Chapter 4

Unfulfilled Desire, Impossible Futures: The Contradictions of African Regional Nuclear Ordering

Tom Vaughan
School of Politics and International Studies
University of Leeds
Leeds, England

Joelien Pretorius
Political Studies
University of the Western Cape
Cape Town, South Africa

4.1 Introduction

This chapter is about African agency when it comes to ordering the nuclear issue-area at the regional level. Walker (2011:12) defines nuclear ordering as the evolution of "patterns of thought and activity" towards goals, including the avoidance of nuclear war and economic development. Implied is a quest for "a tolerable accommodation" of the discrepancies between the rights and responsibilities of different states entailed by an imperfect and unequal order (Walker 2011:12). Our focus here is on regional organisations with a nuclear mandate in Africa, specifically the African Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology (AFRA); the African Commission for Nuclear Energy (AFCONE); and the Forum of Nuclear Regulatory Bodies in Africa (FNRBA). This chapter draws heavily upon our study

of African regional nuclear institutions and complexity in nuclear ordering (Pretorius & Vaughan 2024) and reproduces some material from that article. However, here we develop two additional elements of African nuclear ordering efforts, which limited space restricted us from discussing in that article. These are, firstly, the relationship between nuclear failure, or denial, and nuclear desire, and, secondly, the implications of this relationship for how possible African nuclear futures are defined.

There is a drive to "become [more] nuclear" at the regional level through African nuclear organisations. This drive is framed as follows: the continent suffers from energy poverty with more than half of the states on the continent unable to provide electricity to even 50 percent of their populations. To attain the United Nations (UN) sustainable development goals and the African Union's Agenda 2063, whilst minimising greenhouse gas emissions, African states are looking to nuclear energy (Sah *et al.* 2018:2). Non-electricity uses of nuclear technology are pursued as "low hanging fruit" but the real prize is nuclear power generation (Adenji 2002:4). Nineteen African states are currently pursuing nuclear electricity generation capacity, albeit at a varied pace (Otwoma 2021; NBP 2023). African states, bar South Africa and Egypt, the framing continues, are not ready or safe for nuclear power generation yet; the regulatory frameworks and scientific know-how are still lagging. For most analysts, continental "arrangements and their institutional mechanisms can enable African states to enhance security and cost-effectively develop nuclear power infrastructure" (Chacha 2012:38). Thus, African nuclear organisations come to play a significant role in this nuclear drive by facilitating vertical (between international organisations and African partners) and horizontal (intra-regional) scientific, technological, and regulatory nuclear knowledge and skills transfer.[1]

1 This framing of the regional role is also perpetuated by multinational industry actors facilitating nuclear power expansion, e.g. Nuclear Business Platform (NBP), a Singaporean-based company, advertised a recent conference on regional collaboration and nuclear energy in Africa as follows: "With regional organizations taking center stage as nuclear advocates, the continent can secure

On face value, regional agency is seen as a common-sense good to take ownership of ordering nuclear matters in Africa, and to map a path to development in Africa amid climate change through nuclear energy. There is also no doubt that these organisations pursue these activities to give Africa a louder voice in the global nuclear order. However, there is reason to look more critically at the performative agency of regional nuclear organisations. The critical framing we bring to the table employs the notions of nuclearity as set out in the work of Gabrielle Hecht (2006; 2012) and nuclear desire as set out by Shampa Biswas (2014)the Nuclear Non-Proliferation Treaty (NPT. We also evoke two opposing images of the nuclear future that are brought into view by Africa's regional nuclear agency: the idealised vision of "nutopia" as described by Columba Peoples (2016) versus the dystopian vision of "nuclear eternity" described by Benoît Pelopidas (2021).

We argue that African nuclear ordering at the regional level is driven by nuclear desire, which is in turn fuelled by the constantly deferred promise of an independently "nuclear" continent. Through regional organisations, a collective "African" agency is performed (in the sense outlined by Butler 2010) whereby African states prove themselves competent handlers of civilian nuclear technology, ready to pursue a prosperous and energy-independent future. At the same time, the same institutions (and several African states) performatively pursue a future of global nuclear disarmament. Both impulses are rooted in radical and (post)colonial histories. However, as nuclear desire leads Africa on a constant quest for nuclearity and increased authority on global nuclear matters, the necessary (re) committal to global nuclear ordering arrangements closes off this future. Instead, Africa is committed to a techno-managerial global nuclear future in which nuclear disarmament is infinitely deferred, while the African continent continues to serve as the "nuclear backyard" of the five nuclear weapon states.

The chapter proceeds as follows. We provide a brief explanation of the concepts of nuclearity, nuclear desire, and

clean, reliable energy while positioning itself as a leader in the global energy transition!" (NBP 2024).

nuclear futures. Then we situate African nuclear ordering agency in historical context. We then move on to a discussion of the three African nuclear organisations under review and analyse their performative agency through a critical-conceptual lens, before concluding with a discussion of the contradictory visions of Africa's (non-)nuclear future that they express: the ideal "nutopian" future, and the reality of business-as-usual under "nuclear eternity".

4.2 Nuclearity, nuclear desire, and nuclear futures

Gabrielle Hecht (2012:14) employs the term nuclearity to tease out "[w]hat things make a state 'nuclear,' what makes things 'nuclear,' and how do we know? Are the criteria scientific? Technical? Political? Systemic?" Hecht shows that "being nuclear" is socially constructed and not based solely on the material quality of something; something is not nuclear, for example, just because it has radio-active properties. Hecht's work on uranium and its waning and ebbing nuclearity since the 1940s gives us a sense of how nuclearity gets assigned and the role of (techno)politics in this process. As such, there are contested hierarchies and values around nuclearity, often connected to other expressions of power hierarchies in global, regional, and national contexts. Advocates of nuclear deterrence assign nuclear weapons the highest form of nuclearity as well as the five so-called nuclear weapon states (NWS)[2]. This label was assigned, in the Treaty on the Non-proliferation of Nuclear Weapons (NPT), to states that had tested these weapons by 1967 and tried hard to forge these weapons' value as the ultimate guarantors of international security and peace *in their own hands* (UK Government 2023). The NPT codifies this construction further by making the spread of nuclear weapons beyond these five states illegal and illegitimate. The Treaty on the Prohibition of Nuclear Weapons (TPNW), informally the "Ban

2 Only the United States (US), Russia, the United Kingdom (UK), France, and China are formally recognised as NWS under the NPT. The other four states possessing nuclear weapons—India, Pakistan, North Korea, and Israel—do not benefit from formal NWS status and, as such, may be understood as being somewhat 'less nuclear' than those which do.

Treaty", contests the value of nuclear weapons but confirms their nuclearity at the top of the hierarchy by emphasising their existentially destructive power.

Other forms of nuclearity are accessible to "non-nuclear weapons states'' (NNWS)—as the NPT label suggests—that had not tested these weapons by 1967 and even those that had tested them after this date, for example through nuclear technology for peaceful purposes. However, what is military and what is peaceful nuclear technology remains the subject of negotiation (diplomatically and discursively) and is again not a function of material properties alone, if at all. The value of Hecht's intervention is that it dislodges the idea that nuclear and non-nuclear are determinable through an essential ontology; that is, being nuclear is not self-evident, not simply a material property of states and things, but "distributed" amongst things and arises as a matter of practice. Technopolitical complexes inform nuclearity—what actors and things come to be deemed nuclear and how they are prioritised and treated.

Biswas (2014:41) argues that the nuclear non-proliferation regime "depoliticize[s] nuclearization, which in turn occludes a deeply hierarchical global nuclear order that helps produce *nuclear desire* [emphasis added] as well as deflecting from the interests that benefit from the pursuit of those desires." Nuclear desire is a useful concept with which to investigate the dynamics of African agency in relation to the global nuclear order. "Nuclear desire" conceives of the nuclear weapon as a fetish commodity invested with the power, like totems or crosses in some cultures, to fix what seem like impossible problems or at least provide hope and courage to those faced with these problems (Biswas 2014:41). Nuclear deterrence theory, which claims nuclear weapons' usefulness through their uselessness reflects this fetishization—their value lies in the belief that they scare off attacks from enemy others without being "used". The fetishization of nuclear weapons is possible through the way in which they are talked about: "nukespeak" uses highly technical, abstract, or euphemistic and playful language to obscure what their use actually implies, to make them more morally acceptable, and to domesticate their dangers (Cohn 1987). In

addition, Biswas also explains how nuclear weapons, like luxury goods, become commodity fetishes through their exclusivity, cost, and the complex social messages that they send out about those who can acquire them. They signal complex social messages, communicating not just security but status, power, and modernity. Specialised knowledge of deterrence strategies, infrastructure, and control is a prerequisite for their "appropriate" consumption, which reserves them for societies deemed sufficiently rational and technologically proficient (Biswas 2014:179–189). The control regime around nuclear technology at once serves to prevent the spread of nuclear weapons beyond the original five and to fuel nuclear desire amongst the states prohibited from acquiring them.

