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Greenhouse gas emission reduction proposals and national climate policies of major economies

27 November 2012 | Michel den Elzen, Niklas Hohne, Mark Roelfsema

Policy brief: Greenhouse gas emission reduction proposals and national climate policies of major economies

Authors

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Acknowledgements

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You can download the policy brief at: www.pbl.nl/en/publications/2012 or www.ecofys.com/en/publication/

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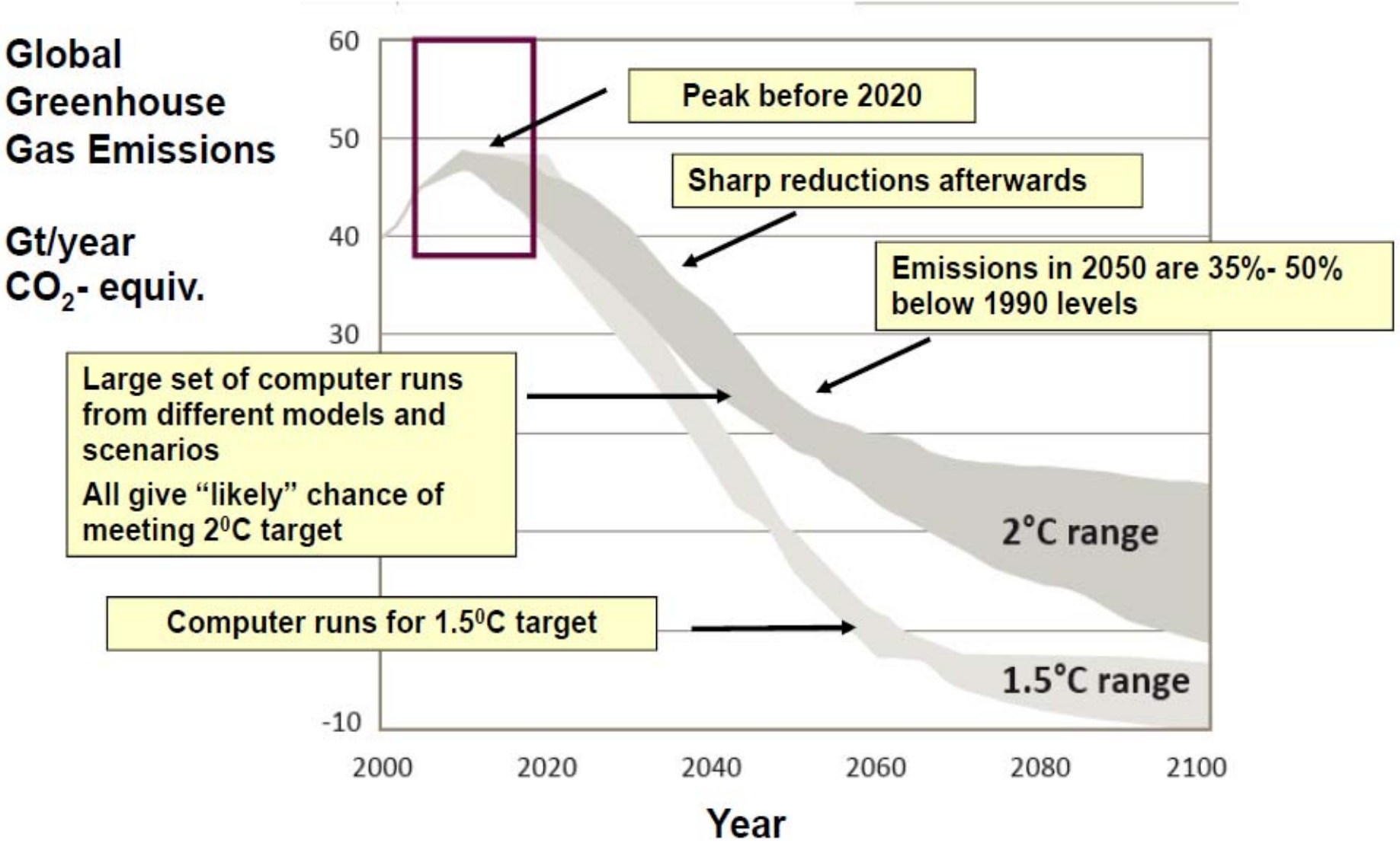
Outline

- Reduction proposals and the 2°C target (Michel den Elzen)
- Overview of national climate policies of major economies (Niklas Höhne)
- Specific countries (Mark Roelfsema)
- Forestry and agricultural policies (Michael Obersteiner)
- Discussion

You can download the policy brief at: www.pbl.nl/en/publications/2012 or www.ecofys.com/en/publication/

What are we aiming for?
Complying with the 2°C target



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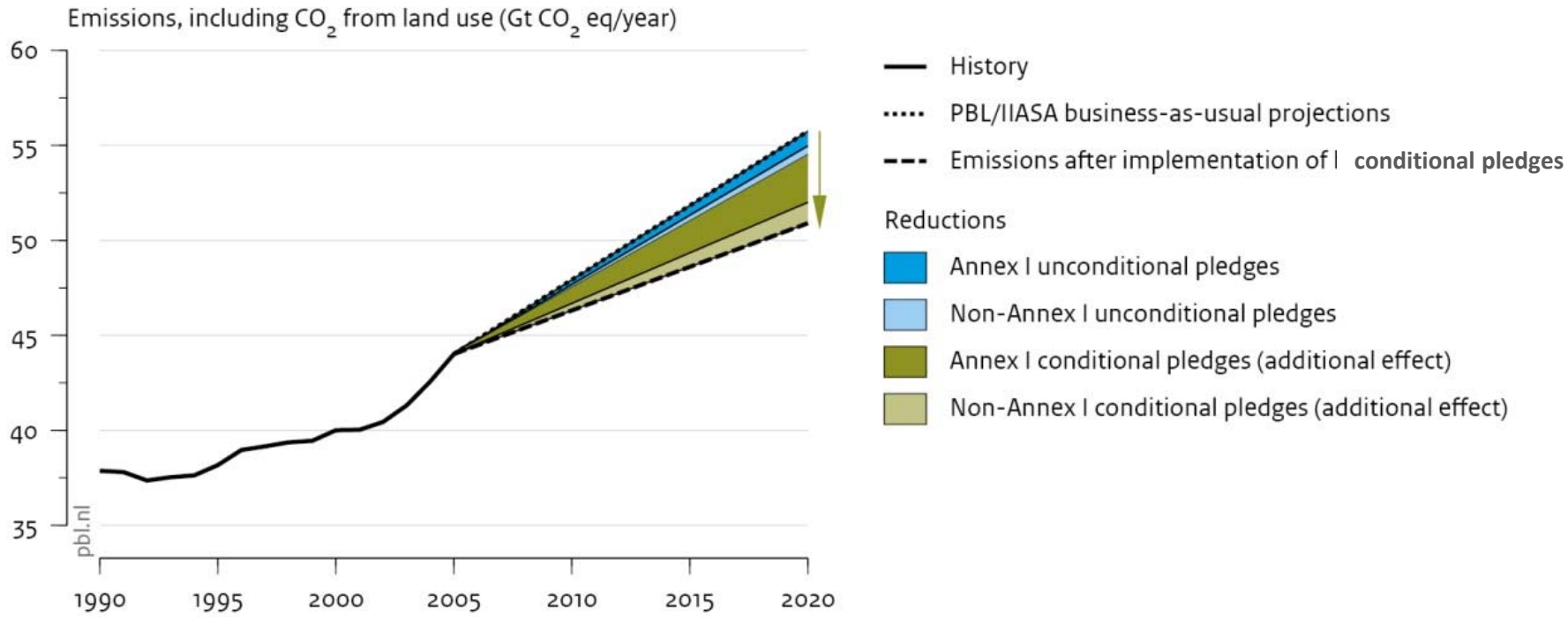
I. Reduction proposals lead to 2020 emissions of 51-55 Gt, which is not enough to meet 2ºC

Impact of pledged reductions in global greenhouse gas emissions



Source: PBL report Analysing the emission gap …, den Elzen et al., 2012, www.pbl.nl/en

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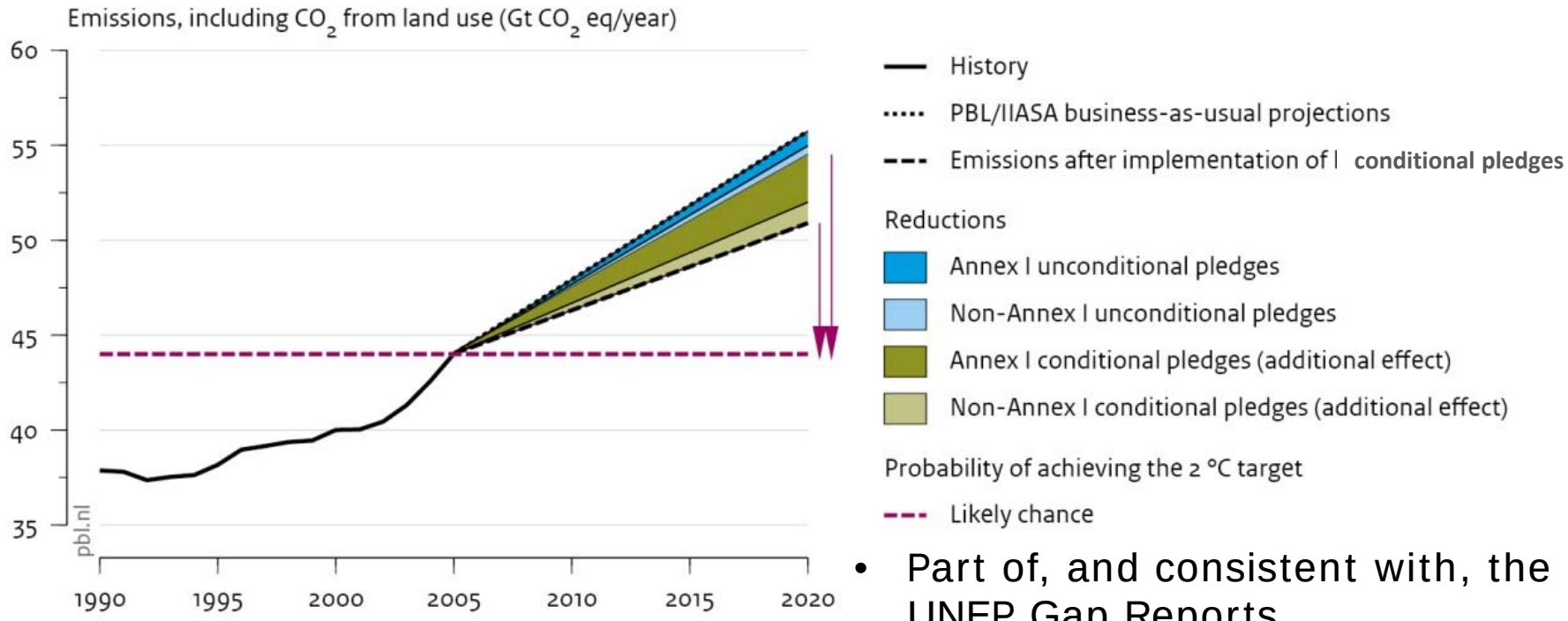
Emissions gap of 7-11 Gt for a likely chance of meeting 2ºC

Impact of pledged reductions in global greenhouse gas emissions



Source: PBL report Analysing the emission gap …, den Elzen et al., 2012, www.pbl.nl/en

- Part of, and consistent with, the UNEP Gap Reports
- Consistent with www.climateactiontracker.org

