>88</sup> [https://taz.de/Atommuell-nach-Russland/!5642614/;](https://taz.de/Atommuell-nach-Russland/!5642614/)  
<https://www.nrz.de/region/niederrhein/atomkraftgegner-protestieren-gegen-urantransport-durch-nrw-id227856365.html>

**f) Legal problems:** The nuclear laws in Germany and the EU are clear: The export of nuclear waste is prohibited under EU Directive 2011/70//Euratom, Art. 4 para. 4 in conjunction with the German Site Selection Act § 1 para. 2 and the Atomic Energy Act § 9a para. 2.<sup>89</sup>

In Russia, moreover, the import of nuclear waste is prohibited. From this point of view, it is legally imperative for both Urenco and Rosatom to declare the depleted uranium as "valuable material".

This is made easy for them because they are allowed to make this declaration themselves (see point VII c). Urenco's business model depends to a significant extent on this definition, because all other options of actual nuclear waste disposal would be much more costly and thus reduce the profit margin.<sup>90</sup>

In November 2019, Greenpeace conducted a legal assessment of exports from Gronau to Russia, which concluded the following:

*"As a conclusion: Under current European law as well as current domestic law, a shipment of radioactive waste to third countries for the purpose of disposal is clearly illegal."*<sup>91</sup>

### **g) Violation of EU sanctions:**

**1. Depleted uranium:** In October 2020, Prof. Dr. Bernhard Wegener of the University of Erlangen-Nuremberg questioned the legality of the transport series of depleted UF<sub>6</sub> in 2019/20 in an expert opinion for the parliamentary group of Bündnis 90/Die Grünen.<sup>92</sup>

The core of the expert opinion is the finding that the exports of depleted uranium from Gronau to Russia violate EU Regulation 833/2014<sup>93</sup>, which was issued as a sanctions regulation after the Russian annexation of Crimea. Specifically, this concerns so-called dual-use products, which can also be used for military purposes. Depleted uranium can be used in armor-piercing ammunition, for example.

Depleted uranium is therefore explicitly listed as such a prohibited product in Annex I under item 0C001 of the relevant EU Dual-Use Regulation 428/2009.<sup>94</sup>

Prof. Wegener concludes in his expert opinion:

*"According to the EU Sanctions Regulation 833/2014, the approval of the export of depleted uranium to Russia requires the justified conviction of the licensing authority that there is no risk of military use or transfer to a military end user. However, such a risk cannot be ruled out under the publicly known general conditions of the specific export taking place and in view of an apparently inadequate information situation of the Federal Government. The authorization granted nevertheless therefore appears to be incompatible with Union law."*<sup>95</sup>

---

<sup>89</sup> <https://eur-lex.europa.eu/legal-content/DE/TXT/PDF/?uri=CELEX:32011L0070&from=EN>;  
[https://www.gesetze-im-internet.de/standag\\_2017/BJNR107410017.html](https://www.gesetze-im-internet.de/standag_2017/BJNR107410017.html); <http://www.gesetze-im-internet.de/atg/AtG.pdf>

<sup>90</sup> Urenco has been paying out an annual dividend of 300 million euros to its shareholders for years:  
<https://www.urengo.com/investors/annual-report>

<sup>91</sup> [https://umweltfairaendern.de/wp-content/uploads/2019/11/Greenpeace\\_Hintergrund\\_URENCO-UF6.pdf](https://umweltfairaendern.de/wp-content/uploads/2019/11/Greenpeace_Hintergrund_URENCO-UF6.pdf)

<sup>92</sup> <https://kottling-uhl.de/site/wp-content/uploads/2020/10/Gutachten-Endfassung-final.pdf>

<sup>93</sup> <https://eur-lex.europa.eu/legal-content/DE/TXT/PDF/?uri=CELEX:32014R0833&from=EN>

<sup>94</sup> <https://eur-lex.europa.eu/legal-content/DE/TXT/PDF/?uri=CELEX:32009R0428&from=ES>

<sup>95</sup> <https://kottling-uhl.de/site/wp-content/uploads/2020/10/Gutachten-Endfassung-final.pdf>

Why the Federal Office of Economics and Export Control (BAFA), which is responsible for export licenses, nevertheless approved the exports in 2019/20 therefore remains incomprehensible and points to a deficient review of the facts by BAFA.

