



# GREEN MIRACLE

GRENFIN SUMMER SCHOOL  
BUSINESS CASE

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# TABLE OF CONTENTS

## 01

### Initial Portfolio

- Introduction & Analysis
- PACTA Analysis
- Risk Measures
- IORP Stress Test

## 03

### Optimized Portfolio

- PACTA Analysis
- Risk Measures
- IORP Stress Test

## 02

### Optimization Process

- Equity
- Corporate Bonds
- Government Bonds

## 04

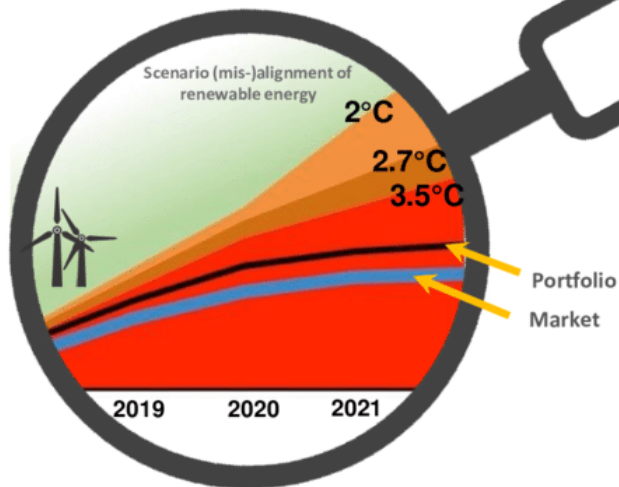
### Conclusion

- Compared Results
- Final Takeaways

# PACTA ANALYSIS

## PACTA (PARIS ALIGNMENT CAPITAL TRANSITION ASSESSMENT)

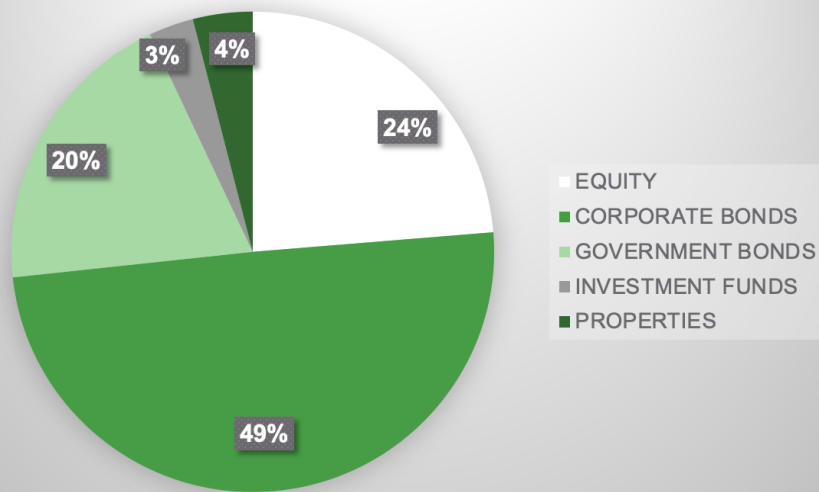
Comparing portfolios trajectories with climate scenarios (at sector or technology level)



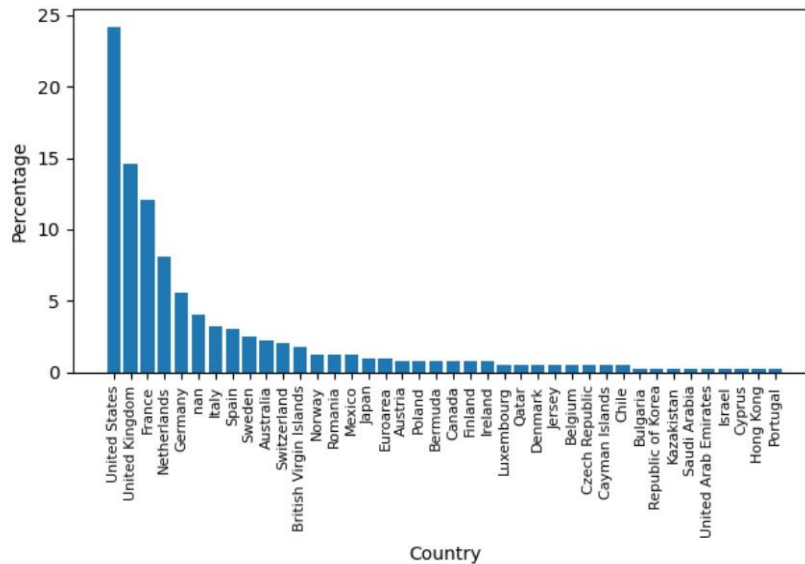
# Initial Portfolio

## Introduction and Analysis

### PORTFOLIO COMPOSITION

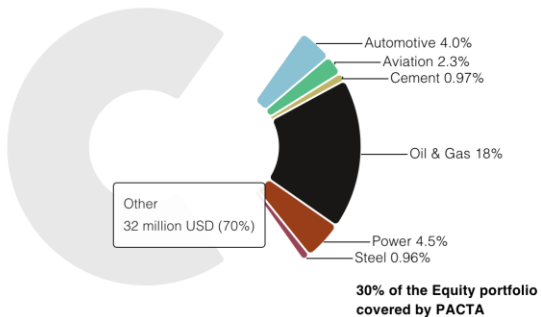


### DIVERSIFICATION BY COUNTRY

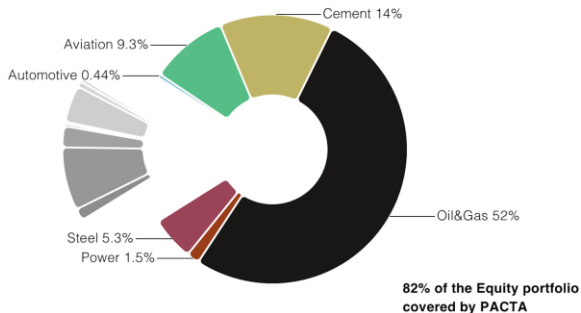


# Analysis – Equities

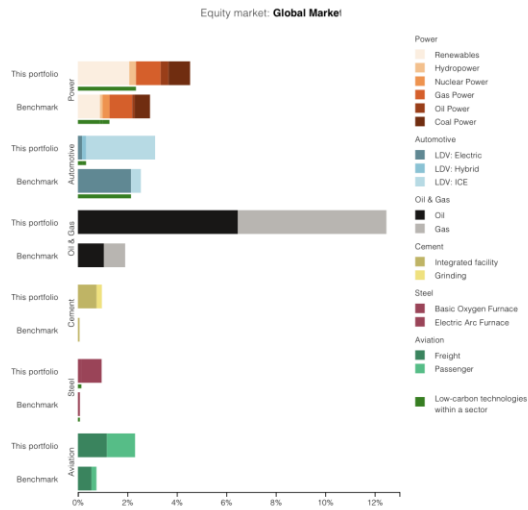
Listed Equity: Financial exposure to climate relevant sectors



