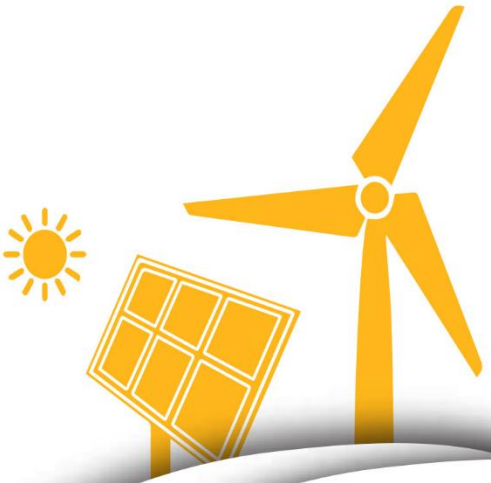
INTEGRATED RESOURCE PLAN

DECEMBER 2023



mineral resources & energy
Department:
Mineral Resources and Energy
REPUBLIC OF SOUTH AFRICA

ITHEBULA LOKUQUKETHWE

UHLU LWEZIBALO

UHLU LWAMATHEBULA

I-Glossary Yamatemu

Itemu/Isifinyezo	Incazelo
Umnyango Wezamahlathi, Ukudotshwa Kwezinhlanzi kanye Nemvelo	*Umnyango kahulumeni ogunyazwe ukunikeza umthelela kulungelo lwabahlali kumvelo ongenakho ukulimaza kumpilo yabo noma ekuphathekeni kahle kwabo nokwenza imvelo ivikelwe ngenzuzo yezizukulwane ezikhona nezizayo ngomthetho ozwakalayo nezinye izimiso.*
Unyango Wemithombo Yezimbiwa Phansi Namandla	*Umnyango kahulumeni ogunyazwe ukuqinisekisa ukunikezwa okuvikelekile nokungagcinwa kwamandla okuthuthukiswa komnotho-womphakathi.*
Isimo Sokutholakala Kwamandla	*Amaphesenti amandla amakhulu angahlinzekwa iplanti kugridi uma lingekho ekucishweni okuhleliwe noma okungahleliwe.*
Igesi Eluhlaza ye-Hydrogen	*Inqubo yokukhiqiza igesi ye-hydrogen kusukela kuzindlela zamandla ahlanzekile.*
Uhlelo Oluhlanganisiwe Lwemithombo	*Uhlelo lokunwetshwa kwamandla okukhiqizwa olususelwa ekuhlinzekweni kogesi obiza kancane nebhalansi yemfuneko ngesikhathi eside nolufaka inqubomgomo kahulumeni.*
Ukudluliswa Kwamandla Nje	*Ukusuka kusistimu yamandla aphezulu ukuya kwaphansi okuqinile kwekhaboni.*
Ukusebenza Kwesikhathi Eside	*Ukusebenza kokufakwa kwenukliya ngemuva kwesikhathi esimisiwe esibekwe, njengesibonelo, isikhathi selayisense, idizayini, amazinga, ilayisense neziqondiso, ezilungiswe ukuhlolwa kwezokuphepha, ngokucatshangwa okunikezwe kuzinqubo ezikhawulela impilo noma izakhi zezakhiwo, amasistimu, nezakhi.*
Amazinga Aphansi Okukhishwa	*Iziqondiso ezishicilelwe ngaphansi kwe-National Environmental Management: Air Quality Act (NEMAQA) 39 yango-2004.*
Umqondisi Kazwelonke Wamandla waseNingizimu Afrika	*Abaqondisi abasemagunyeni abashaya umthetho abagunyezwe ukuqondisa ugesi, ugesi-wepayipu kanye nemikhakha yolayini yamapayipu kaphethiloli ngokuya Ngomthetho Wokuqondiswa Kogesi, wango-2006 (Umthetho Ongunombolo 4 wango-2006), Umthetho Wegesi, 2001 (Umthetho Ongunombolo 48 wango-2001) kanye Nomthetho Wolayini Wamapayipu Kaphethiloli, 2003 (Umthetho Ongunombolo. 60 wango-2003).*
Umqondisi Kazwelonke weNukliya	*Ibhizinisi lezomthetho elisungulwe ngokuya Ngokomthetho Kazwelonke Womqondisi weNukliya 47 wango-1999.*
Ikomidi Likazwelonke Lenkinga Yamandla	*Ikomidi elisungulelwe ukuqondisa nokusheshisa imizamo kahulumeni yokwehlisa ukucisha ugesi sakuwonga.*

Isimo se-Net Zero	*Ibhalansi ephakathi kwenani legesi ye-greenhouse ekhishwayo ekhiqiziwe kanye nenani elehliswe kusukela emkhathini. Ukugxila kuvamise ukuba ekwehliseni ukukhishwa kwekhaboni eningi ngendlela ekungakhonwa ngayo kuqala kanye nasekuqaliseni ukukhishwa okusalele njengesenzo sokugcina.*
I-Turbine Yegesi Yomjikelezo Ovuliwe	*I-turbine yohlobo lokushisa esebenzisa isibaseli soketshezi/sogesi ngokuvamile kuzikhathi zezimo eziphuthumayo.*
Uhlelo Lokutholakala Komkhiqizi Wamandla Avuselelwayo Ozimele	*Imoto esethelwe ukuthola ugesi kusukela kumithombo yamandla evuselelekayo nengavuseleleki kusukela kumkhakha ozimele.*
Uhlelo Lokutholakala Komkhiqizi Wamandla Onciphisa Ingcuphe Ozimele	*Uhlelo olwakhiwe yi-DMRE ukwenza okushiwo Ungqongqoshe okuhlonzwe yi-IRP 2019 gazette.*
Ukukhiqizwa Kwesikali Esincane Okushunyekiwe	*Izindawo zokukhiqiza amandla ezitholakala kumasayithi okuhlala, okuhwebelana noma awezimboni, lapho igesi ivamise futhi ukusetshenziswa khona nalapho engathunyelwa khona kugridi.*
Amandla Angabiwanga / Amandla Anganikeziwe	*Isilinganiso semfuneko esingakwazi ukuhlangatshezwa ngokuthembekile ngenxa yokushoda kohlangothi lokunikezwa.*
Ukuhlolwa Kwamandla Okuxhumeka Kokukhiqizwa	*Kuqaliswe inqubo yewindi elilandelayo lokubhida futhi isho inani lokukhiqizwa elingafakwa kusistimu yokudlulisa ngesikhathi esinikeziwe ngaphandle kokuthikameza kakhulu ukuthembeka kwegridi futhi ngaphandle kokudinga ukuthuthukiswa okubalulekile kwengqalasizinda.*
Ikhodi Yegridi yaseNingizimu Afrika	*Ikhodi Yegridi ihloswe ukuthi isungule izibopho eziphindaphindayo zababambi qhaza bomkhakha ekusetshenzisweni kwesistimu yokudluliswa kanye nokudluliswa kwesistimu yamandla exhunyanisiwe.*

Izifinyezo Nezichazamazwi

BESS	Battery Energy Storage System
CCGT	Closed Cycle Gas Turbine
CCUS	Carbon Capture and Utilisation Storage
CO_2	Carbon Dioxide
COD	Commercial Operation Date
CSP	Concentrating Solar Power
DFFE	Department of Forestry, Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
DSM	Demand Side Management
EAF	Energy Availability Factor
EIA	Environmental Impact Assessment
EC	Eastern Cape Region
ESI	Electricity Supply Industry
FBC	Fluidised Bed Combustion coal technology
FGD	Flue Gas Desulphurisation
GCCA	Generation Capacity Connection Assessment
GDP	Gross Domestic Product
GW	Gigawatt (one thousand megawatts)
H_2	Hydrogen Gas
KNPS	Koeberg Nuclear Power Station
IRP	Integrated Resource Plan
LTO	Long-Term Operation
MES	Minimum Emission Standards

MTSAO	Medium Term System Adequacy Outlook
MW	Megawatt
NEMAQA	National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
NERSA	National Energy Regulator of South Africa
NNR	National Nuclear Regulator
PF	Pulverised-fuel coal technology
PV	Photovoltaic
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
RMIPPPP	Risk Mitigation Independent Power Producer Procurement Programme
RSA	Republic of South Africa
SAGC	South African Grid Code
SMR	Small Modular Reactor
SSEG	Small-Scale Embedded Generation
Tcf	Trillion cubic feet
TDP	Transmission Development Plan
TWh	Terawatt hour
WC	Western Cape region

1. I-IRP Kumongo

1.1. I-Integrated Resource Plan (IRP) uhlelo oluphilayo olulindelwe ukuthi libuyekezwe ngokuvamile njengokubalulekile ngezimo ezishintshayo.

1.2. Injongo enkulu ye-IRP ukuqinisekisa ukuthi ukuvikelwa kokuhlinzekwa kogesi okudingekayo ngokulinganisa ukuhlinzekwa nemfuneko, ngenkathi kucatshangwa imvelo kanye nenani selilonke lokuhlinzekwa.

1.3. INingizimu Afrika iyaqhubeka nokufuna inhlanganisela ehlukahlukene yamandla ezonikeza ukuvikelwa kokuhlinzekwa ngenkathi kuqinisekiswa ukuthobelana nohlelo layo lokunciphisa ukukhishwa. Indlela yeNingizimu Afrika yokuvikela amandla ihambisana namathrendi wamazwe ngamazwe kanye nokuthuthukiswa.

1.3.1. Ilahle

Ilahle liyaqhubeka nokudlala indima ebalulekile ekukhiqizeni ugesi eNingizimu Afrika. Ngokuya ngeningi lemithombo yelahle ezweni, ukucatshangwa kotshalomali kubuchwepheshe obusebenza kahle kakhulu nobuhlanzekile belahle kubalulekile.

Ngaleli banga Ikhanseli ye-GeoScience ngokubambisana Nebhange Lomhlaba yenza ucwaningo lwe-Carbon Capture Utilisation and Storage (CCUS) kusayithi elise-Leandra kumasipala wase-Govan Mbeki.

Ngokuya ngotshalomali olubalulekile oludingekayo ngokuthuthukiswa kobuchwepheshe be-CCUS, iNingizimu Afrika kumele iqhubeke ilandelele ubudlelwane bamasu ngezinhlangano zomhlaba jikelele kanye namazwe aqhubeke ekuthuthukisweni kobuchwepheshe obuhlanzekile belahle.

1.3.2. Inukliya

Amandla enukliya awumthombo obalulekile ohlanzekile wokukhiqizwa kogesi njengoba angahambisana nobuchwepheshe bamandla ahlanzekile ngenkathi futhi kunikelwa ekuvikelweni kogesi njengomthombo wamandla ongakhishwa[1].

[1] I-International Energy Agency (IEA)

Kukhona intshisekelo ekhulayo yomhlaba jikelele ekuthunyelweni kwama-small modular reactors (SMRs). Ngokuya ngesinyathelo sawo esincane, ama-SMR angahlaliswa kuzindawo ezingafanele amaplanti amakhulu amandla enukliya afana nezifunda zangaphakathi nezwe, ngokuhambisana nogwini kanye nakuzindawo ezikude. Ukuguquguquka kwama-SMR kunika amandla amasistimu amandla e-hybrid ahlangana nenukliya kanye neminye imithombo yamandla, efaka evuselelwayo. Ama-SMR angathunywa ngokukhuphuka (ijubane nesikali) ukulingana nemfuneko yamandla ekhuphukayo.

Isiteshi Samandla sase-Koeberg sifika ekugcineni kwempilo yokwakhiwa ngo-2024. Ukuze sigweme ukonakaliswa kwamandla enukliya ekuhlanganisweni kwamandla, iNingizimu Afrika yenze isinqumo esiphathelene nokunwetshwa kwempilo yaso yokwakhiwa kanye nokunwetshwa kohlelo lwamandla enukliya ngokuzayo. I-Eskom iqedele ngempumelelo ukushintshwa kwesikhiqizi sestimu kuyunithi 1 Kusiteshi Samandla Enukliya e-Koeberg. Umsebenzi ofanayo uzokwenziwa kuyunithi 2 ozoqinisekisa ilayisense yokusebenza ye-Koeberg ngemuva kwempilo yayo yasekuqaleni edizayiniwe yeminyaka engama-40.

1.3.3. Igesi

Ubuchwepheshe begesi ukuya kumandla ngendlela ye-CCGT, CCGE noma ye-ICE bunikeza ukuguquka okudingekayo ukuze kuhambisane namandla avuselelekayo.

Ngenkathi kusesikhathini esimfushane ithuba ukulandelela izinketho zokuthunyelwa kwegesi, izinsiza zasendaweni nezesifunda zizovumela ukunyuka kusikali ngaphakathi kwamaleveli engcuphe angaphatheka.

Kukhona amandla amakhulu kanye nethuba kulokhu kuhlonishwa kokutholakala kwegesi kwase-Brulpadda e-Outeniqua Basin yaseNingizimu Afrika, ukutholakala kwensiza yegesi kuzifunda zase-Free State nase-Mpumalanga, igesi yemvelo kusukela e-Mozambique nase-Namibia, igesi yomdabu efana ne-coal-bed methane kanye negesi ye-shale.

Ukusebenzisana namazwe angomakhelwane kuyalandelelwa futhi ubudlelwane buthuthukiselwa ukusebenzisa okuhlanganyele nokuzuza kwegesi yemvelo ngaphakathi kwesifunda se-SADC.

Ukuhlolwa kokuhlola ibanga le-shale yasendaweni engaphinda itholakale, igesi ephakathi nezwe nesogwini kuyalandelelwa futhi kumele kusheshiswe.

Ukutholakala kwegesi kunikeza ithuba lokuguqulelwa ku-CCGT nokuqalisa amaplanti egesi ye-turbine yomjikelezo-ovulekile e-Ankerlig (Saldanha Bay), Gourikwa (Mossel Bay), Avon (Ngaphandle kwaseThekwini) nase-Dedisa (Coega IDZ) kugesi esikhundleni sedizili.

1.3.4. Okuvuselelwayo

I-Solar PV, umoya ne-Concentrated Solar Power (CSP) enesitoreji inikeza ithuba lokwenza kuhluke ukuhlanganiswa kwegesi, ukukhiqiza ukusatshalaliswa okukhiqiziwe kanye nokunikeza igesi engaxhunyiwe kugridi. Ubuchwepheshe obuvuselelwayo buphinda bunikeze amandla amakhulu wokusungula imikhakha emisha kuchungechunge lwenani.

Uma sibheka phambili imakethe yomhlaba jikelele yamandla avuselelwayo iqagelwa ukuthi izokhula kakhulu njengoba imizamo yokukhishwa kwekhaboni iqhubeka futhi imithombo emisha yemfuneko, efana ne-hydrogen eluhlaza kanye nama-New Energy Vehicles (NEVs), ivela.

Endaweni, ukukhishwa kwamandla avuselelwayo kusethelwa ukukhuphuka ngokushesha ngezinhlelo ezisemphakathini neziyimfihlo zokutholakala njengoba izwe lihlose ukuthola ukuvikeleka kwamandla ngenkathi kususwa ikhaboni ekuhlinzekweni kogesi. Ukufakwa kwe-Small Scale Embedded Generation (SSEG) nakho kulindelwe ukuthi kuphakame kakhulu njengomphumela wokucisha ugesi sakuwonga kanye nezintengo eziphezulu zikagesi.

1.3.5. I-Hydro

Lena enye yemithombo emidala kakhulu nemikhulu kakhulu yamandla avuselelwayo, esebenzisa ukugeleza kwemvelo kwamanzi ahambayo ukukhiqiza igesi.

Imifula yaseNingizimu Afrika iphethe amandla amaphrojekthi aqaliswa umfula we-hydro. Lokhu kuboniswe kukhonakala ngamaphrojekthi asetshenziswa imiphakathi elimayo.

Ngokuphathelene ne-hydro yokungenisa, iNingizimu Afrika manje ingenisa i-hydropower kusukela e-Mozambique (Cahora-Basa) ngamandla wokuthunyelwa okuningi kwe-hydro kusukela e-Mpanda Nkuwa okuyiphrojekthi ye-hydropower esathuthukiswa. INingizimu Afrika iphinde yangena Kusivumelwane sokuthuthukiswa kwe-Grand Inga Project e-Democratic Republic of Congo (DRC), ngamanye amandla ahloswe ukudluliselwa eNingizimu Afrika ku-DRC yonkana, eZambia, Zimbabwe naseBotswana. Ngokungeziwe kule nketho yokukhiqizwa ekunikezeni amandla ahlanzekile, abashayeli bokuthuthukiswa kwesifunda bayathobela, ikakhulukazi ngokuya ngokuthi manje kukhona ukuhwebelana okuncane kakhulu kwamandla okuphakathi kwalawa mazwe, ngenxa yokushoda kwengqalasizinda. Amandla okuhwebelana ngaphakathi kwe-SADC makhulu njengoba angavula ukuhwebelana kwezomnotho.