The NRW state government has now submitted a statement in a letter dated February 3 (submission 17/4616), which refers solely to statements by the Federal Ministry of Economics and BAFA – without, however, attaching them as original sources. The wording of the state government's statement largely coincides with a statement sent by the Federal Environment Ministry to the SOFA (Immediate Nuclear Phase-out) Münster initiative on February 1.

The letter from the NRW state government states:

*"The authorities involved actively formed a true notion of the risk of a military end use in the administrative procedure."*

This account is surprising. After all, there is definitely no "active" assessment of end-use on site in Russia of any kind. Prof. Wegener had also criticized this. However, only in Russia can the actual use of the Gronau uranium be verified. A mere assessment of written commitments from Russia or from Urenco cannot be considered "active". Moreover, in the above-mentioned letter of February 1, the BMU added "that the Federal Government cannot provide any information" on applications and licensing procedures for reasons of maintaining company and business secrets. Thus, there is no possibility for public review of BAFA's allegedly "active" assessments, which makes monitoring impossible.

However, this is also irrelevant because EU Regulations 833/2014 and 428/2009 leave no room for interpretation. The explicit listing of "depleted uranium" as a dual-use product only allows for a rejection of export applications in this regard.

These exports therefore obviously represent a serious violation of EU law, which has so far been ignored by BAFA and the responsible federal ministries. Prof. Wegener therefore also rejected the new statement by the NRW state government. It is not convincing.<sup>96</sup>

**2. Enriched uranium:** On July 10 and 24, 2020, Urenco was granted two export licenses for enriched UF<sub>6</sub> to Russia by BAFA.<sup>97</sup> These export licenses also violate the EU dual-use sanctions according to the above EU criteria. Annex I of the relevant EU Regulation 428/2009 explicitly lists "special fissile material" under item 0C002.<sup>98</sup>

The introductory definitions to Annex I state that:

*"'Special fissile material' (0): plutonium-239, uranium-233, 'uranium enriched in the isotopes 235 or 233' and any material containing the above substances."*

Again, the EU Dual-Use Regulation leaves no doubt that exports of enriched uranium to Russia fall under Sanctions Regulation 833/2014. The German government also confirmed this to Bündnis 90/Die Grünen in the Bundestag when asked in mid-February 2021.<sup>99</sup>

---

<sup>96</sup> <https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMST17-3648.pdf>

<sup>97</sup> [https://www.bmu.de/fileadmin/Daten\\_BMU/Download\\_PDF/Nukleare\\_Sicherheit/ausfuergenehmigungen\\_brennelemente\\_bf.pdf](https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Nukleare_Sicherheit/ausfuergenehmigungen_brennelemente_bf.pdf)

<sup>98</sup> <https://eur-lex.europa.eu/legal-content/DE/TXT/PDF/?uri=CELEX:32009R0428&from=ES>

<sup>99</sup> Answer to question 66: <https://dserver.bundestag.de/btd/19/267/1926785.pdf>

Public verifiability of the end user is not possible in view of the above-mentioned restrictive information policy of the federal government, so that justified doubts about legality also arise at this point. Why Russia is involved at all in the supply of enriched uranium from Gronau – and thus from the EU – in view of the present EU sanctions regulation also remains unanswered.

Political and legal clarification is urgently needed here to prevent the creation of legal vacuum areas in the export of uranium from Gronau to Russia.

## IX. Uranium transports through NRW

**a) Factual situation:** The operation of the Gronau UAA is only possible due to numerous uranium transports. Natural uranium is delivered in the form of UF<sub>6</sub>, mainly from the so-called conversion plants in France, Great Britain, the USA and Canada. This uranium is referred to as "feed."

The enriched uranium – the "product" – leaves the Gronau UAA mostly by truck to the various fuel element factories worldwide. Since 2016, approx. 50% goes annually to the USA, followed by France, Sweden, South Korea, the UK and Brazil – as well as occasionally China and, since 2017 for the first time again, Japan. A smaller share goes to the neighboring fuel element factory in Lingen – and from there by truck, partly back through NRW to the nuclear power plant operators.

