Appendix 3. References

In-text references:

Reference no.	Title (with link)	Author(s) (year)
1	Klimaatadaptatie in een stroomversnelling	Platform voor Duurzame Financiering (2023)
2	Kleine kansen, grote gevolgen (n.d.)	PBL
3	Delta Programme: flood safety, freshwater and spatial adaptation	Delta Programme (2023)
4	Economisch perspectief voor een grondige renovatie van de woningmarkt	Rabobank (2022)
5	Coalitieakkoord 2021 – 2025: Omzien naar elkaar, vooruitkijken naar de toekomst	VVD, D66, CDA en ChristenUnie (2021)
6	Gletsjers op Groenland smelten nóg sneller dan gedacht	Nu.nl (2023)
7	KNMI: de zeespiegel stijgt harder dan gedacht	Parool (2021)
8	2023 state of the climate report: Entering uncharted territory	Ripple et al. (2023)
9	Exceeding 1.5°C global warming could trigger multiple climate tipping points	McKay et al. (2022)
10	KNMI 23 klimaatscenarios gebruikersrapport	KNMI (2023)
11	Unavoidable future increase in West Antarctic ice-shelf melting over the twenty-first century	Naughten et al. (2023)
12	Tussenbalans van het Kennisprogramma Zeespiegelstijging	Delta Programme (2023)
13	HWBP gaat miljarden meer kosten: nog eens 500 kilometer primaire kering moet worden versterkt	H20 Netwerk (2023)
14	Klimaatadaptatie: inzicht in maatregelen en kosten	Provincie Zuid-Holland
15	Regional key figures; National Accounts	CBS (2023)
16	Tussenbalans van het Kennisprogramma Zeespiegelstijging	Delta Programme (2023)
17	Bouwstenendocument: Het effect van klimaatverandering op de woningbouwopgave	Delta Programme (2021)
18	Funderingsproblemen in heel Nederland	TNO (n.d.)
19	Impact droogte op funderingen	Deltares (2020)
20	De staat van de fundering van uw (toekomstige) woning	KCAF (2022)
21	Funderingsschade door droogte	KCAF (2022)
22	Kennisagenda funderingsproblematiek	Deltares (2021)
23	Impact droogte op funderingen	Deltares (2020)
24	De staat van de fundering van uw (toekomstige) woning	KCAF (2022)
25	Fonds Duurzaam Funderingsherstel	SVN (n.d.)
26	Stapeling klimaatrisico's en financiële draagkracht woningmarkt	ABN AMRO (2023)
27	Deelnemende gemeenten aan funderingsherstelfonds	FDF (2024)
28	Landelijke werking Fonds Duurzaam Funderingsherstel	Rebel (2023)
29	Dalende bodems, stijgende kosten	PBL (2016)
30	Plaatsgebonden overstromingskans	Klimaateffectatlas (n.d.)
31	Kaarten Landelijk Informatiesysteem Water en Overstromingen	LIWO (n.d.)
32	Overstromingsrisicomodel voor ruimtelijke investeringsvraagstukken	HKV (2023)
33	Vijf vragen over de gevolgen van overstromingen op de financiële sector	DNB (2023)
34	Update basisinformatie SSM 2022	Deltares (2023)
35	Maatregelen voor gevolgbeperking overstromingen	Kennisportaal Klimaatadaptatie (n.d.)
36	Position paper "Overstroming"	Verbond van Verzekeraars (2020)
37	Wet tegemoetkoming schade bij rampen	Overheid.nl (2024)
38	Klimaatschademonitor	Verbond van Verzekeraars (2023)
39	Klimaatverandering en schadelast	Verbond van Verzekeraars (2015)
40	Verzekerbaarheid klimaatrisico's	Verbond van Verzekeraars (n.d.)
41	Gevolgen overstromingen Limburg	Deltares (2023)
42	Regionale kerncijfers	CBS (2023)
43	Wees je bewust van risico's van extreem weer voor je koopwoning	AFM (2023)
44	Huizen met gemelde funderingsproblemen leveren minder op	ABN AMRO (2023)
45	Is kennis over funderingsproblemen van invloed op de huizenprijzen?	ABN AMRO (2023)
46	Nether Lands: Evidence on the Price and Perception of Rare Natural Disasters	Garretsen et al. (2019)
47	Capitalized value of evolving flood risks discount and nature-based solution premiums on property prices	Mutlu et al. (2023)
48	Wees je bewust van risico's van extreem weer voor je koopwoning	AFM (2023)

49	Overstromingsgevaar (Kaarten voor ruimtelijk beleid, in het bijzonder de woningbouw)	Klijn et al. (2023)
50	Funderingsrisicorapport	KCAF (n.d.)
51	Trendzicht 2024	AFM (2023)
52	StatLine	CBS (2023)
53	Framework Climate Adaptive Buildings	Dutch Green Building Council (2023)
54	Nationaal Uitvoeringsprogramma Klimaatadaptatie	Ministerie van Infrastructuur en Rijkswaterstaat (2023)
55	Kamerbrief Water en Bodem sturend	Ministerie van Infrastructuur en Rijkswaterstaat (2022)
56	Maatlat groene klimaatadaptieve gebouwde omgeving	Kennisportaal Klimaatadaptatie (n.d.)
57	Kabinet komt met concept Ruimtelijk afwegingskader klimaatadaptieve gebouwde omgeving	Kennisportaal Klimaatadaptatie (2023)
58	Actieplan Klimaatadaptatie	Provincie Gelderland (n.d.)
59	Financiële instrumenten voor klimaatadaptieve renovatie van woningcorporatiebezit	Deloitte (2021)
60	Meer voorbereid op overstromingsrisico's door duidelijke informatie	Deltares (2022)
61	Are homeowners willing to adapt to and mitigate the effects of climate change?	Bichard et al. (2011)
62	Kamerbrief over voorjaarsbesluitvorming Klimaat	Ministerie van Economische Zaken en Klimaat (2023)
63	Klimaat- en Energieverkenning 2023	PBL (2023)
64	Klimaatbeleid en de Gebouwde Omgeving	EIB (2018)
65	2023 Q3 WOX Kwartaalbericht	Calcasa (2023)
66	Klimaatbeleid en de Gebouwde Omgeving	EIB (2018)
67	Standaard voor woningisolatie	Ministerie van BZK (2021)
68	Al jarenlang hoog rendement van woningisolatie maakt subsidies vrijwel overbodig	Eichholtz et al. (2023)
69	Klimaatbeleid en de Gebouwde Omgeving	EIB (2018)
70	Inkomenseffecten van woningisolatie naar de isolatiestandaard	CPB (2023)
71	Woningvoorraad naar bouwjaar en woningtype, 2019	CLO (2021)
72	Energiecrisis maakt energiezuinige woning nog aantrekkelijker	RaboResearch (2023)
73	The capitalization of energy efficiency: Evidence from the housing market	Aydin et al. (2020)
74	Invloed van energielabel op huizenprijs: 4 conclusies	Kadaster (2023)
75	Terugverdientijd verduurzamingsmaatregelen	CE Delft (2022)
76	ETS 2: buildings, road transport and additional sectors	European Commission (2023)
77	Analyse gestegen energieprijzen en kwetsbare huishoudens	DNB (2023)
78	Subsidie is een suikeroom. En lening een lange man in een zwarte jas.	TNO (2021)
79	Steunmaatregelen energiearmoede hebben positieve effecten	TNO (2023)
80	Rapport Advies Hypotheeknormen 2024	Nibud (2023)
81	Subsidie is een suikeroom. En lening een lange man in een zwarte jas.	TNO (2021)
82	Analyse gestegen energieprijzen en kwetsbare huishoudens	DNB (2023)
83	Woningverduurzaming: willen en kunnen betekent nog niet doen	SCP (2021)
84	Beleidsprogramma versnelling verduurzaming gebouwde omgeving	Ministerie van BZK (2022)
85	One-stop shops for residential building energy renovation in the EU	Boza-Kiss et al. (2021)
86	Comparing public- and private-driven one-stop-shops for energy renovations of residential buildings in Europe	Pardalis et al. (2022)
87	VvE-versnellingsagenda Verduurzaming	Ministerie van BZK (2023)
88	Verschillen in kwetsbaarheid voor hoge energieprijzen vraagt om gericht beleid	TNO (2023)
89	Zowel verduurzaming als inkomenssteun nodig om energiekosten te drukken	Batenburg et al. (2023)
90	Annex 2 - Achtergrondinformatie analyse IBO-klimaat	Ministerie van EZK (2023)
91	Dutch Housing Market Chartbook	ING (2023)
92	Verschillen in kwetsbaarheid voor hoge energieprijzen vraagt om gericht beleid	TNO (2023)
93	Niet meer elektriciteitsverbruik, toch volle netten. Wat is netcongestie en welke opties hebben bedrijven?	RaboResearch (2023)
94	Actieagenda netcongestie laagspanningsnetten	Brandligt et al. (2024)
95	Overzicht Transitievisies Warmte: Signalen, Obstakels & Potentieel	PBL (2023)
96	Wijziging van de Omgevingswet en de Gaswet	Tweede Kamer (2023)
97	Wetsvoorstel collectieve warmte voor betaalbare en duurzame warmtelevering aan burgers en bedrijven	Rijksoverheid (2023)
98	Bestuursakkoord Klimaatadaptatie getekend	Kennisportaal Klimaatadaptatie (2018)
99	Klimaatadaptatie: inzicht in maatregelen en kosten	Provincie Zuid-Holland (2023)
100	Profijt en bekostiging van ruimtelijke ontwikkeling	CPB (2019)
101	Bonds to Finance the Sustainable Blue Economy: A Practitioner's Guide	ICMA (2023)