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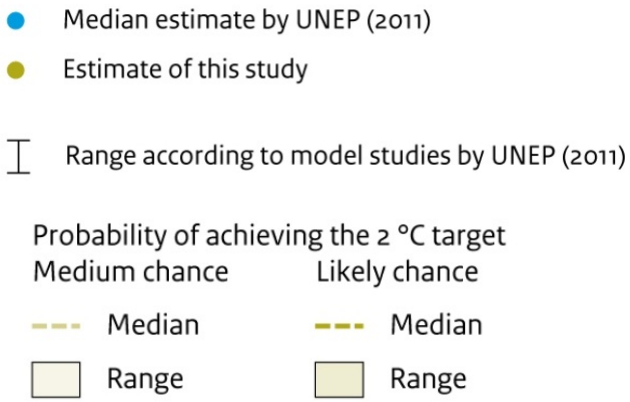
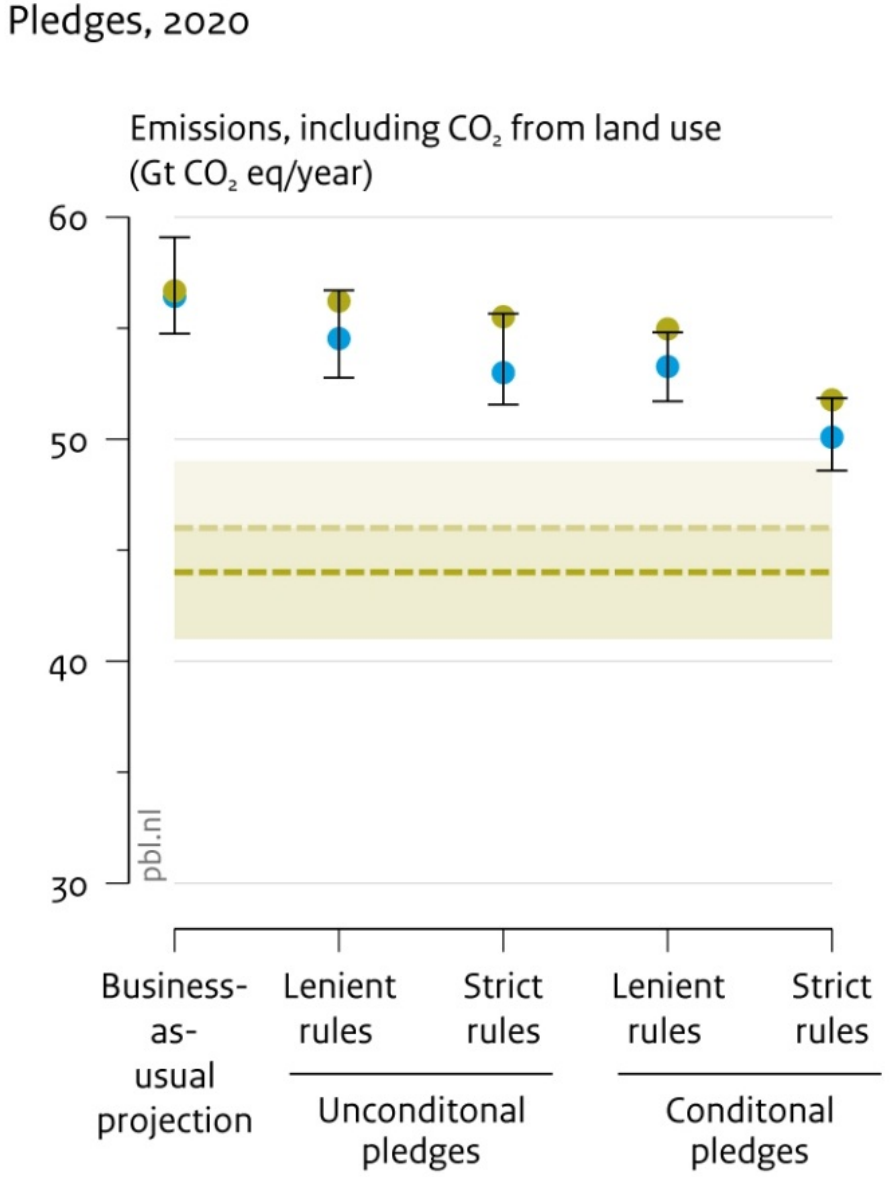
Global emissions gap also depend on rules for land use and surplus credits

- Strict accounting rules
- Lenient accounting rules



Source: PBL report Analysing the emission gap …, den Elzen et al., 2012, www.pbl.nl/en



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Impact Land use accounting rules is modest: less than 2% of 1990 emissions for EU and Annex I Parties

- According to recent study (1) which estimated the possible impact of the new LULUCF rules (as agreed in Durban).
- However, for specific Parties, LULUCF can make a substantial contribution to achieving the pledges.

(1) The role of the land use, land use change and forestry sector in achieving Annex I reduction pledges.
Giacomo Grassi, Michel G. J. den Elzen, Andries F. Hof, Roberto Pilli, Sandro Federici

Climatic Change, December 2012, Volume 115, Issue 3-4, pp 873-881, Open Access
http://link.springer.com/article/10.1007%2Fs10584-012-0584-4

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Estimated potential credits (–) and debits (+) from afforestation/reforestation (AR), deforestation (D) and forest management (FM) by Annex I Parties in the period 2013-2020 (Grassi et al. 2012)

Country	AR	D	FM	Total	
	Mt CO_2			Mt CO_2	% of base year emissions [c]
Australia	-15	38	-6	17	**3.1%**
Belarus	0	0	-3	-3	**-2.2%**
Canada	-2	13	-21	-9	**-1.6%**
Croatia	-0.2	0	-1	-1	**-3.3%**
EU	-72	23	-52	-101	**-1.8%**
Iceland	0	0	0	0	**-6.4%**
Japan	-1	3	-44	-42	**-3.3%**
New Zealand	-19	1	-2	-20	**-33.4%**
Norway	-1	0	-1	-1	**-3.6%**
Russia	-7	18	-117	-107	**-3.2%**
Switzerland	0	0	-1	-1	**-1.8%**
Ukraine	0	0	-2	-2	**-0.2%**
CP1 Parties[a]	-116	96	-251	-271	**-2.1%**
Likely CP2 Parties[b]	**-88**	**62**	**-67**	**-93**	**-1.3%**

The order of magnitude of expected credits is up to 100 MtCO2 for the likely CP2 Parties, and up to 300 MtCO2 for all CP1 Annex I countries (assuming that all adopt the new LULUCF rules)

[a] Sum of Parties above. [b] Excluding Canada, Japan, New Zealand and Russia.
[c] without LULUCF (with the exception of Australia and Norway). For Australia, the 1990 base year is considered, including 140 Mt CO_2eq emissions from AR and D.

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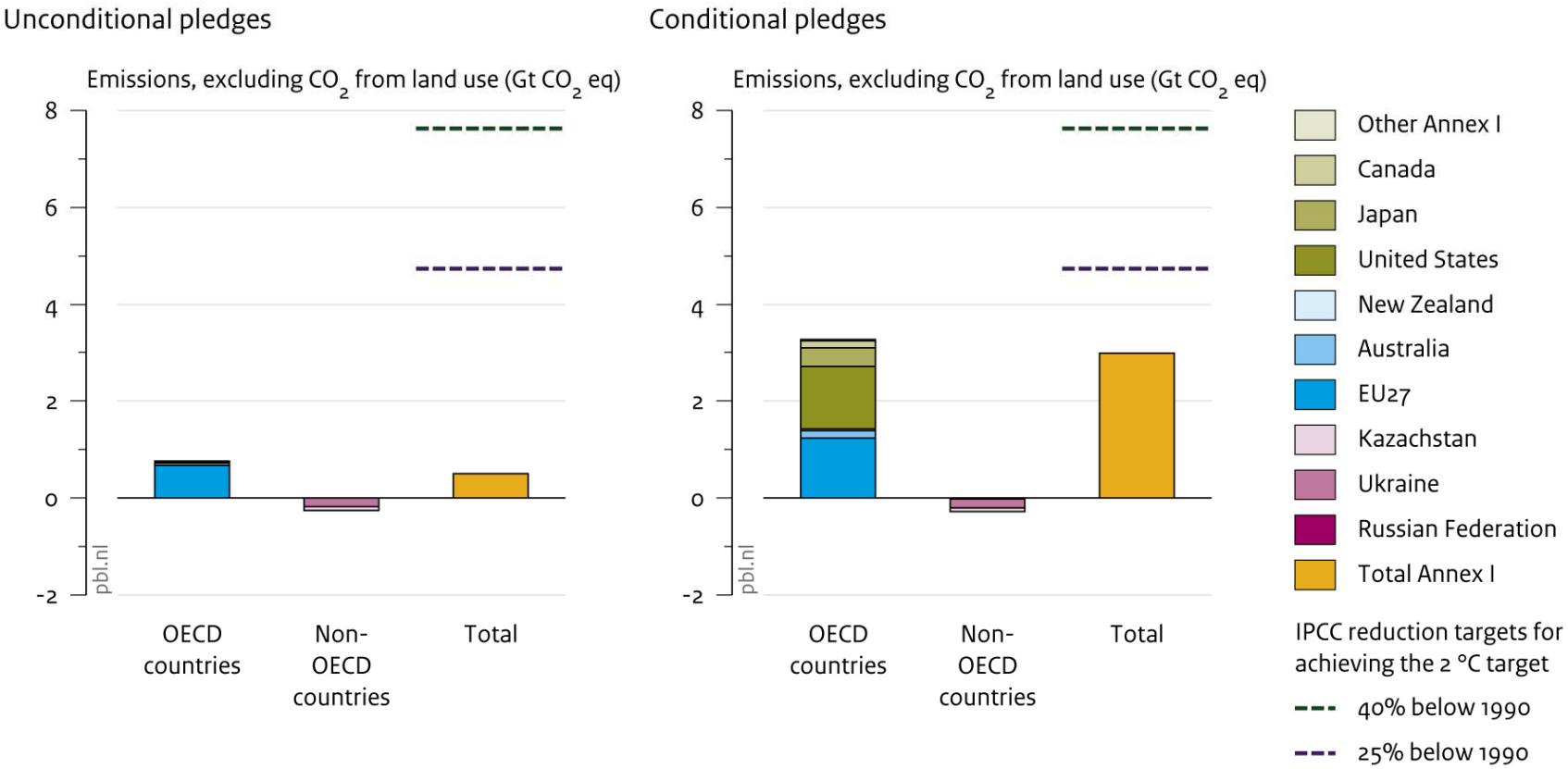
Annex I: reduction 12-18% below 1990 levels, whereas 25-40% is needed for 2ºC

Greenhouse gas emission reductions from PBL business-as-usual projections for Annex I countries, by 2020



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Non-Annex I: pledged reductions applied on BAU emissions. Large uncertainties around BAU & REDD

Country (BAU emissions Gt in 2020)	**Source of emission projections of national study**	**Reduction national BAU**	**Reduction PBL BAU**
China (13.5Gt)	No national BAU available (use PBL BAU of OECD Environmental Outlook 2012)	4%	4%
India (4.5–5Gt)	Planning Commission, Government of India, 2011	23%	-13%
Brazil (3.2Gt)	DECREE No. 7.390/2010	36% to 39%	17% to 21%
Indonesia (2.2Gt)	Ministry of Finance Green Paper (2009), DNPI, 2009	26% to 41%	-8% to 14%
Mexico (0.8Gt)	SEMARNAT (2009)	0% to 30%	0% to 21%
South Africa (0.7)	Scenario Building Team (2007)	0% to 34%	0% to 19%
South Korea (0.8)	National communication	30%	16%
Major emerging economies		14% to 17%	**2% to 6%**
Smaller countries with quantified NAMA		2% to 28%	-3% to 25%
Other remaining NA1 without pledge (30% of BAU emission of NA1)			**0%**
Non-Annex I		9% to 12%	**1% to 4%**

Source: PBL report Analysing the emission gap …, den Elzen et al., 2012, www.pbl.nl/en

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Conclusions

- **Current pledges are insufficient to meet two degree**
- **The Gap can be narrowed with action in the negotiations**
  - Minimizing use of surplus emission credits & LULUCF credits
  - Avoiding double-counting of offsets
  - Pursuing more ambitious (“conditional”) pledges
- **Still large uncertainties for the gap:** conditionality pledges, accounting rules, baseline levels, REDD
- **Cancún pledges show effect:** Almost all countries are implementing national energy and climate policies

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II. How are countries meeting their pledges?

