

# SFO°C

Solutions for Our Climate

# 자본시장과 탄소중립시대

## 회사채 시장의 기후 리스크 평가

2. 23. (화) 15:00 - 17:30 KST.

주 관 더불어민주당 탄소중립위원회 금융분과

공동주최 국회의원 김성주, 국회의원 민형배, 국회의원 양경숙, 국회의원 이소영, 국회의원 정필모, 사단법인 기후솔루션

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# 축사



안녕하세요.

탄소중립실행위원회 금융분과 위원장을 맡고 있는 국회의원(전주시병/재선/국회 보건복지위원회 간사) 김성주입니다.

‘자본시장과 탄소중립시대 - 회사채 시장의 기후 리스크 평가’토론회 개최를 진심으로 환영합니다. 토론회 준비를 위해 노력해주신 민형배 의원님을 비롯한 많은 분께 감사의 인사를 드립니다. 또한 바쁘신 가운데 토론회에 함께해주신 여러분께도 감사의 말씀을 드립니다.

전 세계는 지속 가능한 지구를 위해 탄소중립이라는 목표를 공유하고 있습니다. ‘탄소제로’를 추구하는 국제동맹에 120개 국가가 참여하고 있고, 2019년 9월 기후정상회의에서 세계 65개 국가가 탄소중립을 선언하는 등 지금까지 70여개 국가가 탄소중립을 선언했습니다. 우리나라 역시 지난 10월 28일 문재인 대통령이 “국제사회와 함께 기후변화에 적극적으로 대응하여 2050년 탄소 중립을 목표로 나아가겠다”고 선언했습니다.

친환경·탈탄소를 위한 움직임은 금융 분야에서도 예외가 없습니다. 경제협력개발기구(OECD)는 해외 석탄화력발전소에 대한 공적 금융 수출 지원 가이드라인을 제정해 운영하고 있고, G20 금융안정위원회는 기후 관련 재무정보 공개에 관한 태스크포스를 구성해 파리협정 2°C 목표 달성을 위해 금융회사를 포함한 모든 기업이 기후변화와 관련한 재무적 리스크 정보를 투명하게 공개하도록 권고하고 있습니다.

국제적인 금융기관들도 파슬 프리(Fossil Free)라는 캠페인을 실시하고 있습니다. 전 세계 1244개 금융기관이 동참하는 이 캠페인은 석탄발전을 비롯한 화석연료에 투자하지 않겠다고 선언했습니다. 1경 6000조원에 이르는 석탄 및 화석연료 분야의 투자를 중단하겠다고 선언한 것입니다.

국내에서도 탈석탄 투자의 움직임은 꾸준히 이뤄지고 있습니다. 지난 12년간 국내 총 석탄투자의 25%를 제공한 최대 석탄 금융사인 삼성생명과 삼성화재를 비롯, 5개의 삼성 금융사가 석탄발전사업에 더 이상 투자하지 않겠다는 선언을 했습니다. 또한, 제가 속해있는 보건복지위원회의 피감기관인 국민연금공단 역시 연기금의 탈석탄 투자를 향해 조금씩 나아가고 있습니다. 국민연금기금은 전세계 3대의 연기금으로 곧 기금액 1000조 시대를 맞이할 전망입니다. 그만큼 금융시장에서 국민연금 기금이 가지는 의미는 큼니다. 저는 지난해 보건복지부와 국민연금공단에 대한 국정감사에서 석탄산업에 대한 투자제한 및 배제 선언을 기금운용위원회 안건으로 상정할 것을 제안한 바 있습니다. 그 결과로 국민연금은 ‘투자제한-배제 전략 도입방안’ 관련 기금운용위원회 논의 계획을 지난 1월에 수탁자 책임 전문위원회 및 국민연금기금 실무평가위원회에 보고했고, 상반기 중에 기금운용위원회 논의가 추진될 것입니다.

이런 거스를 수 없는 흐름 속에서 석탄, 가스 등 화석연료 자산의 사용감소는 필연적입니다. 영국의 씽크탱크 카본트랙커이니셔티브와 기후솔루션에 따르면 파리협약을 준수할 경우 우리나라 석탄화력발전 부문의 좌초자산금액은 약 120조원, 가스발전부분의 좌초자산금액은 약 65조원으로 총 185조원 가량의 좌초자산이 발생할 것이라 합니다.

그러나 우리 금융시장과 제도는 아직까지도 화석연료가 정상적으로 가동할 것임을 전제로 그 가치를 산정하고 있습니다. 삼척블루파워 등 민간석탄화력 발전회사가 발행한 회사채는 AA 내지 AA-, 한국전력 발전자회사들의 회사채는 AAA라는 높은 신용등급으로 자본시장에서 원활하게 자금을 조달하고 있습니다. 과연 이 신용평가가 현재의 흐름을 반영한 정확한 평가라 할 수 있는가 의문이 남습니다.

전 세계가 탄소중립을 선언하고 탈 탄소 경제로의 전환을 급격히 맞이하고 있는 현 시점에서 석탄 산업과 관련된 회사에 대한 신용평가가 제대로 이뤄지고 있는지, 회사채 발행을 통한 석탄화력 금융 제공을 방지하기 위한 방안이 무엇일지를 모색하는 이번 토론회는 매우 뜻깊은 자리가 될 것이라 기대합니다. 오늘 이 토론회를 통해 대한민국 금융이 녹색금융으로 나아가는데 중요한 이정표가 될 이야기들을 나눌 수 있길 바랍니다.

감사합니다.

# 축사



안녕하십니까.

더불어민주당 탄소중립위원회 금융분과 간사를 맡고 있는 민형배입니다.

‘자본시장과 탄소중립시대 - 회사채 시장의 기후리스크 평가’를 주제로 토론회로 만나뵙게 되어 반갑습니다.

먼저, 뜻깊은 자리를 함께 해주신 이소영, 김성주, 정필모 양경숙 의원님과 사단법인 기후솔루션 관계자 여러분들께 진심으로 감사드립니다.

더불어 발제를 맡아주신 기후솔루션 윤세중 변호사님과 인류세사채연구소 울프 에얼라드슨 연구원님, 에너지경제 및 재무분석연구소 크리스티나 님께도 감사드립니다.

작년 8월, 산업통상자원부, 산업은행, 기업은행을 포함해 삼척 석탄 화력에 투자한 국내의 금융기관들이 시민들에게 공익감사 청구를 당했습니다. 재무적 타당성 없는 부당 대출이라는 이유입니다.

시민들의 주장은, 삼척석탄화력 발전사업자들이 한국전력으로부터 사업비를 제대로 책정받지 못할 것이며, 삼척석탄화력의 가동률도 향후 급격하게 줄어든 것이라 사업성이 없다는 것입니다. 그럼에도 불구하고 이 사업이 안정적인 상황이 이루어질 것이라 판단하여 대출이 실행된 데에는 한국기업평가가 작성한 투자설명서가 토대가 되었습니다.

금일 토론회는 이러한 문제의식에서 출발했습니다. 신용평가회사들이 탄소배출사업에 대해 지나치게 낙관적인 사업성 평가를 관성적으로 진행하고, 이를 바탕으로 국책은행은 국민의 세금으로 투자를 집행합니다. 국책은행이 집행한 사업이라면 안정적이라 판단한 민간금융사까지 투자에 가담하고, 금융사의 좌초자산은 확대되는 악순환이 반복됩니다. 그간 석탄산업에 투자를 해온 금융사들에 대한 사회적 관심이 높아졌으나, 이 투자의 원인인 신용평가에서부터 우리는 논의를 출발해야 합니다.

오늘 이 자리는 우리나라의 석탄금융이 왜 이렇게 대규모로 진행될 수 밖에 없었는지에 대해 가려져있던 원인을 분석해보는 귀한 자리가 될 것입니다. 국회에서도 그간 신용평가사의 신용등급이 제대로 산정된 것인지 관심을 가지지 않았고, 이로 인해 수백조의 좌초자산이 국내 금융사에 산적하게 된 상황을 방치하고 있습니다.

성공적인 미래는 과거에 대한 냉정한 평가와 철저한 성찰에서 옵니다. 그간 관례라는 이름으로 혹은 관성이라는 편하고 효율적인 방식으로 일관해왔던 것이 우리나라 녹색금융의 발전을 저해했던 것은 아닌지 냉정한 평가가 필요합니다.

마지막으로 한국 녹색금융의 발전을 위해 현장에서 뛰고 계신 많은 전문가 여러분들께 깊은 감사와 존경의 말씀을 전합니다. 신축년 새해가 녹색금융이 우리 경제에 전반으로 확산되는 전환점이 되기를 소망합니다. 감사합니다.

# 축사



존경하는 국민여러분.  
오늘 토론회를 찾아주신 시민여러분.  
반갑습니다. 양경숙입니다.

기후변화의 리스크가 전 세계적인 이슈로 자리잡고 있습니다.  
2018년 국제연합(UN, United Nations) 산하기구인 기후변동에 관한 정부간 패널 IPCC(Intergovernmental Panel on Climate Change)는 ‘지구온난화 1.5℃’특별보고서를 통해 인간의 활동으로 산업화 이전 대비 현재 약 0.8에서 1.2℃의 온난화를 유발한 것으로 추정했습니다.

생태계의 변화나 국민의 삶, 경제는 물론 거의 모든 영역에 미치는 악영향이 어느 수준일지 가늠하기 어려운 상황입니다. 세계는 기후변화가 미치는 경제적 악영향 즉, 기후리스크를 측정하고 대비하기 위하여 박차를 가하고 있습니다.

문재인 정부는 2050년 탄소중립을 선언했습니다.

코로나 위기의 시대에서 세계경제의 모범이 된 대한민국은 기후변화 대응에 있어서도 국제사회의 중심이 되어야 할 것입니다. 지구촌의 지속가능한 발전과 빈곤퇴치, 불평등 해소를 위한 종합적인 탄소중립 실현을 위해 국제사회가 인정하는 우리의 실행방안이 필요합니다.

더불어민주당 2050탄소중립특별위원회는 정부와 함께 장기감축목표인 탄소중립을 이행을 위한 구체적인 방안을 수립하고 있습니다. 저 역시 탄소중립특위의 소속 위원으로서 국회에서 분야별·단계별로 구체적인 탄소중립 이행계획을 마련하는데 노력하겠습니다.

오늘 토론회는 회사채 시장의 재무적 위험을 평가하고 기후리스크의 반영을 논의하는 시간입니다. 전통적인 석탄발전 산업의 피해를 줄이고 산업의 전환을 모색하는 중요한 분석과 제안이 도출되길 기대합니다. 홍종호 교수님을 비롯하여 기후솔루션의 윤세종 변호사님과 인류세사채연구소 울프 에얼란드슨(Ulf Erlandson) 대표님, 에너지경제 및 재무분석연구소 Christina Ng 선임연구원님 세분의 발표 준비에 감사드립니다.

토론자로 참여하신 환경부 녹색산업혁신과 이정용 과장님과 금융위원회 금융정책국 김수빈 사무관님, 한국기업평가 평가5실 최주욱 실장님, 한국서부발전 예산자금부 오유근 실장님, 한화자산운용 채권운용팀 박태우 과장님께서도 감사의 뜻을 표합니다.

아울러 토론회를 준비하신 민형배 의원님과 이소영의원님, 김성주의원님, 정필모의원님의 노고에도 감사드리는 바입니다. 부디 뜻 깊은 시간 되시기 바랍니다.

고맙습니다.

# 축사



안녕하십니까. 더불어민주당 경기 의왕·과천 국회의원 이소영입니다.  
'자본시장과 탄소중립시대, 회사채 시장의 기후 리스크 평가'를 주제로 존경하는 김성주 의원님, 민형배 의원님, 양경숙 의원님, 정필모 의원님과 함께 토론회를 개최하여 매우 뜻 깊습니다. 오늘 뜻깊은 자리를 함께 준비해주신 기후솔루션과 바쁘신 가운데도 토론회의 발제와 토론을 맡아주신 분들께 깊은 감사의 말씀을 전합니다.

세계는 지금 전환의 시대입니다. 고탄소사회에서 탈탄소사회로 전환하고자 EU, 영국, 일본, 중국 등 세계 각국은 물론, 마이크로소프트, 애플, 심지어 글로벌 메이저 석유회사인 BP 등 기업들도 탄소중립 목표를 선언하고, 이를 통해 세계 경제체제를 선도하고자 노력하고 있습니다.

특히 EU는 2030년 온실가스 감축목표를 강화하는 것에 더해, 탄소국경조정 제도 도입을 위해 올해 6월까지 입법을 완료하고 2023년에 시행할 계획입니다. 미국 바이든 대통령 역시 기후변화가 외교 정책, 국가 안보전략, 무역에 반영될 수 있도록 하겠다는 의지를 표명하는 등 세계 경제 패러다임은 '탈탄소화'로 빠르게 전환하고 있습니다.

우리나라는 무역의존도 세계 2위, 높은 제조업 비중과 이산화탄소 4,800만톤을 전 세계로 수출하고 있는 탄소수출국으로 전 세계의 '탈탄소화'라는 거스를 수 없는 시대 흐름에서 통상환경 변화에 취약할 수밖에 없으며, 국제경쟁력을 잃을 수 있는 위험한 상황입니다.

우리나라 기업들이 세계 시장에서 도태되지 않기 위해서는 화석연료 사용을 줄이고 재생에너지 사용 비중을 높이는 것이 시급합니다. 우리나라 경제, 사회 인프라를 새롭게 구축해야 하며, 이 과정에서 소요되는 재원을 조달하기 위한 금융의 역할이 중요합니다. 자본을 '탈탄소' 관련 산업과 기업에 투입해야만 탄소중립 달성이 가능합니다. 글로벌 금융기관들은 화석연료 산업 등의 자산가치 하락이 우려됨에 따라 '탈석탄'을 선언하고 발 빠르게 자산 포트폴리오를 조정해 나가고 있습니다.

세계 최대 연기금인 노르웨이 국부펀드(GPFG)는 2015년부터 석탄에 대한 투자를 중단했고, 전체 수익의 30% 이상을 석탄으로부터 얻는 회사를 투자 대상에서 제외하는 방침을 세운 후 한전을 투자 대상에서 배제했습니다. 네덜란드 공적연금 운용사(APG), 캘리포니아 공무원연금(CalPERS) 등도 '탈석탄' 방침에 따라 한전 지분을 매각했습니다.

우리나라 금융기관 역시 기후변화 대응하기 위해 신규 석탄화력발전사업에 프로젝트 금융지원을 제공하지 않기로 선언하고 있습니다. 그렇지만 여전히 회사채 등을 통해 석탄화력발전사업에 대한 금융지원은 이뤄지고 있습니다.

우리나라 162개 금융기관이 지난 12년간 국내외 석탄화력발전사업에 프로젝트파이낸싱, 보험, 회사채 등을 통해 제공한 금액은 60조원이 넘으며, 이 중 회사채 인수를 통한 금액은 25조원에 달합니다. 금융기관의 탈석탄 선언이 제 역할을 하기 위해서는 운영중이거나 건설중인 석탄발전사업에 대한 회사채를 인수하지 않아야 합니다. 하지만, '탈석탄' 금융을 선언했음에도 석탄화력발전사업 회사채 발행의 주관사로 나서고 있는 것이 현실입니다.