Ngokwemvelo, ukukhathazeka kukhulunyiwe ngakho mayelana nezingcuphe ezihambisana nephrojekthi yalolu hlobo. INingizimu Afrika ayihlosile ukungenisa amandla kusukela kumthombo owodwa kundlule umkhawulo wayo wendawo yokugcinwa, njengendlela yokususa ingcuphe ekuncikeni kule nketho yokukhiqizwa.

1.3.6. Isitoreji

Kukhona ubudlelwane obuhambisanayo phakathi kwamasistimu e-Smart Grid, isitoreji samandla, kanye nobuchwepheshe bamandla avuselelwayo angathunyelwa aqhamuka kumoya naku-solar PV.

Imodeli yomdabu yokulethwa kwamandla iphazanyiswa ukuthuthukiswa kobuchwepheshe okuhambisana nesitoreji samandla, kanye namandla amaningi avuselelekayo angatholwa ngokunganaki iqiniso lokuthi isikhathi sokukhiqizwa kwawo singaba phansi ngenxa yezikhathi zokufuneka kakhulu.

Ubuchwepheshe besitoreji obufaka amasistimu ebhethri, isitoreji samandla omoya ominyanisiwe, isitoreji samandla e-flywheel, amaseli esibaseli se-

hydrogen njll. angukuthuthukiswa okungabhekana nale nkinga, ikakhulukazi kusimo saseNingizimu Afrika lapho amandla angavuselelwa angaphezulu kuka-6 000 MW athulwe khona, kepha isistimu yamandla ayinawo umthamo odingekayo wesitoreji noma ukuguquguquka.

1.3.7. I-Hydrogen

‘Imephu yenqubo Yokukhishwa kwe-Net Zero yango-2050’ ye- International Energy Agency’s (IEA) [4] ihlonza i-hydrogen eluhlaza (i-H2) njengenye yemithombo yamandla ehlanzekile ekuguqukeleni ku-net-zero.

INingizimu Afrika inezinzuzo ezithile ekulandeleni umnotho we-hydrogen. Lezi zinzuzo zifaka phakathi kwezinye; ubungcweti kunqubo ye-Fischer-Tropsch, amaminerali abalulekile adingeka kumnotho we-hydrogen, kanye nezinsiza zamandla avuselelekayo.

Ngo-Okthoba 2021, iNingizimu Afrika yavumela Imephu yenqubo Yomphakathi we-Hydrogen ebeka umdlandla kazwelonke kanye nokwenziwa kubaluleke kwemikhakha ekuthunyelweni komnotho we-hydrogen eNingizimu Afrika. Izwe liphinde lavumela i-Green Hydrogen Commercialisation Strategy (GHCS) efuna ukwenza kusebenze Imephu yenqubo Yomphakathi we-Hydrogen.

1.4. Kube khona ukuthuthukiswa okuthile kumboni yogesi eNingizimu Afrika kusukela ekumenyezelweni kwe-IRP 2019 futhi lokhu okuyinhloko kufaka:

1.4.1. Ukusungulwa kwe-Presidential Climate Commission (i-PCC) ekungumzimba wababambi whaza abaningi osungulwe uMongameli waseRiphablikhi yaseNingizimu Afrika ukweluleka ngempendulo yokushintsha kwesimo sezulu sezwe kanye nezindlela zezomnotho ezimelana-nesimo sezulu zekhaboni-ephansi kanye nomphakathi.

Okunye okukhishwayo okukhulu, kube ukuthuthukiswa kwe-Just Transition Framework. Ngokungeziwe, i-Inter-Ministerial Committee (IMC) ye-Just Energy Transition ithuthukise i-Just Energy Transition Investment Plan (JET IP) kanye ne-Implementation Roadmap elandelayo yesikhathi sango-2023-2027 futhi eveza isilinganiso sesidingo kanye nokutshalwa kwemali okudingekayo ukuze kufinyelelwe ekuzinikeleni kokukhishwa

kwekhaboni ngokuhambisana ne-Nationally Determined Contribution (NDC) yaseNingizimu Afrika.

1.4.2. I-Energy Action Plan edizayinelwe ukunciphisa ukucisha ugesi sakuwonga kuphinde kufinyelelwe ekuvikelekeni kwamandla njengoba kumenyezelwe uMongameli ngomhla ka-25 Julayi 2022. Uhlelo olusetshenziswe ngaphansi kokuqashelwa kwe-National Energy Crisis Committee (NECOM) lufaka izenzo ezinhlanu ezibalulekile ezifaka; ukuthuthukisa ukutholakala kwamaplanti akhona akhiqiza amandla, ukunika amandla nokusheshisa utshalomali oluzimele kumandla okukhiqiza amandla, ukusheshisa ukutholakala kwamandla amasha kusukela kokuvuselelwayo, isitoreji segesi nesebhethri, ukukhipha amabhizinisi nezindlu ukuze zitshale imali ku-solar ephezu kophahla, nokuthuthukiswa okubalulekile komkhakha wogesi ukuze kufinyelelwe ekuvikelweni kwamandla kwesikhathi eside.

1.4.3. Ukususwa kwezidingo zokususwa kwelayisense ekuthuthukisweni kokukhiqizwa kwamandla abathengi (ukukhiqiza okushunyekiwe) obekuqondwe ngakho ukunika amandla nokuheha utshalomali oluningi oludingekayo ukuze kubhekanwe nokucisha ugesi sakuwonga.

Ukungenelela kuze kube manje kuholele ekubhalisweni kwamaphrojekthi anamandla okukhiqiza ngaphezulu kuka-6 000 MW.

1.4.4. Ukungenelela Komnyango Kazwelonke Wezezimali kokubhekana nesikweletu se-Eskom okuthinta ikhono laleli bhizinisi ekugcineni ukusebenza nokutshala imali kungqalasizinda engeziwe. Ukubhekana nesikweletu se-Eskom ngokufanele kuzonika amandla utshalomali oludingeka kakhulu ekudlulisweni okubalulekile nakwenye ingqalasizinda, kanye nasekugcinweni okufanelekile kweplanti kanye nokokusebenza.

1.4.5. Ukutholakala kwesilinganiso esingu-6 000 MW samandla angeziwe okukhiqiza ngaphansi kobuchwepheshe be-agnostic be-Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP), ama-Bid Window 5 no-6 Amandla Avuselelwayo kanye ne-Bid Window 1 Yesitoreji Sebhethri.

1.5. Ngokungezwe ekuthuthukisweni okufakwe kuhlu ngaphezulu, ukucatshangwa okuthile okungukhiye kushintshile kusukela ekumenyezelweni kwe-IRP 2019. Ukucatshangwa okungukhiye okushintshile kufaka ukulinganiswa kwemfuneko yogesi, ukusebenza okukhona kweplanti yakwa-Eskom, kanye nazo zonke izindleko zobuchwepheshe obusha. Lolu shintsho belubalulekile ekubuyekezweni nasekubuyekezeni kwe-IRP okuholele kulokhu okusalungiswa kwe-IRP 2023.

2. Indlela Yokubuyekezwa kwe-IRP

2.1. Inqubo Yokubuyekezwa kwe-IRP yenziwe kusetshenziswa ithuluzi lokumodela le-Plexos. Ithuluzi linokulingiswa kokukhiqiza kanye namakhono okunwetshwa kwamandla. Imojuli yokukhiqizwa kokulingisa ingakhiqiza ukukhishwa kokunquma komnotho noma isethwe ukuze ihlanganise i-stochasticity samapharamitha acabanga ukuhluka. Amapharamitha anjalo afaka ukuqagelwa kwemfuneko yogesi, ukucishwa okungahleliwe, namaphrofayela okukhiqiza ezinsiza zokukhiqiza ezivuselelwayo ezifana nomoya kanye ne-solar PV.

2.2. Imojuli yokunwetshwa kwamandla ihlanganisa izimiso ezibiza kancane ekulungiselelweni kolayini. Lokhu kulinganisa ukuhlinzekwa nemfuneko esikhathini esimaphakathi neside ngokucabanga izakhi zezindleko nezokusebenza zezinketho zokukhiqiza ngenkathi kwenziwa ukuhlinzekwa kwamamethrikhi okuthembeka acacisiwe. Injongo ukunciphisa izindleko sezizonke zesistimu yamandla nokunika amandla isinqumo sokusebenzisa izinsiza ezikhona zokukhiqiza kanzima noma ukutshala imali kuzinsiza ezintsha. Lesi sinqumo sokutshala imali sizohanjiswa inketho yezinsiza ezishibhile futhi siyakwazi ukuhlangabezana nezakhi zesistimu yamandla edingekayo, ngenkathi kuncishiswa amandla angasetshenziswe. Izinqumo zingaphansi kwezithiyo ezifana nesimo sokuthembeka esichazwe umsebenzisi, ukucatshangwa kwemvelo, ukuphuzwa kwamanzi, njll.

2.3. Lesi sibuyekezo sicabange ama-horizon ezikhathi ezimbili, esokuqala ileso sikhathi esingafika ku-2030 kakhulu esigxile ekubhekaneni nezithiyo ezivelele zokukhiqiza zamandla nokuthi isistimu idinga ini ukuze ivale isikhathi sokushoda kokuhlinzekwa kogesi.

2.4. I-horizon yesibili ifaka isikhathi kusukela ngo-2031 ukuya ku-2050 kakhulu esigxile kuzindlela zogesi zesikhathi eside zezwe ukuze kuqondiswe ukukhetha kwenqubomgomo kwesikhathi eside.

2.5. Ku-Horizon One, izimo ezinhlanu ziye zathuthukiswa zaphinde zahlolwa kusukela kusimo sokulungela amaphrojekthi azayo. Izimo ezicatshangwayo ilezi ezilandelayo, okokuqala i-Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP, REIPPPP 5 kanye namaphrojekthi ebhizinisi manje akhiwayo. Okwesibili, konke ukusungulwa kwephrojekthi

nge-commercial operation date (COD) kanye nendawo ecacisiwe. Okwesithathu, konke ukusungulwa kwephrojekthi okufaka lokho okungenakho ukugcinwa kwamandla egridi, i-COD kanye nendawo ecacisiwe.

2.6. Ngokungeziwe, izimo ezimbili, esisodwa esifaka isimo senkomba kanye nohlelo lwegesi lamanje, kanye nesinye esisuselwa ekusebenzeni kweplanti okuthuthukisiwe ngokuya ngohlelo lokuphinda kutholwe ukukhiqizwa kumodeliwe.

2.7. Izifundo ze-Horizon bezifaka:

- Ukuhlaziywa kokuhlinzekwa nemfuneko esikhathini esingafika ku-2030, kucatshangwa ukuthuthukiswa kwakamuva ku-ESI.
- Ukulinganiswa kwamandla okukhiqiza nokushoda kwamandla.
- Ukuhlonzwa nokulinganiswa kwemikhankaso yohlangothi-lokuhlinzeka manje okucatshangwayo ngohlobo lwezinqubo zebhidi eliholwa uhulumeni nezinhlelo zomkhakha ozimele.
- Ukuhlolwa kwebanga lapho ukusungulwa okuphakanyisiwe kubhekene khona nokushoda.
- Ukukhonjwa kwezingcuphe ezingathikameza kakhulu isistimu yamandla kabi.
- Ukuphakamisa izindlela ezidingekayo zokuthuthukisa ukuvikelwa kokuhlinzekwa kwesistimu yamandla ezwe.

2.8. Ku-Horizon Two, izindlela zamandla eziyisithupha ziye zacatshangwa ukuze kubhekelwe ukuqinisekiswa kokuvikelwa kwamandla nokwehlisa ukukhishwa kwe-GHG ngokuhambisana nokuzinikela kweNingizimu Afrika. Izindlela kuhloswe ngazo ukwazisa izinqumo zenqubomgomo mayelana nokuhlanganiswa kwamandla okuvikelekile nokungagcineka okukhulu kwaseNingizimu Afrika ngesikhathi esingemuva kuka-2030. Indlela yenkomba isungule ibhentshimakhi emelene nezinye izindlela futhi ibisuselwa kuzindleko ezibiza kancane, uma kucatshangwa isidingo sokwehlisa okukhishwayo.

2.9. Izifundo ze-Horizon bezifaka:

- Ukukhonjwa kokuphonselwa inselelo okukhona nokulindelwe kwe-ESI okungathinta ukuvikelwa kokuhlinzekwa.

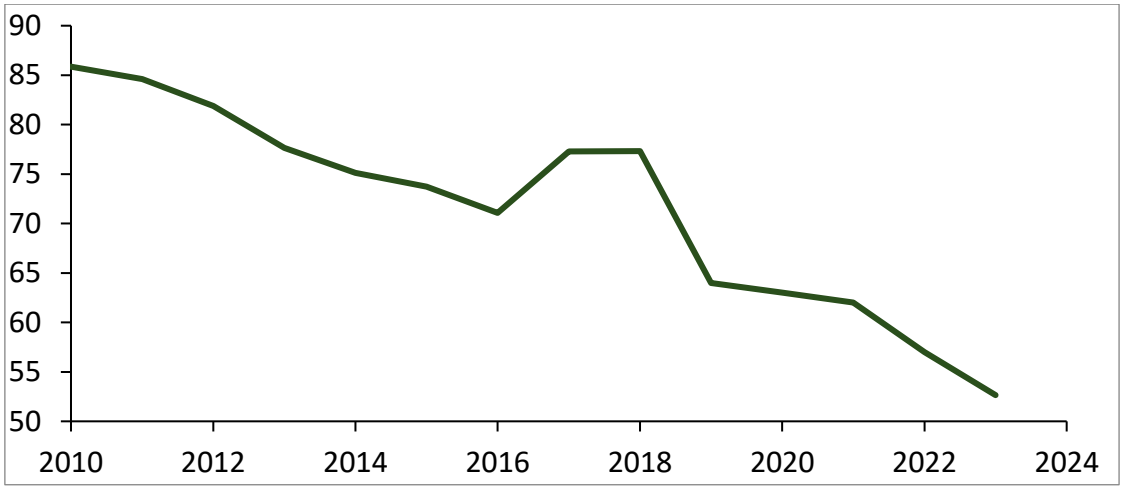
- Ukuhlaziya isethi eqinile yezindlela zamandla esikhathini esiphakathi nendawo ukuya kweside ngenjongo yokuqinisekisa isistimu eyanele, ezinzile, nengagcineka yamandla.

3. Izinto Ezicatshangiwe Ekubuyekezweni kwe-IRP

3.1 Ukusebenza Kweplanti ye-Eskom

Ku-IRP yango-2019, iplanti le-Eskom le-energy availability factor (EAF) lithathwe ukuthi limaphakathi no-75% empeleni i-EAF yangempela ngesikhathi ibikade ilinganiselwe ukuthi ingaphansi kwamaphesenti angama-70. Ukusebenza kwangonyaka wezezimalo wango-2023 kwehlele kumaphesenti angama-54.72, lena ileveli yokusebenza kweplanti ethathwe kulesi sibuyekezo nokuyindlela yokugcinwa. Mayelana nalokhu, insika yokuqala ye-Energy Action Plan yenze kwabaluleka ukuthuthukiswa kokusebenza kweplanti yaphinde yabika ukuthuthukiswa okuncane. Ngaphansi kwale nsika isibuyekezo esizimele sobuchwepheshe seziteshi zamandla e-Eskom siyaqhubeka ukuze kuxilongwe izinselelo kuphinde kunikezwe izincomo kuzenzo ezizokwenziwa. Ngokuya ngokuthi izimoto ze-Eskom zisagcwele kumandla kagesi ofakiwe wezwe cishe ngo-80%, ukuguquguquka okushona phansi kwe-EAF njengoba kuboniswe ku-Figure 1 kuyaqhubeka nokuletha inselelo enkulu ekuhlinzekweni kokuvikelwa.