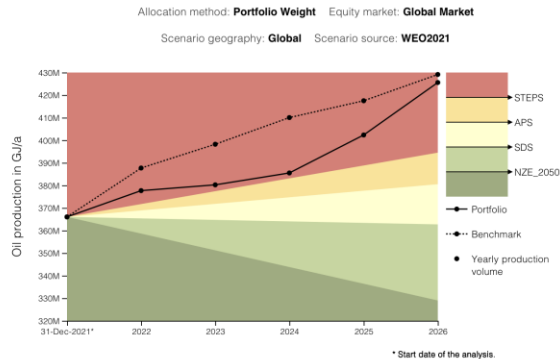
Listed Equity: Emissions exposure from climate relevant sectors



Listed Equity: Technology mix as % of assets under manager compared to iShares Core S&P 500 ET

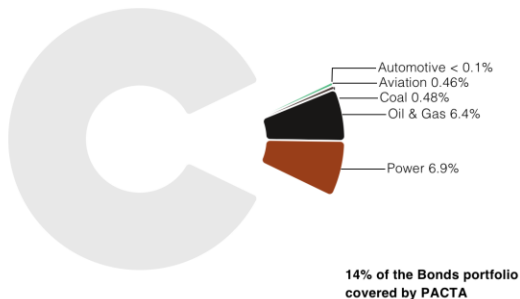


Listed Equity: Production trajectory of Oil compared to iShares Core S&P 500 ETF

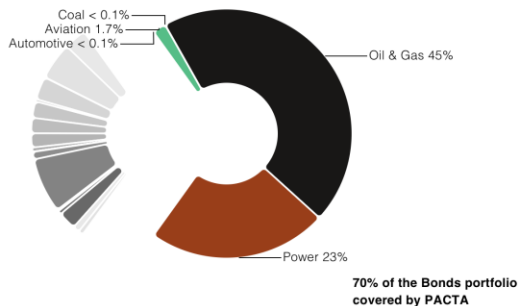


# Analysis – Bonds

**Corporate Bonds:** Financial exposure to climate relevant sectors



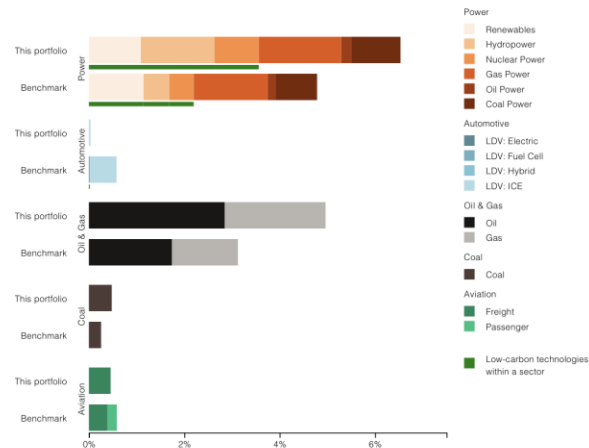
**Corporate Bonds:** Emissions exposure from climate relevant sectors



**Corporate Bonds:** Technology mix as % of assets under management

compared to **iShares Global Corp Bond UCITS ET**

Equity market: **Global Market**

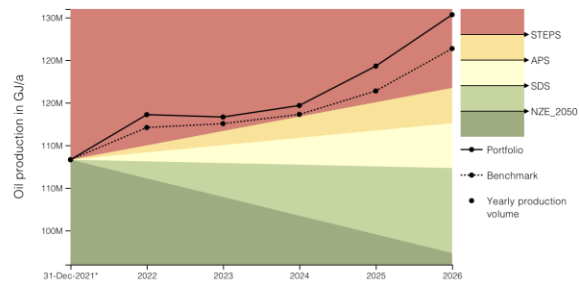


**Corporate Bonds:** Production trajectory of Oil

compared to **iShares Global Corp Bond UCITS ETF**

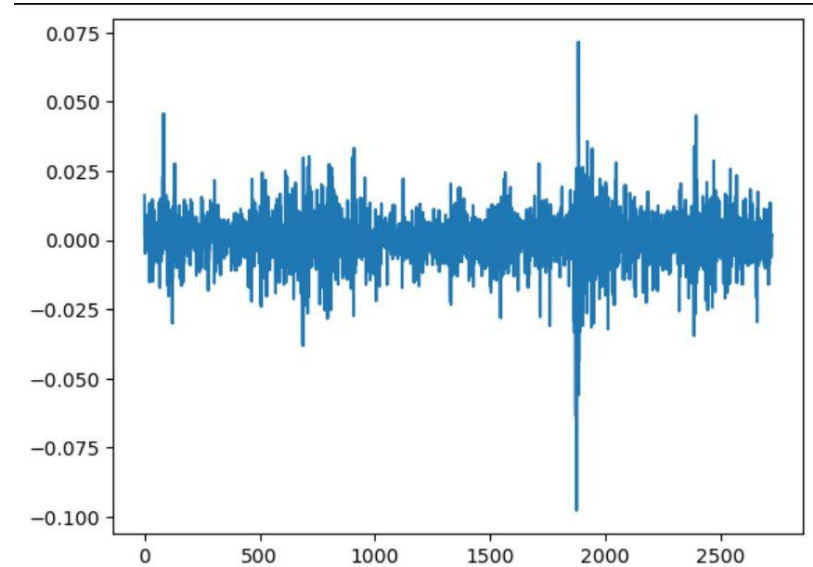
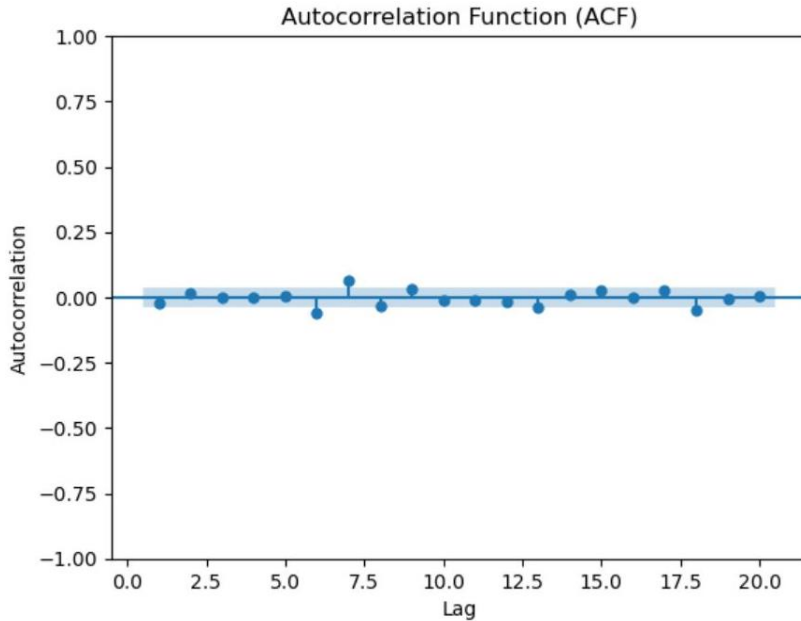
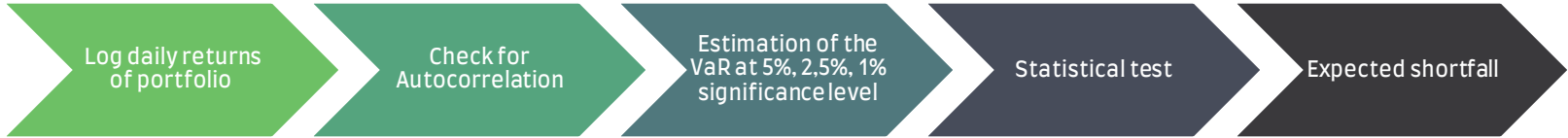
Allocation method: **Portfolio Weight** Equity market: **Global Market**