Engagement in nuclear ordering, we argue, is a particular practice that represents a kind of nuclearity. Exercising ordering agency through regional nuclear institutions, then, is a relatively accessible mode of nuclearity for African states, rooted in a number of historic ordering imperatives and fanned by the fetishisation of things nuclear. The final part of our conceptual framework is the idea of nuclear futures. Africa's regional nuclear agency has a temporal component: Africa is currently not very 'nuclear', in Hecht's sense, but developmentalist narratives invoke a vision of the future in which nuclear power can provide the continent with energy independence and associated economic benefits. Although this is rooted strongly in the political imperatives of decolonization, non-aligned solidarity, and national liberation (see below), it channels the cosmopolitan optimism of "Atoms for Peace". In this vision of the future, nuclear energy abundance coexists with a nuclear-weapons-free African continent (and, indeed, world). Columba Peoples has coined the term "nutopia" to denote the faith in the benefits of civil nuclear energy to "redeem" the evils of nuclear weapons. Peoples points out that "nutopianism" underlies the global nuclear order at large: "International proposals to control, reduce, and end the horrific potential of nuclear weapons tend to be predominantly and crucially predicated on the assumed redeeming features of nuclear power as an embedded form of 'common sense'" (Peoples 2016:219). Although African regional initiatives for building nuclear energy capacity and keeping the

continent free of nuclear weapons are sometimes expressed in rhetorically radical terms, they hew closely to the ideal of a "nutopian" future.

By contrast, Benoît Pelopidas (2021:484–485) has introduced the idea of "nuclear eternity" to denote a globally hegemonic consensus that "no future without [nuclear weapons] is conceivable". Nuclear eternity may not necessarily last forever, since humanity could be destroyed in a nuclear war tomorrow, but a nuclear-free future is broadly understood among policymakers, experts, and citizens to be impossible. While Pelopidas is not primarily concerned with nuclear energy in this treatment, he recognizes its inseparability from nuclear weapons. Our analysis expands upon this link. We demonstrate that, under the NPT regime, African regional efforts to pursue nuclear energy inadvertently entrench nuclear eternity even further, despite pioneering African contributions, past and present, to regional and global nuclear disarmament initiatives. Regional nuclear institutions promise nutopia but end up delivering nuclear eternity, even when good faith commitments to global nuclear abolition exist. This is a consequence of the interaction between postcolonial African nuclear desire and the global non-proliferation regime.

We now detail how this paradoxical situation has developed, beginning with an outline of historic African exercises of nuclear ordering agency.

4.3 African nuclear ordering agency from decolonisation to 1995

Political ordering, it is assumed, occurs because agents recognise an ordering imperative and reflexively act on it. For the purposes of this investigation, three exigencies stand out as those in which Africans recognised an ordering imperative and, subsequently, engaged in ordering activities:

1. Decolonisation, coinciding with a) UN efforts to control nuclear energy after the use of nuclear weapons in Japan and b) nuclear testing by the nuclear-weapons states, particularly in the Sahara Desert;

2. The promise of nuclear technology for continent-wide economic and social development;
3. Apartheid South Africa's pursuit of a muscular national nuclearity and ultimate attainment of a nuclear weapons capability.

The first two of these encouraged straightforwardly the development of the two pillars of the African nuclear order, as identified by Kornprobst (2020): prohibition and peaceful use. The third is more "ambivalent" (Abraham, 2006). While South Africa's actions in pursuing a nationalist and militarised nuclearity in some ways worked against the imperatives of prohibition and peaceful use, the ultimate result of Pretoria's nuclear programme was to energize and further embed them in the regional nuclear ordering landscape.

4.3.1 Decolonization and nuclear testing

The earliest exigency to prompt performances of African agency in regional nuclear ordering emerged from the confluence of formal decolonisation processes, UN-led efforts to control the spread of nuclear weapons, and French nuclear testing in Algeria from 1960 to 1966. French testing began during the Algerian Revolution of 1956 to 1962 and went ahead during an ongoing war of independence. Seventeen tests were ultimately conducted, with atmospheric tests ending but underground tests continuing after the end of the war. Selection of the test sites and decisions around safety and the habitability effects of testing were conducted according to a nakedly colonial logic. Nuclear explosions were conducted far away from the colonial metropole, on colonised lands in close proximity to colonised populations, without consultation or apparent concern for their wishes or wellbeing (Jacobs 2013; Maclellan 2017; Maurer & Hogue 2020). The test programme was accordingly deemed "nuclear imperialism" by Kwame Nkrumah's Ghana and encouraged pan-African as well as pan-Arab sentiment (Ahlman 2010:79; Intondi 2015:45–61). It highlighted the links between European—particularly French—colonialism and the global nuclear complex (Hecht 2012:107–140). The tests spurred some of the earliest discussions conducted in a postcolonial register

regarding the possibility of a nuclear-free African continent and, more broadly, a disarmed world. Nkrumah convened seminal regional organisations during the French tests such as the First Conference of Independent African States (FCIAS). In the context of cascading decolonisation, the Organization of African Unity (OAU) was formed in 1963 and issued its "Declaration on the Denuclearization of Africa" in 1964 (Organisation of African Unity 1964), cementing the idea of an African NWFZ in regional thinking. As Mpofu-Walsh (2022:158) notes, another significant development was the increased African representation (from nine to 35 delegations) at the UN General Assembly, which was crucial in pushing disarmament (and non-proliferation) up on the broader agenda. Elsewhere, Abraham (2018) documents the work of the Afro-Asian Legal Consultative Committee in the 1960s towards laying the legal groundwork for the delegitimisation of nuclear weapons.

At the same time, the two Cold War superpowers were jointly recognising a need to collaborate to restrict the further spread of nuclear weapons in order to maintain the strategic balance in Europe but also to reduce the number of actual and potential regional nuclear confrontations. Regional nuclear developments appeared to pose increasing threats to stability and to complicate assessments and perceptions of threat on the part of the superpowers, and Washington and Moscow thus agreed on "the need to find a universal solution to the proliferation problem" (Popp 2017:21). In the context of bitter confrontation, then, was a shared interest in limiting the spread of nuclear weapons, which would form the basis of the Cold-War (and post-Cold-War) global nuclear order (Potter 1985); and out of this order arose negotiations towards a treaty on non-proliferation. It was therefore significant that UNGA resolution 1652 (XVI), on the "consideration of Africa as a denuclearized zone", not only condemned French nuclear testing and proposed a complete ban on nuclear-weapons-related activity in Africa on the whole but also noted concern about the "present rate of nuclear armament and possible spread of nuclear weapons" (UN General Assembly 1961). This resolution was prelude to the eventual creation of an African NWFZ under the Treaty of Pelindaba and also to the integration of African states and

their non-aligned, non-nuclear armed counterparts into the global non-proliferation architecture on unfavourable terms—a contribution to the fetishisation of nuclear technology in Africa and an expression of what Mpofu-Walsh calls "obedient rebellion" (Mpofu-Walsh 2022). These measures would soon serve to restrict African states from access to nuclear technology for peaceful developmental use.

4.3.2 The promise and denial of peaceful use

Nuclear colonialism in Africa was not limited to nuclear testing, and a cruder form of extractive nuclear relationship predated the French testing programme. Despite abundant raw resources and hence a crucial enabling role in the nuclear programmes of the Western powers, African states served only as resource colonies. Extraction of South African uranium, later boosted by output from occupied Namibia, was vitally important for the British and US nuclear programmes before Pretoria embarked on its own national effort (De Villiers, Jardine & Reiss 1993; Hecht 2012). Elsewhere, Gabon and Niger produced uranium for France, and French companies prospected for uranium ore in Cameroon, Congo, Mali, the Central African Republic, Nigeria, Senegal, and Zambia (Adeniji 2002:25). Despite this, South Africa was the only African state to operate a nuclear power station during the period under review. Aside from South Africa, Egypt and Ghana were most interested in extracting the benefits of nuclear power. Egypt inaugurated a nuclear research programme in 1954 and opening a Soviet-supplied research reactor in 1961. Despite efforts by successive presidents, Egypt was repeatedly thwarted in its ambitious plans to establish an advanced indigenous nuclear research capability during the immediate postcolonial period (Taha 2021:13–16). Ghana's nuclear power programme abruptly ended in 1966 when the Nkrumah government fell to a military coup (Foy & Bosman 2021).

The relative absence of civil nuclear technology in Africa, then, is not always for want of trying. During their post-independence years, African states organised regionally around the principle of peaceful use and lobbied hard within the fledgling IAEA to try and extend its developmental and technical

assistance remit (Roehrlich 2016). Kornprobst (2020:901) details how "African states quickly converged around a much broader view of what a nuclear order ought to look like, including an institutionalized system of technology transfer from 'haves' to 'have-nots'". Apartheid South Africa opposed such a developmental remit for the IAEA (see below). The push for access to nuclear technologies for peaceful use was spearheaded during the early and middle Cold War years by NAM, with participation from a number of African states, including the drafting and insertion into the NPT of Article IV in 1966—a late stage in NPT negotiations (Potter & Mukhatzhanova 2012:81). Egypt (then the United Arab Republic), Nigeria, and Ethiopia, as members of the Eighteen-Nation Committee on Disarmament, teamed up with other non-aligned states to press for the nascent triadic structure of nuclear order that included peaceful use and nuclear disarmament. Shaker (1980) describes how these states, led by the UAR's delegate in the ENDC, put forward the guidelines for the NPT's negotiation as set out in UNGA Resolution 2028 XX. Although Kornprobst (2020) recounts many initiatives that African states pushed for in the NPT negotiations that were shot down, the triadic structure was secured, albeit on an unequal footing.