Lokhu kubangele amaleveli amakhulu okucisha ugesi sakuwonga ngezikhathi ezinde nokushiye umnotho uboniswe ekubeni sengcupheni yokuma.



I-Figure 1: Ithrendi yangempela ye-EAF kusukela ngo-2010

3.2 Uhlelo Lokuvalwa Kwamaplanti e-Eskom

Kusukela ekumenyezelweni kwe-2019 IRP, ukuvalwa kwe-Eskom kubuyekezwe kwaphinde kwabukezwa njengengxenye Yecebo le-Eskom 2035. Lokhu kubangele iziteshi ezithile zamandla, ezibekelwe ukuvalwa ngaphambi

kwango-2030, ngokusetshenziswa isikhathi eside kunokulindelekile. Lokhu kubuyekezwa kusize ekwehliseni ukushoda kwamandla kuze kube imanje, yize kunganele.

Isibonelo, leli cebo liye lacacisa ukuthi isikhungo samandla sase-Tutuka kumele sivalwe ngaphambi kwesikhathi kunempilo yaso yeminyaka engama-50. Lokhu bekuzosho ukuvalwa kwawo wonke amayunithi ayisithupha e-Tutuka avalwe ekupheleni kwango-Septhemba 2030, eminyakeni eyi-10 ngaphambili kumpilo yawo yedizayini nobekuzosungula ukushoda kwe-3 500 MW manje ekhiqizwa isiteshi.

3.3 Izinselelo Zokwakhiwa Okusha kwe-Eskom

Ukusebenza kokuhwebelana Kohlelo Lokwakhiwa Okusha kwe-Eskom ne-Medupi kuqale ngomhla ka-6 Agasti 2015. Kusukela lapho, amanye amayunithi aphinde enziwa asebenzisana negridi kodwa lawa mayunithi awasebenzi ngezinga alindelwe ngalo ngenxa yezinto ezihlukile ezifaka amaphutha edizayini nawokwakhiwa. Ngokufanayo, kukhona izinselelo Kusiteshi Samandla sase-Kusile esithinta ukukhishwa kwamandla kusukela kumayunithi akhomishiniwe. Ukugxila ekulungiseni amaphutha amakhulu eplanti kuyaqhubeka futhi, kusukela ekusebenzeni konyaka odlule ithrendi bekungukuya ekuqondisweni okuhamba kahle.

Amayunithi 5 no-6 ase-Kusile asazokhomishinwa nokuqagelwa kwakamuva okubonisa ukuqedelwa ngo-Ephreli 2024 kanye no-Febhuwari 2025.

3.4 Uhlelo Lokusebenza Lesikhathi eside lase-Koeberg

I-IRP 2019 ibona isidingo sokugcina amandla enukliya ekuhlanganisweni kwamandla kwaseNingizimu Afrika futhi ivume indima edlalwa i-Koeberg Nuclear Power Station (KNPS) kulokhu. Njengoba ilayisense yesayithi izophelelwa isikhathi ngo-2024, i-IRP 2019 iye yasekela imizamo ye-Eskom yokuthola ilayisense ye-long-term operation (LTO) ngeminyaka engama-20 engeziwe. Kulandela ukumenyezelwa kwe-IRP 2019, icala lokuphepha elithunyelwe i-Eskom ngo-2022, kulandele ukubuyekezwa-kontanga yi-International Atomic Energy Agency. I-National Nuclear Regulator (NNR) manje ibuyekeza leli cala lokuphepha ngokusekelwa kwesinqumo sokunweba inqubomgomo yempilo esenziwe ngo-2019.

3.5 Ukuthobelana Namazinga Amancane Okukhishwa

Ukuqondiswa komoya okungaphansi kwe-National Environmental Management Act: Ikhwalithi Yomoya (Umthetho Ongunombolo 39 wango-2004) unikeza ukuthi amaplanti amandla amalahle angaphansi kwezimoto ze-Eskom, phakathi nokunye, kumele kuhlangabezane ne-minimum emission standard (i-MES) ngesikhathi esithile, noma ngeke athobelane futhi awakwazi ukusetshenziswa ngokusemthethweni.

Uma kwenziwe kwasebenza, isinqumo sizoholela ekulahlekeni kwamandla okukhiqizwa kwe-baseload esikhathini esimfushane ukuya kwesiphakathi nendawo ngokulinganiswa:

- I-16 000 MW ngokushesha kanye
- Nokufikela ku-30 000 MW ngemuva kwango-Mashi 2025, uma ukudluliswa kwamanje kudlulile.

Ibhalansi kumele itholwe phakathi kokuvikeleka kwamandla, imithelela emibi yezempilo yekhwalithi embi yomoya kanye nezindleko zezomnotho ezihambisana nokuvalwa kwalawa maplanti.

3.6 Isikhathi kanye Nokukhishwa Kwamandla Amasha

Kuze kube yimanje nokulandela ukumenyezelwa kwe-IRP 2019, ngaphezulu kwamandla okukhiqizwa amasha angaphezulu kuka-6 000 MW kutholwe ngezinhlelo zokutholakala ezintsha. Amaphrojekthi atholiwe akuzigaba ezihlukile zokusetshenziswa kwamanye amaphrojekthi alitshazisekile noma angakwazi ukufinyelela ekuvalweni kwezomthetho nokwezezimali.

3.7 Ukuthuthukiswa Kwegridi Yokudluliswa

Ngokuya nge-Eskom Transmission Development Plan2 (TDP) 2022–2032, amanethiwekhi okudluliswa ezifunda zase-Eastern, Northern nase-Western Cape anokukhawulelwa okukhulu kwamandla [5]. Lolu hlelo lubonisa ukuthi utshalomali lomlando kolayini bokudluliselwa ngaphezulu kweminyaka eyisishiyagalolunye ephakathi kuka-2013 kanye no-2022 lubangele ngaphezulu kuka-4 000 km owakhiwe ngenkathi okungaphezulu kuka-14 000 wolayini abasha badingeka ngo-2032. Lokhu, empeleni, kusho ukuthi izwe kumele

[2] https://www.eskom.co.za/wp-content/uploads/2023/01/Transmission_Development_Plan_2023_E280_932032_Rev1.pdf

lisheshise utshalomali kungqalasizinda ngokuthuthukisa kwemizila emisha neziteshi ezingaphansi nokuqinisa iziteshi ezingaphansi ezikhona. I-Eskom ithatha izinyathelo zokusheshisa amaphrojekthi e-transformer ukuze kuvulwe amandla egridi.

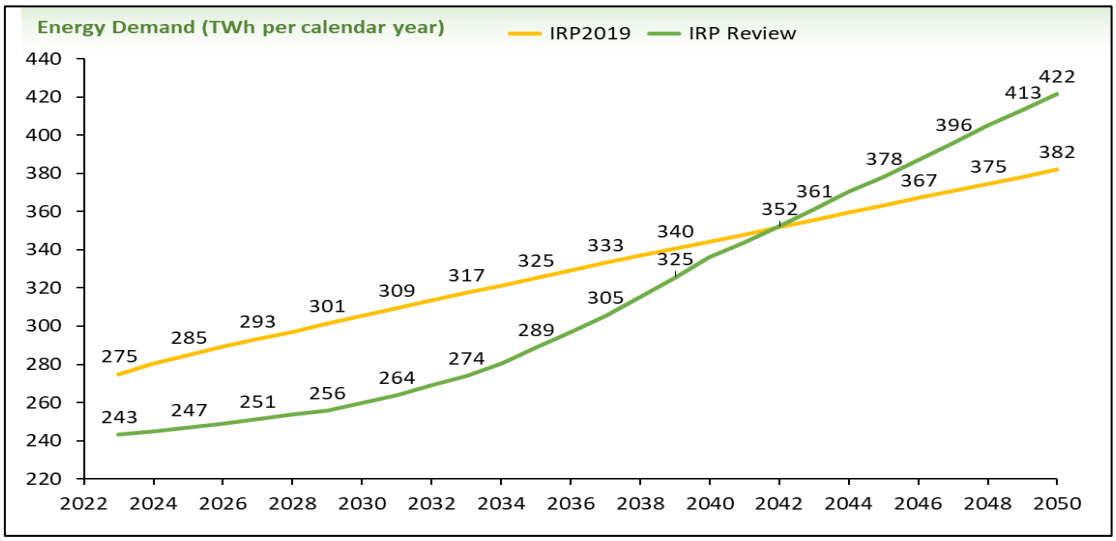
4. Amapharamitha Okucatshangwa Kokufakwa

Idatha eyazise ukucatshangwa okusetshenziswe Ekubuyekezweni kwe-IRP kuye kwaqoqwa kusukela kubanga lababambi qhaza nemithombo efana, Nehhovisi le-IPP, i-Eskom, umkhakha ozimele, i-NECOM, i-EPRI 2021 nemibiko ye-Lazard April 2023.

4.1 Ukubonakala Kwemfuneko Yogesi

Ukuqagelwa kwemfuneko yogesi yezwe okuthuthukiswe yi-ERSG ye-UCT kubonisa ukuthi imfuneko manje ngu-19% kunalokho okuboniswe ku-IRP 2019 njengoba kuboniswe ku-Figure 2. Ushintsho kwimfuneko luphazanyiswe izinto ezithile zasendaweni nezomhlaba jikelele ezifana nokucisha ugesi sakuwonga, ubhubhane lwe-Covid-19 kanye nengxabano ese-Eastern Europe. I-IRP 2023 iqagela ukutholwa okuhamba kancane ngenxa yesimo sezulu esiqhubekayo sezomnotho esikhathini esimfushane nesiphakathi nendawo. Kusukela phakathi kwango-2030, ukuqagelwa kucabanga ukwakhiwa kabusha kwe-National Treasury okuhloselwe ukukhula okunamandla kwezomnotho.

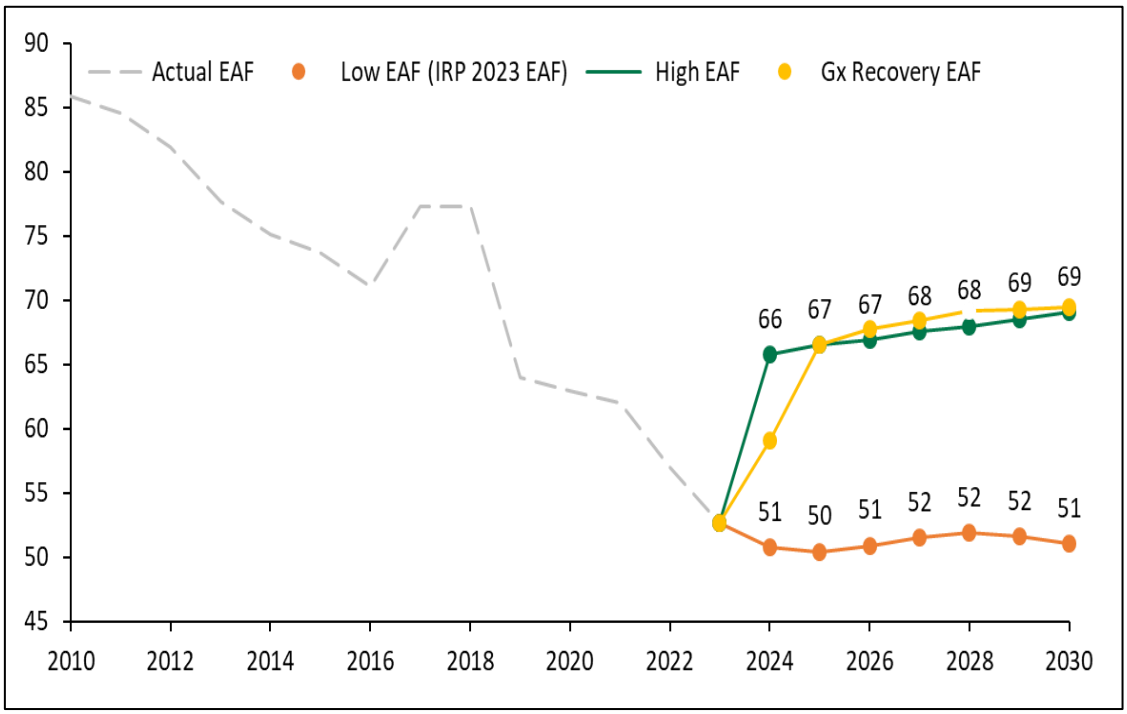
Imfuneko yogesi edingeka ekukhiqizweni kwe-hydrogen eluhlaza ayifakiwe ekuqagelweni kogesi ekucatshangweni kokuthi amabhizinisi azolandelela ukukhiqizwa kwalesi sibaseli kuzokwenza okwaso kanye nokunikezwa okungeziwe kwamandla okuvuselelwa.



I-Figure 2:Imfuneko Yamandla (i-TWh ngonyaka ngamunye wekhalenda)

4.2 I-EAF Yeplanti le-Eskom

Okokufaka Kokukhiqiza kwe-Eskom kunqubo Yokubuyekezwa kwe-IRP kufake izimo eziphezulu neziphansi ze-EAF. Ngo-Meyi 2023, isimo esiphezulu se-EAF siye sabuyekezwa ku-Generation Recovery Plan, nokubonisa umthelela, phakathi kweminye, wokugoqwa kwesitaki se-FGD Kusiteshi Samandla sase-Kusile nokuholele kumayunithi amathathu ukuthi angasebenzi isikhathi eside. I-Generation Recovery Plan isebenzisa ukuphinda kutholwe kwe-EAF ephezulu ngo-2025, njengoba kuboniswa ku-Figure 3. Isimo esiphansi se-EAF sisebenzisa ukuqhutshekiswa kwethrendi yamanje eyehlayo.



I-Figure 3: Ukubuka konke kokucatshangwa okukhona kwezimoto ze-EAF (%)

4.3 Uhlelo Lokuvalwa kwe-Eskom

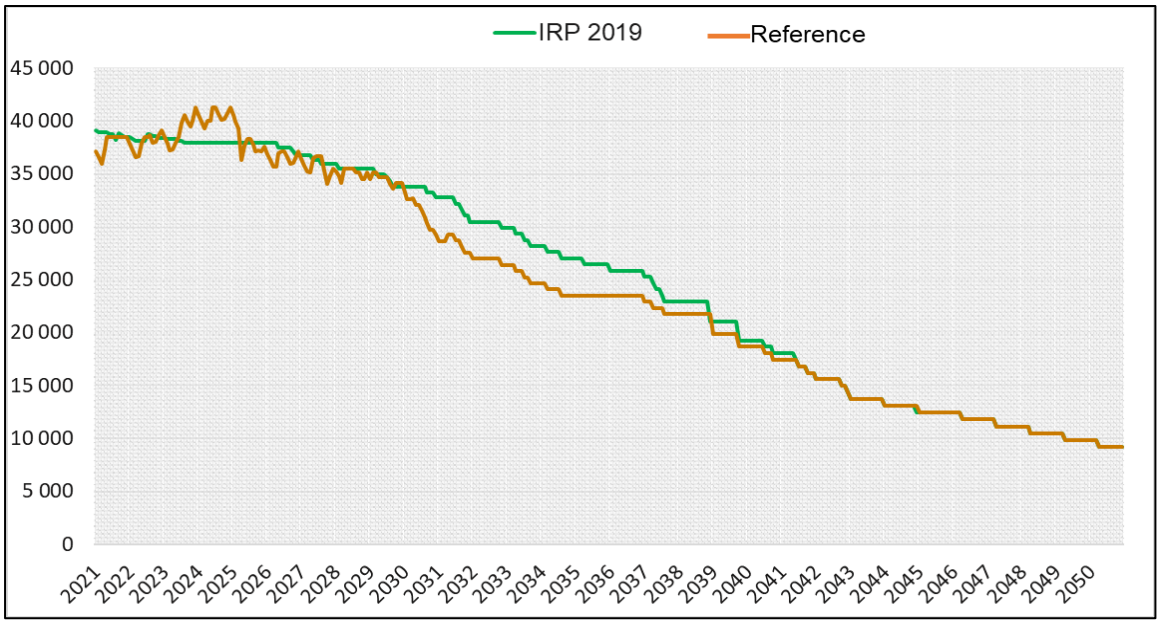
Ngokuya ngempilo yeziteshi zamandla zamalahle, uhlelo lokuvalwa kwe-Eskom elibuyekeziwe lango-2023 lithathwe njengokufakwa kunqubo yokubuyekezwa futhi lithathwe Njengenkomba futhi liboniswa Kuthebula 1. Amalanga aboniswe kuhlelo lokuvalwa asuselwa kumpilo yeminyaka engama-50 yeplanti nezinye iziteshi ezivalwa ngaphambi kwesikhathi sedizayini yempilo yawo.