Scenario geography: **Global** Scenario source: **WEO2021**



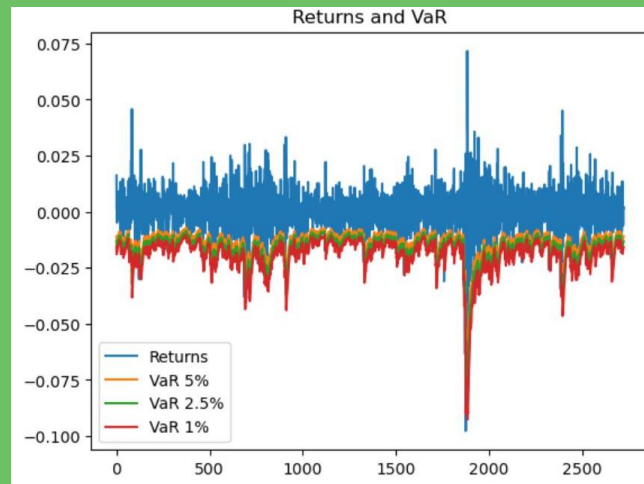
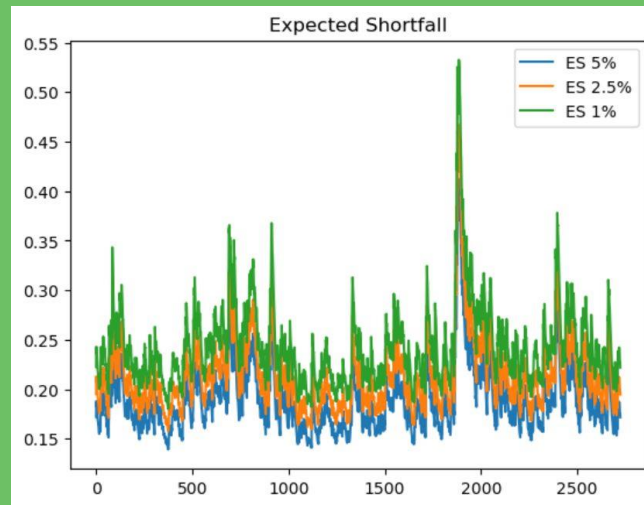
\* Start date of the analysis.

# Initial Portfolio: Risk Measures



# Initial Portfolio: Risk Measures

**Expected shortfall** is the average of all the returns in the distribution that are worse than **Value-at-Risk (VaR)** of the portfolio at a given level of confidence  $\alpha$ .





# Portfolio Stress Test



- A stress test is a financial analysis technique used to assess the **resilience and stability** of a financial portfolio under adverse and extreme market conditions;
- The primary purpose of a stress test is to **identify potential vulnerabilities and weaknesses** in a financial portfolio;
- IORP in this context refers to **Institutions for Occupational Retirement Provision**, which are the pension funds subject to evaluation in this assessment;
- Required by European Union's Institutions for Occupational Retirement Provision Directive (IORP II).

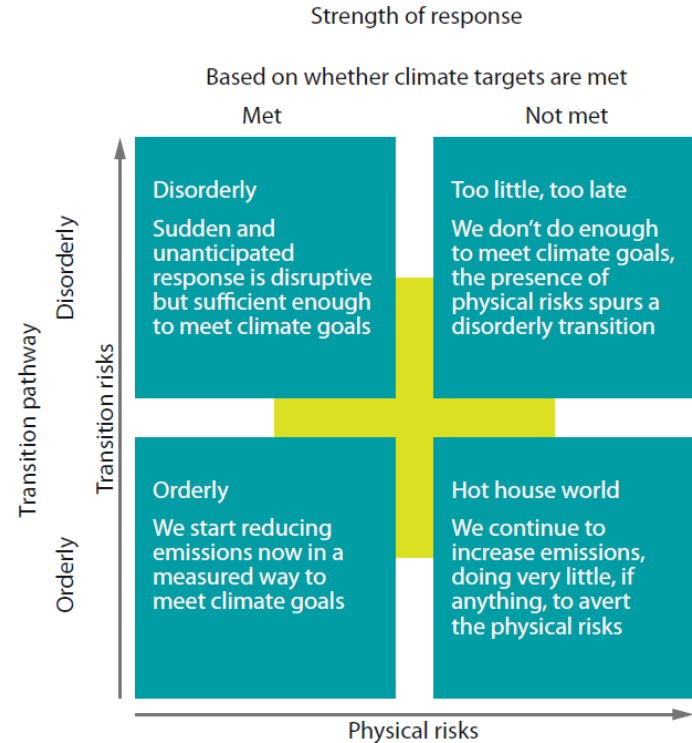
# IORP STRESS TEST: OBJECTIVES



- **Assessing IORPs' exposures to environmental risks**
  - impact on balance sheets
  - assets and liabilities revaluation
- **Assessing the effects of a rise in inflation on retirement income**
- **Assess the effects of "Green-flation"**
  - stricter environmental policies
  - carbon pricing policies

# IORP STRESS TEST: THE SCENARIO

- **Disorderly Transition**
  - lack of planning
  - rapid and disruptive changes





Assess the impact on:

- **Equities**
- **Properties**
- **Investment Funds**
- **Government Bonds**
- **Corporate Bonds**

# INITIAL PORTFOLIO: STRESS TEST

## Equities

NACE first 3 letters

MarketValue		Shocked MarketValue	Currency	Equities Value of initial portfolio	Shocked portfolio Equity	% change
324158	G47	280852,62	GBP	40381806,00	33865730,89	-16,14%
336139	J60	288071,12	GBP			
335363	K66	287406,09	GBP			
314560	C17	280404,93	GBP			
324271	E36	281851,53	GBP			
314285	K64	269342,25	GBP			
324179	C17	288979,50	GBP			
324335	J63	277955,10	GBP			
364307	D35	280517,54	GBP			
414023	G47	358712,24	GBP			
333922	K64	286171,15	EUR			
1443630	C19	979224,51	EUR			
1454263	D35	1119787,12	EUR			
585803	C19	397354,35	GBP			
443686	D35	341639,63	EUR			