In 1969, the OAU hosted a symposium on "Peaceful Uses for Nuclear Energy in Africa" in Kinshasa, in collaboration with the IAEA and the DRC's own Commission on Nuclear Sciences (the DRC had operated a research reactor since 1959). In Kinshasa, the IAEA's delegation recognised the need to incorporate the peaceful use of nuclear energy into African states' plans for development but highlighted that the structural barriers to implementation (personnel, investment, training, *inter alia*) were the responsibilities of individual African states and their planners to overcome, rather than the responsibilities of a developmentalist IAEA (Lloyd 1969). A further decade of stunted progress led the issue of peaceful use to be raised again in NAM's 1979 Havana Declaration, which recorded dissatisfaction with "the obstacles which the developed countries place in the way of transfers of technologies", as well as concern with the use of non-proliferation as "a pretext to prevent states from exercising the right to acquire and develop

peaceful nuclear technology" (UNGA 1979:74). These concerns would be borne out. African states would continue to make the case for stronger technical assistance programmes and greater access to peaceful nuclear technology—but largely through the provisions of the NPT. In highlighting (for some) the dangers of "diversion" of peaceful technology towards weapons programmes, the South African weapons programme was a double-edged sword for African nuclear ordering.

4.3.3 Apartheid South Africa's nuclear programme: ambivalent ordering

The third ordering exigency was South Africa's pursuit of an "indigenous" nuclear industry, complete domestic nuclear fuel cycle, and eventually nuclear weapons. Contradictory ordering forces were at work here. On the one hand, Pretoria performed a militarised and techno-nationalist agency, attempting to carve out a niche for itself in the global nuclear order while isolating itself from the rest of the continent, restricting other African states' access to technical assistance for peaceful use, and ultimately obtaining the continent's first and only domestic nuclear capability. On the other hand, South Africa's active involvement in the foundation of the IAEA helped to embed the norm of peaceful use in a manner that opened the door for future African participation in ordering and provoked a strong pro-disarmament response from both the OAU and the African National Congress (ANC) in exile. This paved the way for South Africa's present-day "norm entrepreneurship" role in non-proliferation (Van Wyk 2012b; Van Wyk & Van Wyk 2015).

Well before Pretoria embarked on its nuclear weapons programme, it saw the fledgling IAEA as a forum in which to position South Africa as a leading force and representative of the African continent, even as it was progressively marginalised elsewhere over apartheid. Hecht demonstrates how South African diplomats lobbied within the Agency to make "production of source materials" an indicator of "nuclear advancement", and therefore to position South Africa as the "most nuclear" state in Africa and secure the African regional seat (Hecht 2006:30). They sought to protect this influence by pushing the IAEA to

adopt a purely "technical" mandate and arguing against the expansion of developmental technical assistance programmes. This militated against wider African demands for expanded access to nuclear technologies for peaceful use. These efforts ultimately generated mixed results: South Africa was replaced by Egypt on the board in 1977 over apartheid, postcolonial politics having breached Pretoria's bureaucratic defences within the organisation. However, the IAEA's codification of its "technical" mandate remained as a durable legacy for global and regional nuclear ordering.

Even more significant as an ordering exigency was South Africa's nuclear weapons programme, which began in earnest in the first half of the 1970s (Masiza 1993). Although official confirmation that Pretoria had successfully constructed six viable nuclear warheads did not come until the fall of apartheid (De Klerk 1993), explicit declarations of nuclear ambiguity by South African officials and the so-called "Vela incident" of 1979 led analysts to conclude with reasonable certainty that South Africa was seeking the bomb (Betts 1979). By the early 1980s, this was an open secret and a prominent transnational campaign spearheaded by other African nations and the ANC in exile through organisations like the Anti-Apartheid Movement and the UN Centre Against Apartheid. This worked to align the rapidly solidifying non-proliferation regime with the anti-apartheid struggle (Van Wyk & Van Wyk 2020). Although the ANC maintained a nominally critical stance towards the discriminatory nature of the non-proliferation regime and attacked instances of Western nuclear collaboration with apartheid South Africa, this campaign aligned the South African resistance movement with the anti-(techno) political ideals of non-proliferation (Vaughan 2021). Although it is difficult to judge the success of the campaign amid the broader context of sanctions on South Africa, the progressive collapse of apartheid, and the end of the Cold War (Fig 1999), the domestic and regional struggle against the apartheid bomb strongly informed future African approaches to nuclear ordering.

When South Africa's formal announcement of disarmament in 1993 and the ANC's subsequent victory in

the first post-apartheid elections arrived, South Africa bore a special status: newly disarmed, newly democratic. As such, its intervention was pivotal in the indefinite extension of the NPT in 1995, where its credibility on both disarmament and the liberation struggle proved crucial in helping to win over recalcitrant NAM states to agree to extension. Onderco and Van Wyk (2019) offer the most comprehensive history of this process (see also Welsh 1995 for individual NAM delegate perspectives). The most important South African contribution to extension was the so-called "package deal" on disarmament and peaceful use, which reaffirmed the obligations of the NWS as set out in the NPT's original text but, crucially, created no further binding commitments and no new mechanism for the NNWS to hold them to account. With specific regard to peaceful use, the statement of the "package deal" pointed to the NWS's obligation under Articles I–III of the NPT to respect the "inalienable right" to nuclear technology for development purposes but added a further layer of complexity in the form of additional restrictions. Delegates affirmed that all new supply arrangements should require full-scope safeguards "as a necessary precondition" (Kimball & Rydell 2020:36). The outcome may have been a coup for South Africa's status as a progressive and responsible "norm entrepreneur" in multilateral circles (Van Wyk 2012b), but it represented the culmination of the three Cold War-era ordering exigencies into a highly discriminatory (and now indefinite) instrument, which defanged the postcolonial demands of African states.

The failure of the non-proliferation apparatus to provide the desired access to civil nuclear technology has drawn African agents into the nuclear order at the regional level, encouraging them to generate and participate in an ever more baroque web of institutions and instruments. While agency is exercised, it functions in the interests of the hegemonic nuclear order (Ritchie & Egeland 2018; Ruzicka 2018; Ritchie 2019) to further deny and restrict and, as we explain below, cement the status of nuclear technology (including but not limited to weapons) as a highly desired fetish commodity.

4.4 The regional dimension of Africa's nuclear drive

As we discuss below, the three key African nuclear organisations—the African Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology (AFRA), the African Commission on Nuclear Energy (AFCONE), and the Forum of Nuclear Regulatory Bodies in Africa (FNRBA)—are intimately linked to the IAEA as the body that operationalises the NPT's peaceful use/non-proliferation mandate to the extent that they form regional iterations of the global nuclear control regime.

4.4.1 AFRA

AFRA was signed into force in 1990 as a framework for encouraging and intensifying collaboration on nuclear technology for sustainable development within Africa. It consists of a technical working group made up of national coordinators appointed by each member state. An annual meeting of representatives (member-states) determines the programme of activities, including cooperative projects among states. The IAEA is not party to AFRA, though it supports it under its technical assistance mandate. Having existed for two decades longer than AFCONE, AFRA claims a number of successes, most tangibly in the broad field of health and nuclear medicine. "Under AFRA, 40 radiotherapy centres in 18 African countries have been upgraded and more than 250 radiotherapists, medical physicists, nurses and radiographers have been trained on improved radiotherapy protocols, medical physics and management of radiotherapy departments" (AFRA 2017:11). Advances have also been made in disposal technology for sealed radioactive sources and training in nuclear science. The AFRA Regional Strategic Co-operative Framework, the organisation's main planning document, identifies seven agreed-upon thematic areas of focus: human health, food and agriculture, water resources, sustainable energy development, industrial applications, radiation safety/nuclear security, and human resource development (Van Wyk, Turianskyi & Bosman 2021:6). Being longer-established, AFRA is "more influential"

than AFCONE, and had 39 partnered African states as of 2012, which at the time was greater than the number of parties to the Treaty of Pelindaba (Van Wyk 2012a:290).

As of September 2024, AFRA had 38 states parties (IAEA 2024). This is a marked improvement from 2021, when just 10 states parties had renewed their membership (Van Wyk *et al.* 2021:6). Membership appears to fluctuate because of the rolling five-year extension period and the non-renewal of membership on the part of several states, and this issue has been addressed by a "revised agreement of indefinite duration" (Van Wyk *et al.* 2021:7). The considerable overlap and potential for competition between the mandates of both AFRA and AFCONE as well as AFRA and the FNRBA (Van Wyk 2012a:290) may have contributed to this dynamic. In 2020, AFRA and AFCONE went as far as signing a memorandum of understanding in the pursuit of "greater synergy in the programmes and optimisation of resources" (AFCONE 2020). Van Wyk *et al.* (2021:14) identify this need in their recommendation that AFRA "increase co-operation with regional and international bodies", along with AFRA's apparently spotty membership record.