102	Taxonomy Regulation	European Commission (2023)
103	Klimaatadaptatie in een stroomversnelling	Platform voor Duurzame Financiering (2023)
104	StatLine	CBS (n.d.)
105	Stapeling klimaatrisico's en financiele draagkracht op de woningmarkt	ABN AMRO (2023)
106	From greening the climate-adaptive city to green climate gentrification?	Planas-Carbonell et al. (2023)
107	Rechtvaardigheid in klimaatbeleid. Over de verdeling van klimaatkosten	WRR (2023)
108	Economisch perspectief voor een grondige renovatie van de woningmarkt	Bani et al. (2022)
109	Core values of the Delta Programme	Delta Programme (2014)
110	There is something to choose from when distributing the climate costs	WRR (2023)
111	Five steps to conducting a systematic review	Khan et al. (2003)

References associated with impact schemes:

Reference no.	Addition	Title (with link)	Author(s) (year)	Mitigation/adaptation/ physical risks	Type measure (infrastructure, tax, subsidies, behavioural)
F1	Physical risk does not appear to be reflected in global equity valuations.	Physical risk and equity prices	IMF (2020)	Physical risks	N/A
F2	Physical risk e.g. flood or foundation risk is not yet currently priced into todays' housing market. No price discount is able to be found broadly.	Is overstromingsrisico nu al van invloed op de huizenprijzen?	van Reeken-van Wee et al. (2022)	Physical risks	N/A
F3	During the sale of a property: if subsidence is known and listed, the price is impacted by -12% on average. If subsidence is restored and listed, the price is impacted by 14% on average.	Huizen met gemelde funderingsproblemen leveren minder op	Phlippen et al. (2023)	Physical risks	N/A
F4	The results show that expected land subsidence has a negative impact on residential property values, although economic cost associated with future land subsidence only is lower than those associated with existing land subsidence and earth fissures. Current subsidence causes a 9,86% discount and future a 6,8% discount.	An externality of groundwater depletion: land subsidence and residential property prices in Phoenix, Arizona	Yoo et al. (2016)	Physical risks	N/A
F5	Results show that uniform subsidence has the largest impact on property values, at approximately −6 %, while “differential” and “surrounding” subsidence show respectively −2 % and no effect. An effect of -7% can be found in Rotterdam.	The effect of land subsidence on real estate values	Willemsen et al. (2020)	Physical risks	N/A
F6	They observe a 9.4% latent risk discount in the year immediately following a wildfire. They also show that the price effects of fire across the latent risk dimension attenuate over the course of one to two years.	WILDFIRE RISK, SALIENCE & HOUSING DEMAND	Shawn et al. (2018)	Physical risks	N/A
F7	They find a significant increase in mortgage delinquency and foreclosure after a fire, but these effects decrease in the size of the fire, which arguably results from coordination externalities afforded by large fires.	Mortgage Markets with Climate-Change Risk: Evidence from Wildfires in California	Issler et al. (2020)	Physical risks	N/A
F8	Factors that are of influence on the risk on a property level are: Permanent change of physical conditions, structural changes to the property or connecting properties, temporal changes in physical conditions and local conditions e.g. leaking sewage .	Impact droogte op funderingen	Kok & Angelova (2020)	Physical risks	N/A
F9	Salinization: reduces biodiversity, disrupts ecosystems functions, loss of ecosystem services such as drinking water, agriculture, fisheries and recreational opportunities. It is not possible to accurately calculate the costs and benefits of management or regulatory actions regarding salinization.	Regulations are needed to protect freshwater ecosystems from salinization	Schuler S. et al. (2018)	Physical risks	N/A
F10	Because it is dry and no water enters the root zone via precipitation, soil moisture decreases and groundwater levels drop. The flow of groundwater decreases as gradients in groundwater become smaller. If this process continues, water flow to the stream decreases and eventually dryness occurs. Meanwhile, evaporation also decreases, due to lack of soil moisture. Withdrawals of ground and/or surface water in a sandy area reinforce and accelerate the above process.	DROOGTE IN DE ZANDGEBIEDEN VAN NEDERLAND	Eertwegh et al. (2021)	Physical risks	N/A
F11	The effect of a price discount after a flood is short-lived. We show that the flood risk discount disappeared between four and nine years after the flood.	Forgetting the Flood? An Analysis of the Flood Risk Discount over Time	Atreya et al. (2013)	Physical risks	N/A
F12	Water stress has its impact on GPD growth, unemployment funding costs and stock market return, that range from low to extreme (1:50 to 1:>2000). GDP: -0.5 <> -10, Unemp: +0.2 <> +2.5, Funding: +0.2 <> 2, Stock market: -0.1 <> -8.	Flood risk and financial stability: Evidence from a stress test for the Netherlands	Caloia & Jansen (2021)	Physical risks	N/A
F13	Estimates that in developing countries, a climatic natural disaster leads to a decline in real GDP of 2%, but that effect on output disappears in five years.	Are external shocks responsible for the instability of output in low-income countries?	Raddatz (2007)	Physical risks	N/A
F14	Finds that extremely large disasters continue to have a negative effect on output in the long run.	Natural Disasters and the Economy — A Survey	Cavallo et al. (2011)	Physical risks	N/A

F15	Our results have the potential to inform adaptation investments and demonstrate how global inequality is both a cause and consequence of the unequal burden of climate change. Effect of extreme heat on economic growth is positive for the Netherlands' GDP.	Globally unequal effect of extreme heat on economic growth	Callahan & Mankin (2022)	Physical risks	N/A
F16	High Sea Level Rise in 2085: Land loss = 0,639% of country without adaptation (almost no effect on GDP). High Sea Level Rise in 2085: Land loss = 0,301% of country with adaptation (0.18%) positive effect on GDP	Economic impacts of climate change in Europe: sea level rise	Bosello et al. (2012)	Physical risks	N/A
F17	By 2060, the annual number of lost working days, which affect labor productivity, are projected to reach 3.7 billion (currently around 1.2 billion) at the global level. The market impacts of outdoor air pollution, which include impacts on labor productivity, health expenditures and agricultural crop yields, are projected to lead to global economic costs that gradually increase to 1% of global GDP by 2060.	The Economic Consequences Of Outdoor Air Pollution	Lanzi & Dellink (2016)	Physical risks	N/A
F18	The combined direct and indirect impacts lead to a decrease in economic growth after a flood. Hitherto scientists have considered that floods – as well as natural disasters more generally – in most cases lead only to a short term economic contraction. In the most extreme scenario we assume GDP growth that is around 10 percentage points lower due to flooding. Unemployment rises by a few percentage points.	Financial Stability Report	DNB (2021)	Physical risks	N/A
F19	rom 25 degrees, with every 5 degrees warmer, roughly 3/4% of productivity is lost. Productivity is lost due to: - reducing work intensity to avoid clinical health problems - reducing physical capacity - absence (missed workdays,hours)	Impact of occupational heat stress on worker productivity and economic cost	Morissey et al. (2021)	Physical risks	N/A
F20	The study finds that, compared to nowadays, productivity of labor can be 1.6% lower in Europe in the 2080s, with a clear geographical gradient showing that southern and eastern regions are much more affected (e.g. up to 5.4% productivity loss in Greece). Regions where the dominant occupations have relatively lower earnings would also experience higher productivity loses. Air conditioning can reduce damages by 30-40%	Heat stress, labor productivity and adaptation in Europe—a regional and occupational analysis	Szewczyk et al. (2021)	Physical risks	N/A
F21	Our findings on the impacts of floods clearly indicate that the negative flood effect capitalized into flood-prone property prices, reduce them by 10.9% on average. However, this discount diminishes over time and eventually vanishes within 9-12 years.	Capitalized value of evolving flood risks discount and nature-based solution premiums on property prices	Mutlu et al. (2023)	Physical risks	N/A
F22	- We find that house prices are, on average, 1% lower in places that are at risk of flooding. - This flood risk discount is more pronounced in neighborhoods with higher predicted flood water levels.	Nether Lands: Evidence on the Price and Perception of Rare Natural Disasters	Garretsen et al. (2019)	Physical risks	N/A
F23	A 9% decrease for house prices after a flood. A 3% discount for houses close to the river.	Floods and Residential Property Values: A Hedonic Price Analysis for the Netherlands	Vanessa et al. (2009)	Physical risks	N/A
F24	Immediate aftermath of inland flooding is 24,9% lower and recovers after five years Immediate aftermath of coastal flooding is 21.1% lower and recovers after four years	The impact of flooding on property prices: A repeat-sales approach	Beltrán et al. (2019)	Physical risks	N/A
F25	Significant negative relationship with Sea Level Rise (SLR) risk and House prices. In contrast with existing two-period competitive equilibrium models, our infinite-horizon competitive-search model predicts more pessimistic agents are more likely to make leveraged investments on risky collateral assets. They also tend to use longer maturity debt contracts, which are more exposed to the long-run risk.	Leveraging the Disagreement on Climate Change: Theory and Evidence	Bakkensen et al. (2023)	Physical risks	N/A
F26	Climate change leads to higher costs for protecting the Netherlands. The Delta Program will have cost EUR 28bn. Until 2028. High costs of damage and lower tax income decreases S&P rating. Estimate of every EUR 30bn in damage decreases rating by 0.5 step.	De Nederlandse financiële sector veilig achter de dijken?	Regelink et al. (2017)	Physical risks	N/A
F27	The indirect damage here results from loss of demand from customers from the flooded area or from suppliers from the flooded area who can no longer supply goods and services. But the failure of infrastructure networks, such as roads and electricity, also adversely affects the surrounding area. In addition, there may be indirect effects on the labor market and housing market.	Ruimtelijk-economische effecten van overstromingen Casus Maeslantkering	Koops (2008)	Physical risks	N/A
F28	Results are counterintuitive, suggesting that air pollution positively influences housing prices in Oakland, CA.	How Does Air Pollution Influence Housing Prices in the Bay Area?	Tang & Niemeier (2021)	Physical risks	N/A
F29	Ozone as the indicator of air quality appears to be positively correlated with housing prices.	The Impact of Air Pollution on Housing Prices	Jin (2021)	Physical risks	N/A
F30	High levels of summer smog could cause an increase of 7% in excess morbidity. Differences are determined by age, heat sensitivity of groups, income-dependent adaptability.	Klimaatsignaal'21	KNMI (2021)	Physical risks	N/A
F31	Workers in small enterprises and with low educational attainment are most affected. With a rising Wet Bulb Globe Temperature (WBGT), injury claims rise (4,8%, p=0,05), work-related injuries rise (4.1%, p=0.05). Heat stress can contribute to	Estimation of work-related injury and economic burden attributable to heat stress in Guangzhou, China	Ma et al. (2019)	Physical risks	N/A