I-Table 1: Uhlelo lokuvalwa kwesiteshi esinikwe amandla amalahle se-Eskom

	Arnot	Camden	Duvha	Grootvlei	Hendrina	Kendal	Komati	Kriel	Kusile	Lethabo	Majuba	Matimba	Matla	Medupi	Tutuka
U1	31-Mar-27	30-Aug-24	17-Aug-31	16-Aug-26	01-Apr-18	30-Sep-39	01-Apr-18	05-May-26	29-Aug-68	21-Dec-36	31-Mar-46	03-Dec-38	22-Aug-30	31-Jul-71	15-Mar-30
U2	31-Aug-26	30-Apr-25	30-Sep-31	21-Mar-26	10-Feb-25	19-Jun-41	01-Sep-18	13-May-27	30-Oct-70	10-Jul-37	31-Mar-47	03-Dec-38	29-Jun-31	30-May-69	10-Jan-30
U3	31-Jul-26	30-Nov-24	01-Dec-17	04-Sep-27	01-Jun-17	15-Dec-42	01-Sep-18	27-Jan-28	30-Aug-71	26-Mar-37	31-Mar-48	28-Sep-39	11-Dec-31	30-Oct-68	28-Jul-30
U4	31-Mar-27	31-Jan-23	30-Jun-33	01-Apr-18	31-Mar-25	30-Nov-42	01-Jun-20	21-Aug-29	30-Jun-72	02-Dec-38	31-Mar-49	29-Sep-40	15-Oct-32	30-Nov-67	22-Apr-30
U5	24-Nov-29	30-Nov-25	30-Mar-33	01-Apr-18	31-Dec-25	23-Dec-43	01-Jun-19	12-Mar-29	31-Dec-72	30-Jun-40	31-Mar-50	30-Sep-41	23-Aug-33	30-Apr-67	25-Sep-30
U6	31-Mar-29	31-Jul-23	21-Feb-34	01-Apr-18	13-Sep-25	09-Dec-44	01-Apr-18	16-Nov-30	30-Jun-73	27-Dec-41	31-Mar-51	30-Sep-42	20-Jul-34	31-Aug-65	05-Jun-30
U7		31-Jan-24			19-Mar-24		01-Sep-19								
U8		31-Jul-25			01-Jun-19		01-Apr-18								
U9					01-Oct-19		31-Oct-22								
U10					21-Mar-23										

Ukuhlaziywa kwezinhlelo zokuvalwa okusetshenziswe ku-IRP 2019 kanye nalesi sibuyekezo kuboniswa ku-Figure 4, futhi kuveza okulandelayo:

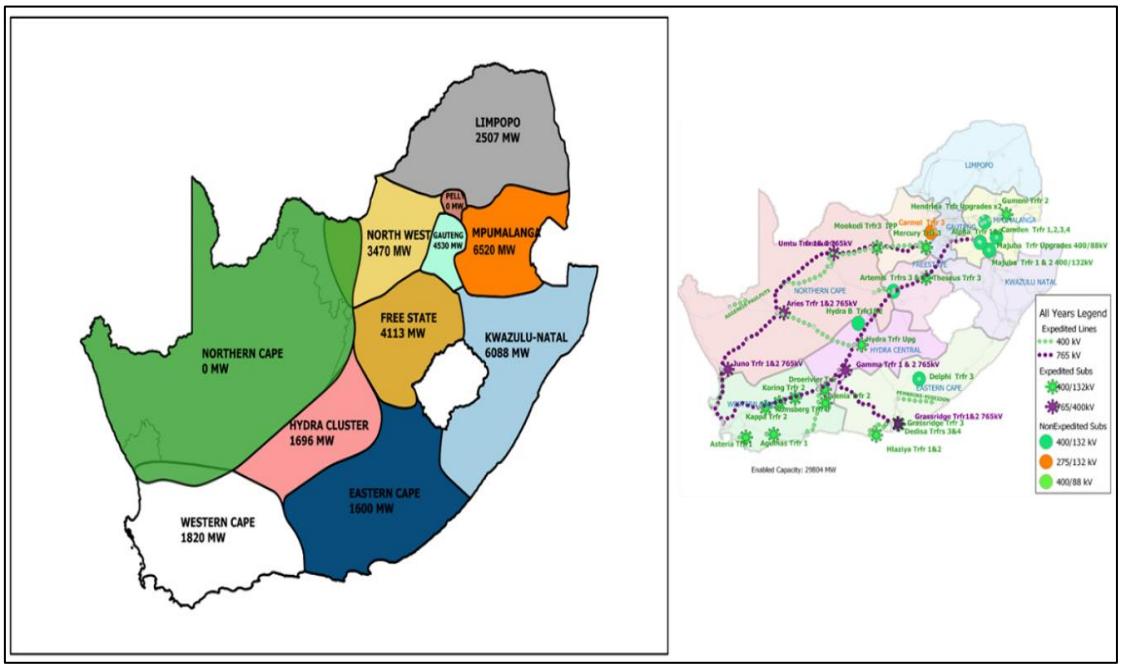
- Amayunithi asebenza kakhulu kunamalanga awo okuvalwa asekuqaleni aqaqiswe ku-IRP 2019, abonisa amandla omthelela omuhle we-net kuminyaka yangaphambi kwesikhathi,
- Ukuvalwa kwesiteshi samandla sase-Tutuka ngo-2030 kubonisa ukulahleka kwamandla okukhiqizwa angu-3 500 MW.



I-Figure 4: Ukubuka konke komthelela wokuvalwa kwamandla afakiwe wezimoto ezinikwa amandla amalahle

4.4 Ukutholakala Kokudluliselwa

I-Generation Capacity Connection Assessment (GCCA) 20243 [6] ibonisa amandla angaba khona atholakala kunethiwekhi yokudluliswa ukuze kuqondiswe ukuxhumana kwamaphrojekthi okukhiqizwa kusifunda ngasinye njengoba kuboniswa ku-I-Figure 5. I-GCCA ithatha wonke amaphrojekthi asakhiwa afaka amaphrojekthi atholiwe kufikela ku-Bid Window 6 kodwa akhiwayo noma afinyelele ekuvalweni kwezezimali. I-Eskom iphinde yathuthukisa i-Transmission Development Plan (TDP) 2023 – 2032 ebonisa ukunwetshwa nokuqinisekiswa kwengqalasizinda Yokudluliselwa ngokuhamba kwesikhathi.



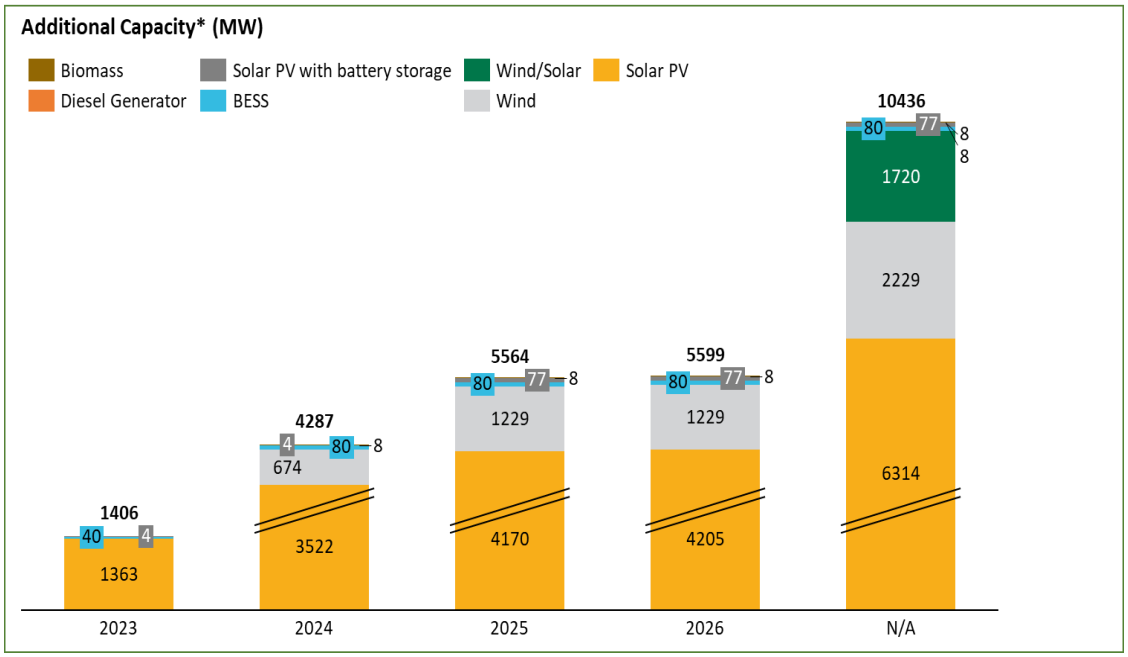
I-Figure 5: Ukutholakala kwegridi ngesifunda ngasinye ngokuya nge-GCCA 2024

I-GCCA ne-TDP zisetshenziswa kulesi sibuyekezo ukunquma amandla okukhiqiza angeziwe angaxhunywa kugridi ngesikhathi sokufunda. Bona i-Annexure B yokunqunywa kwamandla egridi angeziwe.

4.5 Ukusungulwa Kokukhiqizwa Kwamandla Umkhakha Ozimele

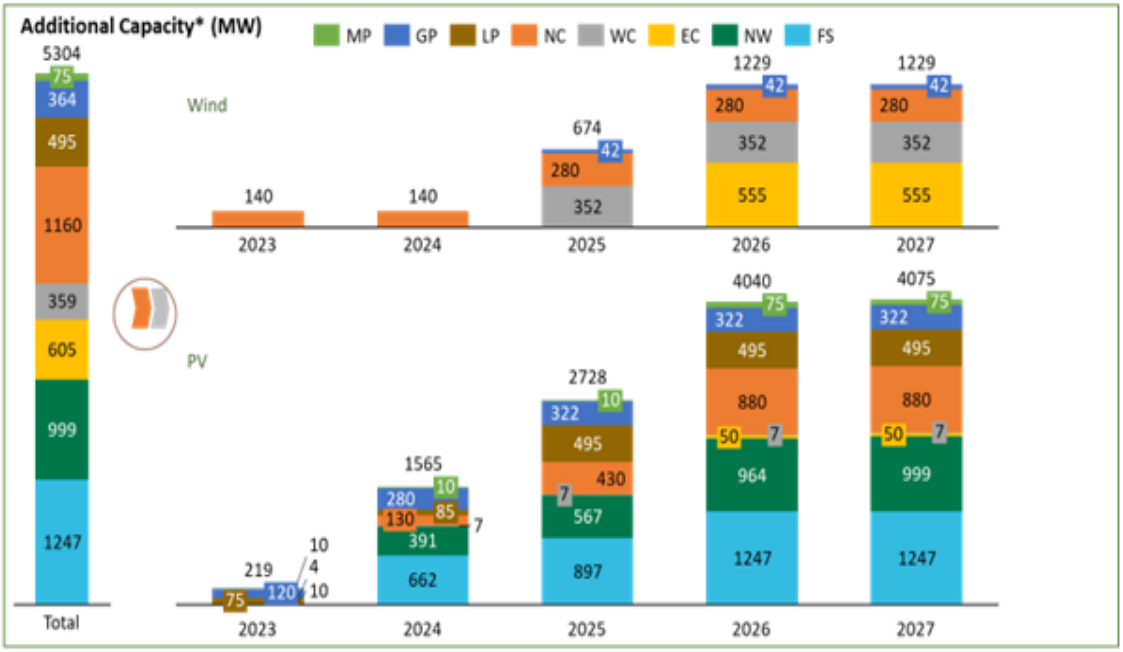
Idatha kumaphrojekthi okukhiqizwa kwamandla umphakathi webhizinisi ibonisa ulayini wepayipu wamaphrojekthi ngamandla womthamo wokukhiqizwa ongu-10 400 MW ngo-2030 njengoba kuboniswa ku-I-Figure 6.

[3] https://www.eskom.co.za/wp-content/uploads/2022/04/Generation-Connection-Capacity-Assessment-GCCA-2024-rev15-Final.pdf



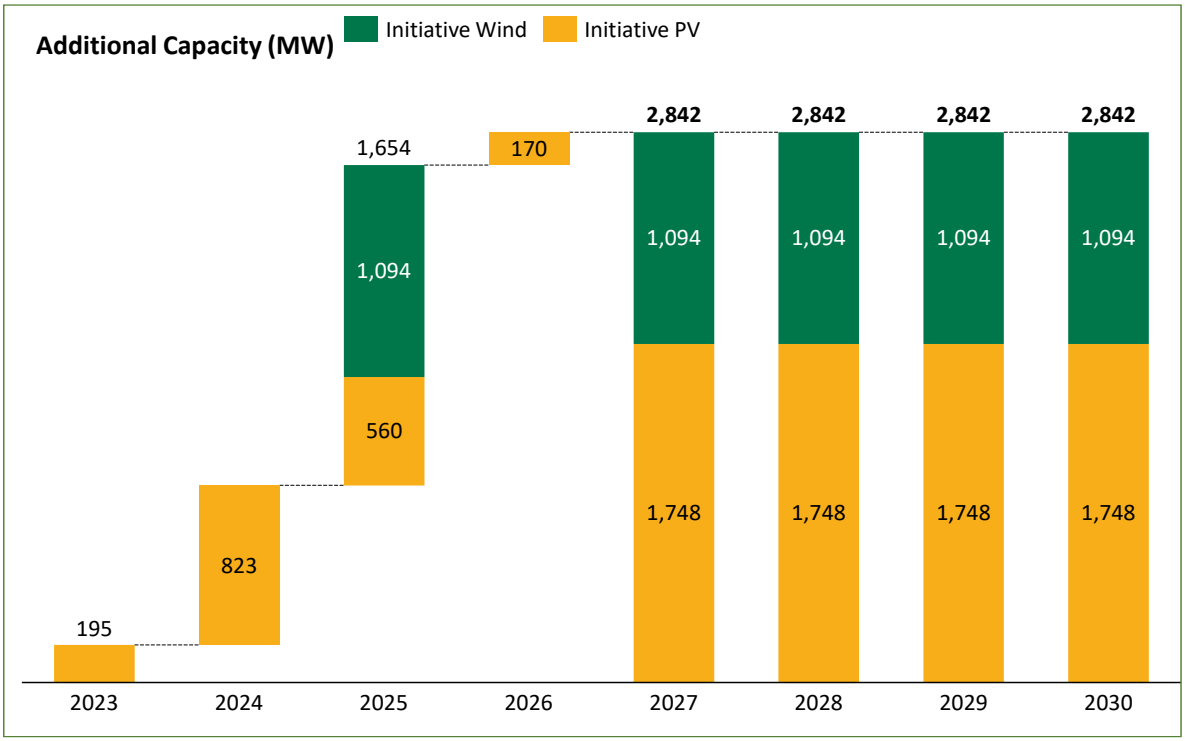
I-Figure 6: Konke ukusungulwa kwebhizinisi okususelwa kubuchwepheshe kanye ne-COD

Ibhizinisi ku-I-Figure 6 ngaphezulu alifaki ukusungulwa okungenayo indawo ecacisiwe kanye ne-commercial operation date (COD) njengoba kuthathwa ukuthi kunokwenzeka okuphansi okungaba khona. I-Figure 7 ngezansi ibonisa isimo esinamandla lapho lawa maphrojekthi angaba nokungaba khona okuphansi akhishwa khona kusukela ekubonisweni.



I-Figure 7: Ukusungulwa Kwebhizinisi ngendawo kanye ne-COD

I-I-Figure 8 ibonisa amaphrojekthi asakhiwa nalawo afinyelele ekuvalweni kwezezimali.



I-Figure 8: Ukusungulwa Kwebhizinisi okusakhiwa noma okufinyelele ekuvalweni kwezezimali.