오늘 토론회를 통해 탈탄소경제로의 전환에 따른 재무적 위험을 제대로 평가하고, 회사채 시장에서 기후 리스크를 반영하는 방안에 대한 건설적인 논의의 장이 마련되기를 바랍니다. 오늘 토론회에 참석해주신 모든 여러분께 다시 한번 진심으로 감사드립니다. 감사합니다.

2021. 2. 23.  
국회의원 이소영

# 축사



안녕하십니까.  
더불어민주당 국회의원 정필모입니다.

자본시장의 탄소 리스크 평가 관행 개선을 위해 마련된 「자본시장과 탄소중립 시대 - 회사채 시장의 기후 리스크 평가」토론회에 함께 해주신 여러분께 감사 인사를 드립니다.

토론회 준비를 맡아주신 사단법인 기후솔루션과 발제와 토론을 맡아주신 여러분께도 감사의 말씀을 드립니다.

지난 10년 동안 집중호우, 이상고온, 최악의 미세먼지까지 기후변화는 어느새 단순한 변화를 넘어 우리의 일상을 침범하는 위기로 다가오고 있습니다. 세계 도처에서 이상기후 현상이 발생하고 있고, 우리도 그 고통에 예외일 수 없습니다.

기후위기 극복을 위해 우리나라를 비롯한 세계 각국은 2050년까지 온실가스 순 배출량을 ‘0’으로 만들겠다는 의미의 ‘2050 탄소중립 목표 기후동맹’에 참여하고 있습니다. 문재인 대통령은 ‘대한민국 탄소중립선언’을 통해 2050 탄소중립 실천에 정부의 정책역량을 집중하겠다는 뜻을 밝히기도 했습니다.

금융도 탄소중립 정책에 예외일 수 없습니다. 금융기관들이 신규석탄화력발전 사업에 더 이상 금융제공을 하지 않기로 선언했지만, 기존 석탄발전자산에 대한 금융제공은 아직 계속되고 있습니다. 기후 리스크를 반영하지 못하는 회사채 평가방식 때문입니다. 금융분야의 탄소중립을 실천하기 위해 회사채 시장에 기후 리스크를 제대로 반영하는 방안모색이 필요한 시점입니다.

오늘 토론회는 금융영역에서의 탈석탄 현황을 되짚어보고, 회사채 시장에 기후 리스크를 어떻게 반영할 것인지에 대한 방안을 모색하고자 마련되었습니다. 탄소중립을 달성하기 위한 금융의 역할과 관련해 합리적 대안이 논의되기를 희망합니다.

토론과정에서 제시된 다양한 의견들을 바탕으로 우리나라의 탄소중립 달성을 위한 입법·정책적 노력을 함께 하겠습니다. 오늘 토론회에 참석해주신 여러분께 다시 한번 감사드립니다.

2021년 2월 23일  
더불어민주당 국회의원  
정필모

# 세부일정

시 간	주 제
15:00-15:10	인사말 - 국회의원 김성주 - 국회의원 민형배 - 국회의원 양경숙 - 국회의원 이소영 - 국회의원 정필모
15:10-15:30	<b>발제 1</b> <b>한국 석탄금융 동향과 채권시장</b> 기후솔루션 윤세종 변호사
15:30-15:50	<b>발제 2</b> <b>EU 사례로 살펴본 기후위기 시대의 회사채 시장</b> Ulf Erlandsson 인류세사채연구소(AFII) 대표
15:50-16:10	<b>발제 3</b> <b>녹색채권 시장 운영 및 아태지역의 기후금융 동향</b> Christina Ng (에너지경제·재무분석연구소(IEEFA) 선임연구원
16:10-17:10	<b>토론</b> 좌 장 : 홍종호 서울대학교 환경대학원 교수  토론자 : 이정용 환경부 녹색산업혁신과 과장 김수빈 금융위원회 금융정책국 사무관 이성호 KDB 산업은행 발행시장실 부부장 최주욱 한국기업평가 평가5실 실장 오유근 한국서부발전 예산자금부 과장 박태우 한화자산운용 채권운용담당 과장
17:10-17:30	질의응답



# 한국 석탄금융 동향과 채권시장

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발제 1

윤세종

기후솔루션 변호사



# 탈석탄 금융 확대를 위한 회사채 시장의 기후 위험 평가

2021. 2. 23.



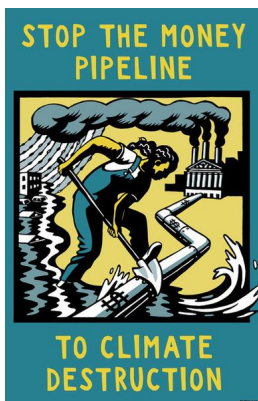
기후솔루션 윤세종 변호사

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## 기후변화와 금융의 관계

■ 기후변화 대응과 금융기관의 건전성 관리는 상호보완적 관계

“투자를 멈추지 않으면  
기후변화도 멈추지 않는다”



“기후변화 위험은 투자 위험”



**BlackRock CEO:**  
**'Climate risk is investment risk'**

<https://www.upstreamonline.com/low-carbon/blackrock-ceo-climate-risk-is-investment-risk/2-1-737714>



# 공적금융기관의 해외 석탄화력 투자 문제

▮ 시민사회 및 정치권의 지속적 요구



# 해외 석탄화력 발전사업 중단

▮ 한국전력, 4개 해외사업 중 2개 취소 및 해외석탄화력사업 중단 선언



# 지자체 및 교육청의 탈석탄 금고 요구

┃ 공공부문이 주도하는 기후금융 요구

## 전국 56개 기관 '탈석탄 금고' 선언...148조원 규모



<https://futurechosun.com/archives/50304>

# 한국 금융기관들의 탈석탄 선언 현황

┃ 2019 - 2021년 현재 한국 금융기관 탈석탄 선언 현황



## 한국 금융기관들의 탈석탄 선언 내용

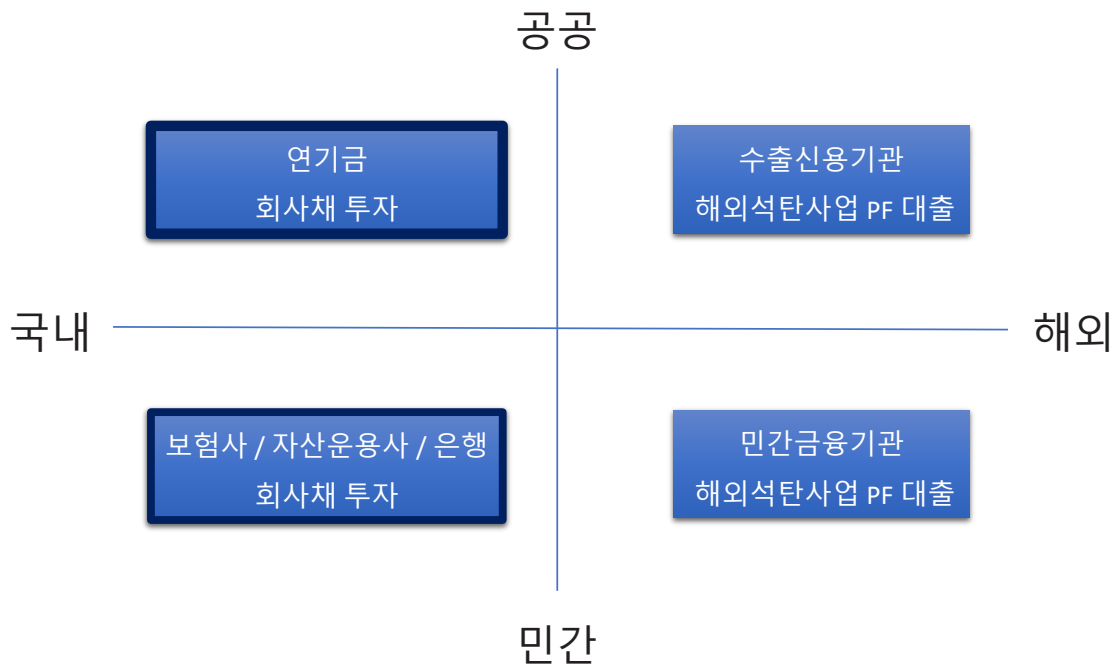
▮ 신규 사업이 예정되어 있지 않은 상황에서 실효성이 부족한 한계

- 신규 석탄화력발전사업 PF / 회사채 투자 중단
- 탈석탄 ESG 투자 가이드라인 수립 
- 자산 포트폴리오 탄소 중립 달성 

**신규사업?**

## 회사채 투자에 주목해야 하는 이유

▮ 기존의 석탄발전자산에 대한 투자로 이어지는 회사채 투자

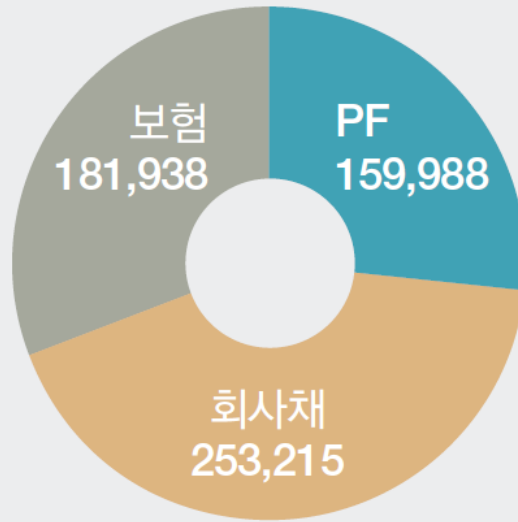


## 회사채 투자에 주목해야 하는 이유

▮ 석탄금융 유형 중 가장 큰 비중을 차지하는 것이 회사채 투자

### 국내 금융기관 유형별 석탄금융규모

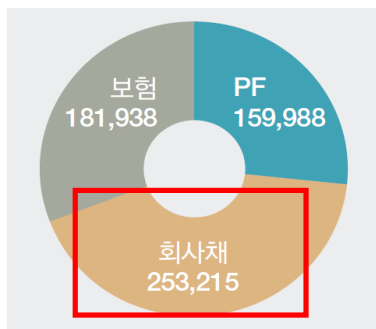
(단위: 억원)



KOSIF 석탄백서 : 2009 - 2020.6. 유형별 석탄금융 비중

## 회사채 투자에 기후변화 위험을 반영하는 방법

▮ 신용평가, Negative Screening, Positive Screening



신용평가

Negative  
Screening

Positive  
Screening

# 신용평가제도

채권의 위험을 객관적으로 평가하여 건전성 유지

- 전문적이고 객관적인 신용평가기관이 회사채 등의 원리금이 상환조건대로 상환될 확실성(발행자의 상환능력)을 "신용등급"으로 표시하여 투자자에게 공시하는 제도
- 필요성
  - ✓ 정보의 비대칭성과 정보획득 비용 문제를 해소, 자본시장 원활화
  - ✓ 투자자에게 합리적 투자의사결정을 위한 참고자료
  - ✓ 자본시장에서는 가격결정의 기준(예를 들어, 이자율)이 됨.
  - ✓ 발행자(피투자자)의 자금조달비용을 경감



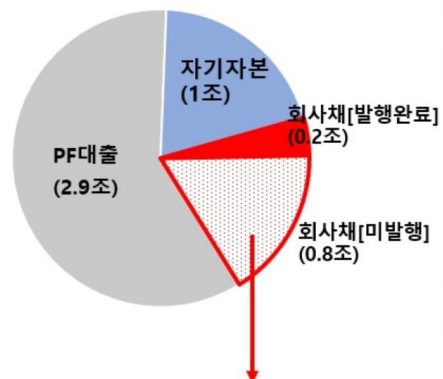
# 신용평가의 리트머시지 - 삼척화력발전사업

신규 건설 중인 석탄화력사업 중 유일하게 회사채로 공사비를 조달하고 있는 사업

## SC bluepower 삼척블루파워

- ✓ 2013년 6차 전력수급기본계획 확정
- ✓ 2100MW 규모 초대형 석탄화력발전
- ✓ 2024년 완공시 2054년까지 운영 예정
- ✓ 시공율 26% (2020년 6월 기준)

삼척석탄화력사업 자금 부족  
[전체 사업비 : 4.9조원]

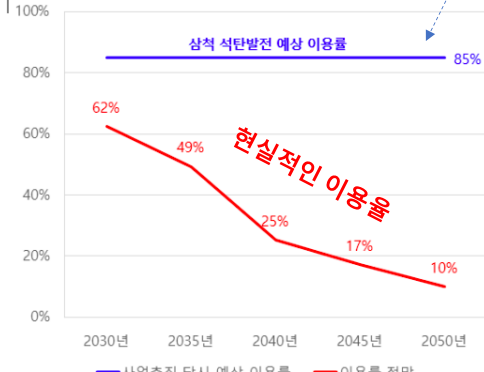


▶ 전체 사업비의 16%(0.8조)부족

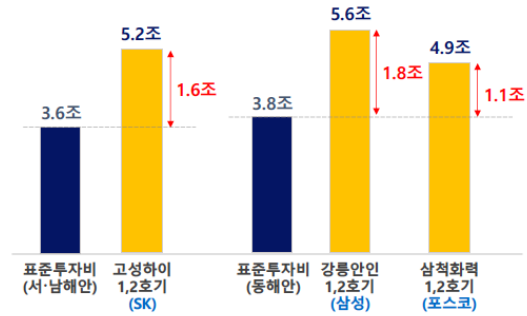
# 저조한 이용률, 원가에 못 미치는 보상 문제

■ 현재 정책에 따르더라도 막대한 손실이 예상되는 상황

[붙임자료2] 신규 석탄발전 7기 연평균 이용률 전망



신용평가에서 전제한 예상 이용률



출처: KDB산업은행(2018), 사단법인 넥스트(2020)

\* 표준투자비: 경상가 기준 (2022. 1. 1. 준공기준)

9

현재 정책 방향을 반영하지 않고 과도하게 예상한 이용률

정부가 제시한 표준투자비보다 훨씬 비싼 건설비

# 신규 민자석탄발전소에 제공되고 있는 높은 신용등급

■ 탄소중립 달성에 따른 추가 정책 변경과 좌초자산 위험은 어떻게 반영할 것인가

## 2020. 9. 11. 3차 발행분 회사채 신용등급

Corporate Analysis

삼척블루파워(주)

삼척블루파워(주)

삼척블루파워(주)

AA-/안정적

AA-/Stable

현재등급

AA-/안정적

## 신규 민자석탄발전소 신용등급

고성그린파워(주)

강릉에코파워(주)