	higher risk of work-related injury and substantial economic costs. Quantified, the impacts of injuries and related economic costs should be considered to develop targeted preventive measures in the context of climate change.				
F32	In the winter, the results indicate cold weather is associated with an increase in price. In the summer, precipitation affects price, but the sign and magnitude of the impact depend on the temperature. The magnitudes are small but highly statistically significant. These results show that home buyers and sellers are affected by temporary weather conditions.	Curb appeal: how temporary weather patterns affect house prices	Gourly (2021)	Physical risks	N/A
A1	Urban greening is not a win-win solution for climate mitigation and adaptation. This study shows that it is highly valued for health and environmental benefits. However, it has negative social impacts on marginalized residents. It contributes to green gentrification (displacement) due to the effect of urban greening on housing prices, and in an overuse or underuse of public green spaces by some groups over others (exclusion of marginalized groups). This may be not applicable to areas dominated by social housing.	From greening the climate-adaptive city to green climate gentrification? Civic perceptions of short-lived benefits and exclusionary protection in Boston, Philadelphia, Amsterdam and Barcelona	Planas-Carbonell, A., Anguelovski, I., Oscilowicz, E., Perez-del-Pulgar, C. & Shokry, G. (2023)	Adaptation	Nature-based solutions
A2	This study highlights conflicts between an entrepreneurial green design agenda and both social and ecological priorities. It finds evidence of the exclusion of disadvantaged groups from green, resilient spaces. This may be unapplicable to areas dominated by social housing.	Green climate change adaptation and the politics of designing ecological infrastructures	Tubridy, F. (2020)	Adaptation	Nature-based solutions
A3	Low-income communities are most likely to experience residential and social displacement (in the short and mid-term) from green climate infrastructure and its associated gentrification risks.	Why green “climate gentrification” threatens poor and vulnerable populations	Anguelovski et al. (2019)	Adaptation	Nature-based solutions
A4	Urban nature (green and blue) has been found to increase housing values in surrounding areas (neighbourhood and city level), depending on population density, distance to and the type of urban nature. Overlapping effects of nature may in specific neighbourhoods double the increases in property values from 5-6% to 10-11%. This study estimated for the city of Utrecht a house price increase up to a maximum of 20 percent compared with properties not affected by green interventions at average prevailing price levels in a particular area in Utrecht. Development of urban nature is often not the main cause of problems with affordability of housing for low-income households, but the effects of nature on property values can exacerbate such problems.	Property price effects of green interventions in cities: A meta-analysis and implications for gentrification	Bockarjova et al. (2020)	Adaptation	Nature-based solutions

A5	Some long-term residents can experience significant displacement pressures as a result of urban greening. This is not predominantly caused by soaring costs, but by political, social and cultural changes encompassing greening initiatives.	Livable streets. Green gentrification and the displacement of longtime residents in Ghent, Belgium	Goossens et al. (2019)	Adaptation	Nature-based solutions
A6	This Polish study suggests that green gentrification may occur even when green spaces remain unchanged. This study shows that the value of park proximity among housing buyers is rising, which, in turn, suggests an increasing desirability of living close to parks. This results in more intense residential change close to parks than in other locations.	Towards green gentrification? The interplay between residential change, the housing market, and park proximity	Laszkiewicz, E. (2023)	Adaptation	Nature-based solutions
A7	This Polish study provides evidence that proximity to an urban green area is positively linked with the price of an apartment. Presence of a green area within 100 meters from an apartment increases the price of an apartment on average by 2.8% to 3.1%. This effect is higher for newer apartments. Close vicinity (less than 100m distance) to an urban green increased the sales prices of apartments in new residential building by 8.0%-8.6%.	The effect of urban green spaces on house prices in Warsaw	Trojanek et al. (2018)	Adaptation	Nature-based solutions
A8	The proximity of green spaces in Poland has an impact on apartment prices and this impact differs with type and size of the green space. In this study, the largest forest and large parks were the most important and, together with small forests and the percentage of green space in a 500 m radius, positively influenced apartment prices.	Hedonic pricing and different urban green space types and sizes: Insights into the discussion on valuing ecosystem services	Czembrowski & Kronenberg (2016)	Adaptation	Nature-based solutions
A9	This German study found that the size of urban green spaces affects the price premium for rented homes. The study finds that rental prices increase for smaller urban green spaces, but the reverse effect occurs for larger urban green spaces.	Urban Green Spaces and Housing Prices: An Alternative Perspective	Liebelt et al. (2019)	Adaptation	Nature-based solutions
A10	This study found that the presence of green increases the attractiveness of a city, which has a positive influence on the location decisions of companies and households. The study also reviews the impact of green on housing prices: various studies find a positive impact of water, green in public spaces and parks on housing prices.	Zeven redenen om te investeren in een groene stad	Stuiver et al. (2018)	Adaptation	Nature-based solutions