**shocked\_value = initial\_value \* (1+equity\_shock)**

## Properties

Residential or Commercial    Country

MarketValue			Shocked MarketValue	Currency	Properties Value of initial portfolio	Shocked portfolio Properties	% change
2340000	Residential	Italy	2355915,28	EUR	46770000,00	46964936,33	0,42%
1650000	Commercial	Italy	1655822,98	EUR			
1950000	Commercial	Italy	1956881,70	EUR			
1980000	Commercial	Italy	1986987,57	EUR			
3280000	Commercial	Italy	3291575,37	EUR			
3390000	Commercial	Italy	3401963,57	EUR			
1720000	Commercial	Italy	1726070,01	EUR			
2270000	Commercial	Italy	2278011,00	EUR			
1760000	Commercial	Italy	1766211,17	EUR			

**shocked\_value = initial\_value \* (1+property\_shock)**

## Investment funds

MarketValue	Shocked MarketValue	Currency	Investment Funds Value of initial portfolio	Shocked portfolio Investment Funds	% change
1240549	771925,14	USD	26525821,00	16505553,59	-37,78%
1970640	1226220,45	EUR			
1316208	819003,55	EUR			
2292516	1426506,11	USD			
2380938	1481526,24	USD			
1982549	1233630,76	USD			
1736383	1080455,25	GBP			
3693150	2298043,30	USD			
2712431	1687796,02	EUR			

**shocked\_value**  
 = initial\_value \* (1+worst\_equity\_shock)  
 = initial\_value \* (1-37.78%)

## Government Bonds

MarketValue	Country	Shock/Yield	Modified duration	Shocked MarketValue	Currency	Government Bonds of initial portfolio	Shocked portfolio Government Bonds	% change
138965	United States	0,00483878	7,928298276	133633,84	USD	322586879,00	315375787,05	-2,24%
10489617	United States	0,00627794	7,061477268	10024596,36	USD			
3018963	Italy	0,00847463	1,328259483	2984980,00	EUR			
689935	Italy	0,00903228	5,619753402	654914,46	EUR			
41705	United States	0,00196048	12,01913415	40722,29	USD			
81298	United States	0,00196048	12,64855033	79282,04	USD			
71126	United States	0,00196048	13,45181955	69250,27	USD			
86000	United States	0,00196048	15,1609064	83443,85	USD			
91508	United States	0,00196048	16,32552607	88579,21	USD			

shocked\_value  
= initial\_value \* (1-modified\_duration\*yield\_shock)



## Corporate bonds

	Currency	Shock/Risk Free Rate	Shock/Corporate credit spread	Shock/Yield					
Market Value					Shocked Market Value	Currency	Corporate Bonds of initial portfolio	Shocked portfolio Corporate Bonds	% change
1000239	USD	0,00887	0,017666	0,026536	895171,07	USD	234101138,00	173733330,70	-25,79%
1508778	USD	0,00770	0,013730	0,021430	1344228,54	USD			
385977	USD	0,01119	0,017666	0,028856	358995,45	USD			
950064	USD	0,01119	0,017666	0,028856	892027,00	USD			
805403	USD	0,00189	0,017666	0,019556	573333,98	USD			
3091636	USD	0,00167	0,046667	0,048337	1424918,06	USD			
915194	USD	0,01235	0,017666	0,030016	890898,23	USD			
5606536	USD	0,00186	0,013730	0,015590	4231160,17	USD			
570759	USD	0,00195	0,028414	0,030364	325841,19	USD			

**shocked\_value**  
 = **initial\_value**  
 \* **(1-modified\_duration\*yield\_shock)**  
  
**yield\_shock** = **riskFreeRate\_shock**  
 + **corporateCreditSpread\_shock**

# Initial portfolio stress test

Asset Class	% change
Equities	-16,14%
Properties	0,42%
Investment Funds	-37,78%
Government Bonds	-2,24%
Corporate Bonds	-25,79%

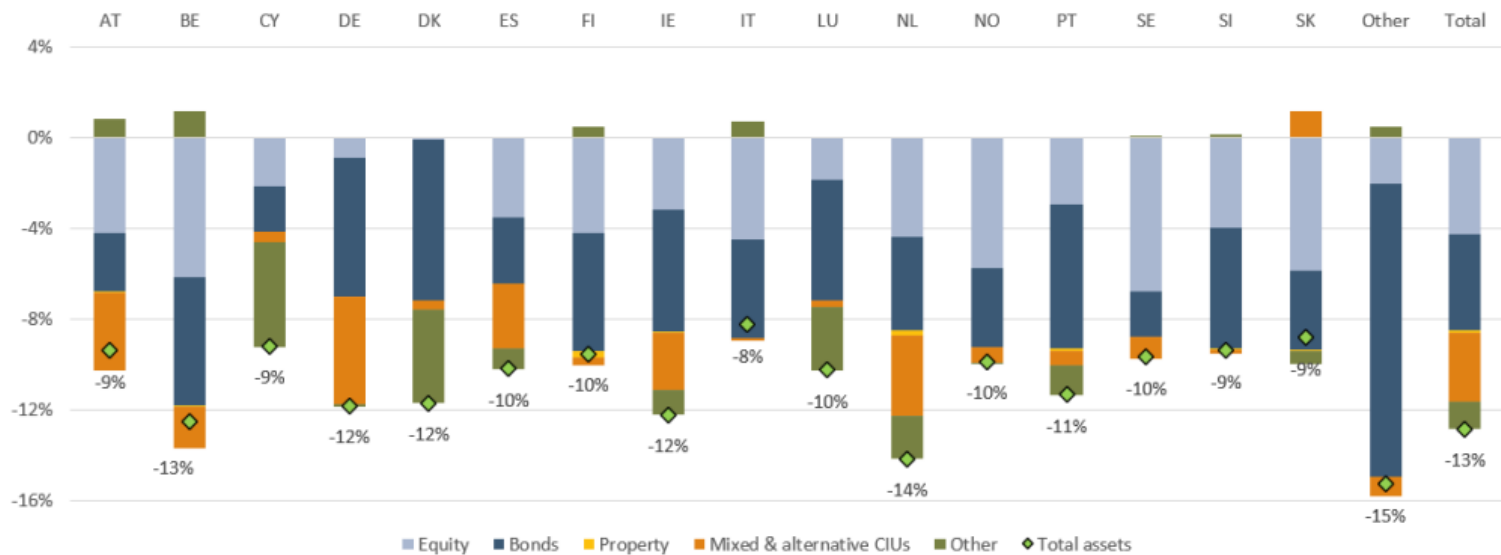
All assets

-14,31%

All assets

-14,31%

## IMPACT ON ASSETS ACCORDING TO COMMON METHODOLOGY



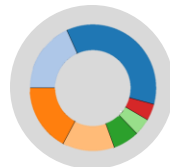
# Optimization Process: Equity

Traditional Mean Variance approach without constraints.