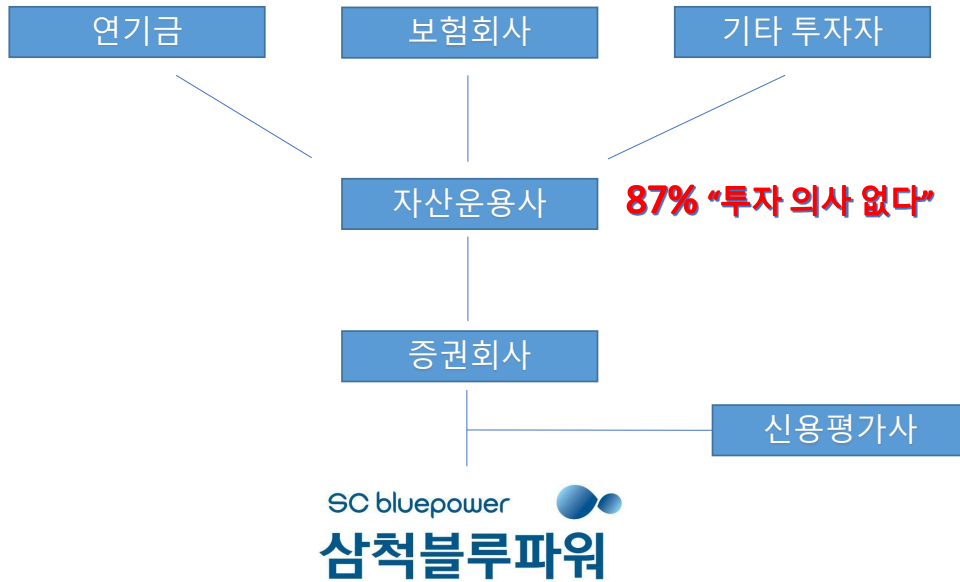
AA-/Stable

AA-/안정적



## 시장의 인식과 신용등급의 괴리

실수요자인 투자자들이 사업을 외면하고 있는 이유



## 시장의 인식과 신용등급의 괴리

실수요자인 투자자들이 사업을 외면하고 있는 이유

### 자산운용사 87% “삼척석탄화력 투자 안 해”

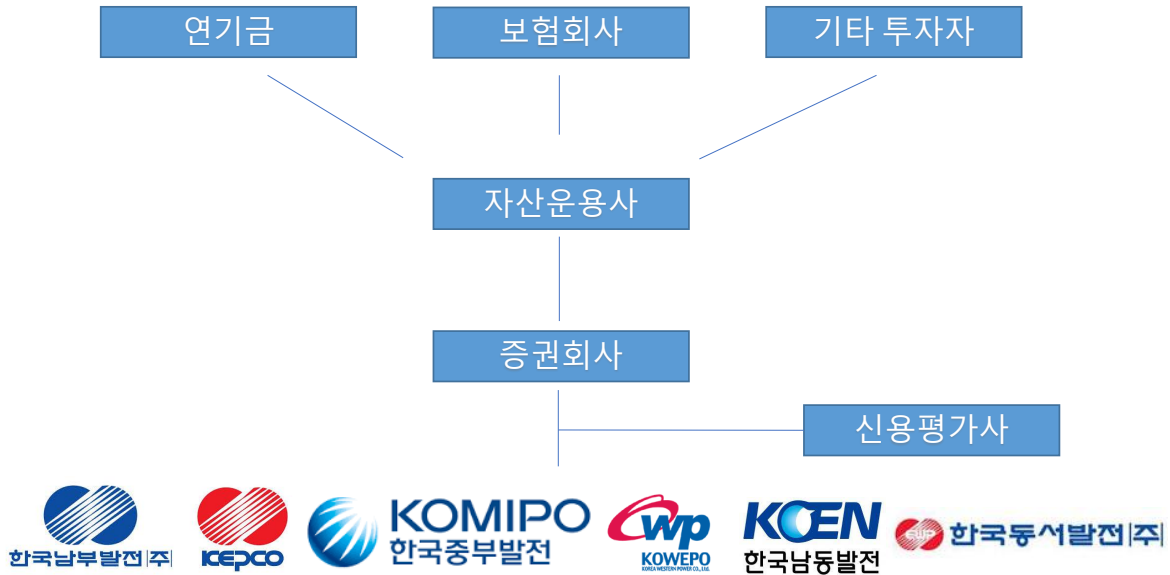
주요 자산운용사 18곳 “투자 의사 없다” 밝혀  
지난해 10곳에서 8곳 추가 선언  
“기후변화·재무적 위험성 고려한 듯”



4일 서울 경희문 세종문화회관 계단 앞에서 '석탄을 넘어서' 활동가들이 자산운용사들의 삼척 석탄화력발전소 투자 중단을 촉구하고 있다. 석탄을 넘어서 제공

# 석탄 관련 회사채의 대부분은 한전 및 발전자회사

발전자회사의 신규 석탄발전소 건설 및 기존 발전소 운영에 사용되는 자금



# 한전 발전자회사 사채는 최고등급 "AAA"

공기업은 기후변화 위험으로부터 자유로운가?

## 증권발행실적보고서

금융감독원장 귀하

2020년 11월 24일

회 사 명 : 한국동서발전 주식회사

### 2. 발행 개요

(단위 : 원)

총 발행금액 :	100,000,000,000
----------	-----------------

회차 : 36-1

(단위 : 원)

구분	사채의 종류	회차별 발행총액	상환기일
무보증	일반사채	60,000,000,000	2023년 11월 24일
신용평가기관		신용평가등급	
한국기업평가		AAA	
NICE신용평가		AAA	



## 글로벌 신용평가사들은 기후위험에 대응하기 시작

▮ S&P, 석유/가스 회사들의 신용등급 대거 조정 예고

# Oil majors' credit ratings under threat from growing climate risks: S&P Global

ExxonMobil, Total, Chevron among oil producers under review

“S&P글로벌은 2021. 1. 26. 에너지 전환, 유가 등락, 미래 수익성에 관하여 증가하는 위험을 반영하기 위해 엑손모빌, 셸, 토탈 등 주요 석유/가스 기업의 신용등급을 강등하는 방안을 검토 중이라고 발표했다.”

<https://www.spglobal.com/platts/en/market-insights/latest-news/oil/012621-oil-majors-credit-ratings-under-threat-from-growing-climate-risks-sampp-global>

## 탈석탄 투자 기준의 강화

▮ 신규 사업 투자 중단을 넘어 매출/자산 기준으로 접근하는 것이 필요

전략	내용
네거티브 스크리닝 (Negative/exclusionary screening)	특정 ESG 항목에 근거하여 부정적으로 인식·평가되는 산업 또는 기업을 포트폴리오나 펀드의 구성에서 배제하는 방법

- 1단계 : 신규 석탄 사업에 투자하지 않겠다
- 2단계 : 매출/자산 비중을 통한 평가기준 도입

## Global Coal Exit List

### relative criteria



The company's ...

- Coal Share of Revenue (CSR) ≥ 20%
- Coal Share of Power Production (CSPP) ≥ 20%

### absolute criteria



The company's ...

- annual thermal coal production ≥ 10 Mt pa
- coal-fired generation capacity ≥ 5 GW

### expansion criteria



The company develops ...

- new coal mines
- new coal-fired power plants
- new coal-related infrastructure

## 공적 연기금 중심으로 기후위험 투자 기준 강화

┃ 유럽 연기금의 주도하에 엄격한 탈석탄 기준 민간금융기관으로 확대



## 공적 연기금 중심으로 투자 기준 강화 움직임

┃ 국민연금의 중점관리사안 도입시 구체적인 탈석탄 투자 기준 수립 필요

### 국민연금, 책임투자 강화위해 기후변화산업재해 중점 관리키로

#### 중점관리사안 확대하는 국민연금

##### 후보군 1 산업재해

- 포스코, CJ대한통운, GS건설, 대우건설, 대림산업, 현대산업개발, 현대건설, 한화, 삼성중공업 등 대상
- 연구용역 결과 기업의 근로자 인정범위, 산업재해 발생 장소 등 사회적 합의 필요

##### 후보군 2 기후변화

- 탄소 및 온실가스 다량 배출 기업 대상
- 탄소 및 온실가스 배출량, 온실가스 관리 시스템, 에너지 사용량 등 선정·관리 기준 검토 필요

# Positive Screening : “녹색채권” 발행

공기업은 기후변화 위험으로부터 자유로운가?

## 녹색채권 가이드라인 (2020.12)

Green Bond Guidelines



환경부 KEITI 한국환경산업기술원 금융위원회 KRX 한국거래소

- PF와 달리 사용 용도가 특정되지 않는 회사채의 경우 “용도 분리” 필요
- “그린워싱” 방지
- 분류체계(taxonomy)와 연계

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# 녹색채권 발행과 검증에 대한 지속적인 관리 필요

REC 자금 조달은 “화석연료” 부담금이지 재생에너지 사업 자금이 아님

## 남동발전, 녹색 채권 3,000억원 발행

발행금액은 REC 구매시 활용  
ICMA 그린 본드 원칙에 부합



남동발전은 이번 발행금액 전액을 신재생에너지 공급인증서(REC) 구매에 활용할 계획이다.

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# 녹색채권 발행과 검증에 대한 지속적인 관리 필요

신용평가사의 ESG 인증 적절성에 의문

ESG 금융상품 인증(Assessment) 평가

한국남동발전(주)  
녹색채권 (Green Bond)

녹색채권 평가<sup>1</sup> 결과

최종 평가	Part.1 평가
	<b>E1</b>
<b>GB1</b>	Part.2 평가
	<b>M1</b>

## 신재생에너지 공급의무화제도

- 일정 규모 이상의 발전설비(신재생에너지는 제외)를 보유한 발전공기업 및 민자 발전사업자(공급의무자)에게 총 발전량의 일정비율 이상을 신재생에너지를 이용하여 공급토록 의무화한 제도

### 녹색채권 조달자금 투입 프로젝트

프로젝트명	투자내용	프로젝트 전체 구매규모	녹색채권 발행금액	비율
REC 인증서 구매	2020년 REC 구매 자금 차환	4,091 억원	3,000 억원	100.0%

# 결론 : 회사채 시장에 기후변화 위험을 반영하는 방법

신용평가, Negative Screening, Positive Screening

신용평가

기후변화 및 탄소중립 정책에 따른 좌초자산 위험 평가 강화

Negative  
Screening

탈석탄 투자의 양적 / 질적 평가 기준 강화

Positive  
Screening

녹색채권 발행 기준 엄정화 및 검증 강화

**감사합니다**

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# EU 사례로 살펴본 기후위기 시대의 회사채 시장

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## 발제 2

Ulf Erlandsson

인류세사채연구소(AFII) 대표





# The bond market: Its relevance and functionality for the climate transition

Emma Sjöström, PhD\*

Misum, Stockholm School of Economics,  
and Stockholm Sustainable Finance Centre  
[www.stockholmsustainablefinance.com](http://www.stockholmsustainablefinance.com)

Ulf Erlandsson, PhD\*\*

Anthropocene Fixed Income Institute  
[www.anthropocenefii.org](http://www.anthropocenefii.org)

A growing number of financial market participants include climate change as a decisive factor in their asset management decisions. There are several explanations for this, from attempts to protect the portfolio against financial risks to trying to contribute to climate change mitigation.

The purpose of this report is to explain and highlight the importance and functionality of the bond market for investing that can have an impact on the climate transition. It presents ways for investors to use bond market mechanisms to include climate perspectives and to push the agenda in this area. It also suggests topics for further investigation in future research.

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\*\* [uge@anthropocenefii.org](mailto:uge@anthropocenefii.org)



**”A significant part of the financial market is focused on entities that are not traded on the stock exchange but rather in the fixed income market. This is also where a lot of climate impact possibilities are to be found.”**

In 2019, the oil company Saudi Aramco launched one of the world’s largest bond issues by offering USD 12 billion to the market. The bond sale gathered a record-breaking USD 100 billion in orders in what the Financial Times (2019a) referred to as a “Saudi bond bonanza,” whilst it was also clear that the company aimed “to fund further gas and oil expansion” (Financial Times, 2019b). Later the same year, Saudi Aramco failed to convince the equity market to buy into what was supposed to be the world’s largest initial public offering (IPO). The limited amount of stocks that was eventually placed on the market was consumed by local investors. The unsuccessful equity capital raising received widespread media attention while the bond issuance was barely covered outside the scope of sector-specific publications.<sup>1</sup> The bond market proved more than willing to finance a company with one of the world’s largest climate burdens (Heede, 2019) while the equity market resisted.

In another capital market occurrence related to fossil fuels, in early 2020 the German industry group, Siemens, was strongly criticized by climate activists for its dealings with the Indian energy conglomerate, Adani, because of Adani’s controversial coal mining project at the Carmichael mine of the Galilee basin in north-eastern Australia. The mine was originally set to become the world’s largest, with a total production capacity of several billion tonnes of coal over 60 years (Queensland, 2020). In February, BlackRock, the world’s largest asset manager, criticized Siemens at its annual general meeting for its business relationship with Adani (Financial Times, 2020a). The international movement Extinction Rebellion called a demonstration outside the meeting about the same issue. While this was unfolding, Adani Power, the power generation arm of Adani Group, issued USD 1bn in 10-year bonds with a yield below 4 per cent. The bond issue was heavily oversubscribed, meaning that demand widely exceeded supply, with USD 5 billion in placed orders (Bloomberg, 2020a). The Carmichael mine is considered a support function of Adani Power.<sup>2</sup>

These are examples of how the bond market is often sidelined in comparison with the equity market with regard to questions related to climate change and sustainability. This could be seen as surprising given that the global bond market is twice the size of the equity market – the size of the global bond market is approximately USD 110–130 trillion, whereas the market capitalization of global stocks is around USD 75 trillion.<sup>3</sup>

A growing number of financial market participants include climate change as a decisive factor in their asset management decisions. For example, the investor initiative Climate Action 100+ has seen an annual increase in subscribing institutions of 65 per cent since its launch in 2016 (Climate Action 100+, 2020). There are several explanations for this, from attempts to protect the portfolio against financial risks to trying to contribute to climate change mitigation. In addition, the Paris Agreement (UNFCCC, 2015) stipulates that financial flows should support the two-degree goal while the Addis Ababa Action Agenda on Financing for Development states that sustainability should be integrated into trade and financial flows (United Nations, 2015). There are therefore good reasons to investigate the opportunities and possibilities that exist for investors in different asset classes to work towards these goals.

The purpose of this report is to explain and highlight the importance and functionality of the bond market for investing that can have an impact on climate change. It presents ways for investors to use bond market

1) For example, the Financial Times website, ft.com, published 161 articles with the search tags “Saudi Aramco” AND “IPO” but only seven with the search tags “Saudi Aramco” AND “bond issue” in 2019.

2) For a further analysis around the Carmichael case, see Anthropocene Fixed Income Institute (2020).

3) Bank of International Settlements (2020), World Federation of Exchanges; (2019) authors’ own time-adjusted and market-weighted calculations applied to original figures.



mechanisms to include climate perspectives and to push the agenda in this area. It also suggests topics for further investigation in future research.

## The bond market's relevance for financial mandates

A bond is an interest-bearing debt instrument or, in other words, a loan that needs to be repaid within a specified period. The issuer of the loan earns interest during its lifetime. Bonds can be issued by entities such as companies, government, inter- and sub-governmental organizations, municipalities, and mortgage loan institutes. Bonds are part of the so-called fixed income market, where other types of debt instruments and financial instruments are traded. The fact that the fixed income market solely trades instruments that offer a predefined return on the initial investment (such as a fixed interest rate) differentiates it from e.g. the equity market, where payments to investors are discretionary.