A11	This Italian study found that a 10% increase in green space within 400 meters increases housing prices by 0.8%. Also, an increase in the amount of green in streets increases housing prices (up to 9%). Especially households in highly urbanised areas attach value to the presence or proximity to green urban spaces, most likely due to the absence of a private garden.	Hedonische prijsanalyse van het effect van open groene ruimte op de marktprijzen voor wonen in Vlaanderen	Helgers & Vastmans (2016)	Adaptation	Nature-based solutions
A12	This study shows that less climate-resilient homes receive a price discount after weather shocks. In particular, prices of European homes without cooling options can become significantly lower after a temperature shock.	Temperatures and search: evidence from the housing market	Cascarano & Natoli (2023)	Adaptation	Make existing homes climate proof
A13	Water pollution reductions had a significant positive effect on property values in Florida.	Evidence of the Effects of Water Quality on Residential Land Prices	Kuwayama (2018)	Adaptation	Nature-based solutions
A14	Increasing the groundwater table reduces the risk of the devaluation of 1 million homes due to foundation damages (up to EUR 50,000-86,500 per house).	Deltaplan aanpak funderingsschade	Vereniging Eigen Huis (2021)	Adaptation	Climate-proof spatial planning
A15	Increasing the groundwater table in peatland areas may increase unemployment in the agricultural sector (hypothesis).	Nieuwe klap voor boeren: kabinet wil grondwaterpeil verhogen	Muller (2022)	Adaptation	Climate-proof spatial planning
A16	Urban greening leads to higher housing prices	Op weg naar een klimaatbestendige stad	NKWK (2019)	Adaptation	Nature-based solutions
A17	Urban greening leads to higher housing prices in the US.	Associations between Greenspace and Gentrification-Related Sociodemographic and Housing Cost Changes in Major Metropolitan Areas across the United States	Schinasi et al. (2021)	Adaptation	Nature-based solutions
A18	According to this study, saline agriculture, as an adaptation strategy, has the potential to ameliorate regional economic impacts of salinization. This may contribute to stable demand for housing (hypothesis).	New ”Baseline Study Report” on behalf of SalFar	Interreg (2020)	Adaptation	Accommodate and retreat
A19	The management of saline soils can create workplaces for local farmers, increase income through higher yields than with conventional crops, and prevent or reduce economic and climate migration.	Future of Sustainable Agriculture in Saline Environments	Negacz (2022)	Adaptation	Accommodate and retreat
A20	Spatial differences in flood protection leads to clustering of vulnerable households in risky regions in the US.	Flood protection and endogenous sorting of households: the role of credit constraints	Husby et al. (2018)	Adaptation	Accommodate and retreat
A21	Sudden house price collapses occur when extreme sea level rise is compounded by: reactive flood risk management, risk perceptions dominating house price dynamics, or long implementation times of flood protection measures. Such tipping points can only be avoided with a proactive strategy and when flood protection measures are implemented rapidly.	A stepwise approach for identifying climate change induced socio-economic tipping points	Van Ginkel et al. (2022)	Adaptation	Climate-proof spatial planning
A22	Climate buffer projects have displacement effects: "Adaptation project-induced movement can introduce new vulnerabilities, whether immediately uprooting people, expecting them to evacuate in the future, reducing the value of their assets by ‘freezing’ investment [..]."	Displacement Induced by Climate Change Adaptation: The Case of ‘Climate Buffer’ Infrastructure	Warner (2021)	Adaptation	Nature-based solutions
A23	Households are on average willing to pay EUR 0.15 per year in additional municipal tax for an additional hectare of water-rich area. This means that creating more water-rich areas will likely increase local home prices.	Economic Valuation of Landscape Fragmentation	Brander (2009)	Adaptation	Nature-based solutions
A24	Households are willing to pay EUR 10.40 per year to avoid raised roads and railway lines. This suggests that flood protection infrastructure can also have negative impacts on home prices when it's too visible or proximate (hypothesis).	Economic Valuation of Landscape Fragmentation	Brander (2009)	Adaptation	Climate-proof spatial planning
A25	More fresh water may also increase possibilities for agricultural activities. This may increase local home prices (hypothesis).	A cost-effectiveness analysis for the Deltaprogramme IJsselmeerregion: what are the costs and safety benefits of raising the water level and increasing the fresh water stock?	Bos, F. & Zwaneveld, P. (2012)	Adaptation	Nature-based solutions
A26	This study found that some residents perceive negative impacts of creating water retention on livability and home construction. Home price decreases are feared, which may become reality when these fears are severe and prolonged (hypothesis).	Droge voeten, ja graag?!	Brouwers, S. (2018)	Adaptation	Nature-based solutions
A27	This quantitative modeling study shows that, in Europe, over 20 years, every euro invested in European Flood Awareness System (EFAS) returned EUR 159 in a baseline scenario, EUR 202 in an improved forecast accuracy scenario, and EUR 409 if avoided damage factors were varied in another scenario. Residual damages avoided by moving and evacuation of property contents amount to 5.7% only. Avoided damages by warning-dependent flood defences amount to 32%.	The monetary benefit of early flood warnings in Europe	Pappenberger et al. (2015)	Adaptation	Reduce financial risk for homeowners
A28	Multifunctional flood defences provide recreational spaces (quality landscape, wildlife, and natural amenities) which leads to higher real estate values.	Living labs for climate adaptation: Success factors and case study on flood prevention for Friesland Province, Netherlands	Chafiq (2018)	Adaptation	Climate-proof spatial planning
A29	Homes near attractive green space are found to sell at a price premium, which decreases with distance and becomes negligible after one kilometer. The estimated price effect varies from 7.1%–9.3% for houses within 0.25 km from the nearest attractive green space to 1.7%–2.3% for houses located 0.75–1.0 km away	Mixed monetary and non-monetary valuation of attractive urban green space: A case study using Amsterdam house prices	Daams et al. (2019)	Adaptation	Nature-based solutions

A30	This UK study found that green space and areas of water within the same administrative area all attract a considerable positive price premium. The study also reported a strong positive effect from freshwater and flood plain locations, broadleaved woodland, coniferous woodland and enclosed farmland.	The Amenity Value of English Nature: A Hedonic Price Approach	Gibbons (2013)	Adaptation	Nature-based solutions
A31	The proximity of natural areas can increase home prices by 5 percent.	Natuur en water stuwen de huizenprijzen op	Atlas research (2023)	Adaptation	Nature-based solutions
A32	Being able to see water or green from your window or garden can increase house prices by between 4,5 and 15 percent.	De invloed van groen en water op de transactieprijzen van woningen	Bervaes & Beke (2004)	Adaptation	Nature-based solutions
A33	"The regional economic losses from seepage salinization have been estimated at about EUR 60 millionper year in Oudlandpolder, Belgium. Furthermore, the bio-physical impact of flooding salinization is not limited to farmland (crop yields), but will have cascading negative consequence both backward (e.g. fertiliser, machinery suppliers) and forward (e.g. processing, distribution) along the supply chain. Flooding salinization in Lincolnshire, UK has been estimated to cause the loss of 944 jobs (0.08 jobs per ha) and a GVA loss of GBP 98,771,984 throughout the food value chain. the greatest comparative losses are borne by food processing (GBP 42 million) followed by direct farm impacts in terms of loss in total Gross Margins (GM). "	SalFar Baseline Report	Domna Tzemi, Eric Ruto*, Iain Gould, Gary Bosworth (n.d.)	Adaptation	Accommodate and retreat
A34	Flushing coastal areas with freshwater prevents salinization damages up to EUR 700 per hectare. This may stabilize local employment opportunities and hence housing demand (hypothesis).	Economische effecten van klimaatverandering	TNO (2008)	Adaptation	Accommodate and retreat
A35	This article puts forward an analysis in which it is argued that policies to construct climate-proof homes only will severely limited housing supply. 220,000 homes are currently planned on climate-vulnerable soils. Such policies will increase home prices, primarily in the Randstad area.	Tientallen grote bouwlocaties door klimaatverandering ongeschikt voor woningbouw	FTM (2023)	Adaptation	Climate-proof housing construction
A36	Flood risk interventions caused a price increase of 5.6% of flood-prone homes in Limburg.	Capitalized value of evolving flood risks discount and nature-based solution premiums on property prices	Asli Mutlu, Debraj Roy, Tatiana Filatova (2023)	Adaptation	Climate-proof spatial planning
A37	This US study found that the "Investment in hazard protection can have the unintended consequence of encouraging development in places especially vulnerable to damage. In a comprehensive, parcel-level analysis of all shorefront single-family homes in the state of Florida, [the study] find[s] that houses in nourishing zones are significantly larger and more numerous than in non-nourishing zones. The predominance of larger homes in nourishing zones suggests a positive feedback between nourishment and development that is compounding coastal risk in zones already characterized by high vulnerability."	Indications of a positive feedback between coastal development and beach nourishment	Armstrong (2016)	Adaptation	Climate-proof spatial planning
A38	Preventing coastal erosion with beach nourishment avoids home value losses of between 4% and 52% in the US.	The value of disappearing beaches: A hedonic pricing model with endogenous beach width	Gopalakrishnan (2010)	Adaptation	Climate-proof spatial planning
A40	"The HafenCity project aimed to present Hamburg as a major port metropolis on the world stage through a mega-project redeveloping central port and industrial area outside the city dike. HafenCity led to distributional issues. First, the high costs of building development, driven by flood protection costs and transaction costs of the tendering process, hindered joint ventures, and co-operatives, from competing in the fixed-price bidding process. Second, major cost overruns led the City in 2010 to end the fixed-price bidding process and once again restrict development to revenue-prioritising land sales. The project has been criticised regarding lack of inclusiveness (Vogelpohl and Buchholz 2017)."	View of Coastal adaptation through urban land reclamation: Exploring the distributional effects	Bisaro (2019)	Adaptation	Scenario zeewaarts
A41	The costs associated with flood-resilient housing construction can increase housing deficit in an already tight market if it leads to higher market prices.	Het effect van stijgende bouwkosten op nieuwbouwprojecten en grondprijzen	1bank (2022)	Adaptation	Climate-proof housing construction
A42	The increasing uptake of the floating home concept (as in Woerden) can increase the accounting value of water bodies and municipal tax revenues.	Steeds meer drijvende gekkigheid	Peree (2018)	Adaptation	Climate-proof housing construction
A43	Floating housing may contribute to local identity building and place marketing, but may not be inclusive and lead to privatization of the waterfront.	Stuck in experimentation: exploring practical experiences and challenges of using floating housing to climate-proof waterfront urban development in Sweden	Sofie Storbjörk & Mattias Hjerpe (2016)	Adaptation	Climate-proof housing construction
A44	Loss of land in the North and Southwest may cause some 1.7 million people to relocate to the Randstad (hypothesis).	Plan New Netherlands	Deltares (2019)	Adaptation	Accommodate and retreat
A45	This study found that differential flood protection causes little permanent movement of economic activity.	Flooded Cities	Kocornik-Mina et al. (2020)	Adaptation	Accommodate and retreat
A46	Housing supply restrictions lead to high societal costs, which are currently already estimated at EUR 3 billion per year in the Netherlands. (2008).	De Nederlandse woningmarkt en overheidsbeleid: Over aanbodrestricties en vraagsubsidies	Besseling et al. (2008)	Adaptation	Accommodate and retreat
A47	For climate-proof construction, the "Additional construction costs vary between EUR 1,200 and EUR 2,500 per house (which corresponds to 0.3% - 0.6 % of average housing price in the Netherlands Q2 2021). The costs depend on the neighbourhood type and the soil and water system. Aside from higher costs per new house, there are also costs related to (re)developing neighbourhoods cq public space. The 'all-in' price per hectare is estimated to vary between EUR 90,000 and EUR 310,000 euro."	Kosten en bekostiging klimaatbestendige nieuwbouw. Programma Metropoolregio Amsterdam Klimaatbestendig	&flux, Arcadis (2021)	Adaptation	Climate-proof housing construction