4.4.2 AFCONE

The African states' efforts to denuclearise the continent as set out in the 1961 UNGA resolutions and in the 1964 Cairo declaration came to fruition with political change in South Africa during the early 1990s, when African states approached the UN to prepare for negotiations of an ANWFZ. The resulting Treaty of Pelindaba addressed several failures, identified by African states in the global nuclear control complex, in an accretionary manner. Foremost, special emphasis was placed on promoting peaceful use of nuclear science and technology through regional cooperation, especially in nuclear energy. The implementing body of the Treaty, AFCONE, had as a primary task regional cooperation on peaceful use. Secondly, AFCONE was designated as an inspection body in addition to the IAEA, particularly because "while the expertise and experience of IAEA inspectors was well known, Africa should not totally rely on the Agency for performing such a vital function in the treaty [...] these IAEA

experts had failed to confirm Africa's earlier loud, bitter and accurate allegations of a South African nuclear weapon capability that posed a grave threat to the continent's security" (Adeniji 2002:84). The lack of (political) will here led to the IAEA's failure. AFCONE, they argued, "should be given the flexibility to call upon expertise from other sources than the Agency" (Adeniji 2002:84). AFCONE would thus be a regional forum for African agency on nuclear matters, aiming to "establish a *continental* legal and institutional framework for nuclear security and safety, and promote African and international partnerships" (Van Wyk *et al.* 2021:9; emphasis added).

The Treaty of Pelindaba entered into force only in 2009, and as a result AFCONE itself was not instituted until 2010. In 2012, Van Wyk (2012a:282) remarked that "the process for a fully operational AFCONE is debatable and not positive" owing to an overall lack of financial and political commitment as well as disagreements between important state backers. After this "initial impasse", however, AFCONE is claimed to have made "progress" in its broad mandate, which *inter alia* covers the exchange of information, the general implementation of the Treaty of Pelindaba, ensuring compliance with IAEA safeguards, and encouraging nuclear co-operation both between African states and between African states and "extra-zonal" states on peaceful use (Van Wyk *et al.* 2021:9). Specifically, this progress has mostly concerned the establishment of co-operation agreements with the implementing organisations of other NFWZs, but also with the IAEA, the CTBTO, and Rosatom, the Russian state nuclear utility. The 2019 Co-operation Memorandum of Understanding between AFCONE and Rosatom "establishe[d] a basis for Russia to help African countries with various projects related to nuclear energy" (NEI 2020), an important step in peaceful use given several African states' existing intentions (and, in some cases, contracts) to acquire Russian-supplied nuclear infrastructure. Indeed, an "action plan for co-operation" was further signed in late 2023 (Rosatom 2023). In addition, AFCONE has integrated itself with the African Union's broader peace and security architecture and, in March 2022, briefed the AU Peace and Security Council on "how the Pelindaba Treaty could contribute [to] advancing [the] global

nuclear disarmament and non-proliferation agenda, thereby promot[ing] international peace and security" (Amani Africa 2022)—thus positioning itself as the authoritative continental voice on nuclear issues.

AFCONE nevertheless faces several challenges. In a set of recommendations, Van Wyk *et al.* (2021:13) note that not only have several African states failed to ratify the Treaty of Pelindaba but existing states parties have not yet "fully commit[ted] to financial and technical support for AFCONE". Indeed, AFCONE is still in need of "additional human resources [for] the Secretariat, such as ICT personnel to complete and maintain its website" (Van Wyk *et al.* 2021:13). The full programme of regular activities envisioned for AFCONE is yet to be fulfilled. Another potentially thorny issue is the threat to the full implementation of the Treaty of Pelindaba posed by the island of Diego Garcia. Formally a British Overseas Territory leased to the US Navy and claimed by Mauritius, Diego Garcia is a crucial element of US military capabilities in the region. The island hosts and services nuclear-powered submarines and B-52 bombers, though it is unclear whether nuclear warheads themselves are stockpiled there (Bashfield 2020). The status of Diego Garcia's boundaries, with regard to whether it is covered under the Treaty of Pelindaba, is contested, and in 2016 Mauritanian activists requested AFCONE inspections of the island (Lalit 2016). No response from AFCONE is documented.

4.4.3 The FNRBA

The FNRBA, established in 2009, consists of the national nuclear regulators of 34 member states and aims to "strengthen and harmonize radiation and nuclear safety and security regulatory infrastructures in its member countries, and serve as an effective platform for the exchange of regulatory experiences and practices among the nuclear regulatory bodies" (IAEA 2022b). It signed a co-operation agreement with the IAEA in 2013, and the two bodies work closely together. The FNRBA's 2016 Strategic Action Plan identifies several problems to be addressed in the region, including but not limited to inadequate resourcing, inadequate commitment to and implementation of regulation,

competing priorities among member states, different regulatory terrains and infrastructures among member states, lack of co-ordination between regulators, and a lack of co-ordination with AFRA, AFCONE, and other regional organisations (IAEA 2016:5). As such, the purpose of the FNRBA is mainly to bring African nuclear regulatory bodies up to IAEA safety standards and encourage the implementation of IAEA methodologies in regulation (see IAEA 2016 for a highly detailed breakdown of the FNRBA's strategic priorities).

Van Wyk *et al.* (2021:11) state that there is "something … to be said for the precise institutional nature of the FNRBA", which claims a straightforward mandate and creates "an opportunity for member states to 'learn from their peers' and experts alike, resulting in a well of knowledge and experience from which members can readily draw". However, a representative of the Sudanese Nuclear and Radiological Regulatory Authority nonetheless identified in 2014 a "lack of financial resources" which "significantly" affected the FNRBA's ability to carry out its mandate (Osman 2014). Once again, van Wyk *et al.* (2021:14) recommend that the FNRBA intensify its efforts at co-operation with "other regional bodies dedicated to the safe and secure use of nuclear science and technology".

These organisations are each engaged in developing links between each other, fostering intra-regional connections, and forging connections between their own region and others. There are varying degrees of crossover between their mandates, and each organisation hosts sub-groupings, committees, and additional agreements. In addition, the AU's African Energy Commission (AFREC) is "likely to jump into the fray and consider nuclear options" (Van Wyk 2012a:290), while analysts (cf. Velichkov 2021) recommend further integration with sub-regional bodies like the Southern African Development Community (SADC).

Furthermore, the implementation of UNSC Resolution 1540, which aims to diffuse nuclear security norms and regulations around illicit nuclear trafficking, has taken on a regional dimension through conferences and workshops hosted by the African Union Commission and the United Nations

Regional Centre for Peace and Disarmament in Africa (Broodryk & Stott 2014; UN 2019). See also Foy's (2019) discussion of regional mechanisms to further nuclear security.

We now analyse Africa's regional nuclear ordering agency within the critical conceptual framework we set out in section 3.

4.5 Nuclear denial, desire, and reification of hierarchy

The NPT can be understood as a foundational instrument that distributes and mediates nuclearity (e.g., Peoples 2016). By drawing a formal distinction between nuclear and NNWS and the relationship between them, the NPT aims to fix in place these differential nuclearities. Hamidi (2020:551) argues:

> By enacting and performing nuclearity through NPT negotiations, states attempted to order the world around what appeared to be a natural distinction between nuclear and non-nuclear states. But these negotiations … themselves solidified and embedded these categories into nuclear discourse. Rather than being a pre-existing ordering, the distinction between nuclear and non-nuclear states was also a product of NPT negotiations.

As noted above, nuclear weapons were assigned the highest order of nuclearity, but the separability of military and civilian nuclear technology codified in the treaty allows for non-nuclear weapon states to have a circumscribed degree of nuclearity through the "inalienable right" to nuclear energy for peaceful purposes (Hecht 2007:102–103). However, the distinction between military and civilian is not clear-cut—nuclear technology is always "ambivalent" (Abraham 2010), the distinction requiring constant discursive reification and policing—and the risk of proliferation is always present. This leads Baker *et al.* (1976:137) to raise questions about:

> the ability of the nuclear states to raise the threshold for entry to the nuclear club. That is, which states—nuclear, soon-to-be nuclear, and non-nuclear—ought to be

> involved in such arrangements?… Is a concerted effort by the nuclear powers desirable or necessary or, to the contrary, might this be perceived as an attempt to form a 'nuclear OPEC'?

The NPT is set up to entangle the three "pillars" of non-proliferation, disarmament, and peaceful use discursively in what Pretorius and Sauer (2022:109) liken to a perpetual game of rock-paper-scissors. Under the logic of the NPT and the wider non-proliferation regime around it, nuclear disarmament cannot occur while there is a risk of proliferation. According to this same logic, however, proliferation is an inherent risk of peaceful use, and peaceful use is an inalienable right. Therefore, the peaceful-use pillar and consequent proliferation risk make nuclear disarmament an impossibility, which in turn unravels the grand bargain of the NPT that links non-proliferation and disarmament. NNWS may think of their peaceful programmes as nuclear hedging, and this allows NWS to play up proliferation risks to justify continued possession of their own nuclear weapons.