From an asset management perspective, a bond portfolio is traditionally seen as complementary to equities. A normal economic cycle comprises economic expansion, which leads to rising equity markets and rising interest rates; and economic contraction, which leads to falling equity markets and falling interest rates. In the expansion phase, bond portfolios are expected to show modest or even negative returns on capital, while in the economic contraction phase the value of bond portfolios increases as interest rates fall. The price of the bond moves in the opposite direction to the move in interest rates, which is illustrated in Figure 4. Equity markets fell sharply during the 2008 financial crisis, while bond yields also fell (and prices went up) increasing the value of bond portfolios.

It is also commonly assumed that economic contraction has a negative impact on illiquid risk instruments – equity markets fall alongside banks and mutual funds while bonds remain more liquid. For this reason, bond portfolios are seen as a “hedge” against equity market risk as well as a liquidity buffer. Note the distinction also within bond markets, where government bonds are more liquid and better hedges than corporate bonds.

From this perspective, fixed income portfolios are naturally seen as a more passive part of the investment portfolio. It is a buffer to the more concentrated equity risk that is supposed to drive portfolio returns. As a result, fixed income portfolios are often more conservative in terms of investment policies and which could also lead to a slower uptake of new developments, such as sustainability considerations.

## Green bonds

Green bonds have their own unique place in the bond markets. They were introduced at the initiative of Swedish investors in 2007 (World Bank, 2019). The market for green bonds grew exponentially in the second half of the past decade. The concept of a green bond involves the issuer (i.e. the borrower) committing to use the money raised to finance projects that have a positive impact on the environment. The market was expected to reach USD 1 billion by 2020 (Climate Bonds Initiative, 2019). This has contributed to far-reaching changes in the way the bond market perceives the debate on climate (see e.g. Maltais & Nyqvist, 2020) and to a new research field investigating how green investments should be

priced vis-à-vis traditional ones (see e.g. Zerbib, 2019 or Erlandsson, 2020a).

Green bonds so far only account for a small part of the total bond market: they were only 1 per cent of the total bond market in 2019 (SEB, 2020). Sweden is an exception as green bonds issued in SEK made up 19 per cent of the total market in 2019 (ibid.). Sweden has had an expansionary real estate financing market, and newly built properties are technically relatively easy to use as green assets for green bond issuance. Coupled with a strong investor interest in green finance, this has led to a large number of green bonds being issued. The Swedish government issued a green government bond in 2020. Other notable green government bond issuers include France, Germany, the Netherlands, Belgium, Ireland, and Poland (somewhat controversial).

While green bonds can be used to finance parts of the green transition, the Paris Agreement and the Addis Ababa Action Agenda stipulate that there is also a need for financial flows that are not explicitly targeted at green causes to be redirected in a more climate-friendly direction. So-called transition bonds are supposed to lead the way by moving capital flows to sectors with greenhouse gas (GHG) emissions that wish to work towards a greener economy. By December 2019, however, only three such bonds had been issued globally (BNP Paribas, 2019).

## Examples of the bond market's importance for a greener economy

A fundamental difference between bonds and equities is the possibility for a shareholder, at least theoretically, to take direct control of a company. A shareholder that is dissatisfied with the activities of a company can elect a new board to move the company in the desired direction, and even present direct suggestions at the board meeting. It is also common for the shareholders of a listed company to have an ongoing dialogue with the board about sustainability, which can have an impact on leading the company in a more sustainable direction.

Bondholders do not have the same direct influence on a company; they have no voting power in board meetings and cannot participate in the election of board members.<sup>4</sup> However, there are some mechanisms unique to the bond market that can be used to have an impact on companies. The following section highlights how the bond market could be of relevance to investors' climate initiatives and why there might be good reasons for market participants, the climate movement, politicians and academic researchers to dig deeper into this subject.

## Businesses with high levels of greenhouse gas emissions are more commonly financed by bonds than equities

The bond market has a large share of the total fixed income market, which also includes loans and other credit facilities. Hence, the bond market affects more or less all types of organizations with financial flows. By contrast, only those companies that have decided to be listed

4) A specific case arises if a company goes bankrupt, when bond holders can play an important role in the continued management of the company in the case of restructuring or liquidation. See for example Financial Times, 4 May 2020, Norwegian investors back debt-for-equity swap to unlock rescue. <https://www.ft.com/content/ae1fc18f-f95b-4d6a-8036-8b9a98679d4d>

on public equity markets (stock exchanges) are affected by traditional equity investors.

From a global perspective, there is clear evidence that GHG emissions-intensive companies are more affected by financing from the bond market than from the equity market, simply because many such companies do not use the equity market for financing.

Figure 1 shows the historical distribution of GHG emissions of companies traded on stock exchanges compared with non-listed companies. We refer to this as the 25/25/25 principle. The 25 companies with the largest emissions are responsible for 25 per cent of total emissions, but only 25 per cent of these companies are listed on and thus subject to the influence of the equity market. All companies, however, are in one way or another influenced by the bond market. A company's various credit facilities, such as its revolving credits, and various internal interest rates are determined by the fixed income market's perception of the creditworthiness of the company or its guarantor.

In other words, one reason for highlighting the climate effect of bond portfolios is that the investor can apply significantly more sustainability influence than they can through the equity market.

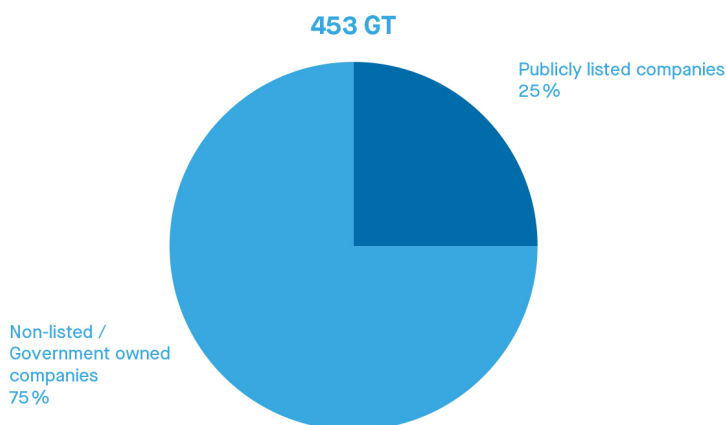


Figure 1: The 25/25/25/ principle Note: The 25 largest emitters of greenhouse gases were responsible for 25% of emissions in 1988–2015. Only 25% of these companies are listed. Emissions refer to Scope 1 and Scope 2.

Source: The Carbon Majors Database, CDP; Bloomberg.

The bond market can still be influential when it comes to listed companies. The large oil companies often hold a special place in investors' equity portfolios, given that they have historically offered relatively high and stable dividends.<sup>5</sup> Despite the fact that the oil price is volatile and the basic revenue model does not merit such a stable flow of dividends, these companies have been able to finance dividends through loans in the bond market. This became particularly obvious during the 2020 corona virus crisis when oil companies were able to finance continuing dividends through record issuance and borrowing from the bond market (Financial Times, 2020b).

5) For example, BlackRock's iShares High-Dividend ETF on 3 April 2020 had a 33% exposure to sectors with high fossil fuel content (energy, utilities) and the single largest exposure was Exxon Mobil at 10.16%.



**”A majority of bond investments are made in the primary market. That is why investor demand for bonds has a direct impact on the capital cost for companies.”**

## The primary market offers impact possibilities

Bondholders are significantly more active than equity investors in what is referred to as the primary market for financing.<sup>6</sup> The primary market constitutes direct transactions between investors (those who offer loans) and companies/issuers (those who borrow money). If British Petroleum issues a bond, this is a primary market transaction; the company, together with several banks, goes out to investors and asks to borrow money at a specified rate or yield. If BP manages to get enough traction, the transaction will go through. Investors send money to BP (buy the bond) and BP commits to pay coupons and repay the loan at the time of the bond's expiration date (sells the bond). If not enough investors are willing to buy the bond at a certain interest rate, BP will need to increase the interest rate on offer (the yield) in order to gather more investor interest. The higher yield that BP offers is a direct cost to the company. Hence, divestments, meaning decreased demand for bonds, would have direct capital cost effects. Higher bond yields (lower prices) translate directly to lower earnings and worsened cash flows for a company, even though it seldom becomes as dramatic as during certain government crises.<sup>7</sup>

This can be compared to the secondary market where investors are matched to buyers and sellers without any effect on the financial flows of the issuing company. If an investor sells Exxon Mobil shares, this has no direct impact on the company's access to capital since there is another investor buying them. As long as investors' transactions do not affect the company financially, divestment is less meaningful as a direct impact methodology (Ansar et al., 2013). If it receives media attention, divestment can send an important signal to management and contribute to stigmatizing a company or sector, thereby having an indirect impact (Ayling and Gunningham, 2017; Bergman, 2018). As a purely financial mechanism, however, it is not particularly efficient. Research has shown that even though an announcement by investors of a decision to divest from fossil fuel sectors has put pressure on the stock market prices for fossil companies in several cases, the effect is only short term in nature (Dordi & Weber, 2019; Hansen & Pollin, 2018).

## Credit spreads as an impact tool

One mechanism that is useful to understand is how bond market divestment can be used as a tool to drive climate issues by affecting the bond yield that an issuing company is facing. Investors could try to increase the yield by selling bond holdings, thereby increasing the cost-of-capital of the company, even potentially putting the company at risk of bankruptcy due to excessive borrowing costs. This section explains such a process.

The two most important components of the yield and the value of a bond is the risk-free interest rate and the credit spread. The risk-free rate is the return that can be obtained by not taking on risk in any given period. The credit spread is the difference between the price/interest rate of different bonds that have the same return on investment but different credit ratings. If a bond issued by Vodafone has an interest rate of 3 per cent and a (risk-free) government bond with the same expiry date has an interest rate of 2 per cent, then the credit spread is the difference between the two (3%–2% = 1%).<sup>8</sup>

6) In 2019, USD 228bn was issued in primary market equity transactions in the United States. The average daily turnover was USD 322bn, a primary/secondary quota of 0.7x. In corporate bonds, the corresponding numbers were USD 1,400bn in issued capital and an average daily turnover of USD 34bn, a primary quota of 41.2x. Source: SIFMA, 4 May 2020, <https://www.sifma.org/resources/archive/research/statistics/>.

7) This was at the core of the euro crisis. When the crisis hit its peak, Italian 10-year government bonds were quoted at 7%. If Italy had had to borrow at that yield for an extended period, the Italian government would have been insolvent. In extremis, this applies to all borrowers that need to extend their loans when they expire.

8) In bond portfolio management, credit spreads are expressed as basis points (bp); 1% corresponds to 100bp.

If the risk-free rate changes, then the price and interest rate of the Vodafone bond would follow by the same magnitude, so the credit spread would be unchanged. Should Vodafone struggle as a company, the bond would be valued lower relative to the government bond. The interest rate on the Vodafone bond would increase but the risk-free interest rate remains unchanged so in this case the credit spread would widen.<sup>9</sup>

The credit spread is, in somewhat simplified terms, the level of compensation for the risk that Vodafone might default on its bond, which is typically the same as filing for bankruptcy. There is thus a strong connection between the credit spread and the probability of bankruptcy. A higher probability means a higher credit spread and vice versa. This connection is of fundamental importance from a sustainability perspective. The credit spread can be used to assess the probability of bankruptcy that the market assigns to a company. In practice, we can hypothesize that fossil dependent companies have an elevated bankruptcy risk in the energy transition and compare this fundamental valuation to where the market is actually pricing that risk. Figure 2 shows a graphical presentation of the relationship between the credit spread and the probability of bankruptcy.

There is also a certain recursiveness in this relationship: a higher credit spread, all else being equal, means a higher probability of bankruptcy. Hence, if action is taken to push credit spreads upwards for companies believed to be unsustainable, for example as a result of their levels of CO2 intensity or their goals surrounding climate change in response to upcoming regulation, the probability of these companies going bankrupt increases. As is mentioned above, higher interest rates on a company's bonds translates into deteriorating cash flows through higher borrowing costs in the primary market or other loan facilities. Investors that wish to challenge fossil fuel-intense companies could therefore actively sell their bonds, thereby increasing the credit spread and driving the price down. This would have a fundamentally negative effect on the companies.

9) In practice, bond portfolios are often managed so that the interest rate and credit component are separate. An owner of a Vodafone bond tends to hedge the interest rate risk through interest rate swaps or government bond futures in order to maintain the credit spread.

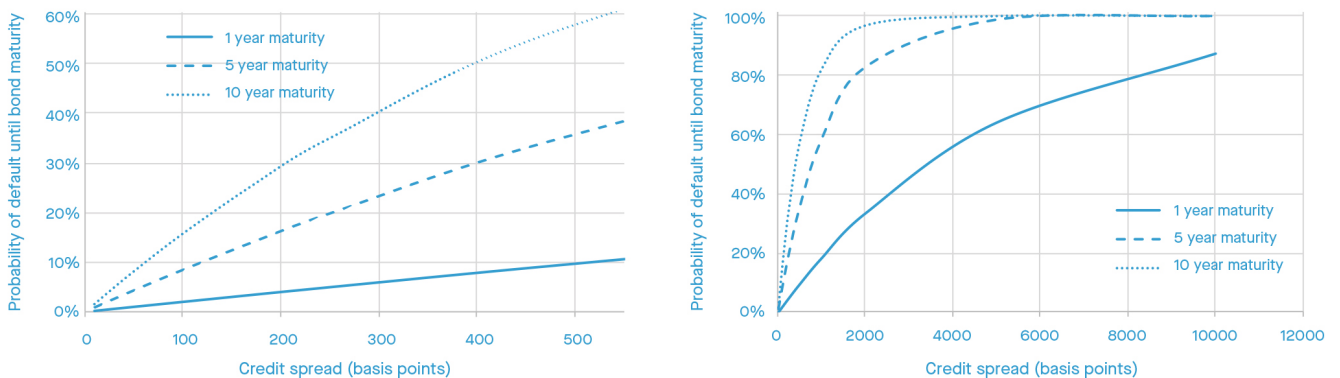


Figure 2. Credit spreads and the probability of bankruptcy. Graphs show the relationship between the credit spread and the cumulative probability that the underlying company will file for bankruptcy during the duration of the bond (the number of years to the expiry of the bond). For example, the graph to the left shows that a bond with a five-year maturity is traded with a credit spread of 100bps, indicating a probability of bankruptcy of 8.4% in the coming five years. If you believe that the probability of bankruptcy is higher you should "buy the credit spread" / "sell the bond" and vice versa.

Source: Bloomberg and the authors' calculations. Date of pricing: April 7, 2020. We have assumed a coupon of 1% and a remaining value of 40% in the bankruptcy.