A48	This study states that "potential benefits are related to a higher residential value (eg due to higher housing satisfaction)."	Financiële instrumenten klimaatadaptief bouwen	Deloitte (2020)	Adaptation	Climate-proof housing construction
A49	For example, floating houses are less vulnerable to flood impacts. This could make these homes more expensive (hypothesis)	Innovations in urban water management to reduce the vulnerability of cities: Feasibility, case studies and governance	De Graaf, R. (2009)	Adaptation	Climate-proof housing construction
A50	Developing amphibian or floating homes would increase housing variety, catering to different preferences.	KlimaatAdaptation en economie	Rietveld, P. (2009)	Adaptation	Climate-proof housing construction
A51	This US study found that the "Gentrification is associated with higher ground elevation in New Orleans. High elevation, low-income, demographically transitional areas in particular – that is areas that more closely resemble high-income area demographics – may be vulnerable to future climate gentrification."	A spatial analysis of climate gentrification in Orleans Parish, Louisiana post-Hurricane Katrina	Aune et al (2020)	Adaptation	Accommodate and retreat
A52	This US study finds that new apartment buildings decrease rents in nearby units by about 6 percent and they increase in-migration from low-income areas. The study found that the impact of increased housing supply exceeds the impact of amenity or signaling effects. If new units attract high-income households and new amenities that make the area more appealing, it could raise demand by enough to offset the increased supply.	Local Effects of Large New Apartment Buildings in Low-Income Areas	Brian J. Asquith, Evan Mast, Davin Reed (2023)	Adaptation	Climate-proof housing construction
A53	The completion of multi-story apartment buildings has a positive impact on apartment values within 300 meters in a Finnish city.	The Impact of Residential Development on Nearby Housing Prices	Kurvinen et al (2016)	Adaptation	Climate-proof housing construction
A54	This study found that flood insurance may cushion the effects of the increase in flood risk in the US.	The Effects of Flood Insurance on Housing Markets	Ortega (2018)	Adaptation	Reduce financial risk for homeowners
A55	This study found that a 14.3 percent relative increase in the price of flood insurance causes a 4.2 percent decrease in property prices in the US. This implies that high premia can make flood-prone areas less attractive, depending on whether this is accompanied by a downward adjustment in housing prices.	Flood insurance reforms, housing market dynamics, and adaptation to climate risks	Hannah Hennighausen, Yanjun Liao, Christoph Nolte, Adam Pollack (2023)	Adaptation	Reduce financial risk for homeowners
A56	Floodplain regulation decreases construction and increases house prices in the US.	The Effects of Floodplain Regulation on Housing Markets	Abigail Ostriker and Anna Russo* (2023)	Adaptation	Climate-proof housing construction
A57	Flood-safe building codes reduce flood damages by about 3 percent of house values, but these reductions are not privately valued by consumers in the US.	The Effects of Floodplain Regulation on Housing Markets	Abigail Ostriker and Anna Russo* (2023)	Adaptation	Climate-proof housing construction
A58	A flood insurance mandate and higher flood insurance prices can move homeowners away to safer areas, but the welfare effect of this can be very suboptimal when these policies are poorly targeted in the US.	The Effects of Floodplain Regulation on Housing Markets	Abigail Ostriker and Anna Russo* (2023)	Adaptation	Reduce financial risk for homeowners
A59	In Australia, "Construction industry has taken limited climate change actions, partly due to its position in the building supply chain. The construction industry largely builds structures that another supply chain stakeholder has designed, and yet another pays for. Their focus is short term: minimising their risks and maximising their profits. Another important barrier is the perceived costs ('unaffordability') of climate change initiatives."	Barriers to climate change adaptation in the Australian construction industry – Impetus for regulatory reform	Hurlimann, A.C., Browne, G.R., Warren-Myers, G. & Francis, V. (2018)	Adaptation	Climate-proof housing construction
A60	"NbS solutions in flood-prone areas increase housing prices up to 15% (or EUR 33,687) on houses nearby water that are directly exposed to flood risk [..]. Impact of NbS solutions on property prices is different than impact of traditional 'gray solutions': these don't capitalize into property prices in surrounding areas."	Capitalized value of evolving flood risks discount and nature-based solution premiums on property prices	Mutlu, A., Roy, D. & Filatova. T. (2023)	Adaptation	Climate-proof spatial planning
A61	This Italian study found that a sea wall (a system of four mobile barriers composed of 78 gates) increased house prices by 3 percent for properties above the sea wall activation threshold and by an additional 7 percent for ground-floor properties. Overall, one year after its inception, the sea wall generated an estimated 4.5 percent increase in the value of the total residential housing stock in Venice, which is a lower bound of the total welfare gains potentially generated by this infrastructure. Results on rent prices are not significant. Benefits in terms of higher housing prices account for at least 10% of the actual costs of the sea wall.	Do House Prices Reflect Climate Change Adaptation? Evidence from the City on the Water	Benetton, M., Emiliozzi, S., Guglielminetti, E., Loberto, M. & Mistretta, A. (2022)	Adaptation	Climate-proof spatial planning
A62	Adapting to climate change is most challenging for financially constrained, low-income households.	Flooded House or Underwater Mortgage. The Implications of Climate Change and Adaptation on Housing, Income & Wealth	Van der Straten, Y. (2023)	Adaptation	Reduce financial risk for homeowners
A63	This study warns that research examining green infrastructure that minimizes damage in noncoastal areas is unable to separate out the impact of reduced damages from climate change from other benefits that occur. The impact of adaptation is very location specific, even when considering the same adaptations in the same state. (Stricter) building codes (requiring developers to build homes that are more resilient against climate change) in an area do increase property values.	Climate Change Adaptation and Property Values: A Survey of the Literature	Kiel, K.A. (2021)	Adaptation	Climate-proof housing construction
A64	Adaptation structures have a significant positive impact on waterfront home prices in the US, with the most vulnerable homes seeing the largest impacts.	Adaptation, Sea Level Rise, and Property Prices in the Chesapeake Bay Watershed	Walsh, P., Griffiths, C., Guignet, D. & Klemick, H. (2019)	Adaptation	Climate-proof spatial planning
A65	Hard infrastructural measures, green infrastructural projects, and structural elevation projects are associated with housing price increases in the US. Adaptation projects to address wind hazards do not have a direct impact on housing prices.	The Economic Effects of Climate Change Adaptation Measures: Evidence from Miami-Dade County and New York City	Kim, S.K. (2020)	Adaptation	Climate-proof spatial planning