## SECOND ESG PORTFOLIO



Exclusion or reduction of carbon heavy industries.  
Weighting the remaining assets according to their risk profile.



## FIRST

## TRADITIONAL PORTFOLIO OPTIMIZATION



Creating an equal weighted portfolio with the best companies ranked by ESG rating



## THIRD

## RISK PARITY ADJUSTED GREEN PORTFOLIO

# Traditional optimization



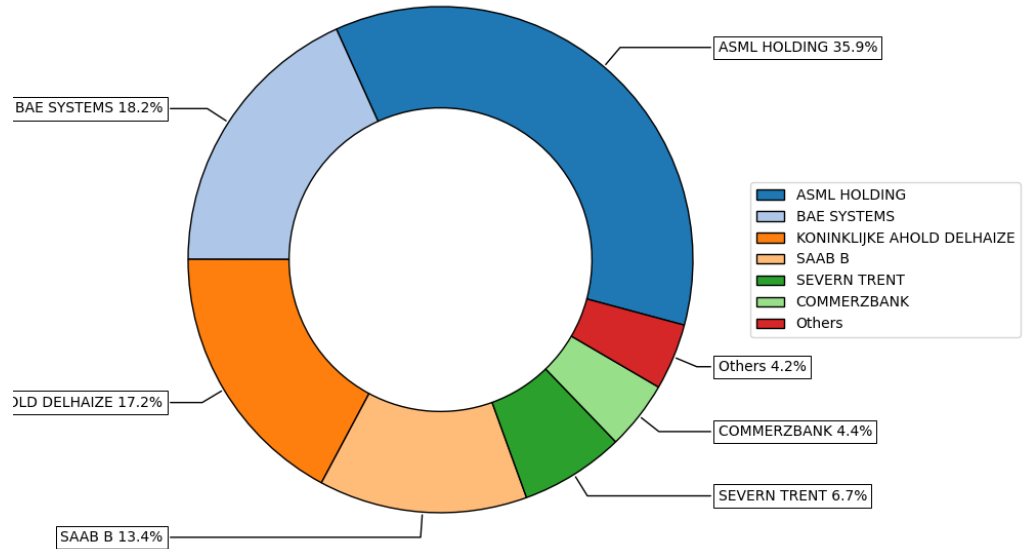
LESS  
DIVERSIFICATION  
&  
NOT PACTA ALIGNED

Optimized  
for expected  
returns and  
variance

Include more  
variables in  
order to  
satisfy  
restrictions

## PORTFOLIO WEIGHTS

Sharpe Mean Variance



# RISK PARITY ADJUSTED GREEN PORTFOLIO



## PHASE ONE

Analyzing time series data



## SECOND PHASE

Reducing exposure to carbon heavy industries



## THIRD PHASE

Including learnings from stress tests

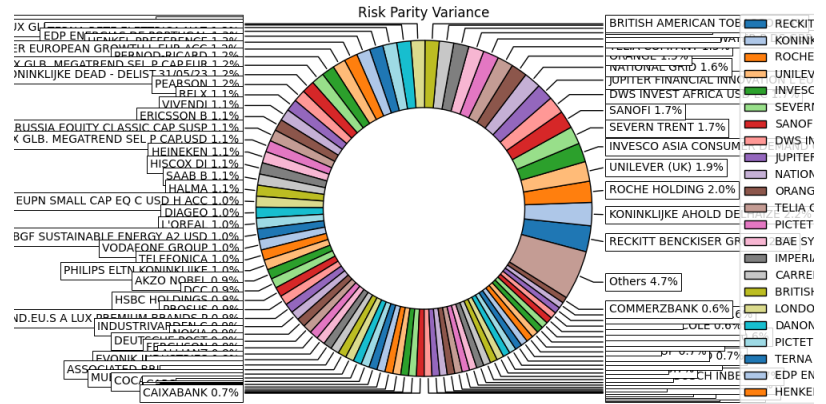
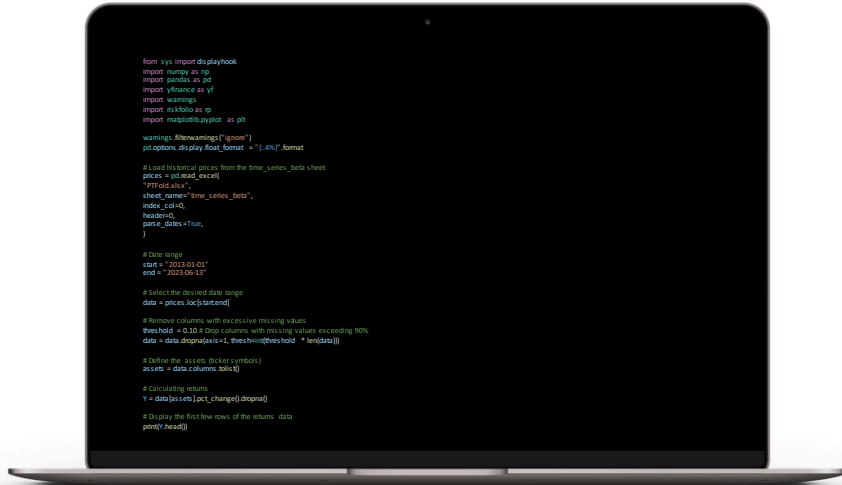


## FINAL FORM

Equally weighting equities with respect to their risk profile and several risk measures