- How much do the most effective domestic climate policies
  - contribute to reducing greenhouse gas (GHG) emissions and
  - contribute to meeting the pledges?

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Approach

- Collect information on implemented climate policies
- Quantify emissions impact of top 3 policies as consolidation of estimates from various sources:
  - Literature review
  - Ecofys: policy by policy impact calculation including potential implementation barriers
  - PBL/IIASA: integrated assessment model calculations (OECD Environmental Outlook 2012)
  - IIASA: Analysis of land use and agriculture

- For China, USA, EU, India, Russia, Brazil, Indonesia, Japan, Mexico, Canada, South Korea,Saudi Arabia, South Africa, Turkey, Ukraine, Argentina, Malaysia

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Caveats

- **Total impact of policies possibly underestimated:** only the most effective national climate policies for some countries

- **Only a snapshot:** situation changes constantly, e.g. recent new emission estimates from China

- **Considerable uncertainty:** Includes wide variety of sources of data and expert judgements

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Current policy trends – more efforts than ever

Renewables electricity

- All major countries have renewable targets
- Many countries have national support mechanisms

Buildings

- Building codes and appliance standards widely used

Cars

- Standards for cars more and more applied

Emission trading

- New systems emerging

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Policy developments

	Energy efficiency	Renewables	Other
Energy supply			CCS
Industry			Material efficiency
Buildings			Urban planning
Transport			Modal shift
Agriculture			
Forestry			

High

Low

First order indication of impact of policies compared to respective potential

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Overall results

- Likely to achieve or overachieve international pledge by implementing the policies portfolio we have assessed:
  - India, China, Russia, EU (unconditional pledge), Australia (unconditional pledge)
- Unclear
  - Japan (new energy strategy), South Korea (implementation of ETS), Brazil (forestry) and Indonesia (forestry)
- Emissions declining but yet insufficiently to meet the pledge
  - USA, Canada, Mexico, South Africa

We make no judgement on the level of ambition of the pledge

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Impact of the major policies per country

Country (2010 emissions)	Mitigation actions with the highest impacts	Result
China (11 $GtCO_2e$)	• CO_2 / energy intensity targets • non-fossil target • emission intensity • renewable and energy capacity targets	Likely to meet pledge (12.8 – 14.7 $GtCO_2e$) but rapid GHG increase up to 2020, due to higher than expected GDP growth in the last few years
USA (7 $GtCO_2e$)	• CO_2 standard for new fossil power plants • car standards • state renewable portfolio standards • California ETS	Emissions expected to be lower than estimated before, but still above pledge
EU (5 $GtCO_2e$)	• Comprehensive policy portfolio including emission trading system, renewable energy targets and support, energy efficiency policy	Likely to meet unconditional pledge
India (3 $GtCO_2e$)	• Renewable energy target • efficiency in industry	Likely to meet pledge, huge uncertainty
Russia (2.5 $GtCO_2e$)	• Energy efficiency plan • renewable target • reduction plan for flaring	Likely to meet pledge
Brazil (2.5 $GtCO_2e$)	• grazing land management • expanding fossil fuels • renewable target	Uncertain whether pledge will be met
Indonesia (2 $GtCO_2e$)	• Action on forestry • renewable energy target	Uncertain whether pledge will be met, current emissions uncertain
Japan (1 $GtCO_2e$)	• Feed-in-tariff for electricity renewables • future of nuclear is unclear	Uncertain whether pledge will be met

Source: Ecofys, PBL, IIASA

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Impact of the major policies per country

Country (2010 emissions)	Mitigation actions with the highest impacts	Result
Mexico (0.7 $GtCO_2e$)	• Framework climate law with pledge • Renewable target • Forestry target	Unlikely to meet pledge with currently implemented policies
Canada (0.7 $GtCO_2e$)	• Car standards • State level renewable policies and industry policies • Power plant standard	Unlikely to meet pledge with currently implemented polices
South Korea (0.6 $GtCO_2e$)	• ETS planned • Renewable target	Unclear whether pledge will be met
Australia (0.5 $GtCO_2e$)	• Comprehensive carbon price mechanism • Renewable targets with strong fines • Forestry actions	Likely to meet unconditional pledge with currently implemented polices, but relatively high uncertainty
Saudi Arabia (0.5 $GtCO_2e$)	• Renewable target	If implemented, substantial impact; no pledge
South Africa (0.5 $GtCO_2e$)	• Renewable target and respective support mechanism	Unlikely to meet pledge with currently implemented policies
Turkey (0.4 $GtCO_2e$)	• Energy intensity • Renewable energy targets	If implemented, substantial impact; no pledge

Source: Ecofys, PBL, IIASA

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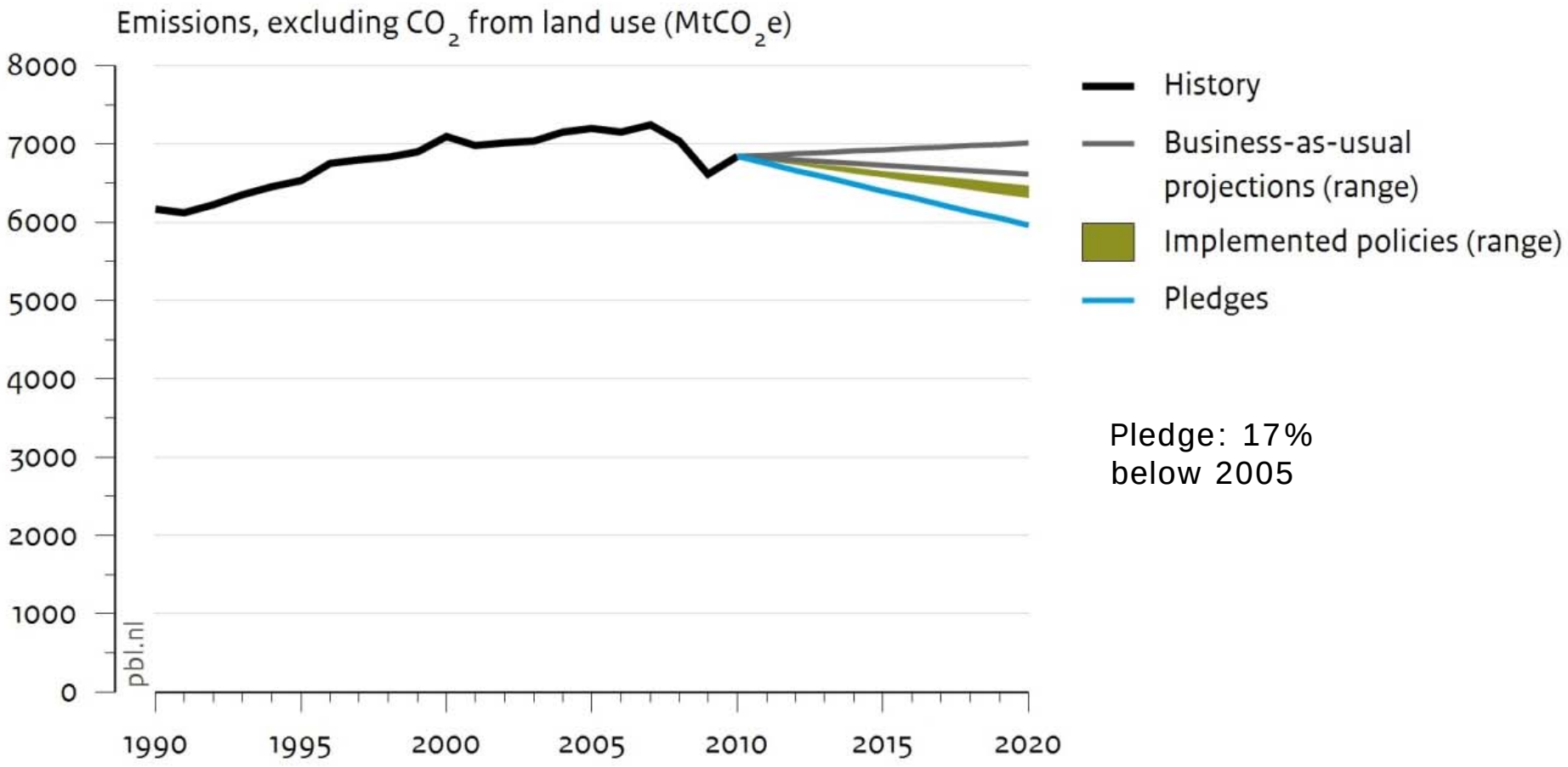
United States: current policies above pledge



Pledge: 17% below 2005

Policies: Power plant standards, car standards, state renewable portfolio standards, California ETS

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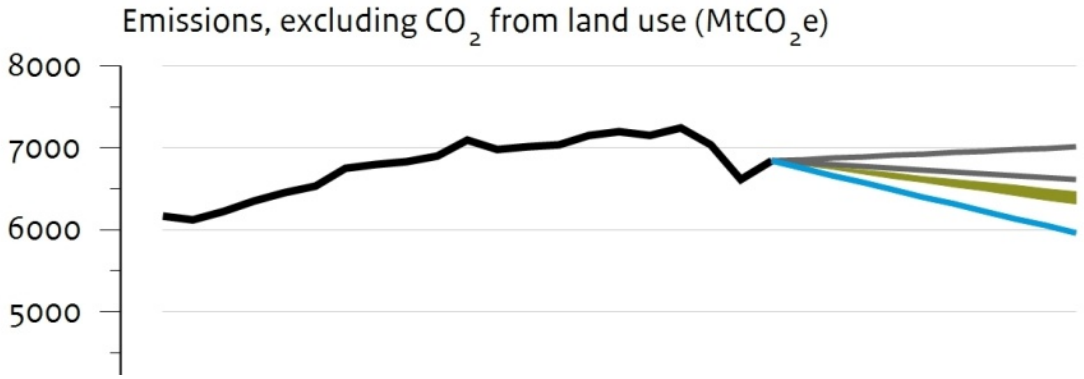
United States: domestic climate policies

Policies

- Standard for new power plants
- Corporate Average Fuel Economy (CAFE) standards
- State renewable targets
- California ETS