A66	This study deals with possible adaptation options in new home construction: adjustment of construction (how to build) and location (where to build). Building climate adaptive homes is a no-regret strategy in urban areas, where benefits exceeds the costs. Whether this is also the case in suburban areas, depends on local soil and watersystem characteristics. Slow transition towards transition urbanisation towards higher lands versus differentation dike circles (Relevant for Physical: De economische efficiëntie van klimaatmaatregelen neemt toe naarmate de maatregelen ook (tijdelijk of permanent) bijdragen aan andere waarden zoals stedelijk groen). Possible tension (especially in a considerable part of the NL where land is supply limited)) between space that is needed for climate adaptation (stronger dikes) and new home construction ambitions.)	Bouwstenendocument: Het effect van klimaatverandering op de woningbouwopgave	Sweco, Ecorys, Deltaris & Defacto Stedenbouw (2021)	Adaptation	Climate-proof housing construction
A67	This study argues that when citizens are encouraged through subsidies and tax benefits to install a rainwater harvesting system in their yard, it is important that these financial benefits are available for renters too.	Distributing Responsibilities for Climate Adaptation: Examples from the Water Domain	Doorn, N., Brackel, L. & Vermeulen, S. (2021)	Adaptation	Nature-based solutions
A68	"adaptation investment has large returns in terms of private investment, employment, output and tax revenue in the long term, especially under climate change." Adaptation investment reduces the "scarring effects with long-lasting macroeconomic implications by way of reducing the output level after each natural disaster event".	The Macroeconomic Returns of Investment in Resilience to Natural Disasters under Climate Change: A DSGE Approach	IMF (2023)	Adaptation	Climate-proof spatial planning
A69	Adaptation is more difficult for low-income households, because credit constraints prevent investments to improve the sustainability of houses.	Flooded House or Underwater Mortgage? The Implications of Climate Change and Adaptation on Housing, Income, and Wealth	Van der Straten, Y. (2023)	Adaptation	Make existing homes climate proof
A70	This US study finds that subsidies increase adaptation by households. Expected damages of extreme climate events can be reduced by approximately one-third by means of subsidies.	Seawalls and Stilts: A Quantitative Macro Study of Climate Adaptation	Fried (2021)	Adaptation	Reduce financial risk for homeowners
A71	This US study found that "The expected net present value of protection benefits from [..] levees amounts to 2.8% of a home's value on average."	Private Benefits from Public Investment in Climate Adaptation and Resilience	Bradt and Aldy (2022)	Adaptation	Climate-proof spatial planning
A72	This letter suggests to make water and soil conditions leading in the choice of how and where to build; avoid locations that we need to implement future climate measures. The Netherlands should also investigate whether it's possible to stimulate people and companies to move to safer parts of the Netherlands to reduce future lock-in risk	Briefadvies Deltacommissaris woningbouw en klimaatAdaptation (Spoor 2)	Glas, P. (2021)	Adaptation	Climate-proof housing construction
A73	Interviews reveal that experts differ in their opinion on whether or not we can keep on building new homes in the lower parts of the Netherlands. This report also argues that if the Netherlands keeps on investing in water safety levels, there is no reason to avoid the construction of new-build homes in areas that are already being protected. Protection from floodings is relatively cheap (around EUR 60 per person per year). It's possible to offer the same safety standards in 100 to 150 years. It's recommended though to take into consideration the impact of climate change on floodings / water logging in the spatial plans and construction of new-build homes.	Advies Woningbouw en klimaatAdaptation gezien vanuit waterveiligheid	Expertise Netwerk Waterveiligheid (2023)	Adaptation	Accommodate and retreat
A74	The UK households most vulnerable to climate change impacts will be the least able to adapt. In contrast to new buildings, the conditon of existing homes is the responsibility of a complex range of independent actors.	Your home in a changing climate	Three Regions Climate Change Group (2008)	Adaptation	Make existing homes climate proof
A75	Household outmigration after floods increases the risk of climate gentrification in the US. This may be not applicable to areas dominated by social housing.	Repetitive floods intensify outmigration and climate gentrification in coastal cities	De Koning & Filatova (2020)	Adaptation	Accommodate and retreat
A76	This US study shows that "there are 8.1% more houses in floodplains than there would have been with actuarially fair premiums. This has led to flood damages of 13.3% in excess of socially optimal levels."	Excess vulnerability from subsidized flood insurance: Housing market adaptation when premiums equal expected flood damage.	Colby & Zipp (2020)	Adaptation	Reduce financial risk for homeowners
A77	This study argues that "retrofitting in a climate-proof way is not so complicated and often not (much) more expensive than the traditional reconstruction of a residential street."	Climate-proof retrofitting of urban areas for the same cost	Kleerekoper, Loeve, & Kluck (2019)	Adaptation	Nature-based solutions
A79	This study found that the net economic benefits of depoldering are higher than that of the conventional approach to strengthen dikes.	Dubbele dijken als robuuste waterkerende landschappen voor een welvarende Zuidwestelijke Delta	Van Belzen (2021)	Adaptation	Accommodate and retreat
A80	Home owners underestimate flood risk, particularly homeowners in cities.	Individual perceptions of climate change	Botzen et al (2009)	Adaptation	Reduce financial risk for homeowners
A81	This report shows that the additional cost of climate adaptive housing construction is limited to up to EUR 2,500 per home.	Onderzoek brengt meerkosten klimaatadaptief bouwen in beeld - IVVD	&Flux and Arcadis (2023)	Adaptation	Climate-proof housing construction
A82	This item warns that limited drinking water availability could slow down housing construction in the Netherlands.	Het effect van klimaatverandering op drinkwater | VanafHier	EenVandaag (2022)	Adaptation	Climate-proof housing construction
M2	The researchers find that house prices within a two kilometer radius of a turbine, after it has been constructed, decrease by about 1.4 to 2.3 percent on average. The results in this paper do not imply that we should not construct wind turbines, but that the external economic costs of wind turbines should be taken into account in spatial planning.	Renewable Energy and Negative Externalities: The Effect of Wind Turbines on House Prices	Droes, M. and Koster, H.R.A. (2014)	Mitigation	
M3	The researchers investigate the role and influence of bottom-up drivers such as household sociodemographic characteristics, education and behavioral factors in household energy decisions. They conclude that behavioural factors play as an	Demand-side solutions for climate mitigation: Bottom-up drivers of household energy behavior change in the Netherlands and Spain	Niamir, L. et al. (2020)	Mitigation	

	important role as monetary factors such as income, emphasizing the role of "soft policy instruments" as nudging and the provision of targeted information, next to norms and fiscal policies.			
M4	The researchers make five policy recommendations to mitigate the income effects on low income households of climate policies. These include: 1) The need for target purchasing power policies to groups that face multiple vulnerabilities on different dimensions (e.g. low income and debt and/or in an unsafe neighbourhood). 4. Accelerating the renovation of homes reduces both energy consumption and costs. It is therefore a "win-win" from a climate and income perspective. However, it cannot overcome all financial vulnerabilities and therefore needs to be complemented with targeted financial support.	Vijf aanbevelingen om klimaat- en inkomensbeleid samen te laten gaan (EN: Five recommendations to merge climate and income policies)	Hoenselaar, van, F.; Heerma van Voss, B. (2023)	Mitigation
M5	This research shows the important role of major decisions (such as purchasing a car or home) and major life events (such as having children or getting divorced) on household footprints. Also, voluntary behavioral changes will not be sufficient by themselves to reach the climate goals, implyng the need for climate policies.	It starts at home? Climate policies targeting household consumption and behavioral decisions are key to low-carbon futures	Dubois, G. et al (2019)	Mitigation
M6	This research confirms the notion that energy taxes tend to be regressive.The researchers make policy recommendations to reduce inequality effects, including: making more use of standards instead of taxing, support for energy-efficiency investments in social housing and targeted compensation policies.	The distributional effects of climate policies	Zachmann, G.; Frederiksson, G.; Claeys, G. (2018)	Mitigation
M7	Distributional effects of environmental policies are generally regressive on income and progressive on nonpecuniary benefits, such as health.	Managing the Distributional Effects of Environmental and Climate Policies: The Narrow Path for a Triple Dividend	Vona, F. (2021)	Mitigation
M8	Study assesses the price effect of Minimum Energy Efficiency Standard (MEES) which came into force in England and Wales on 1 April 2018 aimed at encouraging landlords and property owners to improve the energy efficiency of their properties which should reduce overall greenhouse gas emission. It restricted the granting and continuation of existing tenancies where the property was not energy-efficient, with an Energy Performance Certificate (EPC) rating of F and G. Otherwise landlords would face a fine of up to £5,000. Authors find a price discount of 5,000-9,000 pound for least energy efficient homes.	Climate policy and transition risk in the housing market	Ferentinos, K.; Gibberd, A.; Guin, B. (2021)	Mitigation
M9	Results show negative external price effects for gas plants and wind turbines, but positive effects for biomass plants, conditionally upon ex-ante lower priced locations.	Clean electricity, dirty electricity: the effect on local house prices	Eichholtz, P. et al. (2021)	Mitigation
M10	As of 2030, the construction plans of wind turbines are estimated to lead to a relative loss of property value of an average of 3.8 percent per home. Two thirds of the total loss of house value is caused by only ten percent of the turbines.The business case of most wind turbines amply allows full compensation for loss of house value.	Klein aantal windmolens veroorzaakt fors deel van woningwaardeverliezen	Mulder, P.; Boonman,H. and Sterkenburg, R. (2022)	Mitigation
M11	This paper examines the effect of wind turbines and solar farms on house prices. Using detailed data from the Netherlands between 1985 and 2019, the results show that tall wind turbines have considerably stronger effects on house prices, as compared to small turbines.	Wind turbines, solar farms, and house prices	Dröes, M.I. en H.R.A. Koster (2021) (2021)	Mitigation
M13	The researchers find a positive relationship between energy efficiency and asking prices in Germany. If energy efficiency increases by 100 kWh/m2a, prices increase by 6.9% on average. But there are regional disparities. The effects are significantly weaker in large cities than in other urban areas, whereas the impact in rural regions is much stronger. This might be explained by both the higher housing shortage and higher purchasing power per capita in large cities.	Estimating the impact of energy efficiency on housing prices in Germany: Does regional disparity matter?	Taruttis L. and Weber C. (2022)	Mitigation
M14	In England and the Netherlands there seems to be price premium for energy efficiency on the housing market since 2015.	Energy Efficiency Information and Valuation Practices in Rental Housing	Chegut, A. et al (2019)	Mitigation
M15	Current and potential renovators encounter transaction cost- (TC) barriers mainly at the execution and consideration phases of the renovation process. For energy efficiency renovations, the main barrier is the difficulty of finding ways to make houses more energy efficient.	Transaction costs as a barrier in the renovation decision-making process: A study of homeowners in the Netherlands	Ebrahimigharehbaghi, S. et al (2020)	Mitigation
M16	This research shows that if the "Regionale Energie Strategie" (RES) plans are fully realized, between 2020 and 2030 more than 1,400 onshore wind turbines are expected to be added (a growth of 75%).The number of homes in the proximity to wind turbines is expected to grow from nearly 900 thousand by 2020 (12% of the total) to more than 1.6 million in 2030 (22% of the total, assuming the housing stock remains the same). These homes will suffer from a relative home value loss due to the proximity to a wind turbine.	De impact van windturbines op huizenprijzen	Mulder, P.; Boonman,H. and Sterkenburg, R. (2022)	Mitigation
M17	Lower income households apply less often for energy efficiency investments than high income households.	Achtergrondrapport bij de Monitor van de ISDE, SEEH en het Nationaal Warmtefonds	Tigchelaar, C. en Rovers, R. (2023)	Mitigation
M18	The research shows that the degree of financial vulnerability of households to high energy prices strongly depends on their income, energy-efficient housing quality and ownership situation. Lower-income households are vulnerable to structurally higher energy prices, even if they have a well-insulated home.	De energiekosten van verschillende typen huishoudens in Nederland	Batenburg, et al (2023)	Mitigation