# RISK PARITY ADJUSTED GREEN PORTFOLIO



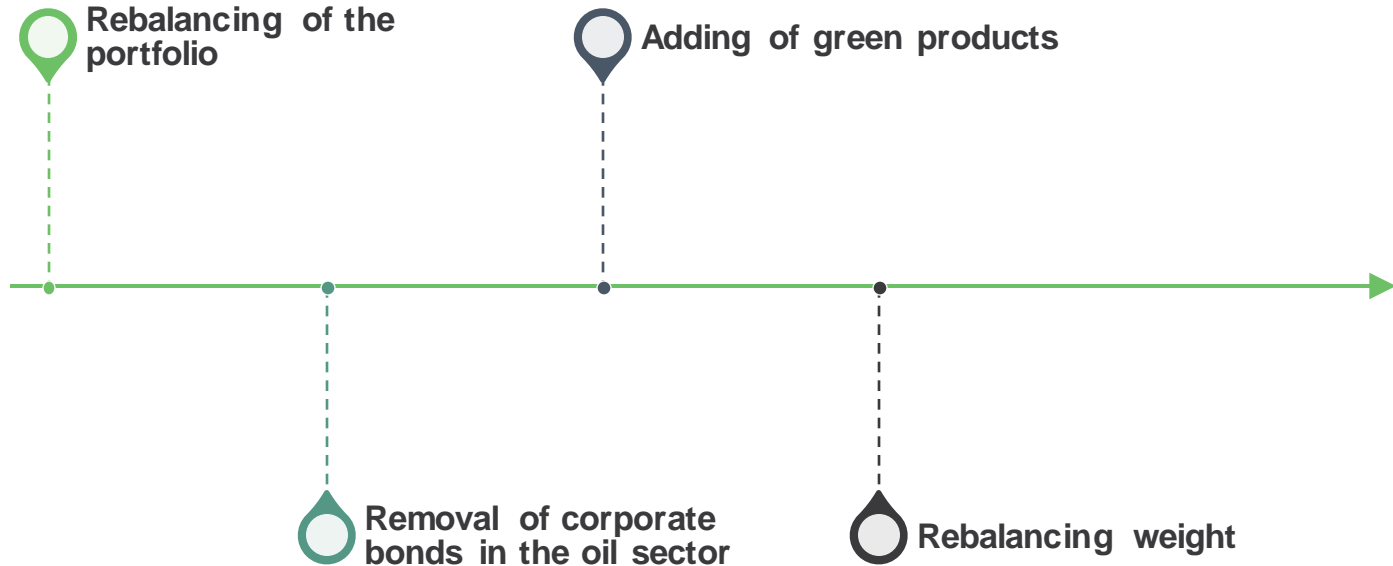


# Optimization Process: Equity



- Since from the first PACTA we have assessed a large exposure in brown assets and, in order to solve this problem, we have substitute them with the highest environmental pillar score equities.

# Optimization Process: Corporate Bonds



# Optimization Process: Government Bonds

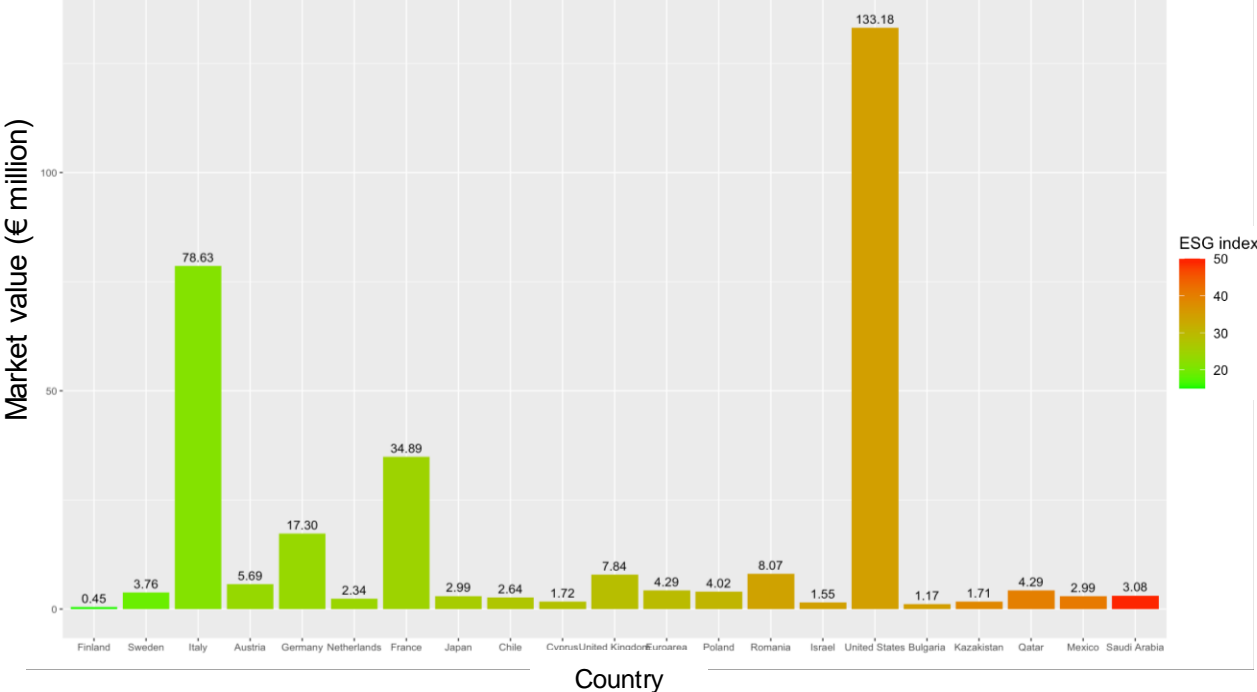
Global ESG Index

World mean: 44.92

Concentrated bond allocations  
Includes ESG underperforming  
bonds

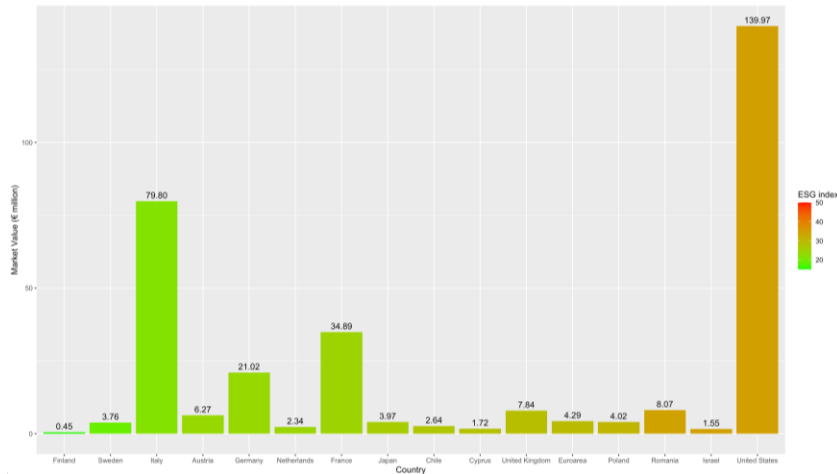
Modified Duration: 3.08 years

## Government Bonds and Country ESG Index



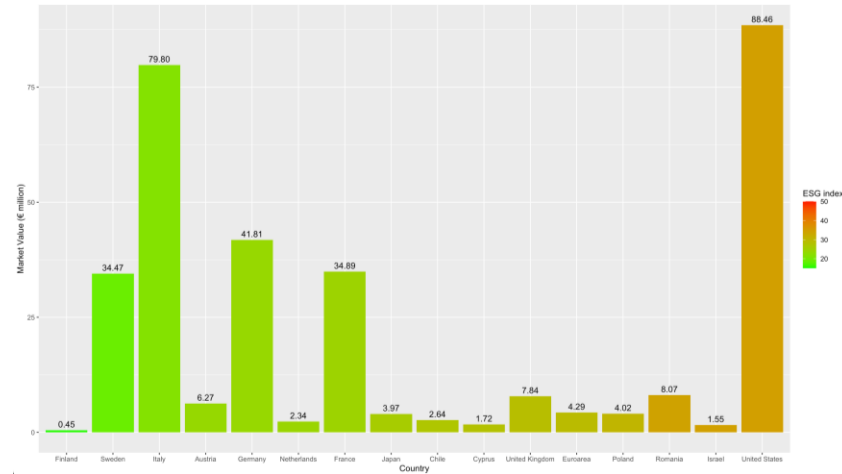
# Optimization Process: Government Bonds