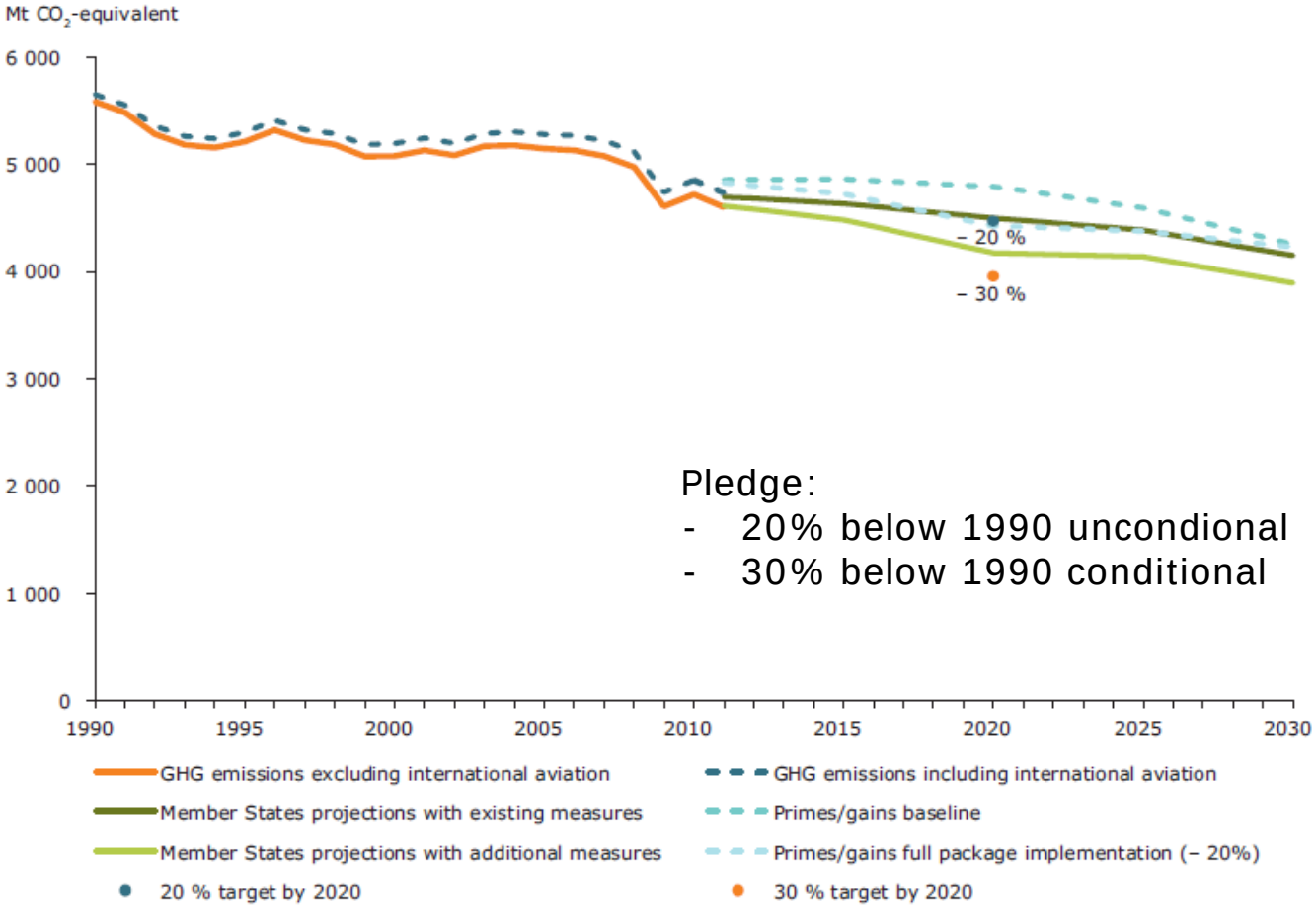
Results

- Lower BAU emissions
  - economic crisis & structural developments in the energy market
- Emission level in 2020 after implementation
  - Limited impact CAFE standards
  - Impact power plant standard in 2020

Uncertainties

- LULUCF Accounting
- BAU development
- State level policies

European Union: meeting unconditional pledge



Pledge:
- 20% below 1990 uncondional
- 30% below 1990 conditional

Source: EEA http://www.eea.europa.eu/publications/ghg-trends-and-projections-2012

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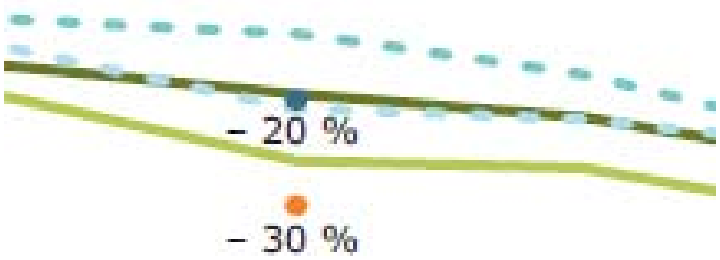
European Union: domestic policies

Policies: comprehensive portfolio

- Emission trading system
- Renewable energy targets and support
- Energy efficiency policies CO_2 standards for light-duty passenger cars.



Results

- Expected to be at level of unconditional pledge
- With planned policies at -25%

Uncertainties

- BAU development
- Member state policies

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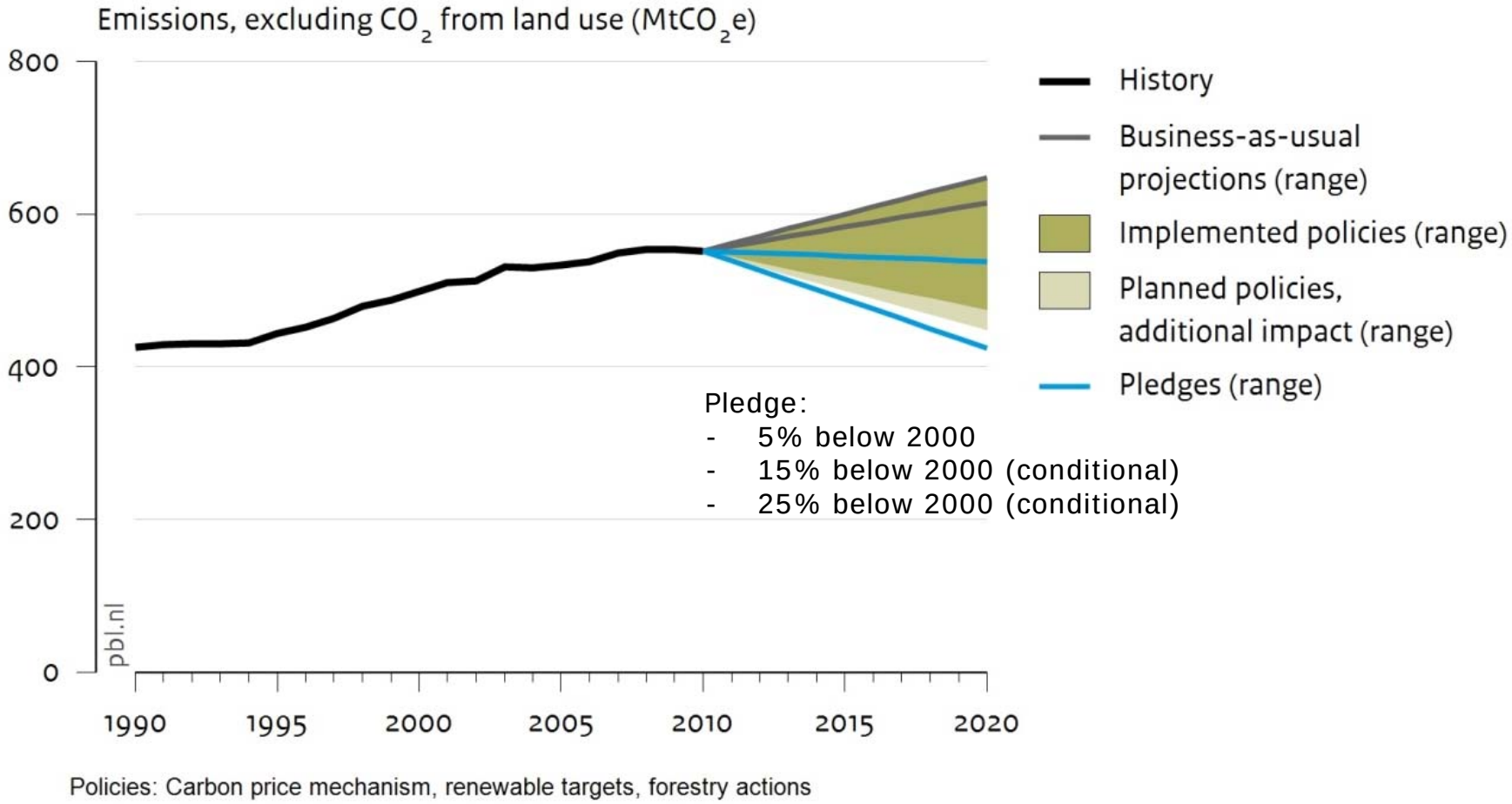
Australia: meeting unconditional pledge, but uncertain



Policies: Carbon price mechanism, renewable targets, forestry actions

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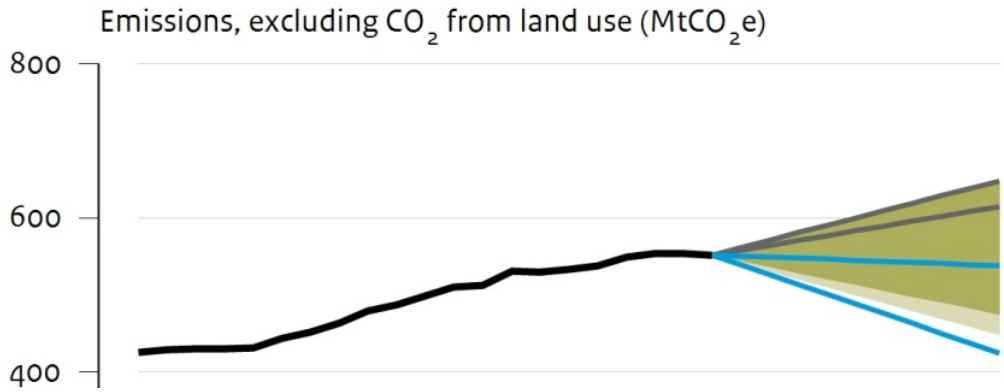
Australia: meeting unconditional pledge, but uncertain

Policies

- Clean Energy Future Plan
- Emission Trading System (ETS) in 2012 (covers 60% of emissions)
- 20% renewable electricity target in 2020, implemented by Renewable Portfolio Standard (RPS)