M19	The survey shows that households have made massive energy savings in 2022 in response to the vast increase of energy prices. Due to the high share of households with fixed energy contracts and government compensation, the share of households with payment problems stayed low. In a scenario without compensation, energy savings and fixed contracts, 13% of households would become financially vulnerable at some point with energy prices at their peak in 2022.	Isoleren en compenseren: reactie van huishoudens op de energiecrisis	Schotten, G. et al (2023)	Mitigation
M20	Most homeowners seem to have sufficient financing options (savings and/or borrowing capacity) to renovate their home. A lacking -actual or perceived- business case seems an important hurdle for home owners to renovate their home.	Financiering voor de verduurzaming van de woningvoorraad	Havlinova, J. et al (2022)	Mitigation
M22	This shows that the price ceiling dampens the purchasing power effects of higher energy prices for households. Nevertheless, purchasing power in the base scenario for an average household will fall by a total of approximately 4% in the years 2022 and 2023, as a result of high inflation and lagging wage growth. Due to the price ceiling and the other extra expenditures announced by the government at Budget Day in 2022 (In Dutch: "Prinsjesdag"), the government deficit without additional funding will rise to 3% of GDP in 2023.	Energieplafond dempt koopkrachtrisico's, maar is geen structurele oplossing	Adema, et al (2022)	Mitigation
M23	At least 2 million homeowners do not have enough savings to renovate their homes. These homeowners need to extend their mortgage or take out a consumer loan.	Kunnen woningeigenaren energie-investeringen betalen?	Bos, J., Verberk-de Kruik,M. en Warnaar, M. (2020)	Mitigation
M24	The price premium for energy efficiency on the Dutch housing market has increased in 2022.	Duurzame woningen presteren beter door energiecrisis in veranderende woningmarkt	Brainbay (2022)	Mitigation
M25	This research shows that the business case of insulation up to the level of the national insulation standard is positive for only for 47% of all owners of homes built before 1992.	Inkomenseffecten van woningisolatie naar de isolatiestandaard	Mot, E. et al (2023)	Mitigation
M26	This study has examined the possible impact of wind farms in the Drentse Mondengebied and near Meeden and Veendam in Groningen investigated on the basis of 20,371 housing transactions from 2008 to 2018. The researchers do not find a significant house price effect. However, the analysis has major limitations because the construction of the parks is planned – ex post house price effects are more easy to interpret.	Windparken en Woningprijzen in Groningen en Drenthe	Daams, M.N and Sijtsma, F.J. (2019)	Mitigation
M27	Energy efficiency policies on the housing market in Germany caused a distributional conflict on injust cost burdens of energy transitions.	Using conflicts to uncover injustices in energy transitions: The case of social impacts of energy efficiency policies in the housing sector in Germany	Grossmann (2019)	Mitigation
M28	The price effects of superior energy performance tend to be higher for terraced dwellings and flats compared to detached and semi-detached dwellings. The evidence is less clear-cut for rates of house price growth but remains supportive of a positive association. Overall, the results of this study suggest that energy efficiency labels have a measurable and significant impact on house prices in England.	Does energy efficiency matter to home-buyers? An investigation of EPC ratings and transaction prices in England	Fuerst, F, et al (2015)	Mitigation
M30	This research studies the difference between actual and theoretical energy consumption in Dutch residential dwelling stock. The gap between theoretical and actual energy consumption is highest for the least energy efficient home, where the theoretical gas use can be as high as double of the actual consumption (due to the rebound effect).	Predicting energy consumption and savings in the housing stock	Majcen, D., Alam, M. et al. (2020)	Mitigation
M31	Two out of ten homeowners have never heard of a hybrid heat pump. Three out of ten have heard of it, but do not know what it is.	Helft woningeigenaren weet niet wat een hybride warmtepomp is	Milieu Centraal (2022)	Mitigation
M32	This report estimates the implementation coss of decentralised authorities between 2022 and 2030 as a result of the Climate Agreement.	Uitvoeringskosten van het Klimaatakkoord voor decentrale overheden in 2022 - 2030	Raad voor het openbaar Bestuur (2020)	Mitigation
M33	Next to market failures, behavioural factors are in important barrier for the energy transition of the residential buildings stock. The report defines Six important barriers for owners to uptake energy efficient renovations: the hassle factor, lack of clarity on the financial benefits of energy efficienct renovation, wrong beliefs on the outcomes of renovation, split incentives, access to finance and the level of income.	Behavioural factors influencing the uptake of energy efficiency in residential buildings	European Environment Agency (2022)	Mitigation
M34	Selection of key mitigation policy insights in the IPCC report are (sic): 1) Carbon taxes tend to garner the least public support among possible mitigation policy options. 2) Predictability of future tax rates helps improve economic performance 3) The principal advantage of a pricing policy is that it promotes implementation of low-cost reductions. The corresponding limitations of pricing policies are that they have limited impact on adoption of mitigation measures when decisions are not sensitive to prices and do not encourage adoption of higher cost mitigation measures. Their effectiveness in influencing long-term investments depends on the expectation that the policy will continue and expectations related to future tax rates or allowance prices. In addition, they tend to be regressive. 4) Economic theory suggests that carbon pricing policies are on the whole more cost effective than regulations or subsidies at reducing emissions.	Climate change 2022 - Mitigation of climate change, chapter 13	IPCC (2022)	Mitigation