Why would African states play the NPT game? The answer is likely bound up in nuclear desire created by the NPT. It is not just the NPT's reserving of the highest order of nuclearity for nuclear weapons and their possessors but its restricting of the (inalienable) right to peaceful nuclear energy—by upping the threshold—that is key to understanding why nuclearity or "being nuclear" is sought after by states, especially African states, in the first place. African states can access the kind of nuclearity that the NPT makes possible for states without nuclear weapons through the promise of an inalienable right to peaceful technology.

Just as the consumption of luxury goods is related to the status and personality of a person, the possession of nuclear weapons is linked to the state by signifying statehood. As Biswas (2014) notes, nuclear weapons become spectacular national monuments. Restriction flames nuclear desire, because "like money, it is the 'scarcity' of nuclear weapons that makes them an appropriate carrier of social value" (Harrington de Santana

2009:333). But this scarcity is not restricted to nuclear weapons alone. As noted earlier, the built-in risk of proliferation is understood as the self-evident flipside of the inalienable right to peaceful uses, and therefore peaceful technology is not a free for all. The logic of restriction that makes nuclear weapons commodity-fetish objects is also at work in the case of the peaceful use of nuclear energy for development. Just as nuclear weapons come to stand in for security, societies can also become dependent (psycho-politically and techno-politically) on peaceful nuclear technology to provide "impossible development", worshipped as having magical powers to deliver Africa from "the cheapest nights"[3].

When we peel back the sometimes lavish nuclear development speak used in relation to and by African nuclear organisations through a critical lens, we also excavate the deeper meanings and power relations of the kind of agency that African organisations perform. Hamidi suggests that NNWSs, like those in Africa, use non-proliferation forums to exercise their identities and pursue their broader interests. Restrictive regimes not only come to constitute nuclear and non-nuclear states but provide a way for these states to construct and perform their nuclear identities (Hamidi 2020:545). Just as Hecht explores "being nuclear", Hamidi draws attention to "being non-nuclear". She tracks debates around the nuclear and non-nuclear distinction in the Eighteen Nation Disarmament Committee (ENCD), the forum established to negotiate the NPT, from 1962 to 1969. Hamidi shows that these debates acquired an identitarian "us vs. them" quality that framed the material difference of having and not having nuclear weapons. NNWSs, and, for our purposes, African states, signed up to a discriminatory treaty that codified the hierarchy between nuclear and non-nuclear states because "Non-nuclear status presented a way to perform a burgeoning

3 The allusion, which is to the short story titled 'The Cheapest Nights' by the Egyptian author, Yusuf Idriss, was made by David Otwoma (2021) in a presentation to motivate why Africans need nuclear energy. The story describes a poverty trap at the level of the family in the absence of development manifesting in lack of public services, such as access to electricity.

post-colonial identity for states" (Hamidi 2020:552). Especially for non-aligned states, there was much at stake in presenting such an identity that could be inserted as a force in the bipolar configuration of international politics. Nuclear disarmament was one aspect that NAM states agreed upon, and non-nuclear status therefore provided a framework by which to bind states together. An imagined Pan-African community identity has found and continues to find expression through Africa's nuclear ordering activities.

In the ENDC, non-nuclear states advocated for the "inalienable right" to nuclear energy and linked this right with the self-determination of people: "Developmental concerns drove these states to both revile nuclear weapons while remaining open to the economic potential brought by nuclear technology, which entangled strategic concerns with normative ones" (Hamidi 2020:559). Although non-nuclear states, especially in NAM, participated in the construction of what it means to be non-nuclear and used the NPT's categories strategically to perform certain identities and to get the inalienable right and disarmament clauses in the NPT set up, the exercise of this type of agency comes at a cost. The cost is reifying the NWS's top spot in the nuclear hierarchy by performing the NPT script and thereby conferring status and prestige on the nuclear haves. Even in nuclear-weapon-free zones like Africa, there can only be obedient rebellion, as Mpofu-Walsh asserts. Bergenäs (2008:6–7) argues that regional and sub-regional African organisations may help to overcome countries' resistance to "assistance from outside states and international organisations out of concern for protecting state sovereignty and to shield themselves against outside actors seeking to gain political influence over their internal affairs" (Bergenäs 2008:7). As shown in the previous section, African nuclear organisations are intimately linked to the IAEA as the body that operationalises the NPT's peaceful use/non-proliferation mandate to the extent that they form regional iterations of the global nuclear control regime. As a result, African agency often comes to mimic the technical rather than the political nature of the IAEA's performance of global nuclear order and its hierarchies. This is not to say that African actors

have not used international forums in the past to exercise more activist agency, but, by and large, African nuclear organisations serve the goal of obedience rather than rebellion, in Mpofu-Walsh's terminology.

One of AFCONE's key activities is encouraging African states to accede to international non-proliferation and disarmament treaties and conventions. In this way AFCONE is instrumental in disseminating global nuclear controls to individual African states where international agreements must find expression in national legislation and eventually practice. South Africa's nuclear regulatory framework, for example, is already extensive and complex, but still not considered adequate (Qasaymeh 2016; Reddiar 2021).Very few African states have the kind of nuclear facilities and capabilities that would justify membership of and allocation of resources to these international institutions and diffusing controls and requirements to their national regulatory space. Nuclear controls expose NNWS to political pressure and intrusion, not only with respect to legitimate concerns about nuclear proliferation, safety, and security, but as a guide to achieving other political objectives. Sanctions on Iran and the war on Iraq in 2003 are the more grotesque enactments of power through the nuclear control regime complex. Goldemberg (2009) explains that in 1970s the US blocked Germany from installing enrichment plants in Iran and Brazil because *political* conditions were not met. In both cases, the states involved then started developing their own enrichment facilities—something that is still on the table in SA. Once in place, national regulatory institutions may well serve to manufacture nuclear desire and rationales for nuclear energy, expanding state power vis-à-vis other local actors, like civil society groups or communities living in the shadow of nuclear power plants and nuclear waste disposal sites. Our investigation thus turns to the contradictory futures that find expression in African nuclear organisations' agency.

4.6 Contradictory nuclear futures

The programmes of Africa's regional nuclear institutions are future-facing: they orientate the continent towards idealised

visions of the nuclear future, proceeding temporally from widely accepted "not-yets". These are also inexorably bound up with broader global nuclear futures, since African regional nuclear institutions are nested within larger international organisations such as the IAEA and implicated within global nuclear trade networks and agreements. Broadly, these visions can be summarised as 1) an abundant, clean, and energy-independent future for Africa (for which, as we have seen, the continent is considered not yet ready), and 2) a future of global nuclear disarmament (to which the nuclear weapons states have not yet committed). While this volume addresses the issue-area of nuclear energy in Africa, "civil" and "military" uses of nuclear technology are inseparable—what Abraham (2006; 2010) calls the fundamental "ambivalence" of nuclear technology. This inseparability results in African regional nuclear institutions serving contradictory aims. As we have shown, both articulations of the future have their roots in historic and often radical political projects. While, in Butler's (2010) terms, the agency performed by African regional nuclear institutions is in keeping with this legacy, the nuclear future which they actually serve to bring about is not. Following Columba Peoples and Benoit Pelopidas respectively, we can contrast these two visions of the future as "nutopia" and "nuclear eternity".

Taken together, the aims of the AFCONE, AFRA, and the FNRBA are oriented towards a "nutopian" future. Peoples (2016:224) sees nutopianism as "predicated upon the assumption that nuclear power has redeeming features that outweigh its destructive application". Civil applications of nuclear technology offer tremendous opportunities for development and energy abundance which redeem the attendant threat of nuclear destruction. The boundary between "civil" and "military" nuclear technology is not a physical one, but discursive and therefore requiring constant policing and re-inscription. Activities like the development of best practices and standardisation of regulatory frameworks pursued not only maximise opportunities for the development of nuclear energy but also limit opportunities for military diversion and "proliferation". AFCONE's mission as the implementing body of the Treaty of Pelindaba also commits Africa formally to nuclear

abstinence, and AFCONE additionally notes that Pelindaba's "normative congruence" with the TPNW aligns Africa with the ideal of global nuclear disarmament (Van Wyk & Turianskyi 2021:2). In fact, as Futter and Samuel (2023) show, African states have helped to stamp this nutopian vision onto the TPNW. At least in performative terms, then, the missions of Africa's regional nuclear institutions appear to work towards a nutopian African future.

However, the concrete effects of African regional nuclear activities, as outlined in this chapter, are more likely to commit Africa in practice to a future of "nuclear eternity". Pelopidas identifies three "modes of perpetualization": styles of reasoning implicit within global policies which, intentionally or otherwise, serve to entrench nuclear weapons as an eternal presence in global politics (Pelopidas 2021:487). Respectively, these take the form of images of "disconnected", "absent", and "inconsistent" post-nuclear futures. The nutopian future articulated through African regional nuclear agency falls into the latter category. An inconsistent post-nuclear future does, at least, present nuclear disarmament as a feasible goal, demonstrated here by the commitment of Africa's regional nuclear apparatus to Pelindaba and the TPNW. However, this future is inconsistent, because it "cannot be reached by the steps that are advocated" to reach it (Pelopidas 2021:488). This is because of African regional institutions' alignment—which continues to deepen—with those of the broader global nuclear order, principally the IAEA and the NPT.