Results

- Domestic actions could reduce emissions to unconditional pledge

Uncertainties

- LULUCF accounting
- Effectiveness of the new policies

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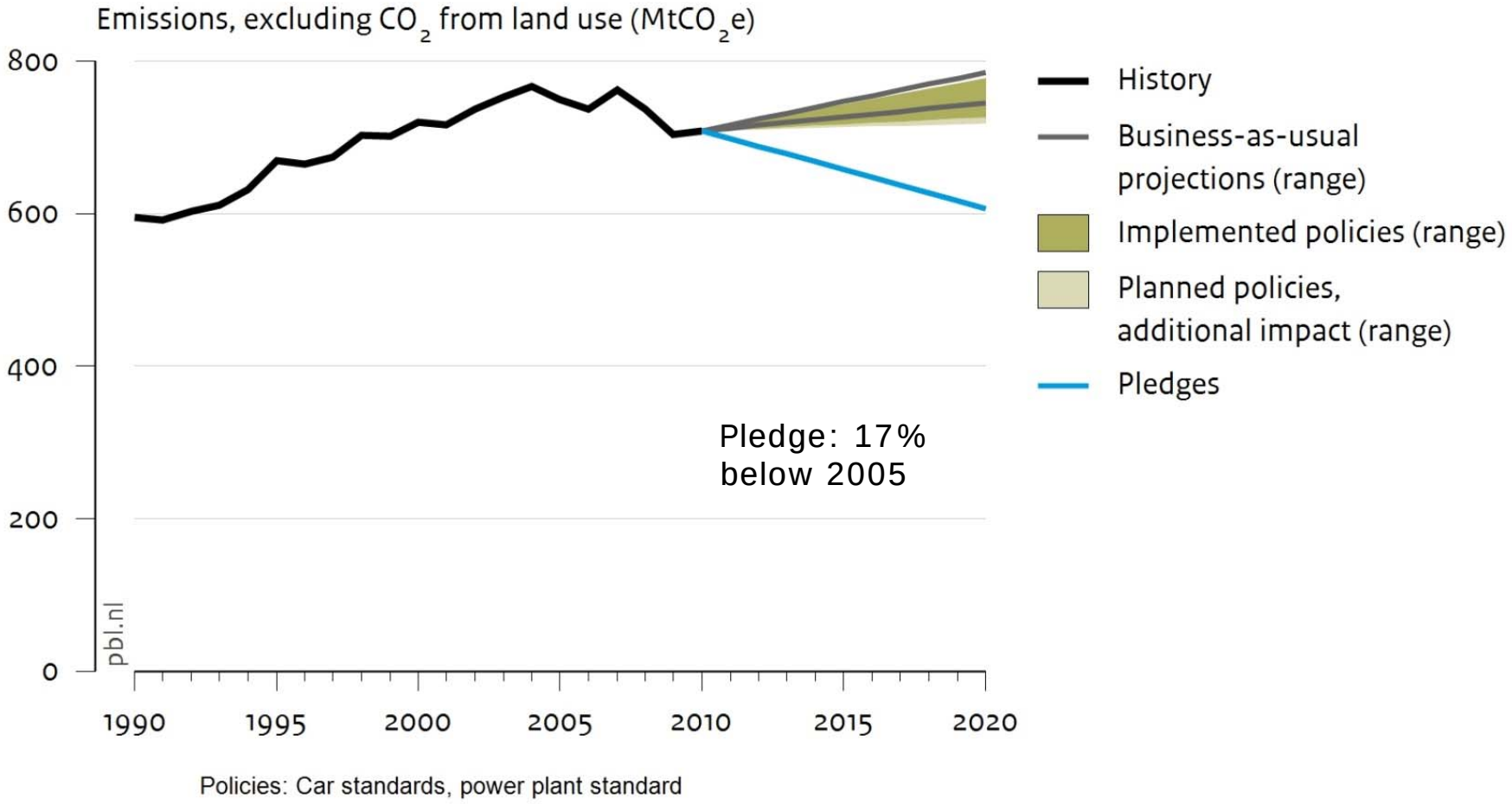
Canada: current policies above pledge



Policies: Car standards, power plant standard

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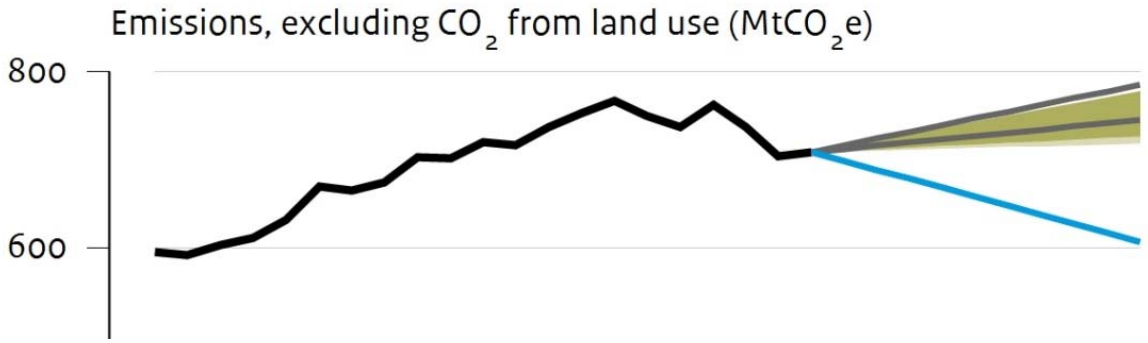
Canada: current policies above pledge

Policies

- Fuel efficiency standards
- Carbon standard for coal fired power plants



Results

- Alignment with US
- Small impact individual policies

Uncertainties

- LULUCF Accounting

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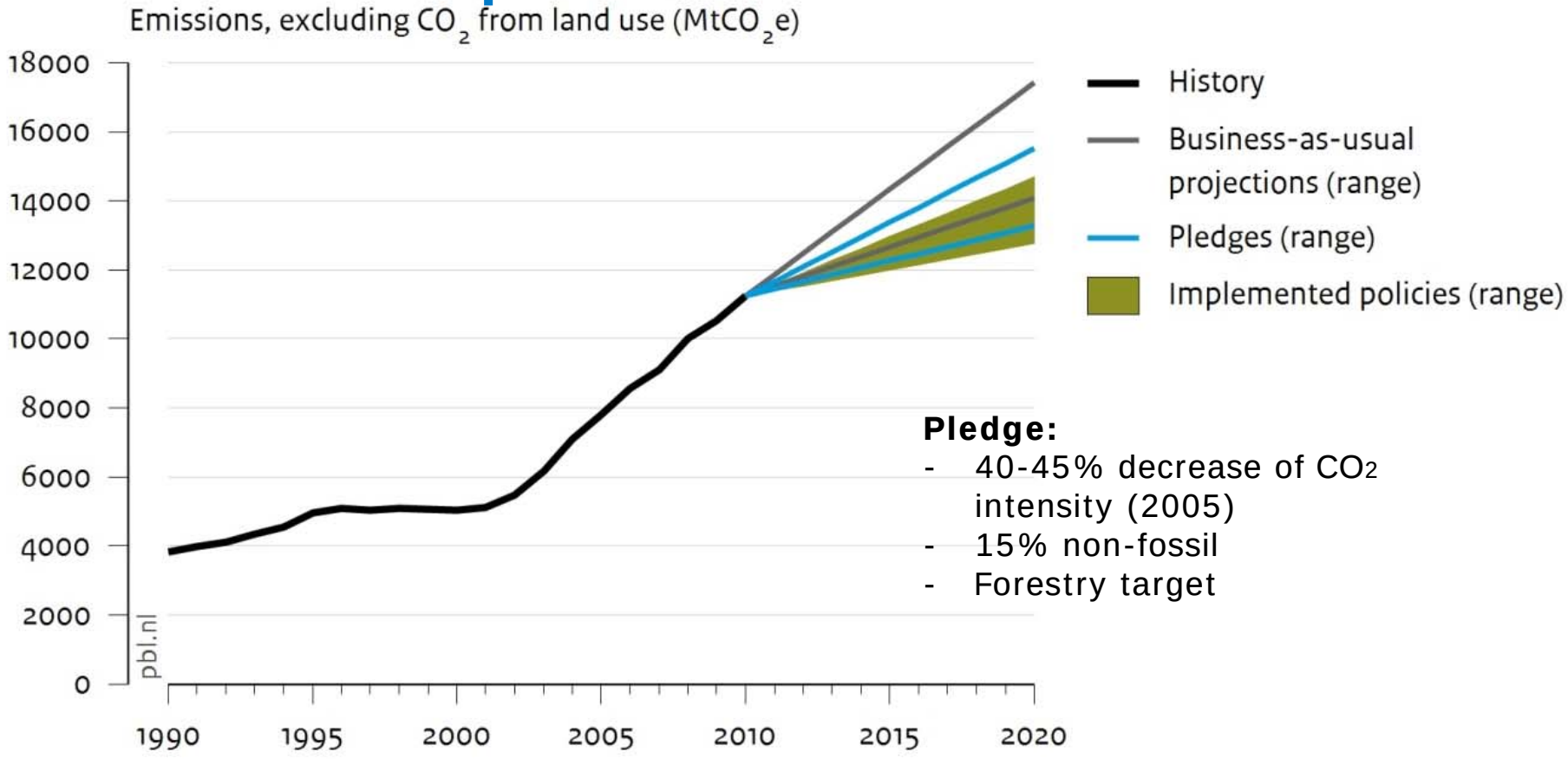
China: meeting pledge, but increasing emissions. Policies do take place



Pledge:
- 40-45% decrease of CO_2 intensity (2005)
- 15% non-fossil
- Forestry target

Policies: CO2 and energy intensity targets, non-fossil target, renewable and energy capacity targets

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China: domestic climate policies

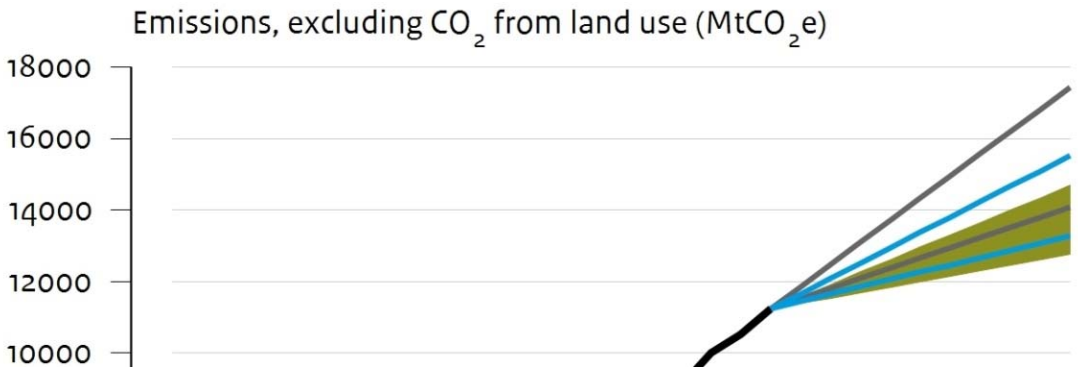
Policy framework

12th Five-year plan (2011-2015)

- CO_2-intensity, decrease by 17%
- Non-fossil target, share is 11.4%
- Energy intensity, decrease by 16%

12th Renewable Energy Development plan

- Renewable capacity targets



Results

- Second National Communication, high BAU
- Implemented policies, but also rapid increase of emissions

Uncertainties

- Historic emissions
- BAU (autonomous) development
- Uncertain GDP projections, which affects intensity targets