Depleted uranium – the "tails" – leaves the Gronau UAA by rail and truck and is only exported (see point VII).

According to the Urenco Environmental Statement for 2019 (p. 25), Feed was delivered with one rail transport and a total of 406 truck transports and was also transported away with 7 truck transports. Product was delivered with 113 truck shipments. Tails were removed with 11 rail shipments and 218 truck shipments. This makes a total of 12 rail transports and 738 truck transports for 2019.<sup>100</sup> On average, there was therefore one rail transport per month and two truck transports per day!

For the same period, the NRW state government registered 158 uranium transports as exports from Gronau, whereby trucks traveling together were obviously added together here. Due to the considerable number of uranium waste transports from Gronau to Russia in particular, the transported mass statewide increased by 44% to a total of 19,795 tons in 2019.<sup>101</sup> The number of nuclear transports in NRW as a whole increased by 195 to 1436 nuclear transports in the same period.

These figures emphatically demonstrate that there is still no sign of the promised nuclear phase-out on NRW's roads and railroads – the operation of the uranium enrichment plant in Gronau is a very significant contributor to this.

---

<sup>100</sup> [https://www.urencocom/cdn/uploads/supporting-files/UD\\_Environmental\\_Report\\_Sept2020\\_web.pdf](https://www.urencocom/cdn/uploads/supporting-files/UD_Environmental_Report_Sept2020_web.pdf)

<sup>101</sup> <https://www.wn.de/NRW/4218382-Atommuell-Exporte-Mehr-Atomtransporte-in-NRW;>  
<https://www1.wdr.de/nachrichten/mehr-atomtransporte-nrw-100.html>

**b) Hazards:** In the case of uranium transports – as in the case of other nuclear transports – the focus is particularly on the danger of transport accidents, e.g. due to rail and truck accidents. If UF<sub>6</sub> casks leak, hydrofluoric acid can be expected to form and be released (see point IV). This in turn would lead to evacuation measures around the accident site, which may well be widespread depending on the wind direction and the amount of hydrofluoric acid released.

The risk situation is increased by the fact that UF<sub>6</sub> transports are kept secret as a matter of principle – even from the local fire department and emergency services along the respective transport routes. In the event of an emergency, this can lead to considerable delays or even misjudgements, especially among the emergency services who are the first on the scene. The wrong extinguishing agent can lead to increased hydrofluoric acid formation in the case of leaking UF<sub>6</sub> drums and thus considerably aggravate the emergency situation.

Another risk is possible terrorist attacks on UF<sub>6</sub> shipments. Although the exact departure time for the uranium trains, some of which are several hundred meters long, can be kept secret in advance, these uranium trains cannot be hidden on the country's rail lines – and are usually on the move without police escort.

Anti-nuclear initiatives and environmental associations have been pointing out the dangers of uranium transports for many years, without this being taken seriously by the state government or the police. This negligence on the part of the security authorities is incomprehensible because it unnecessarily conjures up additional sources of danger.

## **X. Explosive incidents at Urenco and ETC**

Over the decades, a number of serious incidents have occurred around the Gronau uranium enrichment plant, the operating company Urenco and its centrifuge subsidiary ETC in Jülich. Here is a compilation of incidents that became public:

**a) Nuclear theft Dr. Khan/Proliferation:** see points IV and VI.

**b) Industrial accident UAA Gronau:** On January 21, 2010, remaining uranium hexafluoride was released unnoticed from an allegedly empty UF<sub>6</sub> drum at the UAA Gronau, contaminating one employee. The reason was that the UF<sub>6</sub> drums had obviously not been subjected to a thorough incoming inspection (i.e. weight measurement, for example). The Urenco employee was subsequently taken to several hospitals, as the hospitals initially approached in Gronau and Ochtrup turned out to be incapable of an appropriate treatment. The emergency plan for this scenario also proved to be outdated. Finally, a further transfer was made from Münster University Hospital to Jülich to a branch of Düsseldorf University Hospital. The very unfortunate incident generated nationwide attention.<sup>102</sup>