As we have discussed, African expressions of nuclear desire are channelled through regional institutions. These conspicuously perform African nuclear ordering agency, technological and bureaucratic capability, and therefore trustworthiness in handling nuclear technology. In doing so, they imbue Africa with an enhanced status of nuclearity. As more African states become more nuclear, however, the capability—not to say the intention—to proliferate increases, which raises the perennial question of "who's next?" (Abraham 2010) among global nuclear policymakers.

It should be noted here that this fear is usually misguided: Pelopidas points out that pessimistic predictions of "cascading" nuclear proliferation once states acquire the requisite technical abilities have not come true (Pelopidas 2011). These fears are not rooted in historical experience but are an important part of the techno-political ideology of the global nuclear order, which justifies restrictions on peaceful use to "stop the spread" of nuclear weapons (Egeland 2021).[4] Therefore, as African states acquire more advanced nuclear capabilities, the imperative to demonstrate compliance with global standards of safeguarding and security is sharpened, and regional nuclear institutions intensify their adoption of international standards and frameworks and their collaboration with the mainstream non-proliferation agenda. While it places formal obligations on NWS to disarm, these are not time-limited. NWSs thus reserve the privilege to judge when "the international security environment and the actions of potential adversaries" permit concerted action on disarmament (UK Government 2023). The denial of this prerogative to NNWSs entrenches global hierarchies of power (Biswas 2014; Ruzicka 2018)the Nuclear Non-Proliferation Treaty (NPT.

Additionally, for Pelopidas (2021:496), the "technical practices of safeguard agreements and verification by the associated International Atomic Energy Agency have naturalized the eternal nuclear present and contributed to the entrenchment of nuclear eternity". In this context, as Mpofu-Walsh (2022) demonstrates, exercises of politicised dissent through Pelindaba or the TPNW can at best be understood as "obedient rebellion". So long as African regional nuclear institutions attempt to satisfy African states' nuclear desire through ever denser and more complex enmeshment with the non-proliferation regime,

4 For this reason, it is also unlikely that further progress in "proliferation resistant" (Emblemsvåg 2022), next-generation technologies like liquid thorium reactors will help African countries escape suspicion of proliferation. This suspicion is a product of the ideology of global nuclear order and will not be allayed by technical fixes. Relatedly, it should also be noted that this technology is not uncontroversial (Ramana 2022), and some scientists have warned that claims of intrinsic proliferation resistance may be overstated (Ashley *et al.* 2012; Uribe 2018).

the future is not nutopian. Instead, it is a techno-managerialist form of nuclear eternity, under which Africa is continually thwarted in its attempts to unlock the full developmental potential of nuclear energy. Moreover, while Africa itself may be free of nuclear weapons (with the notable exception of Diego Garcia), disarmament by the NWS is no closer at hand.

We reserve judgment on the political question of whether or not African states should pursue civil nuclear technology for development purposes. We simply point out that an idealised, "nutopian" future of nuclear-powered energy abundance and independence for Africa on the one hand, and African-led progress towards global nuclear disarmament on the other, is functionally impossible to achieve within the confines of the NPT. Recognising that this contradiction works to implicate Africa in the perpetuation of nuclear eternity, rendering the nuclear-free future absent, does not necessarily require giving up on either ideal. In fact, it invites us to imagine alternative nuclear futures for Africa, beyond the cycle described in this chapter, of eternally frustrated nuclear desire leading to performances of compliance with global non-proliferation policy, *ad infinitum*. Divergences from this path may appear ambitious, but addressing this contradictory dynamic is necessary for a feasible African nuclear direction.

Several alternative African nuclear futures are possible. On one extreme of the spectrum is a non-nuclear future, in which Africa foreswears not only nuclear weapons but also nuclear power. Civil resistance to nuclear energy is most developed in South Africa, home to the continent's only nuclear power station, Koeberg (Rennkamp & Bhuyan 2017; Fig 2018) and was sharpened by historic suspicions about the links between the country's civil nuclear industry and the apartheid regime's covert nuclear weapons programme. However, the strength of the regional drive to become more nuclear suggests that a nuclear-free African energy future is unlikely. On the other extreme, an alternative African nuclear future, unyoked from the NPT, might resemble that proposed by the late Ali Mazrui (1980)—a resurgent, nuclear-armed Africa. Although we argue alongside Mpofu-Walsh (2022) that African commitments to

nuclear disarmament are likely to be ineffective under current non-proliferation arrangements, there is little reason to doubt that they are sincere. Africa's commitments to regional and global nuclear disarmament appear normatively strong, and Mazrui's vision subsequently implausible.

A middle path may be possible. Pretorius and Sauer (2022) have suggested that non-nuclear weapons states may legitimately abandon the NPT in favour of the TPNW: a radical departure indeed, but one which could not only advance disarmament but also permit the pursuit of more autonomous energy futures. Indeed, the TPNW's legitimacy rests partially on its accommodation of the desire of Global South states to pursue nuclear energy without restriction (Futter & Samuel 2023). By contrast, as Singh (2023:15) argues, "[w]ithout accommodating the interests of the rising powers and preparing for foreseeable shocks (challenges) to existing frameworks", the "fragile bargain" of the NPT is precarious indeed. African regional nuclear institutions may find a more fruitful means of pursuing nutopia through the TPNW, though this would require not only a parallel treaty but a parallel set of nuclear trade, regulation, and verification frameworks outside of the NPT. Efforts towards this have already begun (Durso 2023). Whether or not they will be successful remains to be seen, but an Afro-nutopian future under the NPT is, we argue, even more implausible.

4.7 Conclusion

This chapter framed the ordering agency of the three regional organisations with a nuclear mandate in Africa through a critical lens. The focus was especially on their role in negotiating and practising Africa's "non-nuclear" nuclearity through the pursuit of peaceful use and through the exercise of postcolonial identity in nuclear forums and how their agency relates to nuclear desire, fetishising nuclear technology as an answer to development and a way to a rightful place in the global order (nutopia). Our analysis argues that the likely outcome of this kind of agency is a contradictory nuclear future that reifies nuclear hierarchies and the continued existence of a world with nuclear weapons. Alternative African nuclear futures can be

and indeed have been imagined. By introducing them here, our aim was not to exhaustively explore their desirability or even plausibility, but rather to prompt thinking beyond the categories of the NPT that fans nuclear desire with a view to cementing the horizon in this issue-area for Africa's ordering agency.

References

Abraham, I. 2006. The Ambivalence of Nuclear Histories. *Osiris*. 21 (1), pp. 49–65. https://doi.org/10.1086/507135

Abraham, I. 2010. 'Who's Next?' Nuclear Ambivalence and the Contradictions of Non-Proliferation Policy. *Economic and Political Weekly*. 45 (43), pp. 48–56.

Abraham, I. 2018. Decolonizing arms control: the Asian African Legal Consultative Committee and the legality of nuclear testing, 1960–64. *Asian Journal of Political Science*. 26 (3), pp. 314–330. https://doi.org/10.1080/02185377.2018.1485588

Adenji, O. 2002. The Treaty of Pelindaba on the African Nuclear-Weapon-Free Zone. UNIDIR/2002/16. *United Nations Institute for Disarmament Research*. Available at: https://unidir.org/publication/the-treaty-of-pelindaba-on-the-african-nuclear-weapon-free-zone/

AFCONE. 2020. AFCONE and AFRA Signed a Memorandum of Understanding. Available at: https://www.afcone.org/2020/09/07/afcone-and-afra-signed-a-memorandum-of-understanding-on-07-september-2020/

AFRA. 2017. *Fostering nuclear science and technology for African development*. Vienna: IAEA. Available at: https://www.iaea.org/sites/default/files/19/01/afra-nuclear-science.pdf

Ahlman, J. S. 2010. The Algerian Question in Nkrumah's Ghana, 1958–1960: Debating "Violence" and "Nonviolence" in African Decolonization. *Africa Today*. 57 (2), pp. 66–84. https://doi.org/10.2979/africatoday.2010.57.2.66

Amani Africa. 2022. Briefing by African Commission on Nuclear Energy (AFCONE) on the implementation of Pelindaba Treaty. Available at: https://amaniafrica-et.org/briefing-by-african-commission-on-nuclear-energy-afcone-on-the-implementation-of-pelindaba-treaty/

Ashley, S. F., Parks, G. T., Nuttall, W. J., Boxal, C. & Grimes, R. W. 2012. Thorium fuel has risks. *Nature*. 492 (7427), pp. 31–33. https://doi.org/10.1038/492031a

Bashfield, S. 2020. Mauritius, Diego Garcia and the small matter of nukes. *Lowy Institute*. Available at: https://www.lowyinstitute.org/the-interpreter/mauritius-diego-garcia-and-small-matter-nukes