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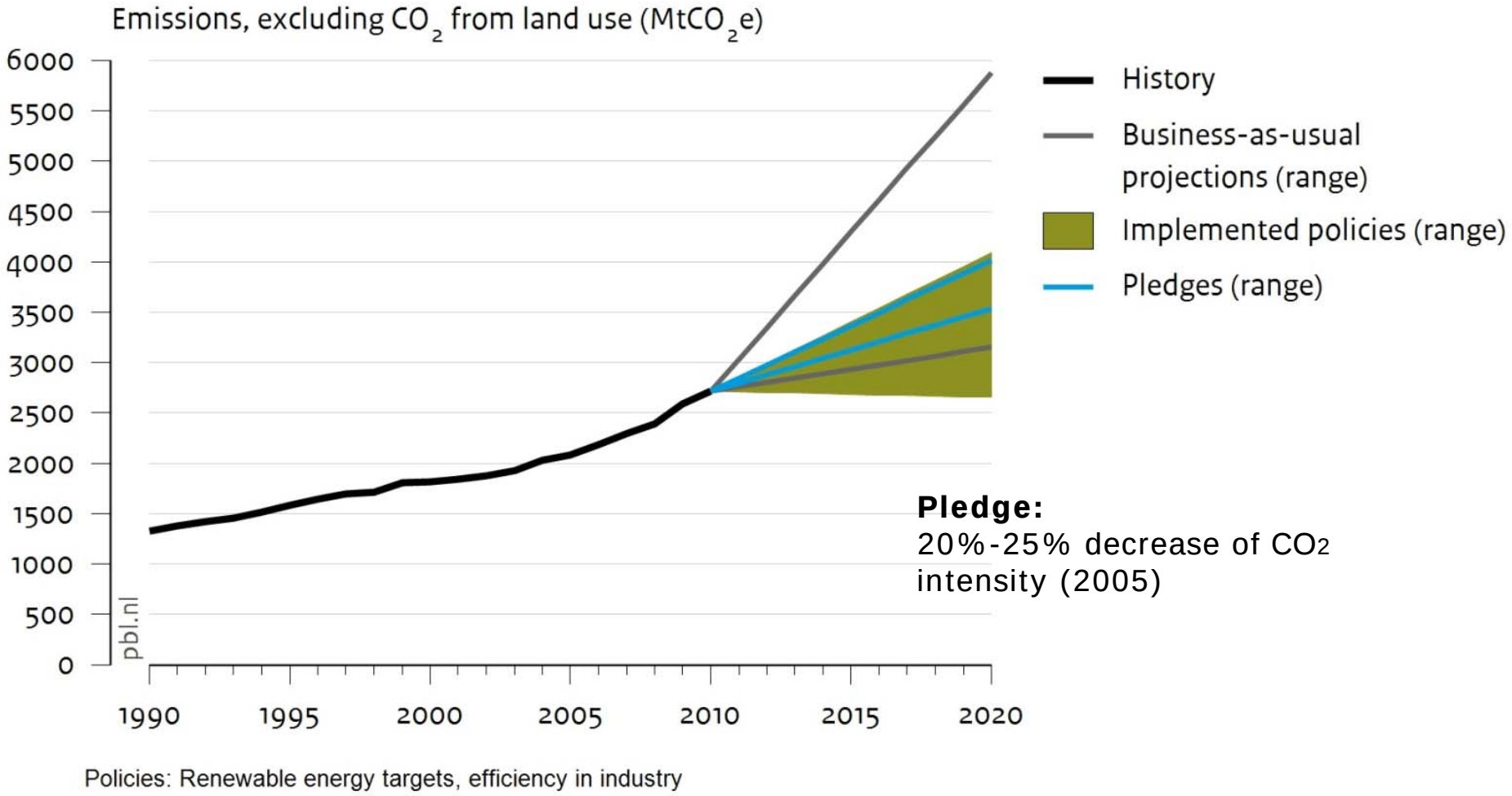
India: meeting pledge, high uncertainty in BAU



Pledge:
20%-25% decrease of CO_2 intensity (2005)

Policies: Renewable energy targets, efficiency in industry

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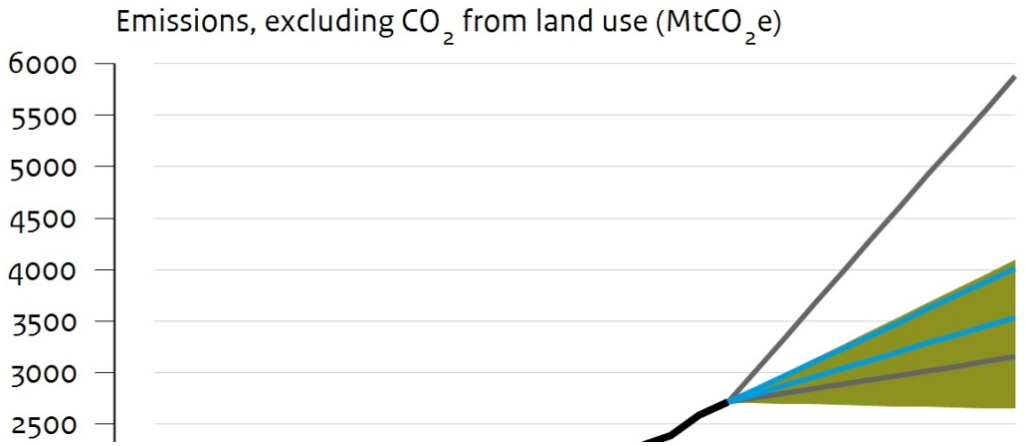
India: domestic climate policies

Policy framework

- National action plan on CC, missions (energy efficiency, solar)
- 11th Five-year plan
  - 15% renewable energy in 2017
- Energy efficiency
  - PAT scheme
- Renewable capacity targets in 2022 (incl. solar mission)



Results

- Impact expected from energy efficiency and renewable targets

Uncertainties

- Large uncertainty in BAU emissions
- Pledge is dependent on GDP growth
- State level policies in place

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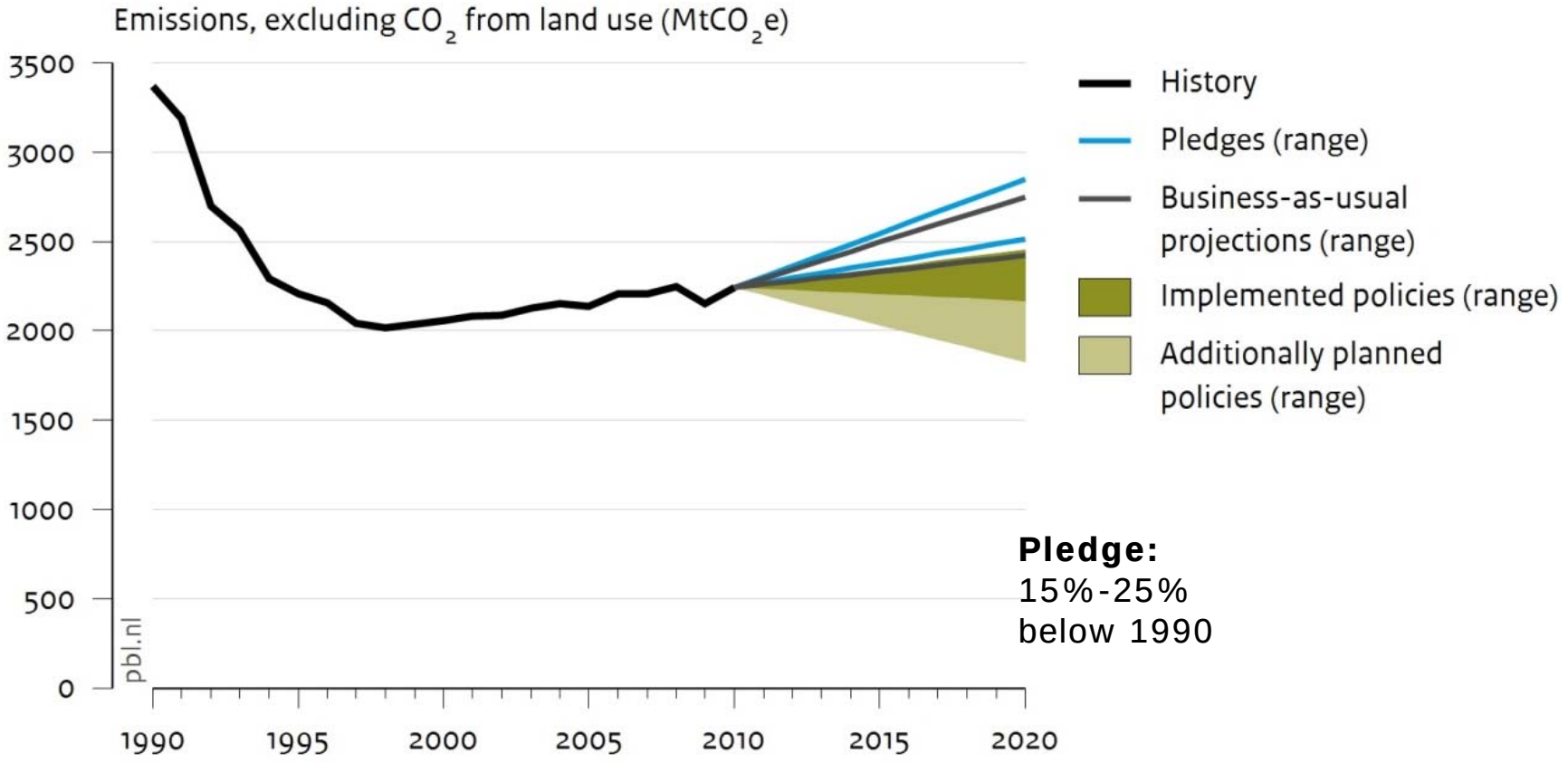
Russia: meet pledge, reductions from policies expected



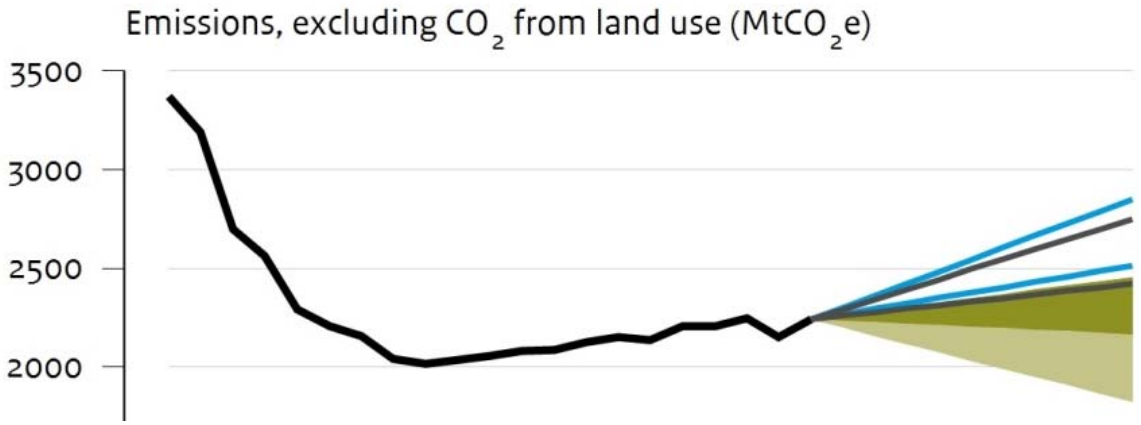
Pledge:
15%-25% below 1990

Policies: Energy efficiency plan (implemented and planned), renewable target, reduction plan for flaring

Russia: domestic climate policies

Policy framework

- Reduce energy intensity of GDP by 40% in 2020
  - 26% autonomous
  - 40% by policies (planned)
- 4.5% renewable electricity in 2020
- Reduction of gas flaring



Results

Policies that could contribute:

- Impact renewable target is small
- Gas flaring substantial impact, fines are not very high
- Autonomous energy intensity improvement (beyond BAU)
  Additional 10% reduction for further improvement