---

<sup>102</sup> <https://www.augsburger-allgemeine.de/politik/Mitarbeiter-wurde-verstrahlt-id7189741.html>;  
<https://www.welt.de/wissenschaft/article5980413/Spaetfolgen-fuer-Arbeiter-nach-Uran-Stoerfall-unklar.html>  
<https://www.stromtip.de/News/22727/Verstrahlter-Mann-wird-weiter-ueberwacht.html?erx1=3>

**c) ETC Almelo industrial accident:** At the end of March 2013, two ETC employees suffered fatal accidents at the UAA Almelo site after argon escaped from a leak, according to media reports. ETC stated at the time that another employee had been killed in previous operational accidents.

Operations at ETC's Jülich and Gronau sites were then temporarily suspended. The ETC site at Gronau no longer exists (see point III).<sup>103</sup>

**d) Ship fire with UF<sub>6</sub> for Urenco in the Port of Hamburg:** On May 1, 2013, a fire broke out on the freighter Atlantic Cartier in the Port of Hamburg. Several tons of UF<sub>6</sub> were also on board. Due to the risk of hydrofluoric acid forming in the event of a leak in the UF<sub>6</sub> drums, the fire inside the ship could not be extinguished with water. As a result, the outer wall of the ship first had to be cooled for several hours until suitable material (CO<sub>2</sub>) was available in sufficient quantity to fight the fire. In addition to UF<sub>6</sub>, there were also 4000 kg of ammunition on board.<sup>104</sup>

Not far from the burning ship, the opening ceremony for the Protestant Church Congress had been held "within sight" shortly before, with several tens of thousands of people in attendance.<sup>105</sup> If the fire had gone worse, it would probably have resulted in a major catastrophe.

The UF<sub>6</sub> on board was destined for Urenco Almelo.<sup>106</sup>

**e) "Weapons fool" at UAA Gronau:** In August 2018, it became known that a Urenco employee had smuggled weapons parts into the UAA without being noticed (see item IV).

## XI. Urenco and new nuclear reactors

**a) "Mini" reactors:** since 2008, Urenco has been working to enter the nuclear power market itself. As the German government announced in November 2019, the University of Manchester, the Dalton Institute in the United Kingdom, and Delft University of Technology are developing a design for so-called mini reactors or Small Modular Reactors (SMR) or Advanced Modular Reactors (AMR) on behalf of Urenco. Urenco has founded the consortium "U-Battery" for this purpose.<sup>107</sup> The design office is located at Urenco's Capenhurst site in the UK.

According to the German government, the Urenco-led U-Battery consortium has already identified 200 potential sites in the U.K., and 79 in Canada. Then, in spring 2020, E.ON CEO Johannes Teyssen added the U.S. to the list of targeted countries in response to questions from

<sup>103</sup> <https://www.wn.de/Muensterland/Kreis-Borken/Gronau/2013/04/Betrieb-in-Gronau-will-nach-Unfall-in-Almelo-Arbeitssicherheit-reflektieren-Auszeit-bei-Urenco-Tochter-ETC>

<sup>104</sup> <https://www.mopo.de/hamburg/feuer-auf-atlantic-cartier-hamburg-entging-nur-knapp-einer-katastrophe-6473580>

<sup>105</sup> <https://www.fr.de/panorama/knapp-katastrophe-vorbei-11266059.html>

<sup>106</sup> [https://www.buergerschaft-hh.de/parldok/dokument/40997/auch\\_uranhexafluorid\\_und\\_munition\\_unter\\_den\\_gefahrstoffen\\_auf\\_der\\_brennen\\_den\\_atlantic\\_cartier\\_nachfragen\\_zur\\_drs\\_20\\_7891.pdf](https://www.buergerschaft-hh.de/parldok/dokument/40997/auch_uranhexafluorid_und_munition_unter_den_gefahrstoffen_auf_der_brennen_den_atlantic_cartier_nachfragen_zur_drs_20_7891.pdf)

<sup>107</sup> <https://dserver.bundestag.de/btd/19/150/1915023.pdf>; more info on U-Battery's corporate website: <https://www.u-battery.com/>

shareholders at the Annual General Meeting. The USA is relevant because the Pentagon in particular is showing interest there (see item VIId).