Bergenäs, J. 2008. The slippery slope of rational inaction: Resolution 1540 and the tragedy of the commons. *Nonproliferation Review*. 15 (2), pp. 373–380. https://doi.org/10.1080/10736700802117387

Betts, R. K. 1979. A Diplomatic Bomb for South Africa? *International Security*. 4 (2), pp. 91–115. https://doi.org/10.2307/2626745

Biswas, S. 2014. *Nuclear Desire: Power and the Postcolonial Nuclear Order*. Minneapolis: University of Minnesota Press. https://doi.org/10.5749/minnesota/9780816680979.001.0001

Broodryk, A. & Stott, N. 2014. Making progress: implementing UNSCR 1540 in Africa. *ISS Africa*. Available at: https://issafrica.org/iss-today/making-progress-implementing-unscr-1540-in-africa

Butler, J. 2010. Performative agency. *Journal of Cultural Economy*. 3 (2), pp. 147–161. https://doi.org/10.1080/17530350.2010.494117

Chacha, M. 2012. Regional integration and nuclear energy in Africa. *African Security Review*. 21 (4), pp. 38–50. https://doi.org/10.1080/10246029.2012.693891

Cohn, C. 1987. Sex and Death in the Rational World of Defense Intellectuals. *Signs: Journal of Women in Culture and Society*. 12 (4), pp. 687–718. https://doi.org/10.1086/494362

De Klerk, F. W. 1993. Speech by South African President F.W. De Klerk to a Joint Session of Parliament on Accession to the Non-Proliferation Treaty. Available at: https://digitalarchive.wilsoncenter.org/document/116789.pdf?v=c254c7fd2c4f6c4d

De Villiers, J. W., Jardine, R. & Reiss, M. 1993. Why South Africa Gave Up the Bomb. *Foreign Affairs*. 72 (5), pp. 98–109. https://doi.org/10.2307/20045817

Durso, T. 2023. SPIA Researchers Named to Pioneering U.N. Nuclear Treaty Scientific Advisory Group. *Princeton School of Public and International Affairs*. Available at: https://spia.princeton.edu/news/spia-researchers-named-pioneering-un-nuclear-treaty-scientific-advisory-group

Egeland, K. 2021. The Ideology of Nuclear Order. *New Political Science*. 43 (2), pp. 208–230. https://doi.org/10.1080/07393148.2021.1886772

Emblemsvåg, J. 2022. Safe, clean, proliferation resistant and cost-effective Thorium-based Molten Salt Reactors for sustainable development. *International Journal of Sustainable Energy*. 41 (6), pp. 514–537. https://doi.org/10.1080/14786451.2021.1928130

Fig, D. 1999. Sanctions and the Nuclear Industry. In: Klotz, A. & Crawford, N.C. (eds). *How Sanctions Work: Lessons from South Africa*. Basingstoke: Macmillan, pp. 75–102. https://doi.org/10.1057/9781403915917_4

Fig, D. 2018. Capital, Climate and the Politics of Nuclear Procurement in South Africa. In: Satgar, V. (ed.). *The Climate Crisis: South African and Global Democratic Eco-Socialist Alternatives*. Johannesburg: Wits University Press, pp. 252–271. https://doi.org/10.18772/22018020541.17

Foy, H. & Bosman, I. 2021. Nuclear Energy in Ghana. Special Report. *South African Institute of International Affairs.* Available at: https://saiia.org.za/wp-content/uploads/2021/05/Special-Report-foy-bosman.pdf

Foy, H. K. 2019. Regional tools to strengthen nuclear security: the African continent. In: *Regional Perspectives on Strengthening the Nuclear Non-Proliferation Treaty: Lessons from the Nuclear Threat Initiative's Global Enterprise Project*. New York: Nuclear Threat Initiative.

Futter, A. & Samuel, O. 2024. Accommodating Nutopia: The nuclear ban treaty and the developmental interests of Global South countries. *Review of International Studies*. 50 (5), pp. 799–820. https://doi.org/10.1017/S0260210523000396

Goldemberg, J. 2009. Nuclear energy in developing countries. *Daedalus*. 138 (4), pp. 71–80. https://doi.org/10.1162/daed.2009.138.4.71

Hamidi, S. 2020. Law as discursive resource: the politics of the nuclear/non-nuclear distinction in the Non-Proliferation Treaty. *European Journal of International Relations*. 26 (2), pp. 545–568. https://doi.org/10.1177/1354066119875999

Harrington de Santana, A. 2009. Nuclear weapons as the currency of power: deconstructing the fetishism of force. *Nonproliferation Review*. 16 (3), pp. 325–345. https://doi.org/10.1080/10736700903255029

Hecht, G. 2006. Negotiating Global Nuclearities: Apartheid, Decolonization, and the Cold War in the Making of the IAEA. *Osiris*. 21 (1), pp. 25–48. https://doi.org/10.1086/507134

Hecht, G. 2007. A Cosmogram for Nuclear Things. *Isis*. 98 (1), pp. 100–108. https://doi.org/10.1086/512834

Hecht, G. 2012. *Being Nuclear: Africans and the Global Uranium Trade*. MIT Press.

IAEA. 2016. Federation of Nuclear Regulatory Bodies in Africa: Strategic Plan 2016–2021. *International Atomic Energy Agency*. Available at: https://gnssn.iaea.org/main/Documents/News%20Documents/FNRBA%20SP_final.pdf

IAEA. 2022. FNRBA, Global Nuclear Safety and Security Network. Available at: https://gnssn.iaea.org/main/FNRBA/Pages/default.aspx

IAEA. 2024. AFRA: Status List. Available at: https://www.iaea.org/sites/default/files/22/06/afra_status.pdf

Intondi, V. J. 2015. *African Americans Against the Bomb: Nuclear Weapons, Colonialism, and the Black Freedom Movement*. Stanford: Stanford University Press.

Jacobs, R. 2013. Nuclear Conquistadors: Military Colonialism in Nuclear Test Site Selection during the Cold War. *Asian Journal of Peacebuilding*. 1 (2), pp. 157–177. https://doi.org/10.18588/201311.000011

Kimball, D. G. & Rydell, R. 2020. The NPT in 1995: the terms for indefinite extension. *Arms Control Today*. May. Available at: https://www.armscontrol.org/act/2020-05/features/npt-1995-terms-indefinite-extension

Kornprobst, M. 2020. African agency and global orders: the demanding case of nuclear arms control. *Third World Quarterly*. 41 (5), pp. 898–915. https://doi.org/10.1080/01436597.2020.1723412

Lalit. 2016. Diego Garcia: First-ever call for inspections under Pelindaba Treaty for nuclear arms free Africa, Lalit Mautritius. Available at: https://www.lalitmauritius.org/en/newsarticle/1903/diego-garcia-first-ever-call-for-inspections-under-pelindaba-treaty-for-nuclear-arms-free-africa/

Lloyd, O. E. S. 1969. Applications of atomic energy in African economic and social development plans. In: *Proceedings of a Symposium. Peaceful Uses of Atomic Energy in Africa*. Vienna: IAEA, pp. 9–25. Available at: https://inis.iaea.org/search/search.aspx?orig_q=RN:46129813.

Maclellan, N. 2017. *Grappling with the Bomb: Britain's Pacific H-Bomb Tests*. Acton: ANU Press. https://doi.org/10.22459/GB.09.2017

Masiza, Z. 1993. A chronology of South Africa's nuclear program. *The Nonproliferation Review*. 1 (1), pp. 34–53. https://doi.org/10.1080/10736709308436523

Maurer, A. & Hogue, R. H. 2020. Special Forum Introduction: Transnational Nuclear Imperialisms. *Journal of Transnational American Studies*. 11 (2), pp. 25–43. https://doi.org/10.5070/T8112050495

Mazrui, A. A. 1980. *The African Condition: A Political Diagnosis*. London: Heinemann.

Mpofu-Walsh, S. 2022. Obedient rebellion: conceiving the African nuclear weapon-free zone. *International Affairs*. 98 (1), pp. 145–163. https://doi.org/10.1093/ia/iiab208

NBP. 2023. Advancing nuclear energy in Africa: a comprehensive overview. *Nuclear Business Platform*. Available at: https://www.nuclearbusiness-platform.com/media/insights/advancing-nuclear-energy-in-africa-a-comprehensive-overview

NEI. 2020. Russia to co-operate with Afcone. Available at: https://www.neimagazine.com/news/newsrussia-to-co-operate-with-afcone-8153681/

Onderco, M. & Van Wyk, A.-M. 2019. Birth of a norm champion: how South Africa came to support the NPT's indefinite extension. *The Nonproliferation Review*. 26 (1–2), pp. 23–41. https://doi.org/10.1080/10736700.2019.1591771

Organization of African Unity. 1964. AHG/Res.11(I): Denuclearization of Africa. Available at: https://www.peaceau.org/uploads/ahg-res-11-i-en.pdf

Osman, O. E. 2014. Contribution of IAEA, FNRBA and ANNuR as Networking in Developing and Maintaining Capacity Building for a nuclear power programme: comparative study. *International Conference on Human Resource Development for Nuclear Power Programmes: Building and Sustaining Capacity*, Vienna, 12 May. Available at: https://conferences.iaea.org/event/39/contributions/7652/contribution.pdf