5. Ukuhlaziywa kwe-Horizon One (Isikhathi sango-2023 ukuya ku-2030)

Ukumodelwa kwe-Horizon One kuhlole izimo ezine ezisuselwa ku-EAF ephansi kanye nesimo esisodwa esisuselwa ku-EAF ephezulu (I-Generation Recovery Plan eboniswe ku- I-Figure 3), ukusungula ibanga lokushoda kokuhlinzekwa nokufunwa. Izimo ezinhlanu bezihloswe ukuthi kuhlolwe ngazo umthelela wezinketho zohlangothi lomhlinzeki manje ezithuthukiswa yikho kokubili umkhakha kahulumeni nozimele ukuze kuthuthukiswe ukuvikelwa kokuhlinzekwa.

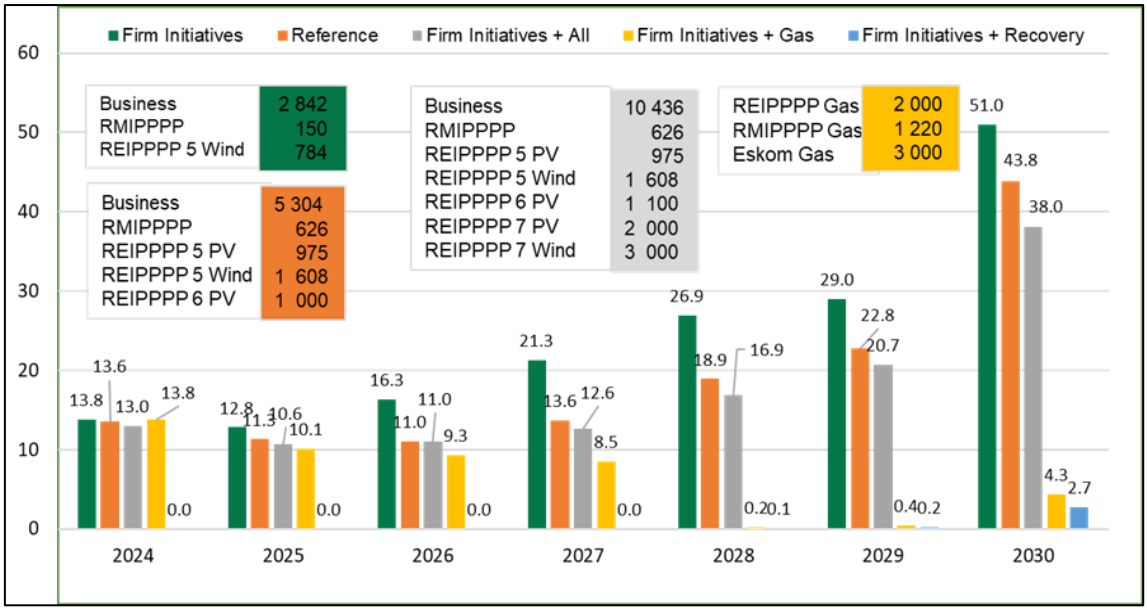
Ekuthuthukiseni lezi zimo, amaphrojekthi azokwenziwa aye wakhonjwa waphinde walinganiswa ngokuya ngesimo sawo sokulunga. Izimo eziyisihlanu ezithuthukisiwe zifakwe imininingwane ku- I-Figure 9 ngezansi.

		EAF	Initiatives 2030 (MW)	New Gas (MW)	Comments
1	Firm Initiatives	49% – 51%	Business 2 842 RMIPPPP 150 REIPPPP 5 Wind 784	0	• Priority Projects as ranked by business and have grid capacity reserved as at June 2023 • Government projects in the RMIPPP + REIPPP programme under construction
2	Reference	49% – 51%	Business 5 304 RMIPPPP 626 REIPPPP 5 PV 975 REIPPPP 5 Wind 1 608 REIPPPP 6 PV 1 140 BESS BW 1-3 + Eskom 2 080	0	• Business initiatives with COD and location • Government projects in the pipeline
3	Firm Initiatives & All Initiatives	49% – 51%	Business 10 436 RMIPPPP 626 REIPPPP 5 PV 975 REIPPPP 5 Wind 1 608 REIPPPP 6 PV 1 140 REIPPPP 7 PV 2 000 REIPPPP 7 Wind 3 000	0	• All initiatives including those with no grid capacity reservation, COD and/or location • Includes REIPPPP 7 due for RFP
4	Firm Initiatives & Gas	49% – 51%	Same as 'Constrained New Build Development' Case	6 220	• Gas includes DMRE Gas, Eskom Richards Bay Gas and RMIPPPP dispatchable Gas
5	Firm Initiatives & Recovery	66% - 69%	Same as 'Constrained New Build Development' Case	0	• Eskom's EAF improvement as per its Generation Recovery plan

I-Figure 9: Horizon One – Izimo ezifundwe kusikhathi esingafika ku-2030

5.1 Imiphumela evela Ekuhlaziyweni kwe-Horizon One

Imiphumela yokwanela kwezimo kusukela ku-Horizon One ekubhekaneni kokushoda kokuhlinzekwa kogesi (amandla angabasiwe) kufinyezwe ku-I-Figure 10 ngezansi kwaphinde kwachazwa ngezansi.



I-Figure 10: Imiphumela ye-Horizon One yazo zonke izimo ezimodeliwe

- UKUSUNGULWA OKUQINILE (ISIMO SOKUQALA)

  Lesi simo sicabanga ukusungulwa kohlangothi lokuhlinzeka olwakhiwa umkhakha osemphakathini nozimele kanye nokusungulwa okulinganiswe umkhakha ozimele.

  Imiphumela yalesi simo ibonise ileveli ephezulu kakhulu yamandla angabasiwe esho ukuthi isistimu yamandla icindezelekile ngesikhathi socwaningo. Amaleveli amandla angabasiwe angafika ngaphezulu kuka-50 000 MWh ngo-2030 njengoba kuboniswa ku-I-Figure 10 ngaphezulu, kulingana nokukabili kwamandla onyaka akhiqizwe yisiteshi samandla esingu-3 700 MW ekusebenzeni kwe-baseload. Ngokungeziwe, ukusetshenziswa okukhona kokuba khona kweziteshi zamandla kulesi simo kuphezulu kakhulu ngaphezu kuka-80% njengoba kuboniswa ku-Annexure B.

- INKOMBA (ISIMO SESIBILI)

  Lesi simo sicabanga ukusungulwa kohlangothi lokuhlinzekwa Kusimo Sokuqala esifaka ukusungulwa kwebhizinisi ngelanga lokusebenza kokuhwebelana nendawo kanye nokusungulwa kokutholwa komphakathi okwenziwe yi-DMRE ngeHhovisi le-IPP.

Imiphumela yalesi simo ibonisa ukuthi amandla angabasiwe ahlala angaphezulu ngaphansi kwalesi simo emkhawulweni wokuthuthukiswa ngenxa yokusungulwa okuphezulu kancane kohlangothi lokuhlinzekwa. Imiphumela yalesi simo iphinda ibonise ukuthi ukusetshenziswa okukhona kweziteshi zamandla okuhleli kuphezulu kumaleveli angaphezulu kuka-80%.

- UKUSUNGULWA OKUQINILE NAKHO KONKE UKUSUNGULWA (ISIMO SESITHATHU)

  Lesi simo sicabanga konke ukusungulwa kohlangothi lokuhlinzekwa ngebhizinisi kanye nangokusungulwa kokutholwa komphakathi kufikela ku-Bid Window 7 njengoba kwenziwe yi-DMRE Ngehhovisi le-IPP.

  Ngaphansi kwalesi simo, umphumela ubonisa ukuthuthukiswa okuqhubekayo kumandla angabasiwe kubonwa kusukela ngonyaka ka-2028 uma kuqhathaniswa nesimo sesibili. Kodwa, amaleveli amandla angabasiwe ahlala aphezulu nokusetshenziswa kweziteshi zamandla okukhona nakho kuhlala kuphezulu.

- UKUSUNGULWA OKUQINILE NEGESI (ISIMO SESINE)

  Lesi simo sicabanga ukusungulwa kohlangothi lokuhlinzekwa Kusimo Sokuqala esifaka igesi eya ekusungulweni kwamandla kwe-Eskom kanye ne-DMRE Ngehhovisi le-IPP.

  Imiphumela ibonisa ukuthi kusikhathi esifika kunyaka ka-2027, isistimu yamandla ihleli icindezelekile njengoba ukusungulwa kohlangothi lokuhlinzeka okuthunyelwe akwanele ukuqeda amandla angabasiwe kuphinde kubuyiselwe ukuvikelwa kokuhlinzekwa. Kusukela ngonyaka ka-2027, ukusungulwa kohlangothi lokuhlinzekwa okungeziwe ngendlela yegesi entsha engathunyelwa kubuyisela ukuvikelwa kokuhlinzekwa namandla aphansi noma angabasiwe. Ngokuqaphela, ukusetshenziswa kweziteshi zamandla ezikhona ezivelele kwehliselwa ku-30% nakho ngokuvamile okusese phezulu.

- UKUSUNGULWA OKUQINILE NOKUTHOLAKALA (ISIMO SESIHLANU)

  Lesi simo sicabanga ukusungulwa kohlangothi lokuhlinzekwa Kusimo Sokuqala esifaka ukutholakala kwe-EAF (i-EAF ephezulu).

Imiphumela yesimo ibonisa ukuthi ukuvikelwa kokuhlinzekwa kubuyiselwe ngokugcwele nomthelela wangaleso sikhathi kanye nokusetshenziswa okukhona kweziteshi zamandla okuvelele okwehlisa amaleveli amukelekile kusikhathi socwaningo, ngaphandle kwango-2030 uma amandla amakhulu anikezwa umlilo ngamalahle avalwa.

5.2 Ukubonakala Sekukonke

Ukubonakala sekukonke kusukela ekuhlaziyweni kwezimo ezihlaziywe ngaphansi kwe-Horizon One kubonisa ukuthi ukusungulwa okuhlukile kokukhiqiza ugesi noma amaphrojekthi manje asetshenziswayo azongena ekwehliseni amandla angabasiwe kodwa kumele afake amandla angathunyelwa. Lokhu ingenxa yezakhi zangaphakathi zesistimu yamandla yaseNingizimu Afrika kanye nokusebenza okuvelayo kwamaplanti anikwa amandla ukushiswa kwamalahle. Isistimu idinga izinketho zokukhiqizwa zezakhi ezifanayo ukuze zingene esikhundleni samandla alahlekile angathunyelwa lapho futhi uma kuvela khona ukuhluleka.

Ukuthuthukiswa ku-EAF nokuthuthukiswa kwegesi ukuya emandleni kunikeza lezi zinketho kusistimu futhi amandla aphansi noma angabasiwe ayabonwa Kuzimo Zesine Nezesihlanu.

Ukuhlaziywa kokukhishwayo kwe-Horizon One kubonisa ukuthi ukukhishwa kwekhaboni ngaphakathi kwe-National Determined Contribution (NDC) kuze kube u-2025 nangemuva kwalokho kuqala ukubonisa ukwehla okungaphansi kwesilinganiso esinqunywe kuzwelonke njengoba kuboniswe ku-I-Figure 21.

Sekukonke, ukuhlaziywa okungaphezulu kwe-Horizon One kuholela kuhlelo elivelayo njengoba lifakwe ku-I-Table 2. Uhlelo lifaka amandla alindelwe kusukela kumayunithi amabili okugcina asele eKusile, izinhlelo zikahulumeni manje zithole kufikela ku-MW 6, amaphrojekthi azinikele nabalulekile omphakathi webhizinisi, ukukhishwa okuqageliwe kwe-solar PV esophahleni kusukela kuyo yomibili imikhakha yezokuhwebelana neyokuhlala. Uhlelo oluvelayo luphinda lubonise isidingo samandla amasha angeziwe e-solar PV, umoya kanye namandla angathunyelwa anesimo sokusetshenziswa okuphezulu. Yize kungaboniswa kuhlelo oluvelayo, kulindelwe ukuthi kuzoba khona amandla e-solar PV nawomoya kusukela kumphakathi webhizinisi azoba khona ngemuva konyaka ka-2027.

I-Table 2: Uhlelo Oluvelayo kusukela Ekuhlaziyweni kwe-Horizon One

	Coal	Gas – IPP Programme	Gas - Eskom	Dispatchable Capacity	Nuclear	Hydro	Pumped Storage	CSP	Solar PV	Wind	Hybrid IPP Programme	Distributed Generation*	BESS – IPP Programme	BESS - Eskom	Unserved Energy (TWh)
Current Base (MW)	38 800	1 005	2 825	-	1 860	1 600	2732	500	2 287	3 443	-	5 000	-	20	
2024	720							100			150	900		199	13.06
2025	720	1 220							2 115	644	476	900	513	141	7.63
2026										140		900			7.66
2027		1 000								684		900	2 000 615		4.55
2028		1 000	3 000						500			900	615		0.22
2029									500	1 500		900			0.25
2030		1 000		1 376					500	1 500		900			0.27
Additional New Capacity (MW)	**1 440**	**4 220**	**3 000**	**1 376**				**100**	**3 615**	**4 468**	**626**	**6 300**	**3 743**	**360**	

Installed Capacity

Capacity under construction

Capacity procured

New Capacity

Distributed Generation Capacity for own use

Unserved Energy, preferred as low as possible

5.2.1. Ukungenelela Okuphakanyisiwe

Ukungenelela 1: Njengoba sekuvele kuhlonziwe futhi kuqhubeka njengengxenye yokungenelela kwe-Energy Action Plan, ukuthuthukiswa kwezimoto ze-Eskom EAF njengokusho kwe-Generation Recovery Plan kubalulekile futhi kuzokwenza ukufakwa okubalulekile ekubuyiseni ukuvikelwa kokuhlinzekwa.

Ukungenelela 2: Ngokungeziwe ekusungulweni okungathunyelwa kokuhlinzekwa (ibhizinisi kanye Nesifundazwe), ukuthunyelwa kwezinketho ezingathunyelwa zokukhiqiza ezifana negesi ukuya kumandla ngokuhambisana Nesigaba 34 Ekunqunyweni Kongqongqoshe kumele kusheshiswe njengoba kuzobhekanwa nengcuphe yamandla angabasiwe futhi kungasetshenziswa kuzidingo zesistimu yamandla ngesikhathi esimfushane ngokumangalisayo.

Ukungenelela 3: Lapho kungakhonakala khona ngobuchwepheshe kanye nangokuhwebelana, libazisa ukuvala amaplanti amandla anikwa umlilo ngamalahle ukuze kugcinwe amandla angathunyelwa.

Ukungenelela 4: Sekela uphinde unike amandla ukuthuthukiswa kwegridi yokudluliswa njengokuya kwe-TDP 2023-2032 ukuze kunikwe amandla ukuxhumeka kwamandla okungeziwe kokusungulwa umkhakha womphakathi nozimele,

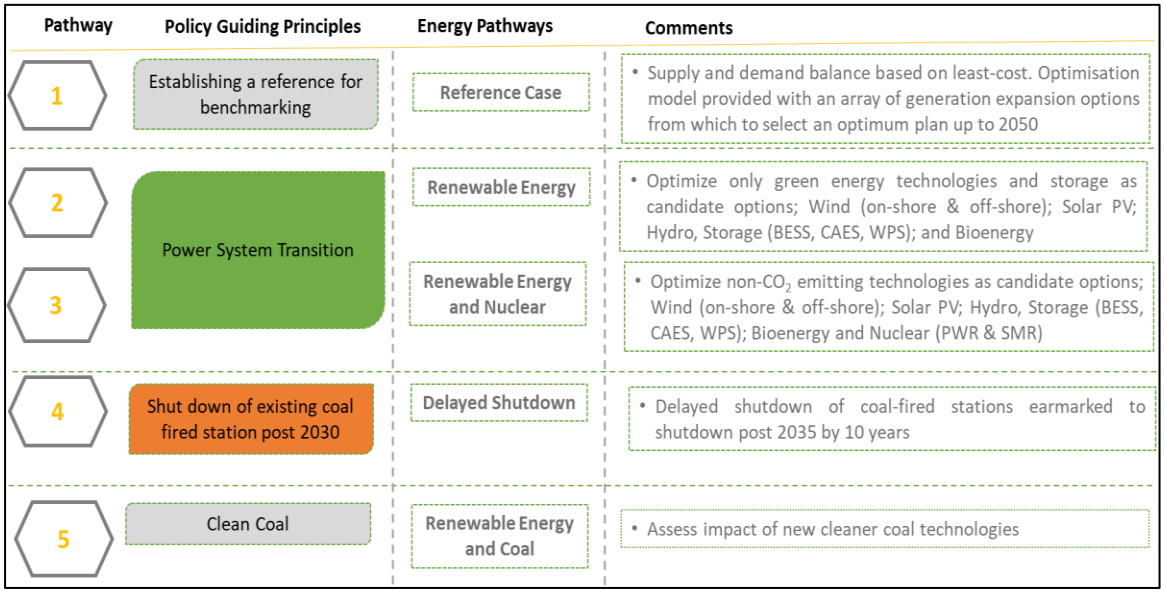
Ukungenelela 5: Phatha izingcuphe ezilandelayo ezivelayo:

- Ukuqedelelwa Kwesandiso sedizayini yempilo ye-Koeberg Power Station Ukuqedelelwa kwesandiso sempilo ehleliwe yesiteshi samandla enukliya sase-Koeberg kumele kuqhubeke nesivumelwano esidingekayo ukuze kubhekanwe nokulahleka kwe-1 800 MW engathunyelwa.
- Ukuthobelana Namazinga Aphansi Okukhishwa
  Ukuxazulula izinselelo ezisekuthobelaneni nokusetshenziswa kwe-Minimum Emissions Standards (MES) kuziteshi zamandla ezinikwe amandla amalahle ngokuya nge-National Environmental Management: Air Quality Act 39 (2004) kubalulekile njengoba kuzoqinisekisa amandla angafika ku-16 000 MW ngokushesha kanye nokufikela ku-30 000 MW ngo-Ephreli 2025 kuyagcinwa.