According to the federal government, the commissioning of a first pilot plant in Canada is not expected before 2026. No such date was on U-Battery's website in early February 2021. In the Dutch newspaper Tubantia, Urenco spoke of a target date of 2028 in early November 2020.<sup>108</sup> This targeted date was also given by Nuclear Engineering International in mid-January 2021.<sup>109</sup> However, such dates should usually be taken with a grain of salt. In the past, supposedly "promising" designs for experimental reactor types have not passed the practical test as planned. One example from NRW is the thorium high-temperature reactor in Hamm-Uentrop, which ultimately failed. The EPR reactors in Olkiluoto and Flamanville are also struggling with significant technical problems.

According to media reports, Urenco and U-Battery do not want to operate the mini-reactors themselves. However, possible operators are not named. Nor is there any information on how the nuclear waste will be handled or how the safety of the smaller nuclear plants will be ensured – especially in remote regions. There is also a lack of reliable information on the costs, so that many critical points have been completely ignored so far. The current euphoria spread by the industry is therefore strongly reminiscent of the promises made by the nuclear industry when commercial nuclear power was introduced. As is well known, the nuclear waste problem in general, for example, remains completely unsolved to this day. Even proponents of the projects see the "ballooning" costs and the "overly complex technology" as another serious problem.<sup>110</sup>

The bottom line here is that with the development of the so-called mini-reactors, Urenco is setting out to move from being a supplier to the nuclear industry to becoming an independent player with its own plans for new construction. The German shareholders RWE and E.ON are also re-entering the nuclear power plant construction business along this path. For all these projects, the extent to which they can be used for civilian or military purposes will have to be examined in each case.

The HALEU production shown in point VI is also related to this, although it also has a clear military component. According to the information available so far, mini-reactors are a high-risk technology whose serious consequences for the environment, society and the field of non-proliferation have not yet been rudimentarily investigated.

All this is, of course, diametrically opposed to the nuclear phase-out envisaged in Germany. The German government would have to stop this reorientation of Urenco's business policy via the Joint Committee of the three Almelo states from the outset. Participation in the Urenco Control Committee obliges the German government to take an active position (see below).

**b) New construction plans in the Netherlands/UK:** At the end of October 2020, Urenco announced new construction plans for nuclear power plants on two levels at once:

---

<sup>108</sup> <https://www.tubantia.nl/almelo/kerncentrale-in-het-klein-urengo-werkt-aan-nieuw-soort-minireactor~a0966950/?referrer=https%3A%2F%2Fwww.google.de%2F>

<sup>109</sup> <https://www.neimagazine.com/news/newscostain-to-partner-with-u-battery-on-advanced-modular-reactor-8453235>

<sup>110</sup> <https://www.jwnenergy.com/article/2020/12/7/small-modular-reactors-challenge-natural-gas/>

First, Urenco announced that it would participate in the consortium to build a new conventional nuclear power plant in Sizewell, eastern England, led by EDF Energy.<sup>111</sup>

Second, Urenco announced in the Netherlands that it may participate in the Dutch government's new "nuclear offensive" announced in the summer of 2020 with a nuclear power plant of up to 300 MW. Possible sites are said to be Eemshaven, Maasvlakte and Borssele, where the Netherlands' only operating commercial nuclear power plant is already located.<sup>112</sup>

These plans also show the extent to which Urenco is now focused on wanting to build nuclear power plants itself, be they small or rather somewhat larger.

For all these plans, Urenco apparently enjoys the full support of RWE and E.ON as shareholders. The German government is obviously divided on this sensitive issue, although the nuclear power plant plans contradict the nuclear phase-out decided by the Bundestag for Germany just as much as the plans for the mini-reactors outlined above. So far, there is no sign of active intervention or even a veto in the Almelo Committee.