Otwoma, D. 2021. Africa and the Atom: Rethinking African Agency in the Global Nuclear Order. *Belfer Center*. Available at: https://www.belfercenter.org/event/africa-and-atom-rethinking-african-agency-global-nuclear-order#!watch-recording

Pelopidas, B. 2011. The Oracles of Proliferation: How Experts Maintain a Biased Historical Reading that Limits Policy Innovation. *The Nonproliferation Review*. 18 (1), pp. 297–314. https://doi.org/10.1080/10736700.2011.549185

Pelopidas, B. 2021. The Birth of Nuclear Eternity. In Kemp, K. & Andersson, J. (eds). *Futures*. Oxford: Oxford University Press, pp. 484–500. https://doi.org/10.1093/oxfordhb/9780198806820.013.28

Peoples, C. 2016. Redemption and Nutopia: The Scope of Nuclear Critique in International Studies. *Millennium*. 44 (2), pp. 216–235. https://doi.org/10.1177/0305829815613051

Popp, R. 2017. The long road to the NPT: from superpower collusion to global compromise. In Popp, R., Horovitz, L. & Wenger, A. (eds). *Negotiating the Nuclear Non- Proliferation Treaty: Origins of the nuclear order*. Oxon: Routledge, pp. 9–35. https://doi.org/10.4324/9781315536576

Potter, W. & Mukhatzhanova, G. 2012. *Nuclear Politics and the Non-Aligned Movement*. Oxon: Routledge.

Potter, W. C. 1985. Nuclear Proliferation: US-Soviet Cooperation. *Washington Quarterly*. 8 (1), pp. 141–154. https://doi.org/10.1080/01636608509449910

Pretorius, J. & Sauer, T. 2022. When is it legitimate to abandon the NPT? Withdrawal as a political tool to move nuclear disarmament forward. *Contemporary Security Policy*. 43 (1), pp. 161–185. https://doi.org/10.1080/13523260.2021.2009695

Pretorius, J. & Vaughan, T. 2024. Complexity, depoliticisation, and African nuclear ordering agency: A meso-level exploration. *Cambridge Review of International Affairs*, first view, pp. 1–23. https://doi.org/10.1080/09557571.2024.2356729

Qasaymeh, K. A. 2016. The Effectiveness of South Africa's legislative Framework Governing Cybersecurity in Nuclear Facilities. *Dirasat.* 43 (2), pp. 1109–1122. https://doi.org/10.12816/0033631

Ramana, M. V. 2022. Molten salt reactors were trouble in the 1960s—and they remain trouble today. *Bulletin of the Atomic Scientists*. Available at: https://thebulletin.org/2022/06/molten-salt-reactors-were-trouble-in-the-1960s-and-they-remain-trouble-today/

Reddiar, M. 2021. *Preventing the re-emergence of a nuclear weapons programme in South Africa: the Evolution of South Africa's policy, legislative and regulatory framework, and infrastructure*. Johannesburg: University of the Witwatersrand.

Rennkamp, B. & Bhuyan, R. 2017. The social shaping of nuclear energy technology in South Africa. In: Arent, D., Arndt, C., Miller, M., Tarp, F. & Zinaman, O. (eds). *The Political Economy of Clean Energy Transitions*. Oxford: Oxford University Press, pp. 271–291. https://doi.org/10.1093/oso/9780198802242.003.0014

Ritchie, N. 2019. A hegemonic nuclear order: Understanding the Ban Treaty and the power politics of nuclear weapons. *Contemporary Security Policy*. 40 (4), pp. 1–26. https://doi.org/10.1080/13523260.2019.1571852

Ritchie, N. & Egeland, K. 2018. The diplomacy of resistance: power, hegemony and nuclear disarmament. *Global Change, Peace & Security*. 30 (2), pp. 121–141. https://doi.org/10.1080/14781158.2018.1467393

Roehrlich, E. 2016. The Cold War, the developing world, and the creation of the International Atomic Energy Agency (IAEA), 1953–1957. *Cold War History*. 16 (2), pp. 195–212. https://doi.org/10.1080/14682745.2015.1129607

Rosatom. 2023. Rosatom and African Commission on Nuclear Energy announce cooperative Action Plan for peaceful use of nuclear energy. Available at: https://www.rosatom.ru/en/press-centre/news/rosatom-and-african-commission-on-nuclear-energy-announce-cooperative-action-plan-for-peaceful-use-0/

Ruzicka, J. 2018. Behind the veil of good intentions: power analysis of the nuclear non-proliferation regime. *International Politics*. 55 (3–4), pp. 369–385. https://doi.org/10.1057/s41311-017-0086-0

Sah, A., Lovering, J., Maseli, O. & Saxena, A. 2018. Atoms for Africa: Is There a Future for Civil Nuclear Energy in Sub-Saharan Africa? CGD Policy Paper 144. *Center for Global Development*. Available at: https://www.cgdev.org/sites/default/files/atoms-africa-there-future-civil-nuclear-energy-sub-saharan-africa.pdf

Singh, S. 2023. Exploring "Accommodation" to Understand the Behaviour of Rising Powers in the Global Nuclear Order: The Cases of India and Brazil. *The International Spectator*. 58 (4), pp. 110–127. https://doi.org/10.1080/03932729.2023.2247324

Taha, H. 2021. Nuclear Revival in North Africa? Developments in Algeria, Libya, and Egypt. Occasional Paper 322. *South African Institute of International Affairs.* Available at: https://saiia.org.za/research/nuclear-revival-in-north-africa-developments-in-algeria-libya-and-egypt/

UK Government. 2023. The UK's nuclear deterrent: what you need to know. Available at: https://www.gov.uk/government/publications/uk-nuclear-deterrence-factsheet/uk-nuclear-deterrence-what-you-need-to-know#a-world-without-nuclear-weapons

UN. 2019. Security Council Resolution 1540 (2004) Points of Contact Training for English-Speaking African States. *United Nations Meetings Coverage and Press Releases*. Available at: https://press.un.org/en/2019/sc13765.doc.htm

UN General Assembly. 1961. General assembly resolution 1652 (XVI). Available at: https://digitallibrary.un.org/record/204593?ln=en

UNGA. 1979. 6th Summit Conference of Heads of State or Government of the Non-Aligned Movement. Available at: http://cns.miis.edu/nam/documents/Official_Document/6th_Summit_FD_Havana_Declaration_1979_Whole.pdf

Uribe, E. C. 2018. Thorium power has a protactinium problem. *Bulletin of the Atomic Scientists*. Available at: https://thebulletin.org/2018/08/thorium-power-has-a-protactinium-problem/

Van Wyk, J.-A. 2012a. No nukes in Africa: South Africa, the denuclearisation of Africa and the Pelindaba Treaty. *Historia*. 57 (2), pp. 263–297.

Van Wyk, J.-A. 2012b. Nuclear diplomacy as niche diplomacy: South Africa's post-apartheid relations with the International Atomic Energy Agency. *South African Journal of International Affairs*. 19 (2), pp. 179–200. https://doi.org/10.1080/10220461.2012.706492

Van Wyk, J.-A. & Turianskyi, Y. 2021. The Nuclear Weapons Ban Treaty: An African Perspective. 104. *South African Institute of International Affairs.* Available at: https://saiia.org.za/wp-content/uploads/2021/06/Policy-Insights-104-van-wyk-turianskyi.pdf

Van Wyk, J.-A., Turianskyi, Y. & Bosman, I. 2021. African Continental Nuclear Institutions: A Review. 119. *South African Institute of International Affairs.* Available at: https://saiia.org.za/wp-content/uploads/2021/11/Policy-Insights-119-van-wyk-turianskyi-bosman.pdf

Van Wyk, J.-A. & Van Wyk, A.-M. 2015. From the Nuclear Laager to the Non-Proliferation Club: South Africa and the NPT. *South African Historical Journal*. 67 (1), pp. 32–46. https://doi.org/10.1080/02582473.2014.977337

Van Wyk, J.-A. & Van Wyk, A.-M. 2020. The African National Congress and Apartheid South Africa's Nuclear Weapons Program. Working Paper 16. *Woodrow Wilson International Center for Scholars.* Available at: https://www.wilsoncenter.org/publication/african-national-congress-and-apartheid-south-africas-nuclear-weapons-program

Vaughan, T. 2021. *South Africa and Nuclear Order: Between 'Local' Technopolitics and 'Global' Hegemony*. Aberystwyth University.

Velichkov, K. 2021. Synchronising Nuclear Governance in SADC Member States Through Regional Cooperation. Occasional Paper 332. *South African Institute of International Affairs.* Available at: https://saiia.org.za/research/synchronising-nuclear-governance-in-sadc-member-states-through-regional-cooperation/

Walker, W. 2011. *A Perpetual Menace: Nuclear Weapons and International Order*. London: Routledge. https://doi.org/10.4324/9780203239124

Welsh, S. B. 1995. Delegate perspectives on the 1995 NPT review and extension conference. *The Nonproliferation Review*. 2 (3), pp. 1–24. https://doi.org/10.1080/10736709508436589