6. Ukuhlaziywa kwe-Horizon Two (Isikhathi sango-2031 – 2050)

Ukumodelwa kwe-Horizon Two kuhlaziye izindlela zokuhlanganiswa kwamandla eziyisihlanu ekuhloswe ngazo ukwazisa izinketho zenqubomgomo yezwe noma izinqumo zamandla avikelekile nangagcineka. Izindlela zihlole inhlanganyela yemithombo yokukhiqiza efana nomoya, i-solar PV, Isistimu Yesitoreji Yamandla, igesi, inukliya kanye nobuchwepheshe bamalahle obuhlanzekile ukuze kuqondwe ibanga okuqinisekiswa ngalo ukuvikelwa kokuhlinzekwa ngenkathi kwehliswa ukukhishwa kwekhaboni ngokuhambisana nendlela yezwe eya ku-net-zero.

Indlela yenkomba iye yasungula ibhentshimakhi emelene nezinye izindlela kuzindleko ezincane futhi ayizange icabange noma iziphi izingcindezi zokusetshenziswa. Izindlela ziye zaqhathaniswa kucatshangwa ukuvikelwa kokuhlinzeka, izindleko sezizonke zesistimu, nokwehlisa izindleko zamandla angabasiwe kumnotho. Izindlela ezinhlanu ezithuthukisiwe zifakwe kumininingwane ku-I-Figure 11.



I-Figure 11: Izindlela Zamandla ze-Horizon Two

6.1 Imiphumela Yokuhlaziywa kwe-Horizon Two

Lesi sigaba siveza siphinde sifinyeze imiphumela evela ekuhlaziyweni kwezindlela ezicatshangelwe i-Horizon Two. Imiphumela enemininingwane nokuhlaziywa iqukethwe ku-Annexure C.

- INDLELA YOKUQALA (ISIMO SENKOMBA)

  Le ndlela eyisimo senkomba isuselwa kokukhishwayo okulingiswayo ekuhlanganisweni kwamandla abiza kancane.

  Imiphumela yalesi simo ibonisa ukwakhiwa okukhulu okufaka kakhulu i-Solar PV, Umoya Negesi ngesilinganiso esiphakathi nendawo noma ngokusetshenziswa okuphezulu. Imiphumela iphinde ubonise isidingo esikhulu sokwakhiwa ngonyaka ka-2035 okude ngeminyaka eyishumi. Kusukela ekuvikelweni kokubuka kokuhlinzekwa, ukuhlanganiswa kwamandla kusukela kule ndlela kwanele.

  Ekuqaleni, imiphumela yendlela ibonisa ukwehla okukhulu ekukhishweni kwekhaboni okuqondiswa kakhulu ukuvalwa kwamaplanti abaselwa ngamalahle kanye nokushintshaniswa kwawo ngamandla avuselelekayo negesi. Ukukhishwa kubonisa ithrendi ekhuphukayo kusukela ngo-2042 njengoba ukusetshenziswa kwegesi kukhuphuka kakhulu ngenxa yokuboniswa kwemfuneko enkulu kusukela ngonyaka ka-2041.

  Indlela ibiza kancane njengoba imodeli ivunyelwa ukuthi ikhethe ukuhlanganiswa kobuchwepheshe ngaphandle kwemikhawulo.

- IZINDLELA ZESIBILI NEZESITHATHU (UKUDLULA KUSISTIMU YAMANDLA)

  Lezi zindlela bezifuna ukuhlola umthelela ekuvikelweni kokuhlinzekwa kusukela kunqubomgomo ekuthunyelweni kokuvuselelwayo nobuchwepheshe obuhlanzekile. Kundlela Yesithathu, izinketho ezinikwe amandla iGesi zivunyelwe kuphela kufikela ku-2033 ngaphambi kweyangaphambi kwesikhathi ukuthi ithole ukutholakala kobuchwepheshe benukliya. Indlela Yesibili ayifaki igesi kodwa icabanga isitoreji sebhethri, isitoreji esipontshwe amanzi, kanye ne-bioenergy ukuze kusekelwe amandla angavuselelwa.

  Indlela Yesibili yakha amandla amaningi okukhiqiza ngo-2050 uma kuqhathaniswa nazo zonke ezinye izindlela futhi lokhu kungenxa yesakhi somthwalo ophansi kanye nezakhi ezingathunyelwa zamandla avuselelekayo. Kusukela ekuvikelweni kokubuka kokuhlinzekwa, izindlela

ezimbili zinokuvikelwa okuphezulu kakhulu kokunganeli kokuhlinzekwa (amandla angabaselwe). Izindlela ezimbili zinokukhishwa kwekhaboni okuncane kakhulu esikhathini socwaningo esingafika ku-2050.

Indlela yamandla avuselelwayo kuphela inezindleko eziphezulu kakhulu uma iqhathaniswa nezinye izindlela. Izindlela zendlela yenukliya ziphinde zibe ngaphezulu kunalezo ezivela kundlela yenkomba.

- IZINDLELA ZESINE (UKUVALWA OKULITSHAZISIWE)

  Le ndlela yakhiwe kusukela ekulibaziseni ukuvalwa kwamaplanti anikwa amandla amalahle ngeminyaka eyishumi. Ekulinganisweni, iziteshi zamandla ezisetshenziselwe ukulitshaziswa kokuvalwa kube ilezo zokuphela kwempilo edizayiniwe okungemuva kwango-2035 okulingana cishe no-15 000 MW.

  Ukulibazisa ukuvalwa kunezidingo eziphansi kakhulu zokwakhiwa okusha nokugcina okwanele ukuvikelwa kokuhlinzekwa.
  Imiphumela ibonisa ukuthi ukulibazisa ukuvalwa ngaphandle kwe-retrofit ene-abetment kuzobangela ekutheni ukukhishwa kwekhaboni kufike kumaleveli afana nalawo wangonyaka ka-2026.

- INDLELA YESIHLANU (UBUCHWEPHESHE BAMALAHLE OBUHLANZEKILE)
  Le ndlela isuselwa ekuthunyelweni kobuchwepheshe bamalahle obuhlanzekile, futhi lokhu kufaka ukuhlanganiswa kwe-fluidised Bed Combustion (FBC) kanye nobuchwepheshe besibaseli esi-pulverised esine-CCUS. Ukuhlaziywa kulinganisele ukuthunyelwa okusha kwamalahle hhayi ngaphezulu kuka-6 000 MW ngesikhathi socwaningo.

  Le ndlela ibangela izidingo zokwakhiwa ezincane zesibili ngamandla angeziwe angavuselelwa, igesi kanye nesitoreji. Kusukela ekuvikelweni kokuhlinzekwa, le ndlela ayanele ngokukhawulelwa. Imiphumela ibonisa indlela enezidingo zokwakhiwa zesibili ezibiza kancane, futhi zinokukhishwa okuncane okuqhathaniswa nendlela yenkomba.

6.2 Ukubukwa Sekukonke

- Kulesi sikhathi socwaningo kusobala ukuthi izindlela zamandla ezisuselwa kubuchwepheshe obuvuselelwayo nobamandla ahlanzekile buletha kuphela umphumela ofunwayo ngokuya ngokukhipha ikhaboni isistimu yamandla. Kodwa, lezi zindlela azinikezi ukuvikelwa ngenkathi kuphethwe izindleko eziphezulu kakhulu zokusebenzisa.

- Esikhathini esiphakathi kuka-2031 no-2050 isistimu izodinga uhlelo olusha olukhulu lokwakhiwa namandla abalulekile adingekayo eminyakeni eyishumi kusukela manje. Umthelela walokhu ukuthi ukusetshenziswa kwamandla okukhiqizwa adingeka kule horizon afaka inethiwekhi ehambisanayo yokudluliswa kumele iqale ngokuzimisela.

- Izindlela ezifaka ubuchwepheshe obungathunyelwa ngento yokusetshenziswa okuphezulu zinikeza ukuvikelwa kokuhlinzekwa. Ngaphandle kokuvalwa okulitshazisiwe, lobu buchwepheshe bufaka ukuhlanganiswa obuhlukile benukliya, okuvuselelwayo, amalahle ahlanzekile negesi. Ngokuphawulwa lezi zindlela zisekela ukuzinikela kokwehlisa ikhaboni.

- Kusobala kusukela ekuhlaziyweni okwenziwe kanye nasekubukweni okungaphezulu ukuthi ngemuva kwango-2030 indlela ezoqinisekisa ukuvikelwa kokuhlinzeka, yehlise ukukhishwa kwekhaboni, iphinde iqinisekise okungenani izindleko eziphansi emnothweni kuzoba inhlanganisela yokuhlaziywa kobuchwepheshe (ukwenza imodeli kwesistimu yamandla kanye nokulingisa) kanye nokulungiswa kwenqubomgomo okucabanga ukusetshenziswa okungaba khona.

7. Isiphetho

Lesi sibuyekezo se-IRP sinikeza ukuhlaziywa kwezinketho ezibanzi ekusetshenzisweni kwezwe ngokubuka okukhulu kokuhlangabezana nokufiswayo okuthathu okuhlukile kodwa okungakhethekile kukho konke, okubizwa ngokuthi, ukuvikelwa kokuhlinzekwa, ukufinyeleleka kwamandla kanye nokuncishiswa kokukhishwa kwekhaboni. Ukuhlaziywa kwesikhathi esiphakathi kwamanje kanye nonyaka ka-2030 kugqamisa ukushoda okukhathazayo kokuhlinzekwa kogesi nemfuneko yawo. Ngenkathi ukusungulwa okuqhubekayo okungeziwe kwamandla okukhiqizwa kulindelwe ukuthi kuqede amandla angabasiwe, ayibhekani nokugcwele ekunganelini okungaphansi kwesistimu.

Izindlela zokukhiqizwa nezinketho ezifundiwe zibonisa ukuthi izinqumo eziqinile ezisuselwa kuzidingo zesistimu zibalulekile, kodwa, lezi zinketho zihlangatshezwa ukungaboni ngasolinye okudinga ukuthatha isinqumo okubhalansile. Izinqumo zokugcina zenqubomgomo kumele zithathwe ngokuya ngokubuka ukususa ikhaboni kwesikhathi eside ngenkathi kuthuthukiswa ukuqhudelana kweNingizimu Afrika, kukhuliswa umnotho ngokuvela kabusha kwezimboni njengoba kudalulwe ku-NDP.

8. Izinkomba

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9. Ama-Annexure

I-ANNEXURE A: Ukutholakala Kwamandla Egridi eKapa kule Minyaka: 2024, 2027 no-2030

Ukuze kunqunywe amandla egridi atholakalela ukuxhumana kwezikhiqizi ezintsha ezindaweni ezinengcindezi enkulu yokuhlinzekwa zaseKapa, i-IRP ithathe isimo sokunquma esilandelayo sesimo senkomba:

- Wonke amaphrojekthi akhiwayo kusukela ngo-Juni 2023.
- Amaphrojekthi afinyelele ekuvalweni kwezezimali, anokuvunyelwa kwe-EIA; kanye
- Namaphrojekthi anikezwe amandla egridi.

Lesi simo sokunquma sikhulule amandla egridi ezifundeni ezihlukile ukuze kuqinisekiswe ukufakwa okulungele ihalavu kwamaphrojekthi okukhiqiza njengoba kuboniswe ku-I-Figure 12 futhi ukususwa kusukela kugridi yamaphrojekthi akuhlangabezani nesimo sokunquma esingaphezulu. Ukuthuthukiswa kwegridi yokudluliswa kuze kube u-2032 njengokusho kwe-TDP kuyacatshangwa futhi kunika amandla ukukhiqiza okuningi ukuthi kuxhunywe kugridi.

I-Figure 12: Ukutholakala kwamandla egridi eKapa ngo-2024, 2027 nango-2028

I-Annexure B: Ukusetshenziswa kweziteshi zamandla ezivelele (%) ku-Horizon One

Le-annexure ifaka imininingwane yokusetshenziswa kweziteshi ezivelele zamandla ze-Horizon One (Isikhathi sango-2023 ukuya ku-2030)

Ukusetshenziswa okukhona kwegesi isilinganiso esifakwe esikalini se-Acacia, Ankerlig, DMRE Peakers, Gourikwa ne-Port Rex. Igesi entsha isho i-DMRE REIPPPP Gas, Eskom Richards Bay kanye ne-RMIPPPP Gas.

I-Table 3: Izakhi Zokusetshenziswa Kwegesi Ekhona

Sensitivity		2023	2024	2025	2026	2027	2028	2029	2030
Reference		77.50	78.79	72.49	70.38	71.14	77.14	79.57	87.86
Reference + High-Likelihood Initiatives		77.50	78.79	72.43	70.48	71.14	77.14	79.57	87.86
Reference + All Initiatives		77.53	78.75	72.49	70.38	70.83	69.06	63.69	80.30
Reference + Gas	Existing Gas	84.44	87.04	84.47	87.73	85.11	18.03	25.85	73.38
	New Gas	-	-	-	42.50	65.77	72.88	76.44	86.71
Reference + Recovery		26.31	2.65	1.60	2.00	2.69	5.81	10.52	46.90

I-Annexure C: Imiphumela Enemininingwane Yobuchwepheshe Yokuhlaziywa kwezindlela ze-Horizon Two (Isikhathi sango-2031 – 2050)

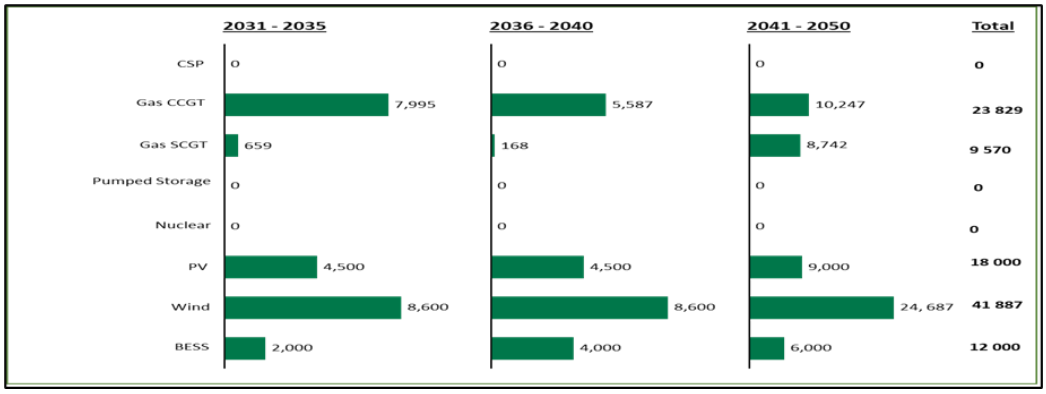
Le annexure inikeza ukuhlaziywa okungeziwe okwenzelwe i-Horizon Two kanye nezinhlelo zemininingwane yokunwetshwa kwamandla, amandla angabasiwe, ukukhishwa kwekhaboni nezindleko zesistimu kuzindlela zamandla.

a) Isimo Senkomba (Indlela Yokuqala)

Ukuhlaziywa kwale ndlela kubonise amandla amasha adingekayo ukuze kubuyiselwe ukuvikelwa kokuhlinzekwa kwesikhathi esingafika ku-2035, kungendlela elandelayo:

- I-Mid-merit gas (CCGT), yokungaphezulu kuka-7 000 MW,
- 4 500 MW womoya,
- Ngaphezulu kuka-4 000 MW we-PV kanye no-2 000 MW we-BESS.