	5) An ex post analysis of European carbon taxes finds no robust evidence of a negative effect on employment or GDP growth. (Metcalf and Stock 2020. 6) Mitigation by regulation often enjoys greater political support but tends to be more economically costly than mitigation by pricing instruments.			
M35	The annual Climate and Energy Outlook by the Netherlands Environmental Assessment Agency, as prescribed by the Climate Act. The analysis concludes that with current mitigation policies (implemented, planned and stated) the built environment will only in the most positive scenario reach the 2030 target, and only if external factors move in the most favorable direction.	Nationale Klimaat- en Energieverkenning 2022	PBL (2022)	Mitigation
M36	Based on a cost-of-living stress test, this research finds that between 670,000 (base scenario) and 1.2 million households (worst case scenario) may eventually struggle to pay their monthly bills if prices of energy and other fixed charges remain high. That amounts to between 9% and 15% of all households.	Stresstest kosten van levensonderhoud	CPB (2022)	Mitigation
M37	This study shows where energy poverty is prevalent in the Netherlands. It is mainly outside the Randstad conurbation, in the north, east, and south-east of the country and in part of the province of Zeeland.	Rapport: Gezondheidskosten en energiearmoede	TNO (2023)	Mitigation
M39	This research finds a positive price premium for energy efficiency on the Flemish housing market. The premium is higher for single-family homes (+2.3% for homes with an EPC score that is 100 points lower) than for appartments (+1.8%). A breakdown into categories shows that the effect of the EPC score is non-linear.	Het effect van het EPC en energetische kenmerken op de verkoopprijs van woningen in Vlaanderen	Damen, S. (2019)	Mitigation
M40	This study states that energy efficiency improvements help to reduce the number of households with energy poverty. However, it cannot fully compensate for the income effects of the planned heat transition policies and projected increase of energy prices. This implies that there is also a need for targeted income policies.	Energiearmoede in de warmtetransitie	CE Delft (2021)	Mitigation
M41	This report evaluates the expected effectivenes of existing national mitigation policies in the built environment and other sectors, and provides policy recommendations that help to increase the likeliness of reaching the climate targets.	Aanvullend klimaatbeleid voor 2030	CE Delft (2022)	Mitigation
M42	The researchers find a positive correlation between the price and energy label of homes. But, the higher sales price induced by a higher energy rating is not as high as the saved future energy cost over time would justify (35-50 percent lower than the theoretical calculation). The researchers provide several explanations for this difference. For example if the expected value of the energy savings is higher than the costs to renovate a similar house with a low energy rating, the buyer will be willing to pay a price premium that is lower than the value of the expected energy savings.	Do homes with better energy efficiency ratings have higher house prices?	Danish Energy Agency (2016)	Mitigation
M43	The researchers conclude that the price difference between energy-efficient and energy-inefficient houses has increased over the past decade. And that it may even become bigger due to the high energy and construction prices and the future renovation obligations.	The impact of changes in dwelling characteristics and housing preferences on house price indices	Reusens, P. (2022)	Mitigation
M44	Evaluation of the application process for homeowners' renovation subsidies.	Vereniging Eigen Huis Factsheet resultaten meldpunt subsidies (ISDE)	VEH (2023)	Mitigation
M45	This report discusses the financial and non-financial drivers and impediments for owner-occupiers in deciding whether or not to make their homes more energy-efficient.	Woningverduurzaming: willen en kunnen betekent nog niet doen	SCP (2021)	Mitigation
M46	Homeowners with insufficient financing options to renovate their homes are clustered regionally. There are 23 municipalities in the Netherlands in which the percentage of homeowners with insufficient funds for renovation measures is relatively high.	Verduurzaming huis vaker te duur voor eigenaren in aandachtsgebieden	Caloia, F. & Heerma van Voss, B. (2022)	Mitigation
M47	Article illustrates expected costs of investing in a heat pump, the avaliable subsidies and expected energy savings by dwelling type.	Warmtepomp: kosten en besparing	Vereniging Eigen Huis (2023)	Mitigation
M48	This research finds an increase of 3-8% in the price of residential assets as a result of energy efficiency improvements as a rule of thumb, and an increase of around 3-5% in residential rents compared to similar properties.	Energy efficiency, the value of buildings and the payment default risk	Zancanella, P. (2018)	Mitigation
M49	Comprehensive report by the Netherlands Enterprise Agency on among others the attitude of homeowners towards the renovation of their homes, the policy contexts, emissions of buildings etc.	Monitor verduurzaming gebouwde omgeving	RVO (2022)	Mitigation
M50	News article on the existence of a price premium for energy efficiency on the Flemish housing market.	Vlaams energieverslindend huis daalt in waarde	De Tijd (2023)	Mitigation
M51	This difference in the energy consumption of households in dwellings with energy label A compared to enerhy label G are much smaller than expected in theory. The type and size of homes, as well as household characteristics explain a much larger part of energy consumption than the energy label. Behavioural factors play a role too.	Energielabel zegt niet alles over energieverbruik	Groot, S. (2023)	Mitigation
M52	The researchers aim to enrich insights of the drivers of homeowners to renovate their home. They emphasize the need to distinuguish between immediate and proximate drivers and deeper, ultimate influences. This requires combining both applied behavioural research on energy efficiency and sociological research on domestic life.	Why do homeowners renovate energy efficiently? Contrasting perspectives and implications for policy	Wilsona, C., Cranea, L., Chryssochoidis, G. (2015)	Mitigation

M53	This research finds that the information value of the voluntary energy labels during the period 2008-2014 is limited. The information value of mandatory labels that are adopted since 2015 is less clear-cut. The researchers find that homes with higher energy efficiency were already transacted with significant price premiums before obtaining energy labels. This implies that at least part of the premiums cannot be attributed to mandatory labels.	The information value of energy labels: Evidence from the Dutch residential housing market	Zhang, L., Stangenberg, S., Van Wickeren, S. (2020)	Mitigation
M54	Statistics on the Dutch housing stock by energy label over time.	Energielabels van woningen, 2010 t/m 2022	Compendium voor de Leefomgeving (2023)	Mitigation
M55	This report outlines the options for phasing out the mono central heating boiler in homes through stricter norms.	Normering verwarmingsinstallaties	CE Delft (2022)	Mitigation
M56	The report suggest to set up an office for homeowners' assocations (VVE's) that enable a single application for both subsidies and loans. This could substantially simplify the procedure.	Evaluatie van de Subsidieregeling energiebesparing eigen huis 2016-2020	Overheid.nl (2023)	Mitigation
M57	The report states that some households are not aware of or do not have the financial options to make (even profitable) sustainability investments. The government can play a role to provide information and loans or subsidies for households with small assets.	Economische beschouwing Fit for 55-pakket	CPB (2022)	Mitigation
M58	Over the past decade, households and financial institutions have become more resilient to shocks from the housing market. Homeowners' housing costs and debt ratios have decreased and their financial buffers have increased.	Risicorapportage Financiële markten 2023	CPB (2023)	Mitigation
M59	The report states that climate policy in the form of tax increases has a develling effect. The effect of a higher energy tax in the Netherlands for the lowest income category is 0.6% in 2019 versus 0.2% for the highest category.	Verkenning inkomenseffecten van energie- en klimaatbeleid	CPB (2018)	Mitigation
M60	Suggestions made by experts to remove impedements for VVE's: 'good availability of subsidy schemes, good loan conditions, less bureaucracy and easier decision-making'	Problemen binnen vve's hinderen verduurzaming Nederlandse woningen	Nieuwsuur (2022)	Mitigation
M61	The study finds that measures aimed at combating and preventing energy poverty have positive effects on energy poverty-related aspects. The study encompasses eight different measures and find that these measure can have positive effects on the wallet, on the home and the pshyscial, mental and social conditions of the residents.	Steunmaatregelen energiearmoede hebben positieve effecten	TNO (2023)	Mitigation
M62	The study finds that one-stop shops can bridge the gap between a fragmented residential building sector, with a large heterogeneous set of households, and the construction supply side. They can help increase the actual renovation rate by supporting potential clients through the various steps of the decision-making process.	One-stop shops for residential building energy renovation in the EU	Boza-Kiss, B., Bertoldi, P., Della Valle, N., Economidou, M. (2021)	Mitigation
M63	The study finds that public-driven one-stop-shops appear to operate smoother in the renovation market offering services that are considered crucial by customers. Private-driven one-stop-shops are dealing with greater challenges in trying to consolidate their presence in the renovation market.	Comparing public- and private-driven one-stop-shops for energy renovations of residential buildings in Europe	Pardalis, G., Mahapatra, K., Mainali, B. (2022)	Mitigation
M64	'Carefree service' is as an important way to which residents can be supported to make their homes more sustainable. The report outlines four action pesperction for the Dutch government to contribute in creating an effectieve market for 'carefree services': 1) Create a sense of urgency and clarity about the necessity and objectives of home sustainability for residents and market parties. 2) Increase comfort and capacity of municipalities to improve the collaboration with 'carefree service providers' through the neighborhood approach ('Wijkaanpak') and individual approach 3) Strengthen opportunities for financing and savings-as-a-service, also for people who do not want or cannot incur new debts. 4) Encourage pre-competitive cooperation across 'carefree service providers' in the field of knowledge and data exchange and a guarantee fund.	Op weg naar een effectieve ontzorgingsmarkt	Ministerie van Binnenlandse Zaken en Koninkrijksrelaties (2021)	Mitigation
M65	The study finds that households in the Netherlands with above-average incomes (mid-high and high) are rarely vulnerable to high energy prices, even when residing in a poorly insulated rental or owner-occupied home. Lower incomes are often vulnerable to high energy prices, especially when they reside in poorly insulated homes.	Zowel verduurzaming als inkomenssteun nodig om energiekosten te drukken	Batenburg, A. et al. (2023)	Mitigation
M66	Study finds that improving the energy-efficiency of homes generally pays off for homes up to and including energy label C. The last mile", i.e. insulation to the level of *Bijna Energie Neutraal Gebouw (BENG)* norms, is on average not financially beneficial for existing homes.	Klimaatbeleid en de gebouwde omgeving	Economisch insituut voor de bouw (2018)	Mitigation

M67	Analysis based on cross-sectional data on household energy consumption by energy label. This data implies that the difference in energy consumption of households in a label D versus label G home seems on average insufficient to outweigh the initial investment costs, even at 2022 price levels. The price premium for energy efficiency is positive and increasing over time, amounting ca. €37,000 for a home with label A compared to G in 2023.	Energiecrisis maakt energiezuinige woning nog aantrekkelijker	Groot, S. (2023)	Mitigation
M68	Official description by the Dutch government of its policy program to accelerate the renovation of the housing stock. The report includes an overview of the main hurdles for the transition.	Beleidsprogramma versnelling verduurzaming gebouwde omgeving	Rijksoverheid (2022)	Mitigation
M69	Mitigation policies steer the transition to a zero carbon housing stock. This will go along with increased grid congestion problems in virtually every region of the Netherlands	Niet meer elektriciteitsverbruik, toch volle netten. Wat is netcongestie en welke opties hebben bedrijven?	RaboResearch (2023)	Mitigation