Uncertainties

- Surplus credits

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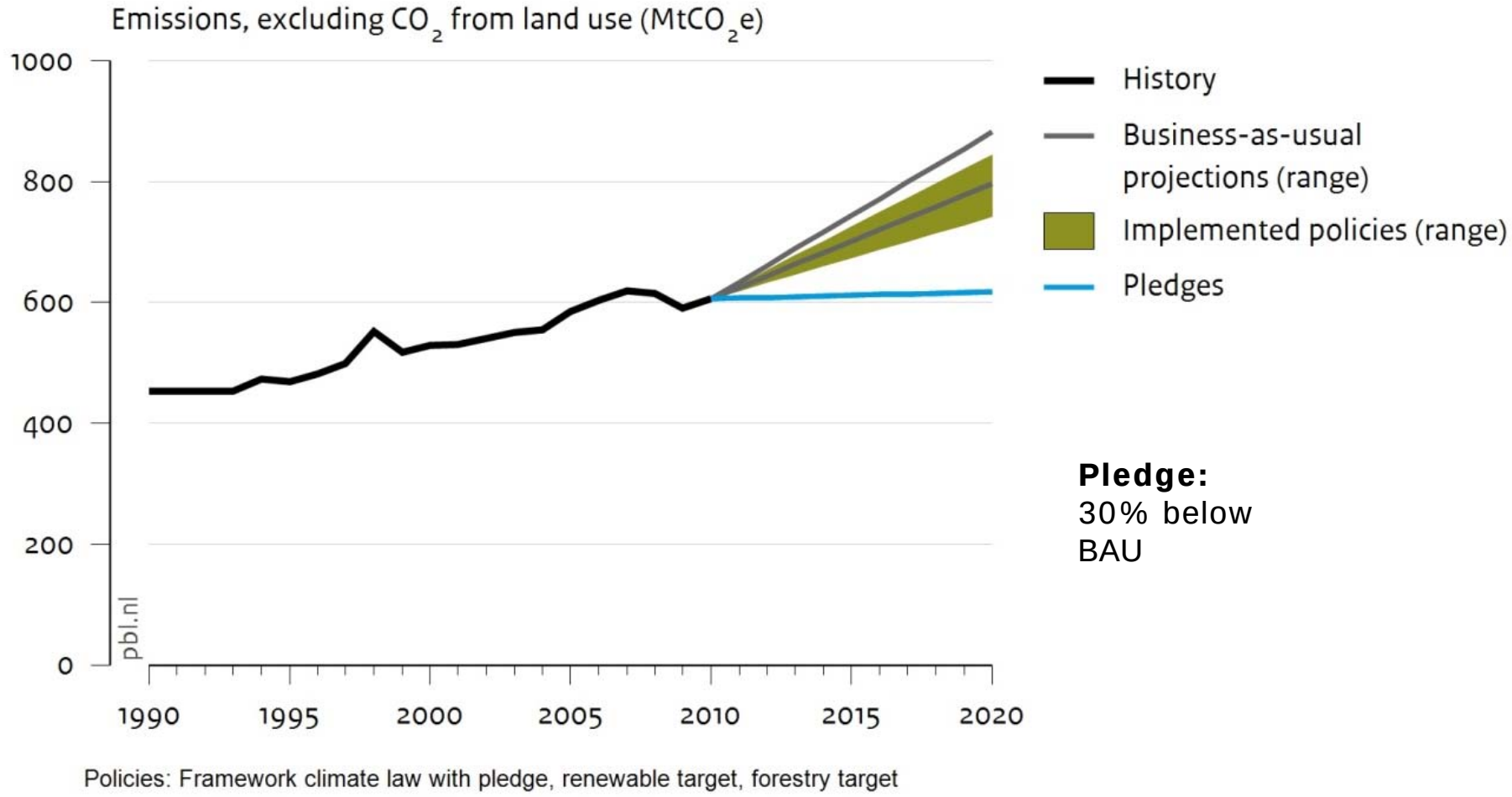
Mexico: current policies above pledge



Pledge:
30% below BAU

Policies: Framework climate law with pledge, renewable target, forestry target

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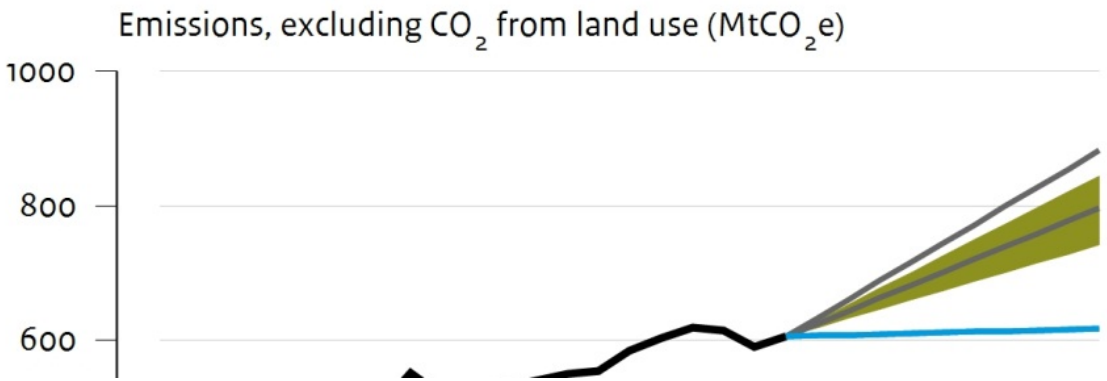
Mexico: domestic climate policies

Policy framework

- General law for climate change
- Currently a Low Emission Development Strategy (LEDS) is being designed
- Renewable target: 35% renewable electricity in 2024
- Smaller policies



Results

- Renewable target has limited impact (gas)
- Results from two studies

1. SEMARNAT (national study)
2. Climate Action Tracker report on Mexico

Uncertainties

- Implementation of LEDS

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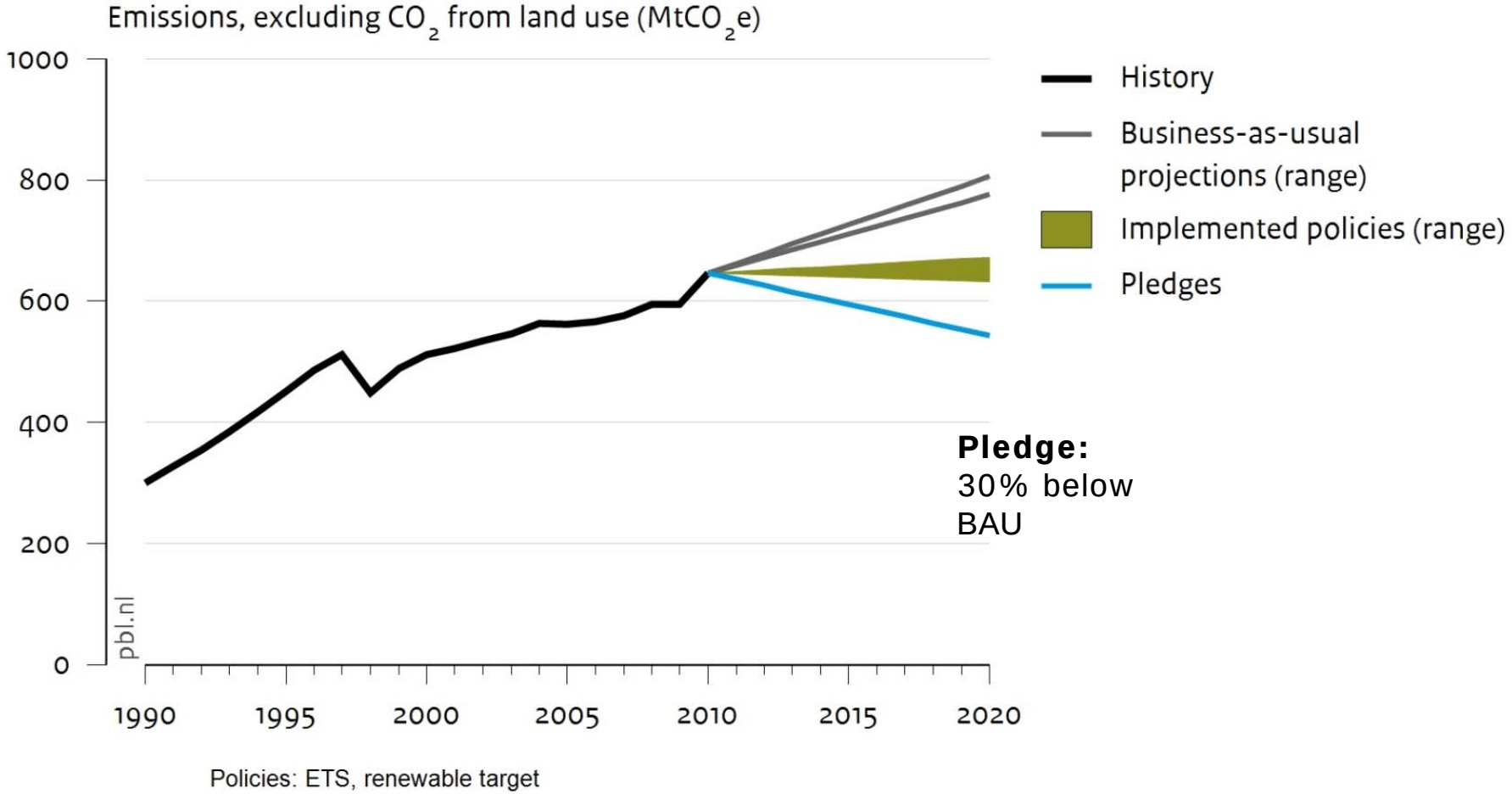
South Korea: significant impact, dependent on full implementation ETS



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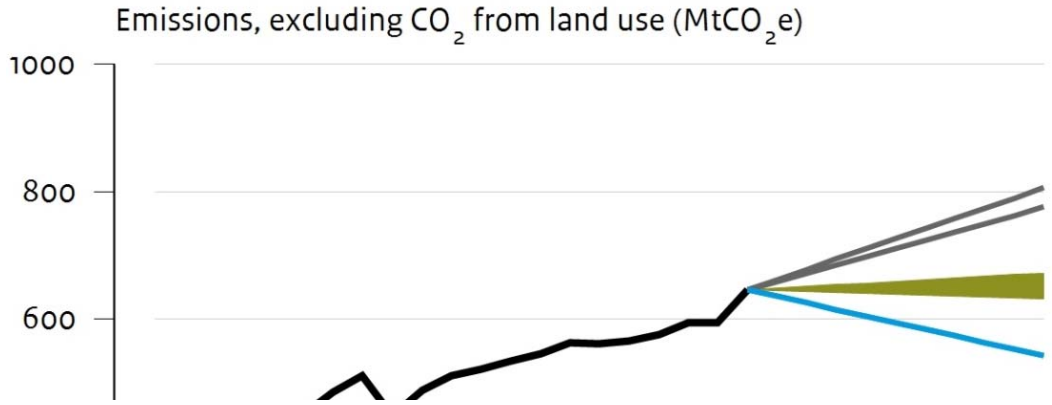
South Korea: domestic climate policies

Policy framework

- Target Management System (TMS) in 2012
  Emission Trading system (ETS) in 2015
- 6% share of renewable electricity in 2020



Results

- Remaining emissions: other policies necessary

Uncertainties

- Coverage ETS
- Other policies (energy efficiency, transport, building)

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Other countries / regions

- South Africa: renewable targets, but structural and policitacl implementation barriers, same for carbon tax
- Japan: nuclear phase out, energy plan is expected
- Ukraine: Feed-in-tariff in place, but administrative barriers
- Turkey: No pledge, if national policies implemented, decrease compared to baseline