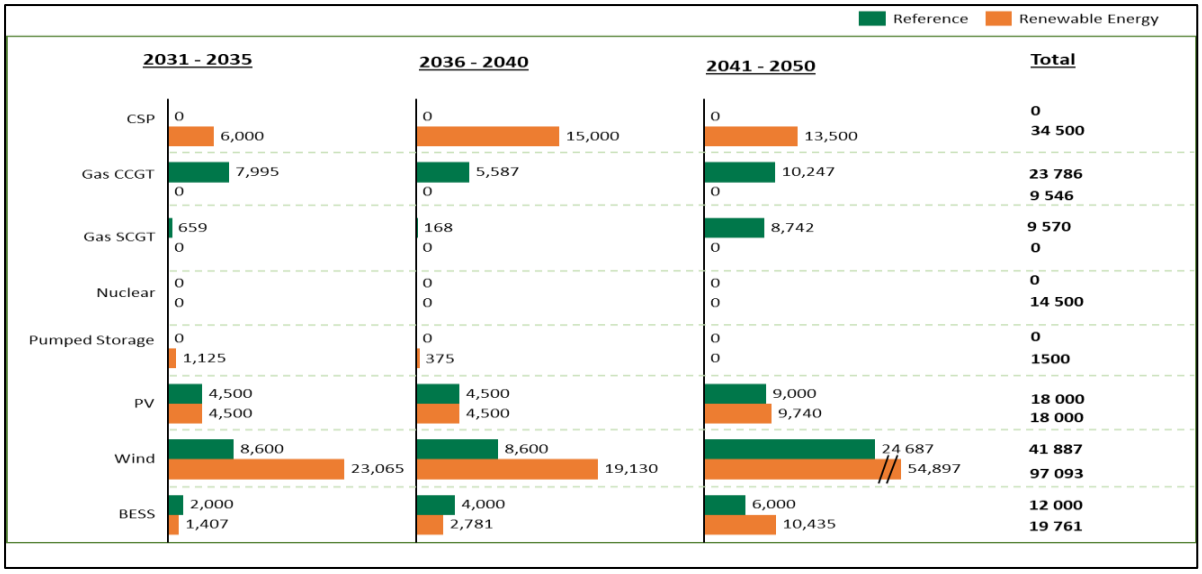
Esikhathini esiphakathi kuka-2036 no-2050 ngaphezulu kuka-15 000 MW we-CCGT, ngaphezulu kuka-30 000 MW womoya kanye no-10 000 MW we-BESS kuyadingeka njengokusho kwe-I-Figure 13.



I-Figure 13: Amandla okukhishwa okusha Kwendlela Yenkomba Yamandla

b) Amandla Avuselelelwayo (Indlela Yesibili)

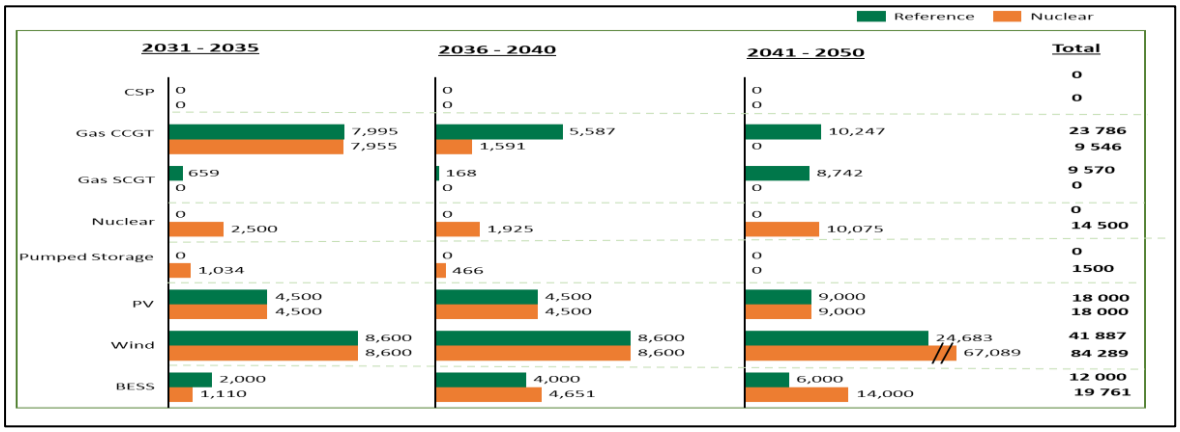
Le ndlela ibonisa amandla aphezulu kakhulu enani lokwakhiwa okusha lokungu-166 000 MW ngo-2050, njengoba kuboniswe ku-I-Figure 14. Lawa mandla afaka umoya, i-solar, igesi kanye nesitoreji.



I-Figure 14: Imiphumela Yendlela Yesibili

c) Amandla Avuselelekayo Nenukliya (Indlela Yesithathu)

Ukuhlaziywa kwale ndlela kubonise amandla asewonke angu-4 000 MW wenukliya entsha ngo-2040 ngamandla angeziwe enukliya angafikela kwangu-14 500 MW ngo-2050. Ngokuqashelwa, imiphumela yendlela ebonise amandla abalulekile omoya amasha angu-67 000 MW ne-14 000 MW we-BESS njengoba kuboniswa ku-I-Figure 15.

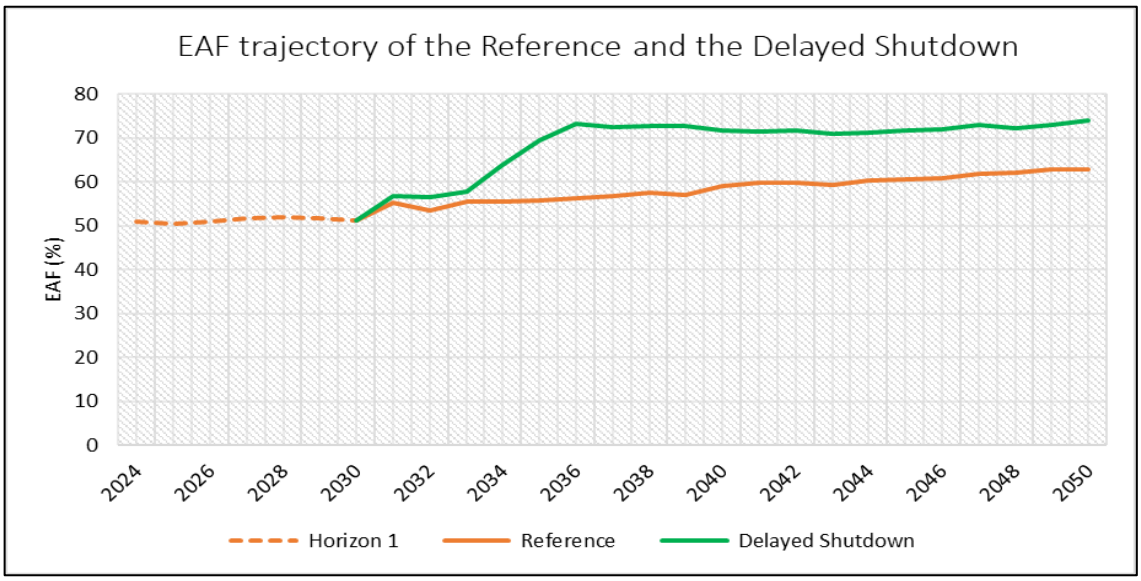


I-Figure 15 Imiphumela Yendlela Yesithathu

d) Ukuvalwa Okulitshazisiwe (Indlela Yesine)

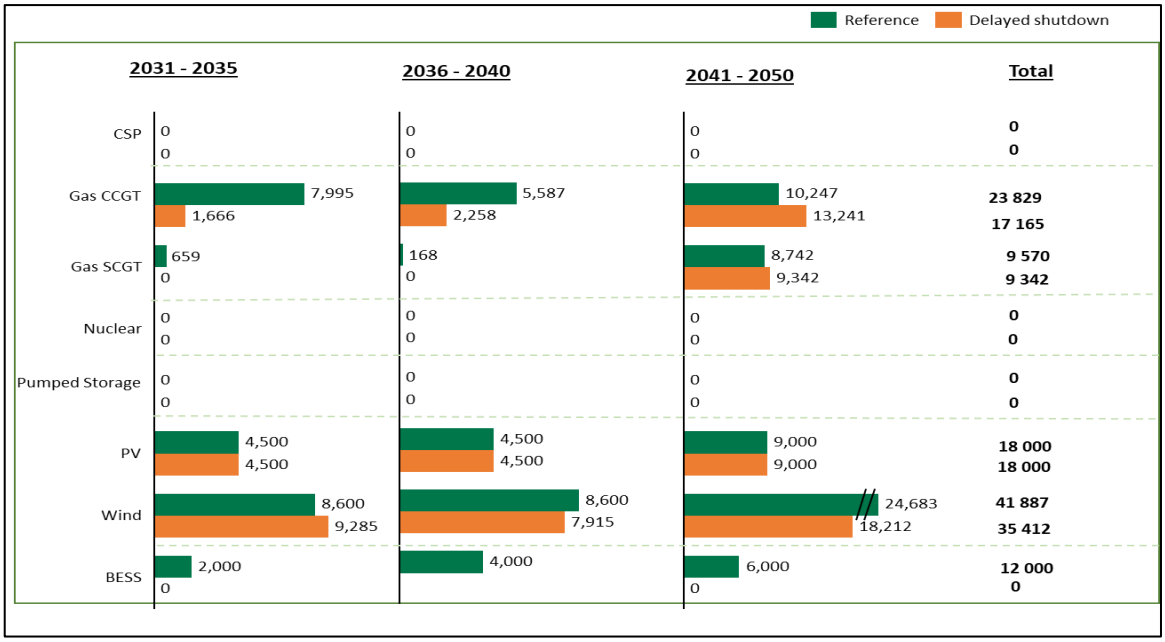
Ukuze ube nokuqaphela okukhulu ekulinganiseni ibanga lapho i-Generative Recovery Plan ibhekana khona kahle nokuvikelwa kule ndlela, Isibuyekezo se-IRP sibona kungukuhlakanipha ukuthatha isimo esihamba kancane se-EAF esithuthukiswe sibheke isimo esiphezulu se-EAF kusukela ngo-2031.

Umphumela, kusukela kubanga lamayunithi alezi ziteshi, ukuthuthukiswa kwe-EAF okuya ngaphezulu ku-70% kusukela ngo-2036 njengoba kuboniswa ku-I-Figure 16.



I-Figure 16: Ukucatshangwa kokuthuthukiswa kwe-EAF Kwendlela Yokuvalwa Okulitshazisiwe

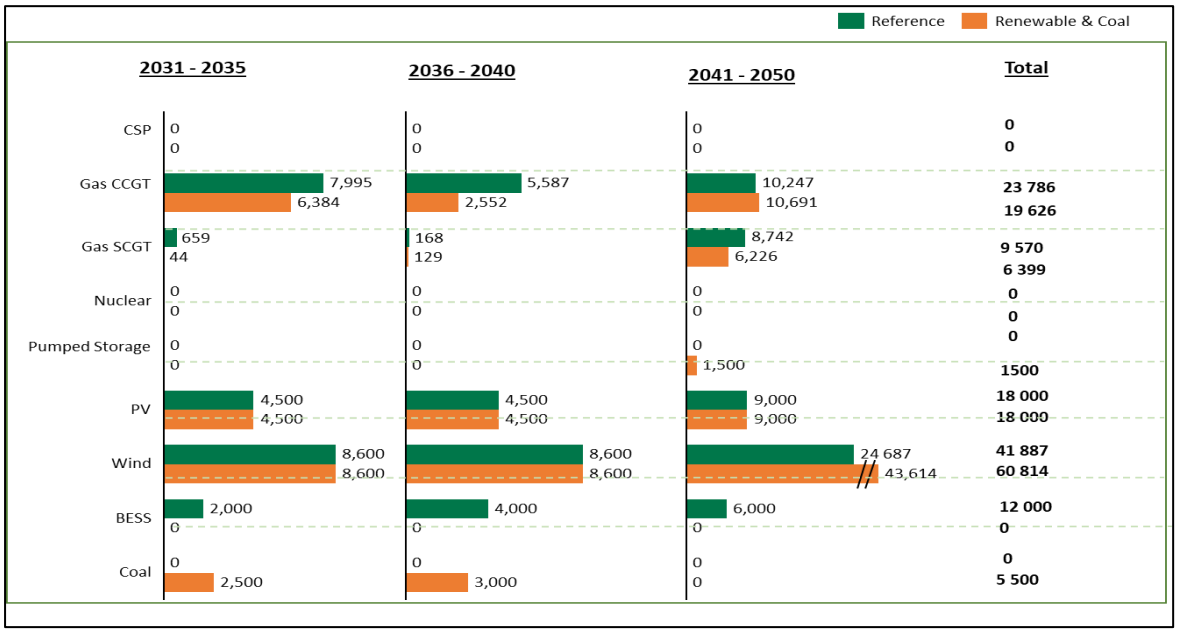
Ukuhlaziywa kwale ndlela kubonisa izidingo zamandla okukhiqizwa okusha sekukonke okungu-4 000 MW kwe-CCGT ngo-2040 njengoba kuboniswe ku-I-Figure 17. Lokhu kungenxa yokuvalwa okucatshangiwe okulibazisekile kweziteshi ezinhlanu. Lokhu kunciphisa isidingo segesi yokusetshenziswa okuphezulu ngesilinganiso sokuthathu sesidingo Senkomba Yendlela. Okuqhubekayo, asikho isidingo samandla e-BESS esiqhathaniswa ne-6 000 MW Kundlela Yenkomba.



I-Figure 17: Uhlelo Lokwakhiwa Olusha Lwendlela Yokuvalwa Okulibazisekile Kwamalahle

e) Amandla Avuselelwayo Namalahle (Indlela 5)

Imiphumela esuka ekumodeleni kwale ndlela kubonisa amandla amasha wamalahle angu-5 000 MW kusimo sobuchwepheshe obuhlanzekile bamalahle ngo-2040. Ngokungeziwe, lesi simo siye sagqamisa u-60 000 MW wamandla wesimo ngo-2050 njengoba kuboniswa ku-I- Figure 18. Awekho amandla amasha we-BESS adingeka kule Ndlela.