## Short selling and speculative attacks

A more extreme way of influencing credit spreads is through the practice of short selling. Selling short can be explained as the speculator offering to replace the payout from a bond with his or her own money. As an example, an investor could put on a short position on Exxon Mobil by informing the market that: “if you buy an Exxon Mobil bond in the market, you will receive a yield of 4 per cent, but we will offer a yield of 4.1 per cent for an identical cash flow and based on the same credit risk (Exxon Mobil).” When Exxon Mobil then wants to borrow money directly from the market (the primary market), the yield offered must be, all things being equal, higher than the yield offered by the short seller for the same amount of risk. In extremis, a short seller with an unlimited balance sheet or assets could make it impossible for Exxon Mobil to borrow money in the market by always making a higher bid in terms of yield.

Such extreme situations, “speculative attacks”, are not very common, but still occur at a relevant frequency for bond investors to be aware of and potentially use. Theoretically, investors could, for example, use such attacks against coal mining companies that have a fundamentally questionable business model, and thereby increase the speed of liquidating these companies (Erlandsson, 2018).

## Impact through interaction and clear expectations

Another aspect of primary market transactions is that the company seeking to issue bonds needs to have a dialogue with and market themselves to investors to get the best possible terms for the bond issue. As a result, there is a close interaction between the company and its bondholders at events such as “roadshows”. There are not as many investors per transaction in the bond market as there are in the equity market. This gives bond investors substantial opportunities to make an impact (see e.g. Global Capital, 2018).

Bond investors could also give better terms to sustainable companies if they believe that such sustainability will have a positive impact on the company’s future earnings. This could be a reason for companies to listen to investors in the first place. There is limited research on the relationship between environmental, social and governance (ESG) issues and the pricing of bonds, but an overview of studies published in 2016 shows that ESG factors could be correlated with credit quality. The cost of capital increased by as much as 64 basis points and was on average 20 per cent higher for companies with worse environmental qualities than their similar competitors (Clubb et al., 2016). A Chief Financial Officer (CFO) with experience of her company borrowing money at a higher cost than more sustainable companies could therefore have an incentive to raise environmental questions if she believed that this might lead to reduced borrowing costs.

It might be thought that one basis point, or 0.01 per cent, does not matter very much, but it can. If company X borrows USD 500 million in the bond market with a 10-year expiry date, each 0.01% difference in the issued bond’s coupon (at a discount rate on future cash flows

**“I used to think that if there was reincarnation, I wanted to come back as the president or the pope or as a .400 baseball hitter. But now I would like to come back as the bond market. You can intimidate everybody.”**

James Carville  
(1993), adviser to  
US President Bill  
Clinton

of 2.5%) makes a difference of USD 430,000 for the company. It is important to appreciate this in order to understand why many CFOs listen to investors – a few basis points of lower borrowing costs translate into sizeable incentives on the individual’s level.

## Passive investments: taking climate into account when using an index investing approach

To divest – meaning to sell the entire holding in a company or even an entire sector – as a result, for example, of climate concerns could only be done in the active part of an investor’s portfolio. Many asset managers invest in passive products, however, meaning that they invest in the constituents of a certain index, which makes it impossible to sell at their own discretion. Index investing is a fast-growing part of the market (Fink & Novick, 2018).

Over time, credit ratings agencies have become increasingly interested in including sustainability risks in their credit ratings. The first credit derivative index to include ESG issues was launched in March 2020. Work is continuing to introduce indices with lower CO2 intensities. This development is still in its early stages and bond portfolios are still managed against indices that do not take sustainability into account.

Currently, many of the large investments in, for example, bonds issued by coal mining companies originate from passive managers who are following an index. The world’s largest asset manager, BlackRock, has announced that it will exclude coal from its investments, but this only applies to the active book, which is a much smaller part of the total assets managed compared to their passive investments.<sup>10</sup>

With regard to passive investments, there are significant development opportunities when it comes to restructuring underlying passive indices to take climate change into account. There is also some evidence that doing this could achieve excess returns. Polbennikov et al. (2016) identified significant excess returns from allocating bond portfolios to “ESG leaders”, that is, companies leading on ESG issues in their respective sectors. Figure 3 shows that S&P’s CO2 efficient S&P 500 IG Bond Index,<sup>11</sup> which was constructed based on the ECOBAR model (Erlandsson, 2017), has had an annual excess return of 0.24 per cent compared to the “original” index.

**”Passive investments via standardized indices are common in the fixed income market. It is possible to reconstruct such indices.”**

10) BlackRock manages approximately USD 7 trillion, of which USD 1.8 trillion (25%) is actively managed. The decision was to divest from companies that obtained 25% or more of revenues from thermal coal, i.e. coal that is burned for heating or electricity production. This does not apply to: (i) passive investments (75%); (ii) conglomerates where more than 25% of revenue is related to other energy sources, electricity networks or other type of activities; or (iii) “coking coal”. See e.g. Bloomberg (2020b) and BlackRock (2020).

11) For the complete methodology and information about the index, see: <https://us.spindices.com/indices/fixed-income/sp-500-bond-investment-grade-carbon-efficient-index> and the benchmark index: <https://us.spindices.com/indices/fixed-income/sp-500-investment-grade-corporate-bond-index>. Note that the CO2 efficient index reflects a rebalancing of the original index but contains exactly the same issuers.

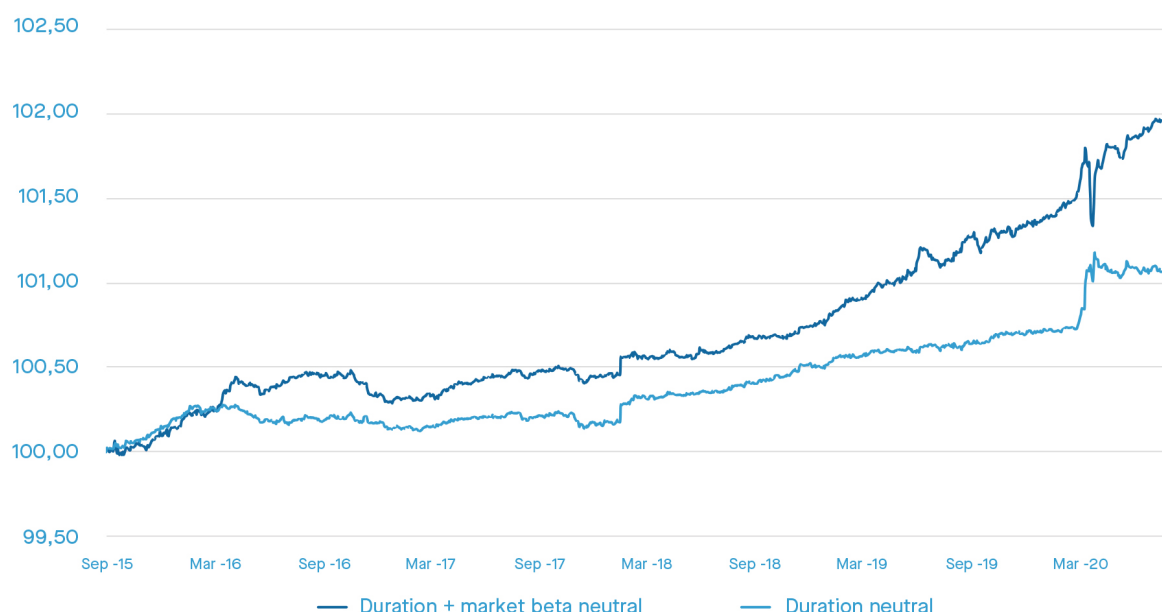


Figure 3. Excess return from the S&P 500 investment grade carbon-efficient index compared to the original index.

Source: S&P Dow Jones indices and the authors' calculations. The indices are adjusted to the same interest rate sensitivity/duration.

## The downside risks and insurance possibilities of bonds

An investor in a bond could lose 100 per cent of the capital invested but can never get back more than the nominal amount plus the coupons paid out during the life of the bond. For this reason, bond investors are more focused on downside risks, or risks that are associated with losses. When investing in equities, by contrast, the downside is also 100 per cent but the upside potential is unlimited.<sup>12</sup>

The bond market typically has significant tail risks, meaning risks that are unlikely to happen but when they do they lead to big losses. Many sustainability-related risks have such tail risk properties. It can be difficult to foresee that a dam will burst, for example, but if it does the consequences will be catastrophic. Corruption scandals and oil leakages are other examples of such risks.

Early-stage research<sup>13</sup> on the subject suggests that tail risk insurance costs increase for CO<sub>2</sub>-intensive companies when public attention on climate issues is heightened (Ilhan et al., 2020). Generally speaking, research shows that options for protecting against tail and variance risks become more expensive when there is a high level of political uncertainty (Kelly et al., 2016).

CO<sub>2</sub>-intensive businesses have already experienced such effects in the bond market, as is illustrated in Figure 4. One of the most sizeable risks in the investment grade market in Europe in the 2010s was related to the repricing of bonds issued by Vattenfall. In early 2015,

**“The returns on bonds are characterized by small high-probability profits and large low-probability losses.”**

12) For a longer discussion about the differences between bonds and equities when it comes to risk and return, see e.g. Erlandsson (2020b).

13) Research on the financial effects of CO<sub>2</sub> intensity generally encounters significant problems when it comes to data. The limited data meant that early studies often relied solely on Scope 1 (direct emissions) and Scope 2 (indirect emissions) data on CO<sub>2</sub> intensity. Over time, larger studies covering a broader spectrum of companies and issuers, and higher quality data, such as on Scope 3 emissions from the entire value chain, should be expected.



”Insurance contracts on bonds (CDS) could also be relevant from a sustainability perspective.”

Vattenfall issued a EUR 1.5 billion hybrid bond<sup>14</sup> at an average yield of approximately 3 per cent. Shortly after the issuance, as was the case for other European utility companies, the market began to question the valuation put on the company’s coal business. As the re-evaluation of coal intensified, the price of the newly issued bond fell by 25 per cent in one of the largest price drops of a newly issued investment grade bond in history. For an investor seeking to invest in bonds for protection, a price drop of 25 per cent is hard to accept, even though the price recovered over time. At the trough, the bonds were traded at a yield of 6 per cent. It is likely that the significantly higher capital costs implied by this had a substantial impact on the estimated costs of shutting down the coal business. Its lignite activities were put up for sale latter part of 2015.

#### Example: The bond market pricing in coal-related risks

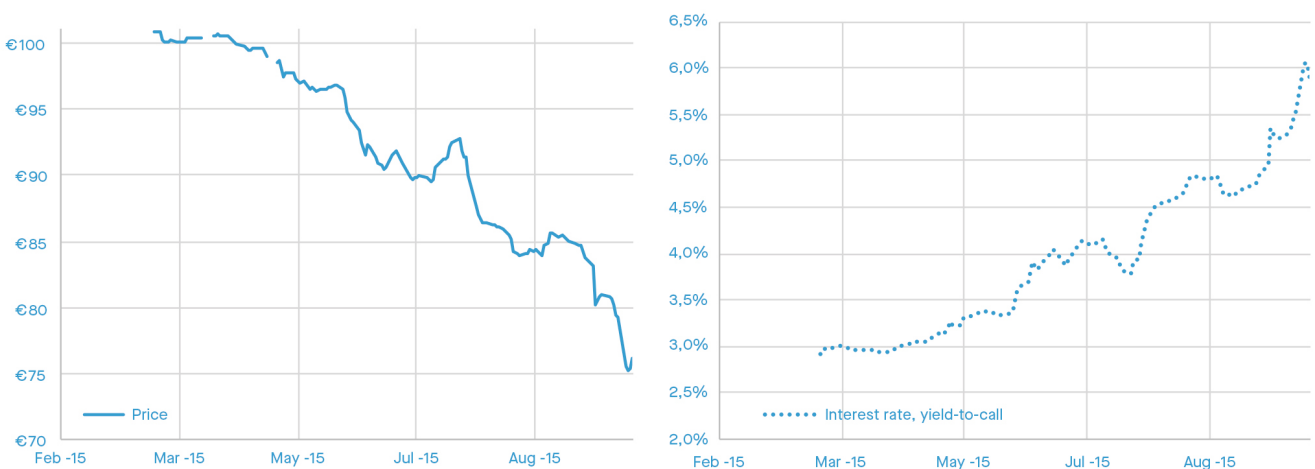


Figure 4. Vattenfall 3% Perp, call 2027, hybrid bond in €. Bond price after issuance in February 2015 (left) and yield/implicit capital cost (right). The initial price was €100 for a capital cost of 3%. The price fell to around €75 in September, translating into an implied capital cost of 6%.

Source: Bloomberg and authors’ calculations.

The asymmetry inherent in bonds, with their large downside risks, translates into a need to find insurance solutions. In the same way as private individuals buy insurance for low-probability events, such as the risk of the house burning down, there is also an active market for bond insurance. Credit Default Swaps (CDS) are one way for investors to insure bond portfolios against downside risks. There is, however, no requirement for the underlying asset to be owned by the insurer. Hence, investors can buy insurance protection in the CDS market for issuers that are believed to be at high risk without owning the actual bonds.

What implications does the CDS market have for sustainability? First and foremost, this gives investors an opportunity to speculate on certain companies that do not have climate-related risks priced into their bond valuations. Exxon Mobil, for example, currently has very low risk priced into its credit spread. Buying CDS protection in Exxon Mobil is therefore a direct way of speculating that higher climate-related risks will be priced into the company’s bonds over time.<sup>15</sup>

14) A hybrid bond is a bond that can be converted to equity capital if the company’s financial condition deteriorates. This buffer property involves higher risk than a regular bond and a wider credit spread. Bonds that take on equity-like risks are referred to as subordinated capital and are most commonly used by banks, financial issuers and power companies.

15) The share price of Exxon Mobil fell by 33.4 % in the first four months of 2020. The five-year CDS spread increased from 0.35% to 0.74%.

Such speculation can have an impact on the bond price and the capital costs of Exxon Mobil.<sup>16</sup> The market's pricing of CDS, or the CDS spread, is an important input factor when new bonds are issued and priced, and also affects the pricing of different types of credit facilities (see e.g. Ivanov et al., 2014). A bank quoting a yield for a credit facility for a company, so-called revolving credit,<sup>17</sup> will price in how expensive it will be for them to hedge against the company's risk, which will be done in the CDS market if possible. As a result, the interest rate that the company receives on its credit facility will be directly linked to the CDS spread. During the COVID-19 pandemic, many companies have used their revolving credit facilities as a first port of call to obtain liquidity (Financial Times, 2020c).

## Bond curves and the time perspective on climate risk

Bond issuers face important decisions when borrowing money – and so do investors when trying to evaluate the risk profile of an individual bond. One of the most important risk factors is the time to maturity.<sup>18</sup> When BP borrows USD 1 billion by issuing a bond with a time to maturity of 30 years, this has a significant impact on financing risks for a long time to come.

At the same time, investors need to carefully analyse very different climate risks if they are lending on/investing in a bond that is to be repaid in 30 years as opposed to 2 years. This creates opportunities for investors to initiate so-called curve positions on bonds. An equity investor simply chooses whether to invest in the BP stock or not. As a bondholder, there is a decision to be made on making an investment over different time horizons.