For example, Environment Permanent Secretary Jochen Flasbarth stated in this regard in the taz newspaper of Dec. 3, 2020:

*"We have a broad social and political consensus in Germany for nuclear phase-out and energy transition. RWE and Eon should also orient themselves to this with all of their corporate divisions."<sup>113</sup>*

In the same taz article, however, the Federal Ministry of Economics said:

*"Business decisions are made exclusively by the shareholders," a ministry spokeswoman stated in response to a taz inquiry. And, "I ask you to contact the companies that hold shares and are involved in the business decisions for this."*

The nuclear power plant plans also have the effect of making NRW an important interface not only for the continuation of nuclear energy use, but also for its drastic expansion – without binding safeguards against military uses.

## **XII. Conclusion – Shutdown of the Gronau uranium enrichment plant**

**a) Shutdown Objective:** As discussed in detail in the preceding sections, uranium enrichment in Gronau and the associated centrifuge development in Jülich are exempt from the nuclear phase-out at the end of 2022, just like the fuel element factory in Lingen. This legal anomaly means that NRW will be affected by the dangers of nuclear energy for an indeterminate period of time due to nuclear facilities in its own state – and at the same time will remain a central hub for the maintenance and expansion of international nuclear energy use. By continuing to accept this state of affairs, the legislature is counteracting its publicly communicated intention to phase out nuclear energy in Germany after the experiences of the Chernobyl and Fukushima reactor disasters.

---

<sup>111</sup> <https://www.urencocom/news/global/urencocom-joins-sizewell-c-consortium>

<sup>112</sup> <https://www.tubantia.nl/almelo/kerncentrale-in-het-klein-urencocom-werkt-aan-nieuw-soort-minireactor~a0966950/?referrer=https%3A%2F%2Fwww.google.de%2F>

<sup>113</sup> <https://taz.de/Grossbritannien-und-Niederlande/!5729028/>

**b) Supply of high-risk reactors:** Continued operation of the Gronau uranium enrichment plant will inevitably entail the continued supply of high-risk reactors abroad. This export counteracts, for example, the demand for decommissioning of the Belgian "crack reactors" Tihange 2 and Doel 3, which has been documented several times by the NRW state parliament.

As the example of the United Arab Emirates has shown, the UAA operator Urenco even promotes the "nuclearization" of politically extremely unstable regions. In this way, Urenco is sending completely the wrong signals, both in terms of energy policy and peace policy.

**c) Militarization of uranium enrichment:** Continued operation of the Gronau uranium enrichment plant and the continuation of centrifuge development in Jülich also increase the risk that NRW and Germany will become increasingly involved, directly and indirectly, in Urenco's business, which directly or indirectly benefits the US military or the British military, for example. The limitation of uranium enrichment to purely civilian purposes has been subject to a breathtaking softening process in recent years due to the global crisis of the nuclear industry. The dangers of militarizing the Urenco business are thus obvious.

Those who allow uranium enrichment to continue in Gronau will have to get used to seeing Urenco – and thus also RWE and E.ON, as well as NRW as a federal state – mentioned more and more frequently in connection with military nuclear projects. The construction of new nuclear power plants is now also Urenco's declared goal. NRW and Germany are thus moving further and further away not only from the goal of phasing out nuclear power, but also from the peace policy disarmament goals.

**d) Irresponsible uranium exports:** The exports of depleted uranium to Russia are also irresponsible and manifestly illegal. They transfer the serious nuclear waste problem from Gronau to the Urals and Siberia, without the local people being able to defend themselves against this in a constitutional process. Such an asymmetrical contractual relationship is not only illegal, but also ethically untenable because it exploits the difficult human rights situation in Russia.

The exports clearly violate the relevant EU sanctions against the Russian Federation, as Prof. Dr. Wegener has demonstrated in detail.

**e) Shutdown of the UAA:** Only the shutdown of the Gronau uranium enrichment plant is legally, energy-politically and peace-politically required as part of the nuclear phase-out. The 86<sup>th</sup> Conference of Environment Ministers already called on the German government to do so on June 17, 2016:

*"The Conference of Environment Ministers recalls the Bundesrat resolutions Drucks. 340/11 and 390/15 on the decommissioning of the Gronau uranium enrichment plant, which called on the German government to initiate the necessary legal measures to end the operation of the enrichment plant in a legally secure manner. Accordingly, the environmental ministers and senators of the federal states ask the federal government to include the decommissioning*

*of the Gronau uranium enrichment plant and the production of fuel elements in its nuclear phase-out strategy.*"<sup>114</sup>

Based on this, the Federal Environment Ministry commissioned two expert reports. The expert reports by Prof. Ewer/Dr. Thienel and Dr. Konrad, published in October 2017, prove the legally secure possibility of decommissioning the Gronau UAA (see item 0, p. 2).