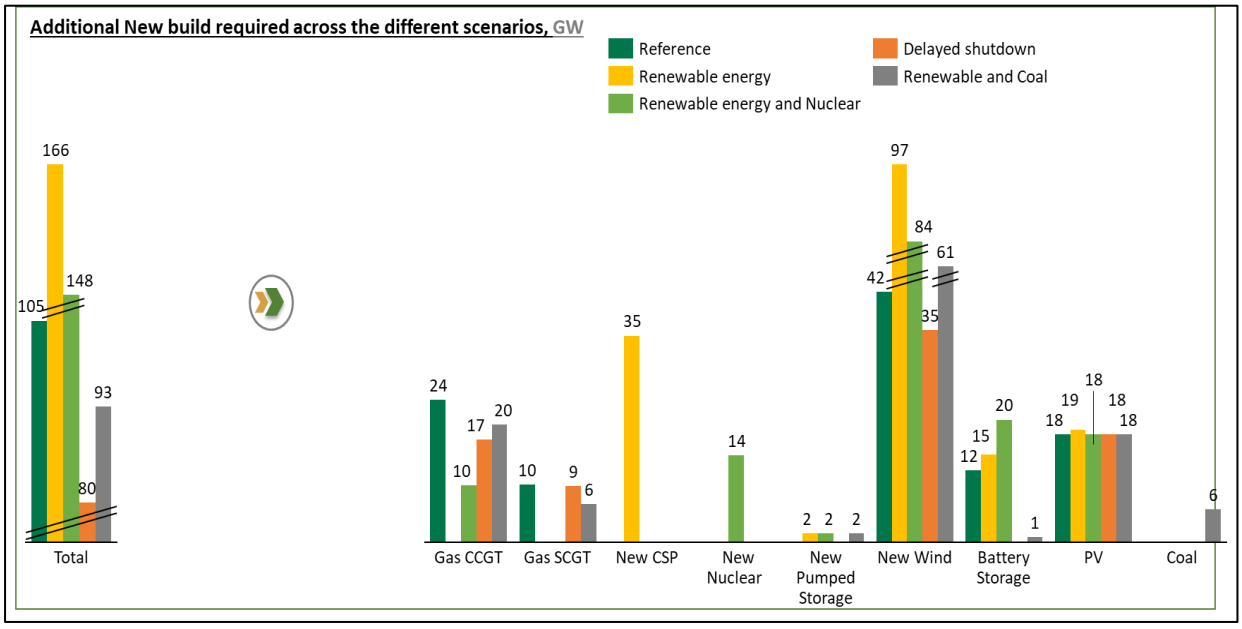


I- Figure 18: Imiphumela Yendlela Yesithupha

Ukubonwa sekukonke kokwakhiwa okusha

Isifinyezo samandla angeziwe okwakhiwa okusha Kuzindlela ezihlukile siboniswa ku-I-Figure 19. Ukubhekwa okulandelayo kuyenziwa:

- Uhlelo Lwezindleko Oluphansi lwakha u-105 000 MW ngenkathi Indlela Yamandla Avuselelwayo adinge u-166 000 MW wamandla amasha.
- Kokubili Indlela Yokuvalwa Elitshazisiwe; kanye Nokuvalwa Okulitshazisiwe kanye nokwakhiwa Kokuphinda kunikwe amandla okungu-80 000 MW wamandla amasha ngo-2050 okuba yinani elincane lamandla amasha kulesi sikhathi.
- Indlela Yamandla Avuselelwayo Kuphela eyakha amandla amasha e-CSP.
- Amandla Avuselelwayo Kuphela, Amandla Avuselelwayo Nenyukliya Entsha; kanye Namandla Avuselelwayo Nezindlela Zamalahle zobuchwepheshe besitoreji samanzi aphampiwe esisha.



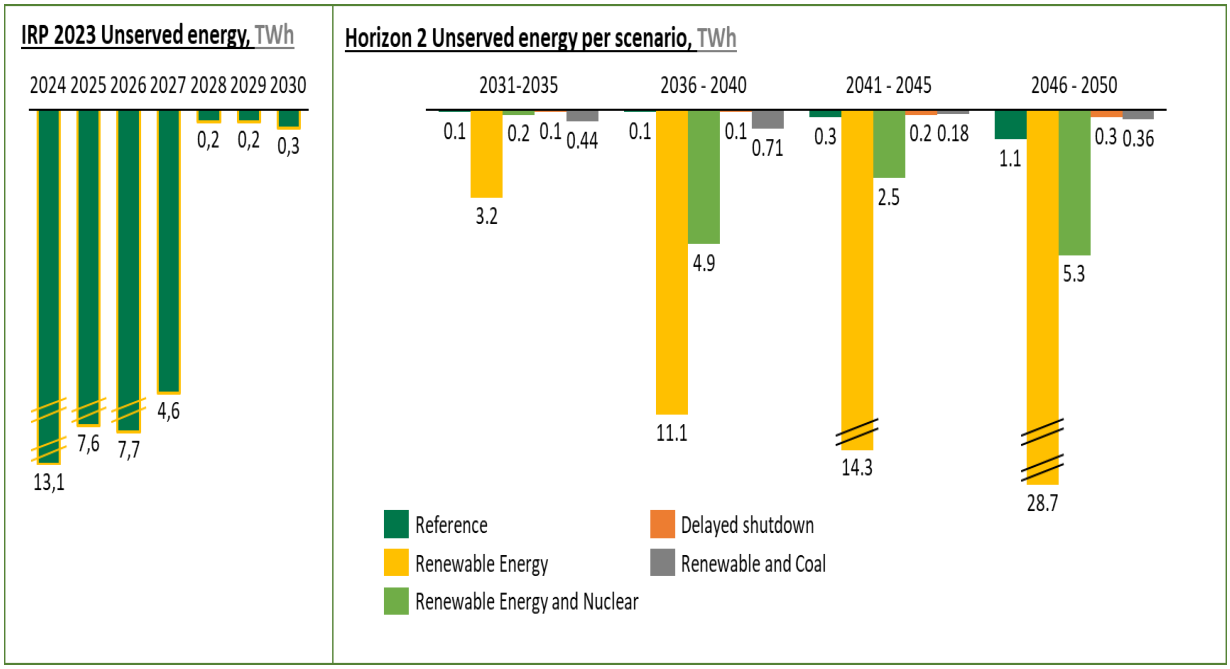
I-Figure 19: Isifinyezo sokwakhiwa okusha kwendlela entsha

Amandla Angabasiwe Ezindlela

Lesi sigaba sifinyeza ukuvikelwa kwezimo zokuhlinzekwa ezivela kusukela kuzindlela ezihlukile ezifundwe kulesi sikhathi (Bona i-I-Figure 20):

- Izindlela zokudlula zesistimu ezigxile kakhulu ekukhishweni kwekhaboni isistimu yamandla azinikezi ukuvikelwa kokuhlinzekwa.

- Zonke ezinye izindlela zibuyisela ukuvikelwa kokuhlinzekwa kusukela ngo-2031 ukuya ku-2050.

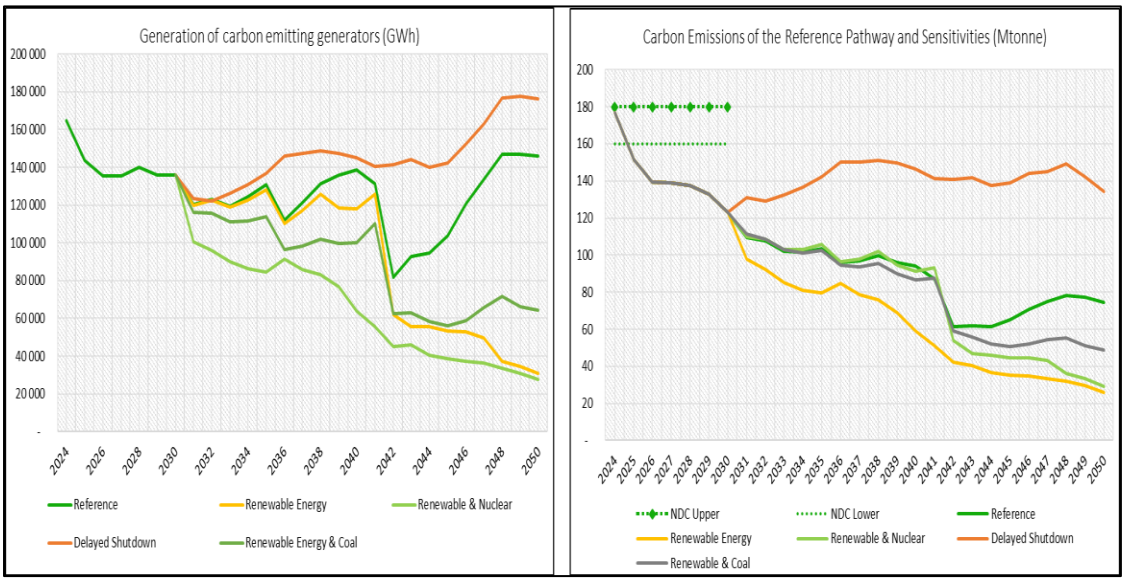


I-Figure 20: Amandla Angabasiwe njengokuboniswa kokuvikelwa kokuhlinzekwa

Ukukhishwa Kwekhaboni Kwezindlela

Ukukhiqizwa kwamandla Wezindlela ezihlukile ngokukhishwa kwazo okuhambisanayo kuboniswa ku-I-Figure 21 futhi kuholela ekubonweni okulandelayo:

- Ukuhlaziywa kokukhishwa kwe-Horizon One kubonisa ukuthi ukukhishwa kwekhaboni kungaphakathi kwe-National Determined Contribution (NDC) kuze kube ngu-2025 futhi ngemuva kwalokho kuqala ukubonisa ukwehla ngaphansi kwesilinganiso esinqunyiwe sikazwelonke.
- Ekuvalweni okulitshazisiwe nokuphinda kunikwe amandla kokuhlaziywa, isifundo sibonise ukuthi ukukhishwa kwekhaboni kuhlale kuphezulu kuso sonke isikhathi socwaningo.
- Sekukonke, ukudlula kwesistimu yamandla kulethe ukukhishwa okuphansi kakhulu kwekhaboni.

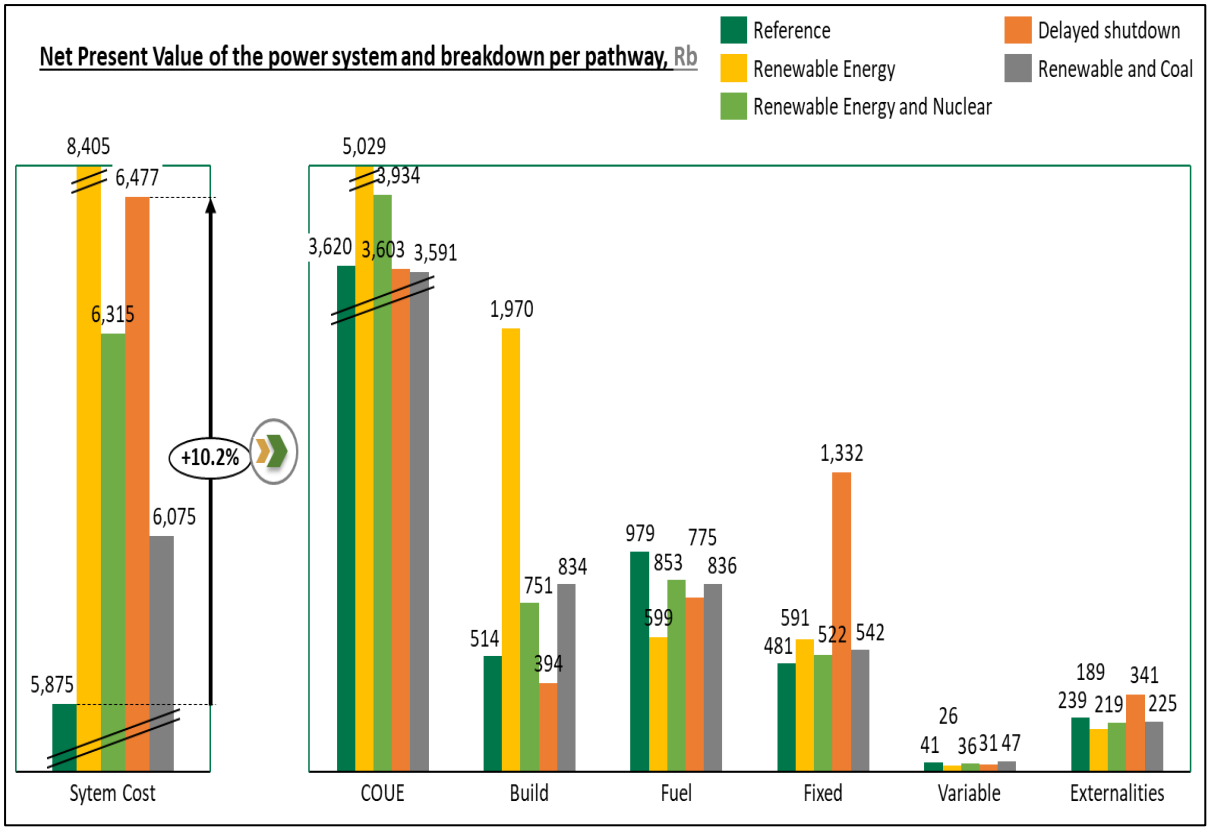


I-Figure 21: Ukuhlaziywa Kokukhishwa Kwekhaboni kwawo womabili ama-Horizon

Izindleko Sezizonke Zesistimu

Izindleko zenani elikhona le-net zezindlela ezihlukile, eziboniswe kumatemu emali ango-2024, zibonisa okuboniwe okulandelayo (bona i-I-Figure 22):

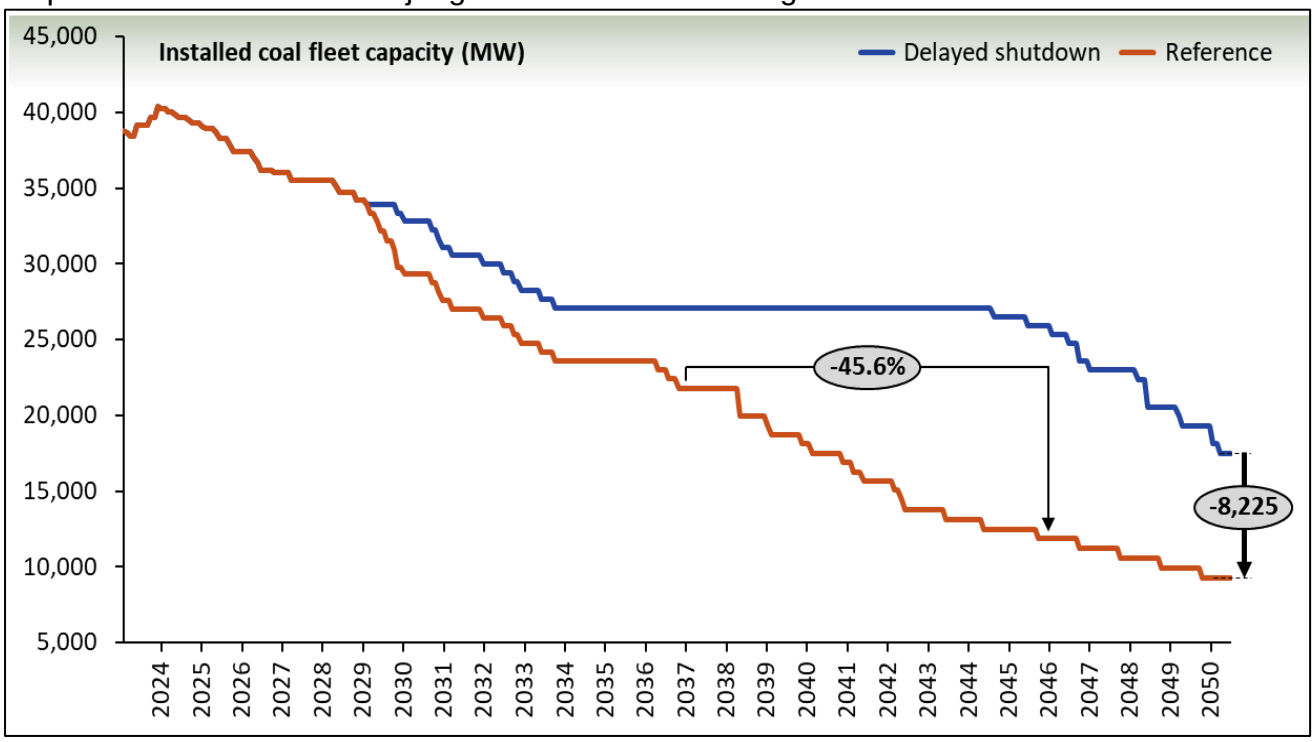
- Indlela yenkomba ibonisa inani eliphansi kakhulu lezindleko zesistimu.
- Imiphumela yezindlela zokudlula ibonisa ukuthi lezi zindlela zinezindleko eziphezulu ngenxa yamandla angabasiwe kanye nezindleko ezintsha zokwakhiwa.
- Ngenxa yebanga lokuhlukile lezindleko zalo zesistimu isiyonke, okungavuselelwa nenukliya, ukuvalwa okulitshazisiwe; nesiqinisekiso sokuphinda kunikwe amandla ngokuqhuba izifundo zezomnotho-zobuchwepheshe ukuze kutholwe izakhiwo zawo zezindleko.



I-Figure 22: Izindleko zesistimu yamandla ezihambisana nezindlela ezifundiwe

I-Annexure D: Umthelela Wokuvalwa Okulitshazisiwe Kuziteshi ezinikwe amandla Amalahle.

Ukulibazisa ukuvalwa kweziteshi ezingukhiye ezinhlanu ukuphela kwempilo yazo kungemuva kwango-2035 kuholela ngaphezulu kuka-8 000 MW ngo-2050 kuqhathaniswa Nenkomba njengoba kuboniswa ku-I-Figure 23.



I-Figure 23: Umthelela wokulibazisa ukuvalwa kumandla afakiwe

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