It could be that the market believes the risk premium for BP should be 0.3 per cent annually over the risk-free rate for a three-year horizon, but maybe 0.5 per cent annually on a 30-year horizon. In this case the curve is said to be  $0.5\% - 0.3\% = 0.2\%$ . The investor then needs to judge whether the curve is “correct”. If the investor believes the curve is too flat, there is the possibility of building a position to profit from a steeper curve; or, in other words, to prepare for a scenario in which the market starts to assess the long-term risk as higher relative to the short-term risk. For a demonstration of common credit curve trade techniques see, for example, Rennison et al. (2008).

16) There is an arbitrage argument regarding the CDS spread and the bond spread, see e.g. Bai & Colin-Dufresne (2018).

17) A revolving credit facility is a binding contract on behalf of a bank or bank syndicate to lend money to a company directly. This can be compared to a personal overdraft. In the early days of the COVID-19 pandemic, many companies maxed out their credit facilities to access liquidity.

18) Other parameters include currency, subordination and coupon (floating or fixed).

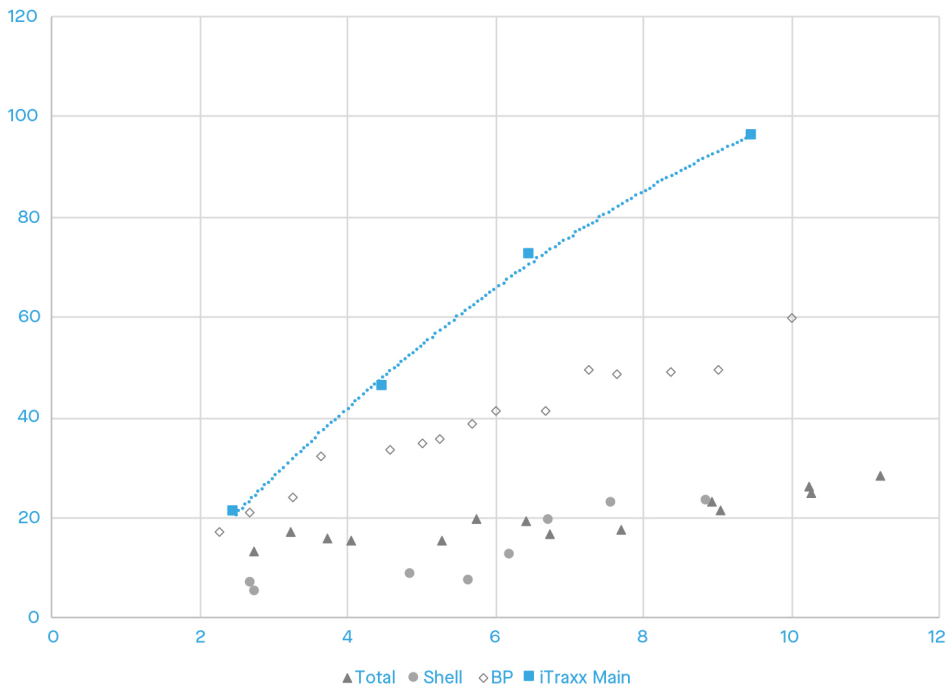


Figure 5. Bond curve credit spreads for three oil company issuers and a broad credit index. iTraxx Main, 2091H1.

Source: Bloomberg.

All this could have significant implications for how the markets prices climate risks. Big oil companies' bond curves appear to discount very low long-term risks in their business models. The bond curves are quite flat from 3 year maturities and further out. BP will likely still be around in three years, regardless of whether the company makes structural changes on renewable energy. The long-term risks, however, are substantial if there is no effort to transition into renewables. In today's market, however, as is illustrated in figure 5, many fossil-intense companies have flat price curves, indicating high short-term risks relative to long-term risks. Hence, the market seems to believe that there are bigger risks for BP in the short run relative to the long term. This inference is even more clear for Total and Royal Dutch Shell who have flatter long term curves.

For investors, the shape of the curve can send an important message to companies. An investor may be looking to provide capital to BP under the condition that the proceeds will be used to transition the business model from fossils to renewables. The company might accept this in spirit, but through the traditional bond market the lender will have little legal recourse over the company to actually fulfil such a transition commitment. However, by only agreeing to lend shorter term, e.g. over three years, the investor achieves a form of control. If BP does not comply, the investor simply will not renew the loan. Thus, the willingness to finance over the longer or shorter term plays an important role in incentivizing companies to actually execute on commitments.



## Central banks and their impact on the bond market

Central banks have become an increasingly dominant player in the bond markets. Despite their dominance, however, they have taken few initiatives in relation to sustainability. The world's central banks currently hold bond portfolios of approximately USD 10,000 billion for the management of foreign exchange reserves alone.<sup>19</sup> Central banks are also big players in the government bond markets. For example, they own 20 per cent of Australian government debt (IMF, 2020; Australian Office of Financial Management, 2020),<sup>20</sup> and are thereby financing the world's largest exporter of coal and the world's third-largest exporter of fossil fuels (Australia Institute, 2019). The Swedish Riksbank has begun to analyse its bond holdings from a climate perspective, and the European Central Bank is starting to look at climate risks in its bond portfolio. November 2019, the Riksbank decided to sell its bonds in the Canadian province of Alberta and the Australian states of Queensland and Western Australia because of their large climate footprint (Sveriges Riksbank, 2019; Environmental Finance, 2020). It should be noted that the government bond market is a source of financing for global public fossil subsidies, which were estimated to be USD 5.2 billion or 6.5 per cent % of global GDP in 2017 (Coady et al., 2019).

Additional central bank resources of approximately USD 11.5 billion (Papadopoulos, 2020) are in the non-conventional portfolios linked to quantitative easing (QE). It is here that "green QE" is being discussed. Green QE would occur when a central bank conducts a bond purchasing programme that prioritizes a larger share of green bonds over regular purchases. (For more on the effects of QE on corporate bonds, see Todorov, 2020, among others.) Such a policy would primarily affect the proportion allocated to corporate bonds, which have historically been a small part of QE programmes.<sup>21</sup> The QE programmes launched in response to the COVID-19 pandemic are explicitly tilted towards corporate bonds, which will increase the importance of these programs in the future.

Central banks sometimes play an important role as managers of national funds, the Norwegian Oil Fund or the Monetary Authority of Singapore (MAS) being typical examples. Should the Norwegian Oil Fund, which has over USD 1 billion in assets under management, decide not to invest in certain bonds, this would have an impact on the bond market. Decisions by large institutions not to invest in certain bonds mean a permanent shift in demand for this type of capital. Once again, this translates into issuers being forced to offer higher coupon rates on their bonds, meaning increased capital costs, in order to replace the large institutional investors.

In this context, the role of central banks as financial regulators should also be noted.<sup>22</sup> This is outlined briefly in Box 1. Sometimes relatively technical regulations can have an impact on bond valuations and the capital costs of climate-related economic activities. Capital weights are being used as policy instruments in other contexts and this can be controversial. For example, capital weights for holdings in government bonds are often set at zero today, indicating zero risk of investing in these bonds. This means that the central bank or the regulator takes on the risk valuation element that would otherwise be handled by the

19) The foreign exchange reserve is a portfolio of foreign bonds that is kept to maintain the ability to process international payments in the case of disturbances in the supply of foreign currencies. For example, the Swedish Riksbank holds US government bonds that can be sold to obtain US dollars should Swedish companies be unable to obtain US dollars for themselves.

20) The authors make the assumption that at least 50% of the official figure for central bank holdings of AUD bonds is in government bonds.

21) For example, the ECB has implemented a quantitative easing programme of €2.1 trillion, of which €195 billion, <10%, has been invested in corporate bonds (ECB, 2020). The COVID-19 pandemic could affect these numbers significantly over time. The federal reserve had not bought corporate bonds before the current crisis.

22) In Sweden there is a difference between interest rate policy, which is set by Riksbanken, and financial regulation, which is undertaken by Finansinspektionen.

market (BIS, 2017). The discussion about so-called green risk weights is ongoing, not least within the Swedish Riksbank (Bremán, 2020) but also at the international level – often in the shape of increased risk weights for fossil fuel risks (Financial Times, 2020d; Philipponnat, 2020).

## Increased focus on the bond market and its link to the climate change mitigation

This report shows that there are obvious links to the climate and that there is considerable potential for investors to use their bond mandates to contribute positively to climate change-related investments. Academic researchers, market participants, the environmental movement, politicians and others who study sustainable finance or have an agenda for sustainable investing should put more emphasis on this aspect of the capital market.

The report also identifies questions that require further investigation, not least through academic research.

- We know something from previous research about how shareholders conduct so-called shareholder engagement (e.g. Sjöström, 2008; 2020): but to what extent are bond investors using their impact possibilities through roadshows and other interactions with the companies they are considering financing or refinancing? What do these processes look like? What are the potential obstacles to climate issues receiving greater attention? To what extent is there cooperation with colleagues in equity markets on discussions of climate impact investing? How is the climate question valued financially by investors?
- How does the climate question – or sustainability more generally – affect the pricing of bonds? There is nascent academic research on the subject (see e.g. Zerbib, 2019; Hachenberg & Schiereck, 2018) but more research is required.
- To use short selling, that is to use speculative positions to profit from falling prices, is often considered controversial. At the same time, however, it is useful to investigate, empirically or theoretically, whether it is more efficient to make green investments in a Swedish real estate company or to sell certain fossil-intense companies short, and to undertake other comparisons of this kind.
- How do central banks see their role with regard to climate change, as investors and regulators respectively? What effects would central banks have on the fossil fuel sector's capital costs if they redirected their holdings to less CO<sub>2</sub>-intense alternatives?
- Regarding the development of passive indices within the fixed income asset class: how could broad flexible indices with less climate impact be constructed? In addition, can cheap investment products be designed based on these indices?

- The “term structure of interest rates” has received widespread attention in financial research (see e.g. Cox, Ingersoll and Ross, 1985; or Merton, 1974). How can the research on the time aspect of climate scenarios be integrated into the shape of bond curves?
- What does the price relationship between the supply of and demand for capital look like in the bond market? In other words, what effect would the decision to exclude certain bonds have on interest rates and the capital costs of the borrower? In this context, it should be possible to devise central bank models related to how bond purchases drive down interest rates costs, thereby stimulating the economy. This would be a constructive way of starting to measure the climate effect of investment decisions on bond portfolios.
- How important is the bond market as a source of financing that allows listed fossil fuel-intensive companies to ensure stable dividend flows?

## The role of the regulator: How risk weights work

A bank has equity capital of USD 100. The bank regulator<sup>23</sup> decides that the risk weight for lending to companies should be 25%. This means that for every dollar that the bank lends, it needs to set aside 25 cents as a buffer should the loan not be repaid. As a consequence, the bank could lend  $\$100/25\% = \$400$ . The risk weight simply determines the maximum amount that the bank can use for its lending activities.

If the bank regulator increases the risk weight for “non-green” loans to 30%, then the bank can lend  $\$100/30\% = \$333$  to non-green projects. If the regulator decreases the risk weight for “green” loans to 20%, then the bank can lend  $\$100/20\% = \$500$  to green projects.

Assuming that the bank has a required rate of return from shareholders of 10%, meaning an annual dividend of \$10, the bank would need to have a margin on its lending activities of  $\$400 \cdot x = \$10 \Leftrightarrow \$10/\$400 = 2.5\%$  in the base case scenario with neutral risk weights. In other words, if the bank pays 2% interest to its savings clients, it would need to lend money at an interest rate of 4.5% to achieve the shareholders' required rate of return.

If the bank regulator requires the use of “non-green” risk weights, then the bank would need a margin of  $\$10/\$333 = 3\%$  for such lending, with a total interest rate of  $2\% + 3\% = 5\%$ . For green financing, the required margin is only  $\$10/\$500 = 2\%$ , with total interest on the green loans of 4%. This means that a marginal shift of risk weights can shift the relative lending and capital cost of brown and green lending quite substantially. In this case, the green borrower gets a 1 per cent cheaper loan and a lower cost of capital compared to the non-green borrower.

23) Bank regulation is often part of a central bank's mandate. In Sweden it is Finansinspektionen, not the Riksbank, that is responsible for the regulatory oversight of banks and for setting risk weights.



# References

- Ansar, A., Caldecott, B. & Tilbury, J. (2013), **Stranded assets and the fossil fuel divestment campaign: what does divestment mean for the valuation of fossil fuel assets?** Smith School for Enterprise & Environment, Oxford.
- Anthropocene Fixed Income Institute (2020), **Global investors and the Carmichael mega-mine**, <https://anthropocenefii.org/afii-carmichael>.
- Australia Institute (2019), **High Carbon from a Land Down Under**, [https://www.tai.org.au/sites/default/files/P667%20High%20Carbon%20from%20a%20Land%20Down%20Under%20%5BWEB%5D\\_O.pdf](https://www.tai.org.au/sites/default/files/P667%20High%20Carbon%20from%20a%20Land%20Down%20Under%20%5BWEB%5D_O.pdf).
- Australian Office of Financial Management (2020), **The Australian Government Securities investor base**, <https://www.aofm.gov.au/investors/wholesale-investors/investor-insights/australian-government-securities-investor-base>.
- Ayling, J. & Gunningham, N. (2017), **Non-state governance and climate policy: the fossil fuel divestment movement**, *Climate Policy*, 17(2): 131-149.
- Bai, J. & Colin-Dufresne, P. (2018), **The CDS-bond basis**, *Financial Management Journal*, 48(2): 417-439.
- Bank of International Settlements (2020), **Summary of debt securities outstanding**, <https://stats.bis.org/statx/srs/table/c1?f=pdf>.
- Bergman, N. (2018), **Impacts of the fossil fuel divestment movement: Effects on finance, policy and public discourse**. *Sustainability*, 10: 2529.
- BIS (2017), **The regulatory treatment of sovereign exposures**", Discussion paper Basel Committee on Banking Supervision, ISBN 978-92-9259-117-5.
- BlackRock (2020), **Sustainability as BlackRock's New Standard for Investing**, <https://www.blackrock.com/au/individual/blackrock-client-letter>.
- Bloomberg (2020a), **BOOKSTATS: Adani Electricity Gets >\$5.9bn Orders for \$1bn Bond** <https://blinks.bloomberg.com/news/stories/Q59HOTDWX2PU>.
- Bloomberg (2020b), **Big Coal Escapes BlackRock's New Climate Plan**, <https://www.bloomberg.com/news/articles/2020-01-14/blackrock-s-tough-on-coal-plan-skirts-around-the-biggest-miners>.
- BNP Paribas (2019), **Transition bonds: is sustainable finance about to reach critical mass?** [https://cib.bnpparibas.com/sustain/transition-bonds-is-sustainable-finance-about-to-reach-critical-mass-\\_a-3-3260.html](https://cib.bnpparibas.com/sustain/transition-bonds-is-sustainable-finance-about-to-reach-critical-mass-_a-3-3260.html).
- Breman, A. (2020), **Så kan Riksbanken bidra till klimatpolitiken [How the Riksbank can contribute to climate politics]**, Speech March 2, 2020, <https://www.riksbank.se/sv/press-och-publicerat/tal-och-presentationer/20202/breman-sa-kan-riksbanken-bidra-till-klimatpolitiken/>.
- Carville, J. (1993) **Wall Street Journal**, 25 February 1993, p. A1.
- Climate Action 100+ (2020), **2019 Progress Report**, <https://climateaction100.files.wordpress.com/2019/10/progressreport2019.pdf>.
- Climate Bonds Initiative (2019), **Green Issuance Surpasses \$100bn mark for 2019**". 25 June 2019. <https://www.climatebonds.net/2019/06/green-issuance-surpasses-100-billion-mark-2019-first-time-milestone-reached-first-half-eu>.
- Clubb, R., Takahashi, Y., & Tiburzio, P. (2016), **Evaluating the Relationship Between e and Corporate Fixed Income**. MIT Sloan. Retrieved from <http://mitsloan.mit.edu/actionlearning/labs/s-lab-projects.php>.
- Coady, D., Parry, I., Le, N-P. and Shang, B. (2019), **Global Fossil Fuel Subsidies Remain Large: An update on Country-Level Estimates**, IMF Working Paper WP/19/89. <https://www.imf.org/~media/Files/Publications/WP/2019/WPIEA2019089.ashx>.
- Cox, J. C., Ingersoll J. E. & Ross, S. A. (1985), **A theory of the Term Structure of Interest Rates**, *Econometrica* 53(2): 385-407.
- Dordi, T. & Weber, O. (2019), **The impact of divestment announcements on the share price of fossil fuel stocks**. *Sustainability*, 11: 3122.
- ECB (2020), **Asset purchase programs**, <https://www.ecb.europa.eu/mopo/implement/omt/html/index.en.html>.
- Environmental Finance (2020), **Riksbank divestment open floodgates to questions on climate divestment**. <https://www.environmental-finance.com/content/news/riksbank-divestments-open-floodgates-to-questions-on-climate-divestment.html>
- Erlandsson, U. (2017), **Credit alpha and CO2 reduction: A portfolio manager approach** [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2987772](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2987772).