## 1. Optimized



- Replaced worst 5 ESG-rated government bonds with better ESG-rated bonds of same duration
- Modified Duration: 3.08 years

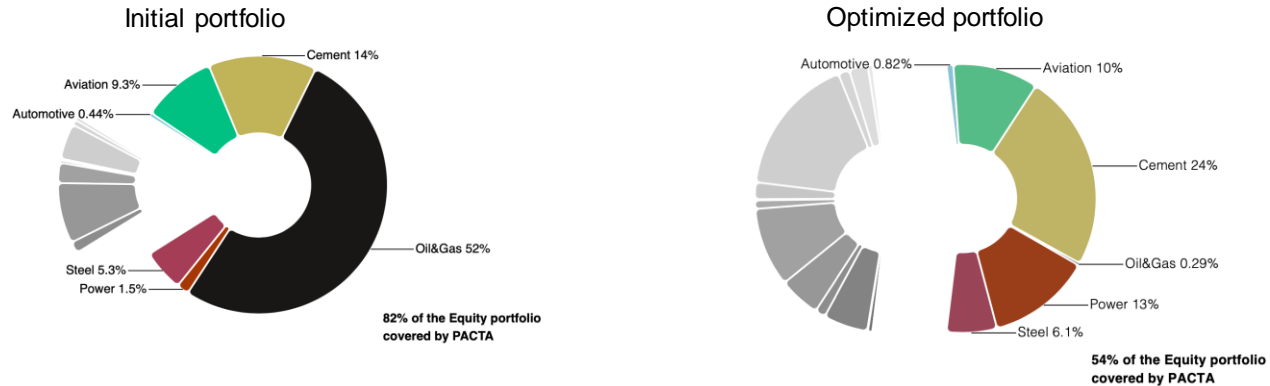
## 2. Diversified



- Diversified bond portfolio by reducing concentration in US government bonds
- Modified duration: 3.06 years

# Optimized Portfolio: PACTA Analysis

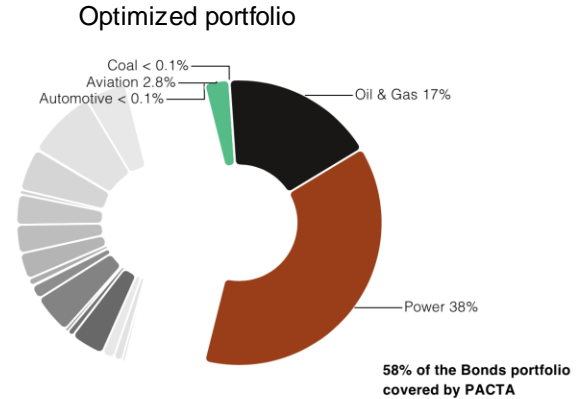
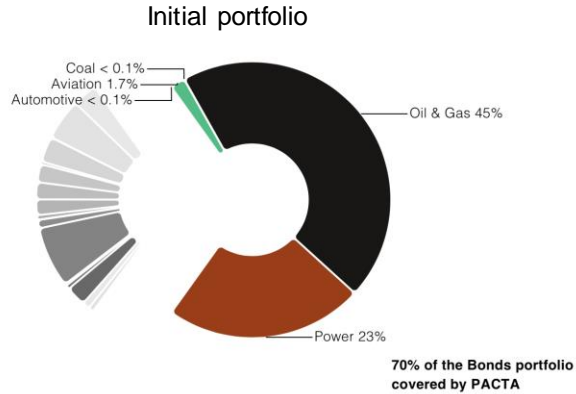
Listed Equity: Emissions exposure from climate relevant sectors



- Minimized Oil & Gas emissions within the portfolio
- Reduced CO2 Emissions of Aviation about 50%
- Reduced CO2 Emissions of Cement about 20%

# Optimized Portfolio: PACTA Analysis

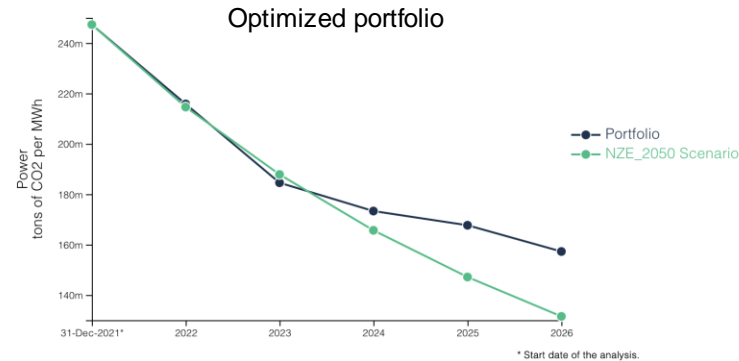
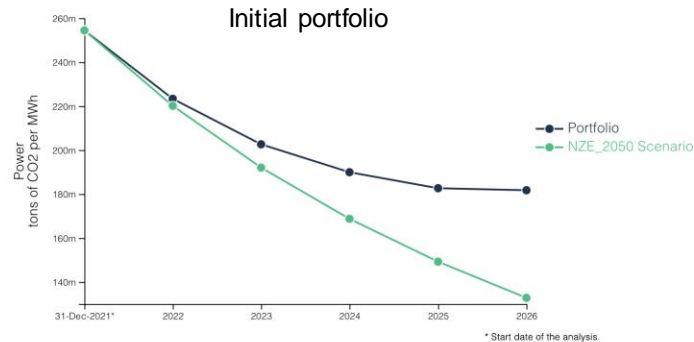
**Corporate Bonds:** Emissions exposure from climate relevant sectors