Ewer and Thienel state that a law to end uranium enrichment would "in all probability be constitutional"<sup>115</sup>. Such a regulation, with a corresponding deadline, would also be proportionate because "the high-priority protection of human life, human health and the natural environment from the residual risk of nuclear technology takes precedence over the impairment of property (...) in the abstract and in concrete individual cases."

The operators of nuclear facilities are "at all times exposed to a risk of reassessment of the unavoidable residual risk of nuclear technology by the legislator (...)."

Under Article XV of the Almelo Treaty, the German government can terminate the treaty with one year's notice. Nor would the Euratom Treaty or the EU rules on the free movement of goods stand in the way of decommissioning the uranium enrichment plant.

It should be recalled at this point that even immediately before the reactor catastrophe at Fukushima, there was an intensive debate in this country about the possibility or impossibility of a nuclear phase-out. Germany recognized the signs of the times in 2011 and decided to phase out nuclear power. However, it should also be remembered that the agreed remaining operating times for the remaining German nuclear power plants, such as in Lingen, already represent a considerable and unnecessary source of danger.

The task now is to consistently fill the "blanks" in the nuclear phase-out law and complete the nuclear phase-out. No one wants to be responsible if the next serious reactor accident occurs in a nuclear power plant supplied by Urenco.

With nuclear power, after the experience of the last decades, only one thing is certain – the risk.

Therefore, only the immediate shutdown of the Gronau uranium enrichment plant – together with the last German nuclear power plant at the end of 2022 at the latest – and combined with the shutdown of the Lingen fuel element factory is consistent. The German government and the two responsible state governments in Düsseldorf and Hanover must act now. With the appropriate political will, they can withdraw the operating licenses for both nuclear plants and thus bring about their decommissioning.

Münster, March 2, 2021

## **Contact:**

---

<sup>114</sup> [https://www.umweltministerkonferenz.de/documents/umk-protokoll\\_juni\\_2016\\_1522236592.pdf](https://www.umweltministerkonferenz.de/documents/umk-protokoll_juni_2016_1522236592.pdf)

<sup>115</sup> All quotes and information here from Ewer/Thienel, p. 232 ff:  
[https://www.bmu.de/fileadmin/Daten\\_BMU/Download\\_PDF/Nukleare\\_Sicherheit/urengo\\_gutachten\\_wolfgang\\_ewer\\_bf.pdf](https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Nukleare_Sicherheit/urengo_gutachten_wolfgang_ewer_bf.pdf)

## **SOFA (Immediate Nuclear Phase-out) Münster**

c/o Umwelthaus  
Zumsandestr. 15  
48145 Münster

Germany

[info@sofa-ms.de](mailto:info@sofa-ms.de)

<http://www.sofa-ms.de/>

### **Notice:**

All sources and links have been evaluated to the best of our knowledge. However, if any errors or inaccuracies have crept in, we apologize and would appreciate being notified.

### **Cooperation:**

This short study was produced in cooperation with Arbeitskreis Umwelt Gronau, Aktionsbündnis Münsterland gegen Atomanlagen, AntiAtom Bonn, Aktionsbündnis "Stop Westcastor" in Jülich, Bundesverband Bürgerinitiativen Umweltschutz (BBU) and IPPNW Germany.

### **Further information on uranium enrichment can be found on the net at:**

[www.ippnw.de](http://www.ippnw.de)

[www.bbu-online.de](http://www.bbu-online.de)

[www.umweltfairaendern.de](http://www.umweltfairaendern.de)

[www.urantransport.de](http://www.urantransport.de)

[www.westcastor.org](http://www.westcastor.org)

[www.wise-uranium.org](http://www.wise-uranium.org)

<https://uranium-network.org>

[www.laka.org](http://www.laka.org)

<http://close-capenhurst.org.uk>