Erlandsson, U. (2018), **Bond vigilantes and climate change**, Responsible Investor, <https://www.responsible-investor.com/articles/comment-bond-vigilantes-and-climate-change>.

Erlandsson, U. (2020a), **Green Bond Risk Premiums: A Twin-Bond Approach**, manuscript. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3624591](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3624591)

Erlandsson, U. (2020b), **Resolution for Europe's regulators: Let retail investors access climate impact strategies**. Responsible Investor, 20 January 2020, <https://www.responsible-investor.com/articles/a-resolution-for-europe-s-regulators-let-retail-investors-access-climate-impact-strategies>.

Financial Times (2019a), **Saudi bond bonanza as investors draw a line under Khashoggi killing**, 9 April 2019, Revised web-version titled **Orders for first Saudi smash \$100bn** on <https://www.ft.com/content/8b82d9ec-5a95-11e9-9dde-7aedca0a081a>.

Financial Times (2019b), **Why the bond market is so keen to back Saudi Aramco**, 4 April 2019, <https://www.ft.com/content/5b6512a2-561c-11e9-91f9-b6515a54c5b1>.

Financial Times (2020a), **BlackRock rebukes Siemens on its environmental record**, 6 February 2020 <https://www.ft.com/content/92512bcc-48b3-11ea-ae2-9ddbdc86190d>.

Financial Times (2020b), **Oil majors tap bond markets for \$32bn**, 5 April 2020 <https://www.ft.com/content/c4121d80-0815-4d7d-b43f-582f55ad2892>.

Financial Times (2020c), **Riskier European companies draw €32bn from bank credit lines**, 27 May 2020, <https://www.ft.com/content/c405fe29-9e78-4ade-9ee5-1f890911bdb3>.

Financial Times (2020d), **Threat from climate change to financial stability bigger than Covid-19**, 8 June 2020. <https://www.ft.com/content/710cc474-15f7-4db0-8d54-a50f161f76bb>.

Financial Times (2020e), **Norwegian investors back debt-for-equity swap to unlock rescue**, 4 May 2020, <https://www.ft.com/content/ae1fc18f-f95b-4d6a-8036-8b9a98679d4d>.

Financial Times. **"ECB to consider using climate risk to steer bond purchases, says Lagarde"**, 14 October 2020. <https://www.ft.com/content/f5f34021-795f-47a2-aade-72eb5f445e09>

Fink L.D. & Novick, B.G. (2018), Trends in global asset management: the rise of index investing, **Financial Stability Review**, Banque de France, issue 22, pp. 49-62, April 2018.

Global Capital (2018), **The power of the roadshow**, 30 April 2018 <https://www.globalcapital.com/article/b17zy2b2rtpy89/the-power-of-the-roadshow>.

Hachenberg, B., Schiereck, D. (2018) Are green bonds priced differently from conventional bonds? **Journal of Asset Management**, 19: 371–383.

Hansen, T. & Pollin, R. (2018) **Economics and climate justice activism: Assessing the fossil fuel divestment movement**. Political Economy Research Institute, University of Massachusetts Amherst, Working Paper No. 452.

Heede, Richard (2019), **Carbon Majors: Accounting for carbon and methane emissions 1854-2010**. Methods & Results Report, ISBN 978-3-659-57841-0, OmniScriptum, Riga, 148 pp.

Ilhan, E., Sautner, Z. & Vilkov, G. (2020), **Carbon Tail Risk**. <https://ssrn.com/abstract=3204420> el. <http://dx.doi.org/10.2139/ssrn.3204420>.

International Monetary Fund (2020), **Currency Composition of Official Foreign Exchange Reserves (COFER)**, <https://data.imf.org/?sk=E6A5F467-C14B-4AA8-9F6D-5A09EC4E62A4>.

Ivanov, I.T., Santos, J.A.C. & Vo, T. (2014), **The transformation of banking: Tying loan interest rates to borrowers' CDS spreads**, Finance and Economics Discussion Series, Federal Reserve Board.

Kelly, B., Pastor, L. & Veronesi, P. (2016), The price of political uncertainty: Theory and evidence from the option market. **Journal of Finance**, 71: 2417–2480.

Maltas, A. & Nykvist, B. (2020), **Understanding the role of green bonds in advancing sustainability**, Journal of Sustainable Finance & Investment, DOI: 10.1080/20430795.2020.1724864.

Merton, R. C. (1974), **On the pricing of corporate debt: the risk structure of interest rates**, The Journal of Finance, 29(2): 449-470.

Papadopoulos, C. (2020), **Central bank kickstart asset purchases**, OMFIF, <https://www.omfif.org/analysis/central-banks-kickstart-asset-purchases/>.

Phillipponnat, T. (2020), **Breaking the climate finance doom-loop**, Finance Watch report <https://www.finance-watch.org/publication/breaking-the-climate-finance-doom-loop/>.

Polbennikov, S., Desclée, A., Dynkin, L. & Maitra, A. (2016), ESG ratings and performance of corporate bonds, **Journal of Fixed Income**, 26(1):21–41.

Queensland (2020), **Carmichael Coal Mine and Rail Project**, <https://www.statedevelopment.qld.gov.au/coordinator-general/assessments-and-approvals/coordinated-projects/completed-projects/carmichael-coal-mine-and-rail-project.html>.

Rennison, G., Erlandsson, U. & Ghosh, A. (2008), CDS Curve **Trading Handbook 2008**, Barclays Capital Research report, <https://mhderivatives.com/wp-content/uploads/2014/07/6716-Barclays-Capital-CDS-Curve-Trading-Handbook-20081.pdf>.

SEB (2020), **The Green Bond**, 8 April 2020.

Securities Industry and Financial Markets Association. SIFMA, <https://www.sifma.org/resources/archive/research/statistics/>.

Sjöström, E. (2008), Shareholder Activism for Corporate Social Responsibility: What Do We Know? **Sustainable Development**, 16: 141-154.

Sjöström, E. (2020), **Active Ownership on Environmental and Social Issues: What works?** Report published by Mistra Center for Sustainable Markets.

Sveriges Riksbank (2019), **Flodén, Riksbanken säljer obligationer av klimatskäl**, 2019-11-13 <https://www.riksbank.se/sv/press-och-publicerat/tal-och-presentationer/2019/floden-riksbanken-saljer-obligationer-av-klimatskal/>.

Todorov (2020), Quantify the quantitative easing: Impact on bond and corporate debt issuance. **Journal of Financial Economics**, 135:2.

UNFCCC (2015), Paris Agreement [https://unfccc.int/files/meetings/paris\\_nov\\_2015/application/pdf/paris\\_agreement\\_english\\_.pdf](https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf).

United Nations (2015), Addis Ababa Action Agenda of the Third International Conference on Financing for Development, [https://www.un.org/esa/ffd/wp-content/uploads/2015/08/AAAA\\_Outcome.pdf](https://www.un.org/esa/ffd/wp-content/uploads/2015/08/AAAA_Outcome.pdf).

World Bank (2019), **10 Years of Green Bonds: Creating the Blueprint for Sustainability Across Capital Markets**, <https://www.worldbank.org/en/news/immersive-story/2019/03/18/10-years-of-green-bonds-creating-the-blueprint-for-sustainability-across-capital-markets>.

World Federation of Exchanges (2019) **Full Year Market Highlights**, <https://www.world-exchanges.org/news/articles/world-federation-exchanges-publishes-2018-full-year-market-highlightspressrelease>

Zerbib, O.D. (2019), The effect of pro-environmental preferences on bond prices: Evidence from green bonds. **Journal of Banking & Finance**, 98: 39–60.

# 녹색채권 시장 운영 및 아태지역의 기후금융 동향

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## 발제 3

Christina Ng

에너지경제·재무분석연구소(IEEFA) 선임연구원





# 자본시장과 탄소중립시대 – 회사채 시장의 기후 리스크 평가

아시아 태평양 지역의  
녹색 채권과 석탄

Christina Ng  
2021년 2월 23일



Institute for Energy Economics  
and Financial Analysis  
IEEFA.org



# Capital Markets in the Carbon Neutral World – Dealing with Climate Risk in the Fixed Income Market

Green bonds and Coal in  
Asia Pacific

Christina Ng  
23 February 2021



Institute for Energy Economics  
and Financial Analysis  
IEEFA.org



## IEEFA 소개

- '에너지경제재무분석 연구소(이하 IEEFA)'는 에너지 시장, 트렌드, 그리고 정책 관련 문제들을 검토하는 연구소입니다.
- 호주, 홍콩, 인도, 인도네시아, 필리핀, 베트남, 영국, 푸에르토리코와 미국 등 국가 출신인 35명의 에너지 및 금융 분석가들로 구성되어 있습니다.
- 자선사업으로부터 자금을 받고 운영하며, IEEFA의 전략에 대해 정부 투자나 영리목적의 컨설팅은 받지 않습니다.

Trey Cowan February 9, 2021

### IEEFA: Capital markets are shifting decisively towards cleaner investments

Small-but-rising renewable opportunities soar while big-and-falling legacy shares fall hard

Press Release and Thu Vu January 19, 2021

### IEEFA: There will be no smooth sailing for LNG investors in Vietnam

Great enthusiasm will be met by regulatory, financing and market challenges

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### IEEFA Indonesia: PLN has 'Green Ambition' but is short on renewable energy credibility

A detailed sustainability roadmap going forward will assist PLN's credibility with ESG investors



22 December 2020 (IEEFA Indonesia): PLN must be prepared for a much higher level of scrutiny around its continuing coal investments and lack of progress in renewable energy investment as projects when the company launches its debut green and/or sustainable bonds, finds a **new briefing note** by the Institute for Energy Economics and Financial Analysis (IEEFA).

Indonesian state-owned electricity company PT Perusahaan Listrik Negara (PLN) is preparing to issue a "green and/or sustainable financing" instrument as early as January 2021 following the publication of its Statement of Intent on Sustainable Financing Framework last month.

Author of the briefing note Christina Ng, says although this is the right direction, PLN now needs to work hard to build investor credibility given its track record.

"PLN's recent commitment to provide clean and sustainable energy for Indonesia in line with

PLN's renewable energy performance will be of concern

3



## About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies.

35 energy finance analysts across Australia, Hong Kong, India, Indonesia, the Philippines, Vietnam, England, Puerto Rico and the USA.

Solely funded by philanthropy who have no material input into our work strategy. No paid consultancies nor government funding.

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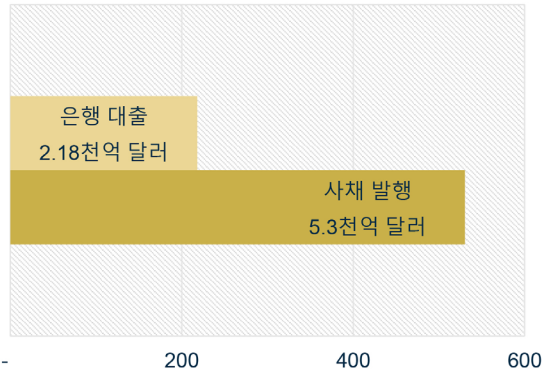
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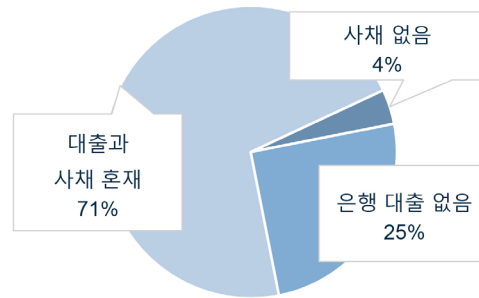
아시아 석탄기업들은 사채발행을 통해 은행 대출 2.5배 규모의 자본을 조달하고 있음

### 사채 vs. 은행 대출 규모



출처: 로이터즈, 무디즈, 회사

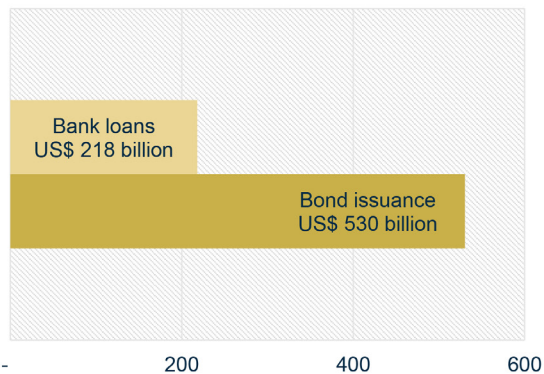
### 자금 조달 방식



출처: 로이터즈, 무디즈, 회사 연차 재무보고

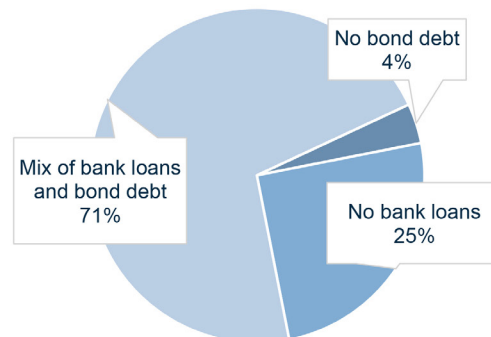
## Asian coal players raise 2.5x capital through bond issuance than bank loans