# Optimized Portfolio: PACTA Analysis

Listed Equity: 5-year emission intensity trend of Power

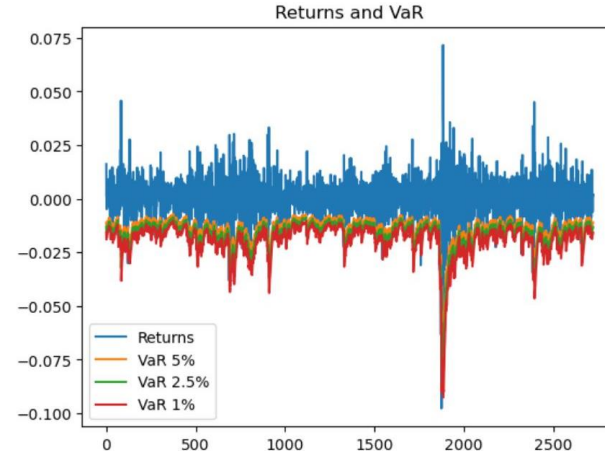
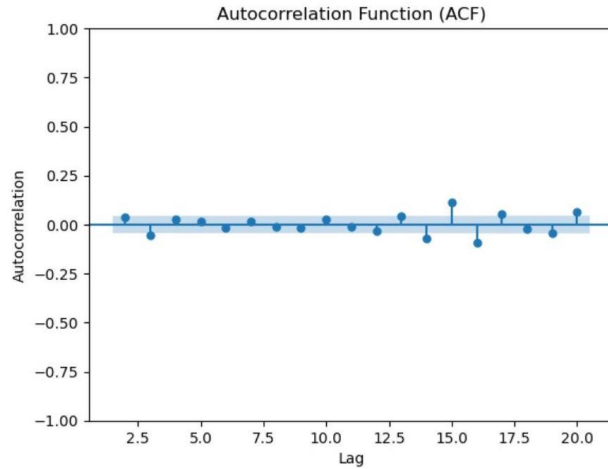
Allocation method: Portfolio Weight Equity market: Global Market



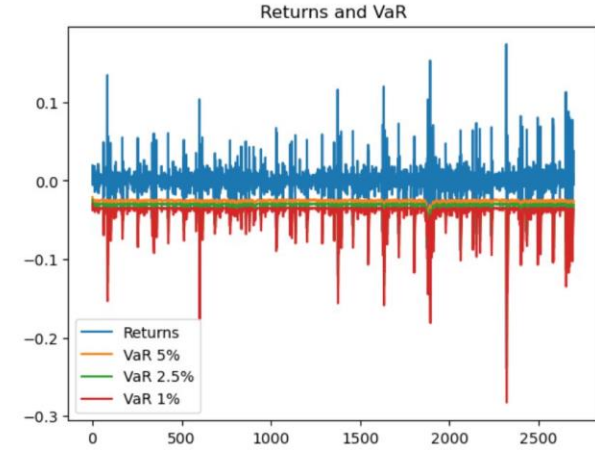
- Amount of CO2 Emissions per MWh within the whole Power Sector reduced
- The optimized portfolio shows a downward trend whereas the initial portfolio seems to converge

# Optimized Portfolio: Risk Measures

Does this portfolio entail a price to pay in terms of riskiness in order to obtain a greener asset allocation?



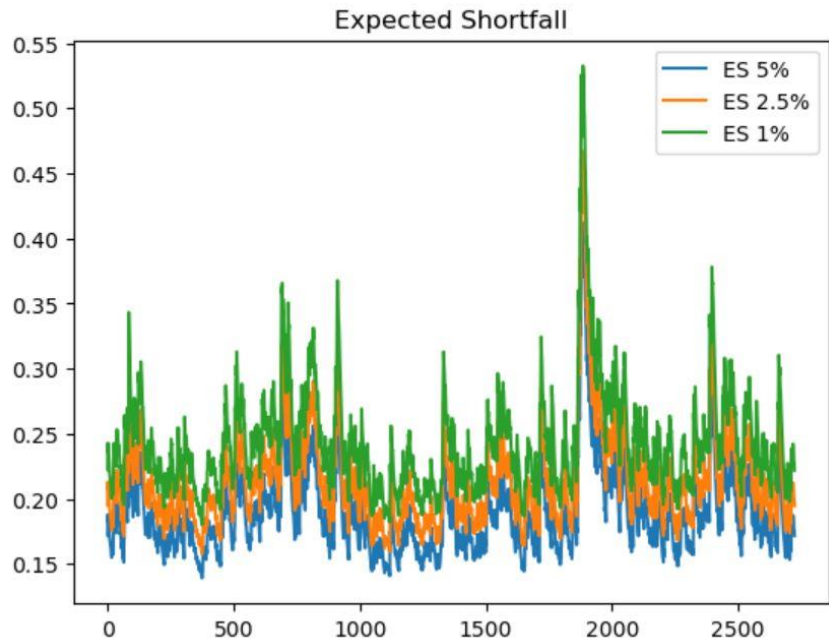
Original Portfolio



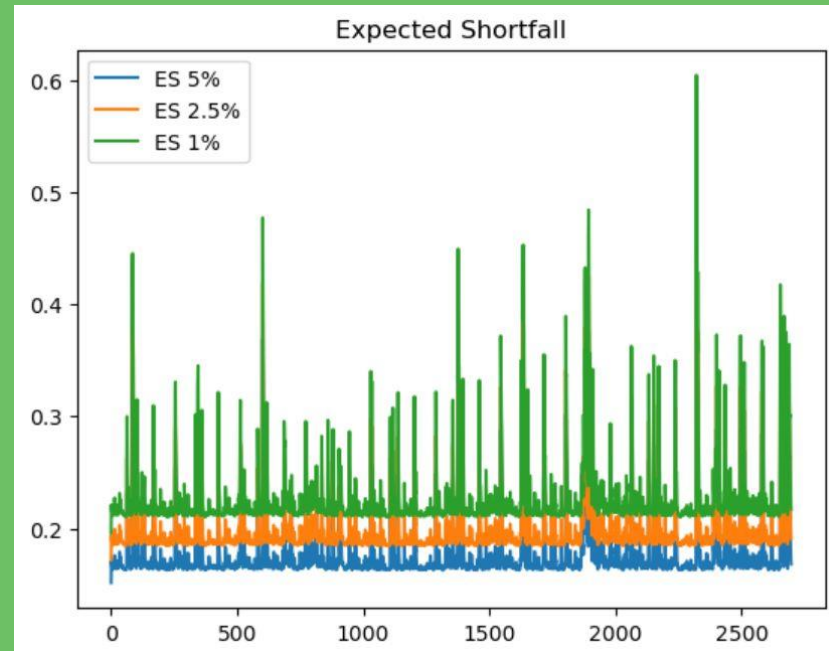
Optimized Portfolio



# Optimized Portfolio: Risk Measures



Original Portfolio



Optimized Portfolio

# Results of stress test

## Initial portfolio

Asset Class	% change
Equities	-16,14%
Properties	0,42%
Investment Funds	-37,78%
Government Bonds	-2,24%
Corporate Bonds	-25,79%

All assets -14,31%

## Optimized portfolio

Asset Class	% change
Equities	-13,42%
Properties	0,42%
Investment Funds	-37,78%
Government Bonds	-2,24%
Corporate Bonds	-22,41%

All assets -12,82%

# Conclusion: Final Takeaways

Greener  
portfolio

Increased  
diversification

More  
balanced  
portfolio

Reduced risk  
in stress test  
scenario



Thank you!