### Bond issuance value vs Bank loan origination value



Source: Reuters, Moody's, company annual financial reports

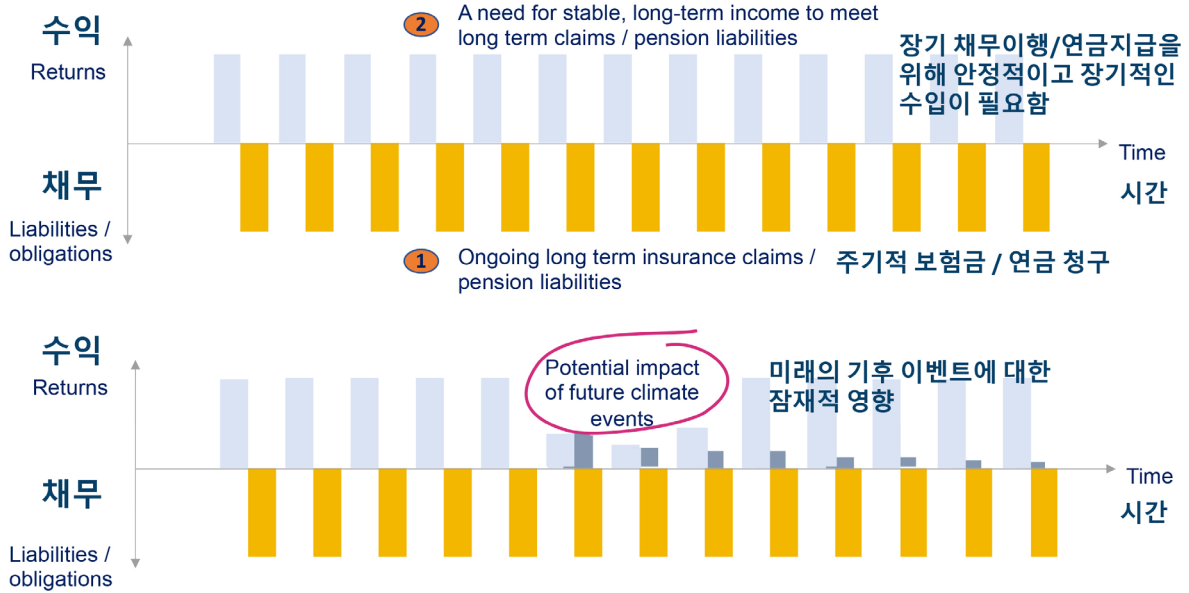
### Source of financing



Source: Reuters, Moody's, company annual financial reports

# 왜 기후 리스크는 사채 투자자에게 우려인가?

장기채무는 안정적인 장기 수익으로 뒷받침되어야 함



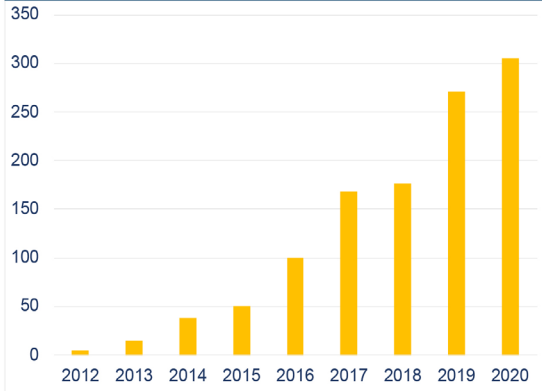
## Why climate risk is a concern to bond investors?

Long-dated liabilities need to be serviced from stable long-term yield



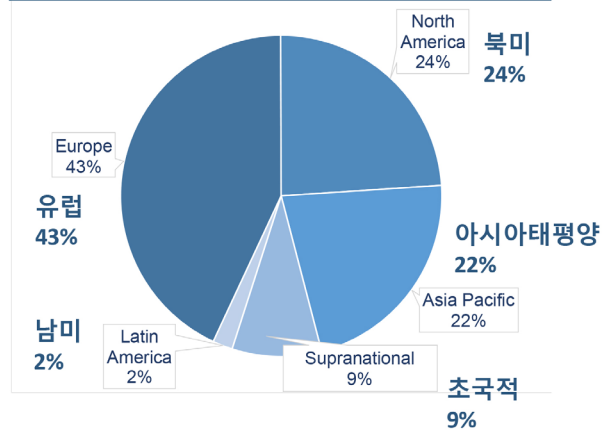
## 녹색채권 시장은 급격하게 성장하는 단계에 진입했지만 내역은 천차만별

세계 녹색 채권 연간 총발행액 (\$10억)



출처: 블룸버그 NEF

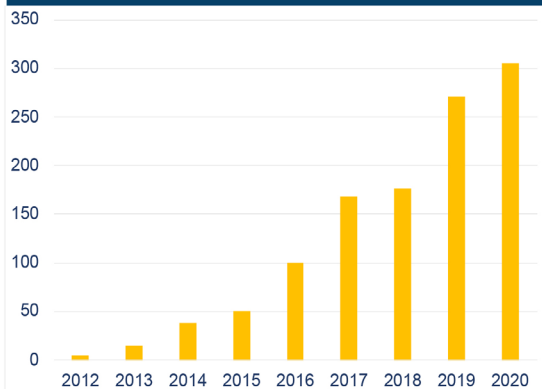
지역별 녹색채권 발행 (2020)



출처: Climate Bond Initiative

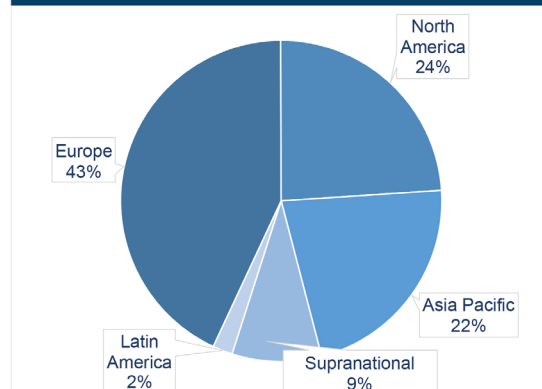
## Green bond market poised for dramatic growth but quality of issuance varies

Global green bonds annual issuance (in US\$ billion)



Source: Bloomberg NEF

2020 green bond issuers by region



Source: Climate Bonds Initiative

## 아시아 태평양 지역은 빠르게 성장하는 초기 시장

녹색채권에서 옥석을 가리기 위해서는 경험이 필요함

- Look beyond high yields and investment grades, and scrutinise a company's overall strategy, governance and follow-through
  - A credible roadmap for phasing out fossil fuel energy sources
  - Experts and methodology for selecting projects
  - Safeguards for managing proceeds
  - Commitment on impact reporting post-issuance
  - Quality of past reporting: transparency, granularity and consistency
  - Continuous monitoring and engagement
- 이자율과 신용등급 외에도 회사의 전반적인 전략과 거버넌스를 살펴보고 지속적으로 모니터링할 것
  - 화석 연료를 감축하는 믿음만한 계획이 있는지
  - 프로젝트 선정을 위한 방법론 수립과 전문가 보유
  - 수익 관리를 위한 보호장치
  - 발행 후 영향 보고 체계
  - 과거 보고 실적을 통한 투명하고 자세하며 일관된 보고 여부 평가
  - 주기적인 모니터링과 개입

AXA자산운용은 카마이클 광산에 대한 반대 여론속에 인도 주립 은행 녹색 채권 투자를 정리하였음

저희의 녹색 채권 투자 관련 프레임워크는 엄격합니다. 저희는 파리 협정을 지지하고 친환경적인 방향으로 가는 회사들을 찾고 있습니다. 그런 맥락에서 해로운 사업에 금융 제공 하는 것은 용납할 수 없습니다.

리스 모레, 기후 전략 담당 / 악사 IM 임팩트 및 사회 책임 투자

## A very young and fast moving market in Asia Pacific

It's a learning process sorting through the good and not so good green issuance

- Look beyond high yields and investment grades, and scrutinise a company's overall strategy, governance and follow-through
  - A credible roadmap for phasing out fossil fuel energy sources
  - Experts and methodology for selecting projects
  - Safeguards for managing proceeds
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  - Quality of past reporting: transparency, granularity and consistency
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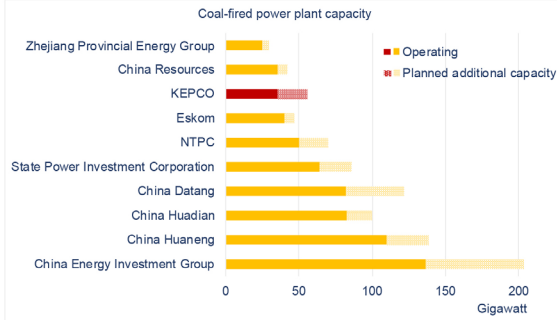
**Axa IM ditches State Bank of India green bonds amid Carmichael coal furore**

*"We have a framework that is very strict with regards to green bond investments... Typically, we are looking for intentionality of companies to go green and support the Paris agreement. In that context, financing such a harmful project is a no-go."*

– Lise Moret, head of climate strategy – impact and responsible investment at Axa IM

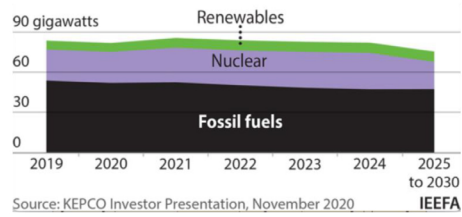
## 사례 : 한전 2020 녹색채권

### 전세계 석탄화력발전 용량 8위



출처: Global 석탄발전소 트래커 2020 7월, Global 탈석탄 목록 2020

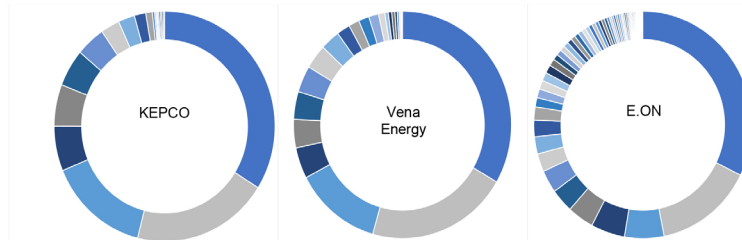
### 화석연료가 발전용량 중 1위 유지 예상



Source: KEPCO Investor Presentation, November 2020 IEEFA

출처: 한전 투자자 발표 2020 11월

### 한전의 사채는 동종업계에 비해서 다양성이 부족함



출처: 블룸버그

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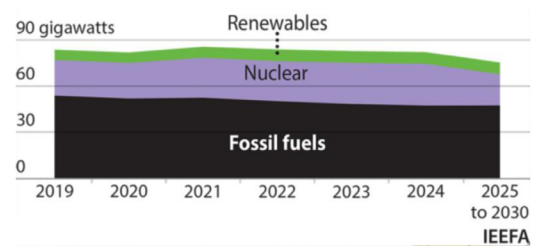
## KEPCO 2020 green bond as an example

### Ranked 8<sup>th</sup> in global coal-fired power plants



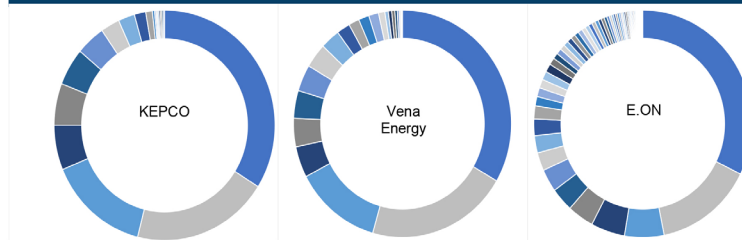
Source: Global Coal Plant Tracker July 2020, Global Coal Exit List 2020

### Fossil fuels lead projected capacity



Source: KEPCO Investor Presentation November 2020

### KEPCO's bondholding lacked breadth compared to its peers



Source: Bloomberg

## 정부 지원으로 인한 높은 신용 등급이 리스크를 축소하는 효과

재무적 기초가 탄탄하지 않을 경우 채무 상환 능력에 대해 의문이 제기될 수 있음

국영기업	최종 평가 S&P / 무디즈 / 피치	Notch Upgrade	자본부채 비율	Debt Service cover
KEPCO	AA / Aa2/ AA-	6	51.4%	-0.58x
China Huadian	A-/ A2/ A	5	85.2%	-0.42x
PT Perusahaan Listrik Negara	BBB/ Baa2/ BBB	4	29.1%	-1.14x
NTPC Limited	BBB-/ Baa3/ BBB-	0	59.4%	-0.81x

Source: Reuters, S&P, Moody's, Fitch and IEEFA estimates

## High credit ratings due to sovereign support underplay risks

Weak financial fundamentals raises questions about the company's ability to service its debt obligations

State-owned enterprises	Final ratings S&P / Moody's / Fitch	Notch upgrade	Debt to capital	Debt service cover
KEPCO	AA / Aa2/ AA-	6	51.4%	-0.58x
China Huadian	A-/ A2/ A	5	85.2%	-0.42x
PT Perusahaan Listrik Negara	BBB/ Baa2/ BBB	4	29.1%	-1.14x
NTPC Limited	BBB-/ Baa3/ BBB-	0	59.4%	-0.81x

Source: Reuters, S&P, Moody's, Fitch and IEEFA estimates



## 정부 지원으로 인한 높은 신용 등급이 리스크를 축소하는 효과

기존 신용평가 방법이 기후 리스크 요인들을 고려하지 않는다는 점은 자본시장의 큰 숙제

국영기업	최종 평가 S&P / 무디즈 / 피치	화석 연료	재생 에너지	기타 (수력 포함)
KEPCO	AA / Aa2/ AA-	61%	<1%	39%
China Huaneng Group	A- / A2/ A	72%	13%	15%
China Huadian	A- / A2/ A	71%	11%	18%
PT Perusahaan Listrik Negara	BBB/ Baa2/ BBB	90%	2%	8%
NTPC Limited	BBB- / Baa3/ BBB-	93%	2%	5%

Source: S&P, Moody's and Fitch

(Reuters) - The cost of so-called 'stranded assets' as the world moves away from fossil fuels could cause substantial falls in exporters' sovereign credit ratings in the coming decades, a new report from Fitch said on Monday.

The global push to limit climate change is expected to cut demand for coal, oil and gas, and the infrastructure required to get them out of the ground, turning them into 'stranded assets' that will never be fully utilised.

Source: Reuters 15 February 2021

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## High credit ratings due to sovereign support underplay risks

The market is wrestling with the fact that traditional credit rating methodologies do not address climate risk factors

State-owned enterprises	Final ratings S&P / Moody's / Fitch	Fossil fuel	Renewables	Other, incl. hydro
KEPCO	AA / Aa2/ AA-	61%	<1%	39%
China Huaneng Group	A- / A2/ A	72%	13%	15%
China Huadian	A- / A2/ A	71%	11%	18%
PT Perusahaan Listrik Negara	BBB/ Baa2/ BBB	90%	2%	8%
NTPC Limited	BBB- / Baa3/ BBB-	93%	2%	5%

Source: S&P, Moody's and Fitch

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Source: Reuters 15 February 2021

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# Thank you

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