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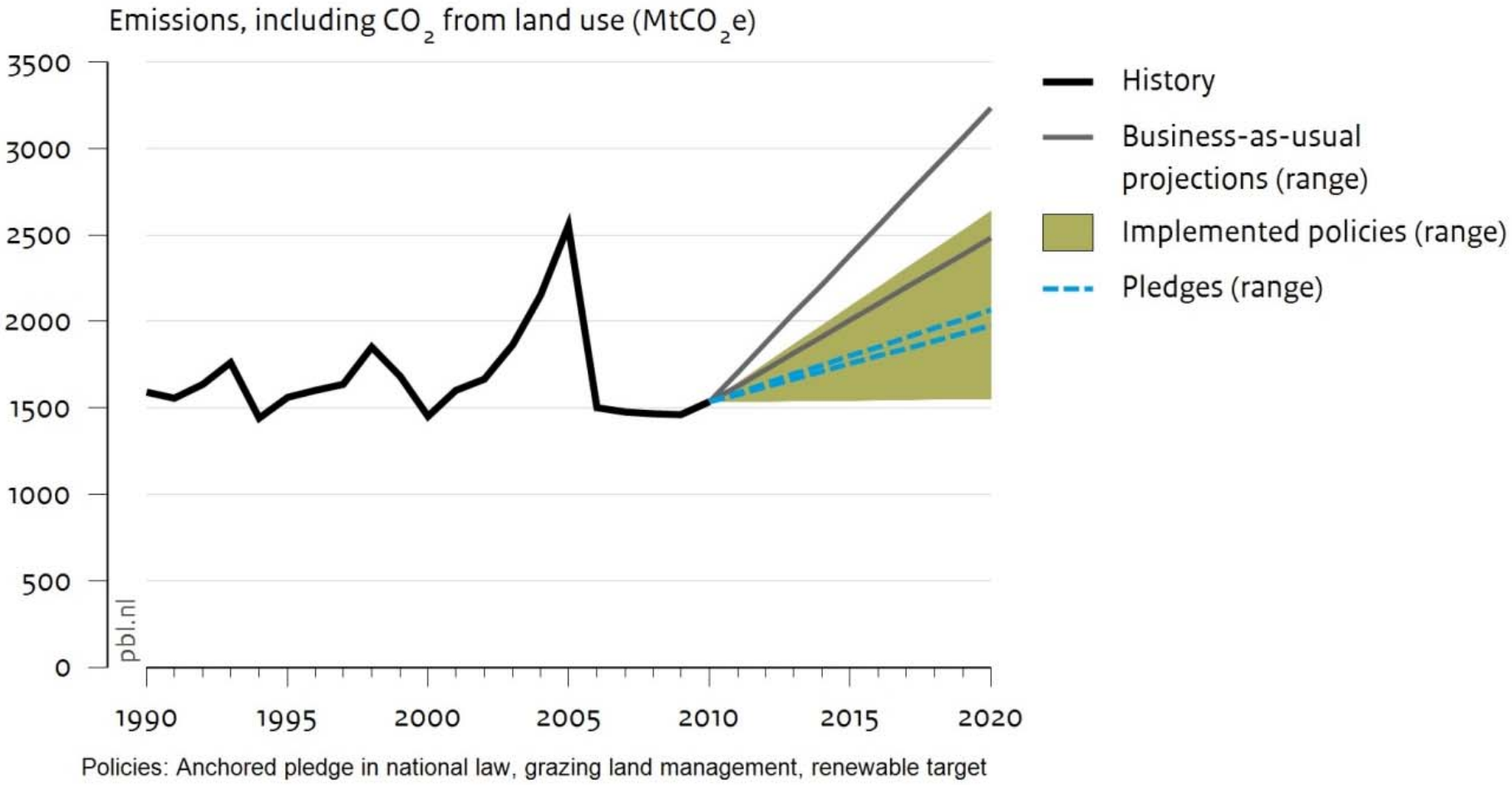
Brazil: Uncertain whether pledge will be met



Policies: Anchored pledge in national law, grazing land management, renewable target

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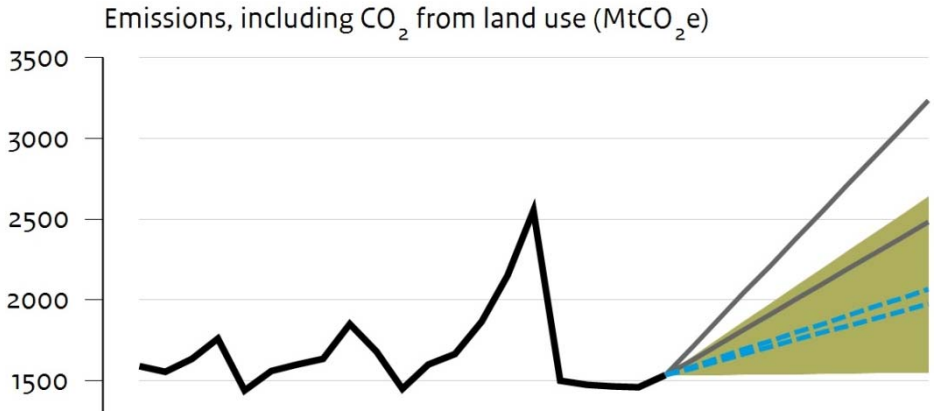
Brazil: domestic climate policies

Policy framework

- Legislation
- Action plan for deforestation (Amazone, Cerrado)
- Grazing land management
- 16% renewable electricity in 2020 (excl. hydro)



Results

- Impact renewable target is small
- Deforestation: national estimations are higher than IIASA projections
- Grazing land management: 50% barrier

Uncertainties

- High uncertainty in deforestation emissions

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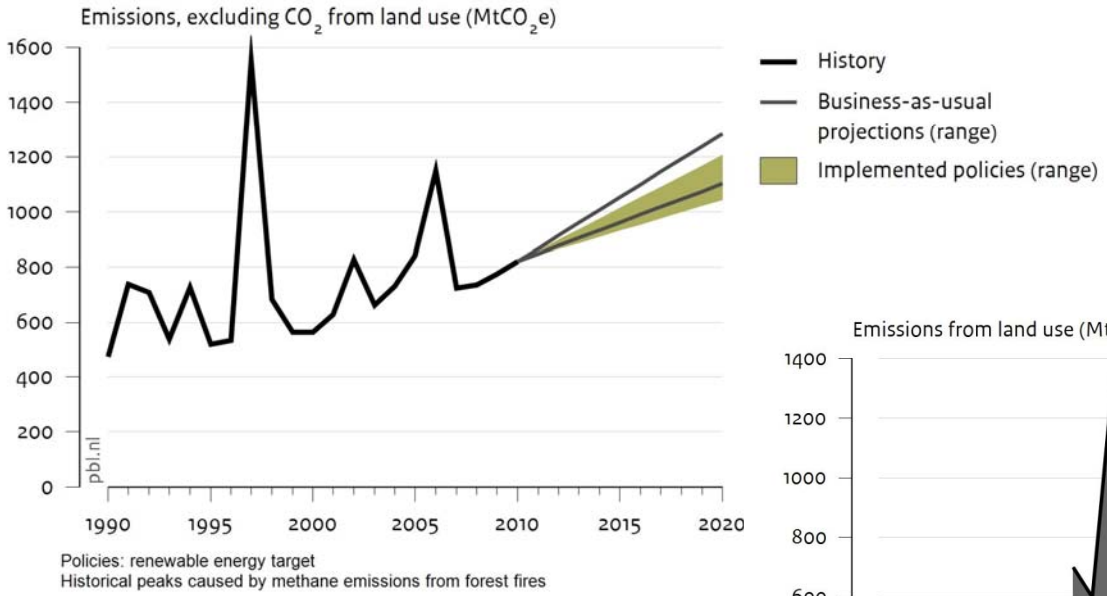
Indonesia: expected reductions from policies within uncertainty range

Greenhouse gas emissions for Indonesia



Pledge:
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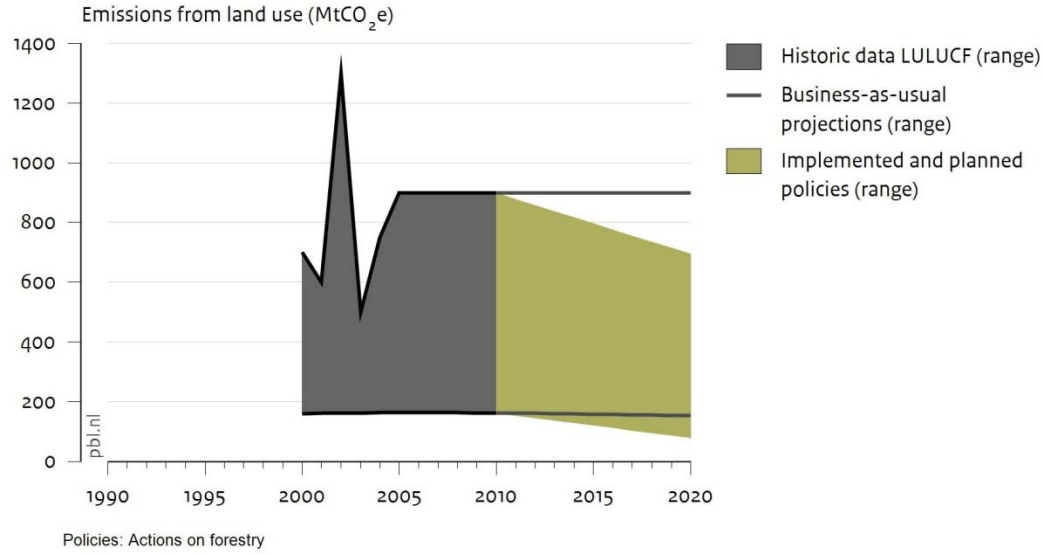

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Indonesia: domestic climate policies

Policy framework

- Stop illegal logging
- 15% renewable energy in 2020
- Biofuel target of 15% biomass in transportation in 2025

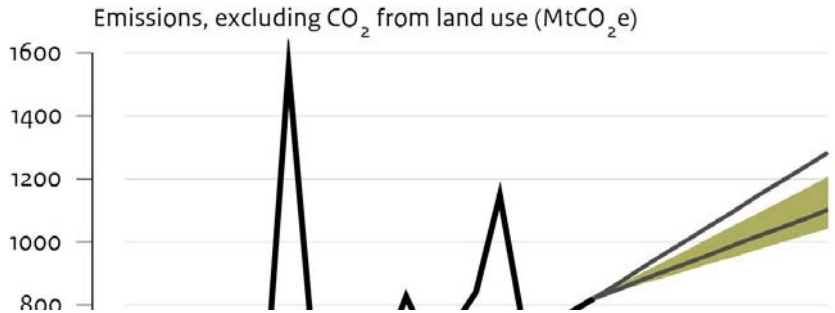
Results

- Renewable target replaces mainly oil, not coal
- Biomass is also part of renewable target, largest effect

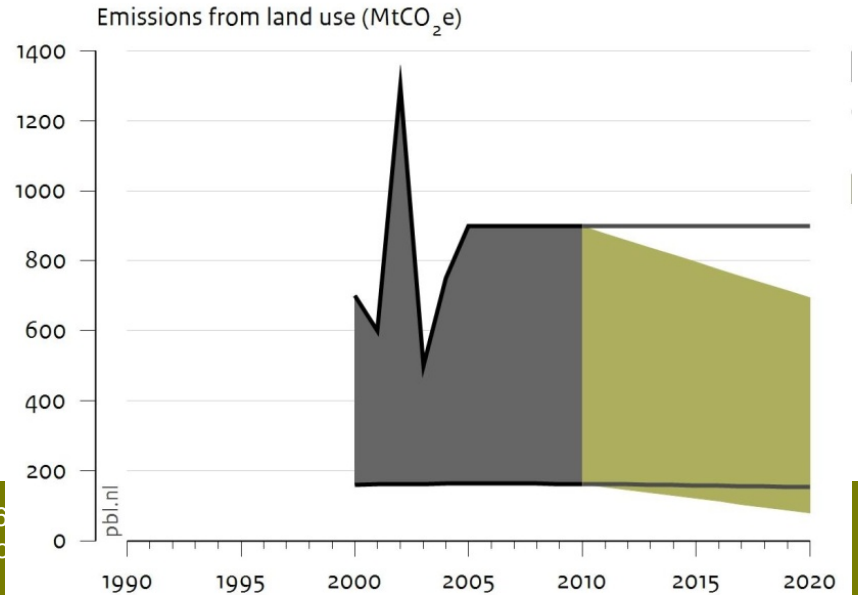
Uncertainty

- Very large uncertainty
- Difficult to quantify forestry policies

Energy/industry



Land use CO_2



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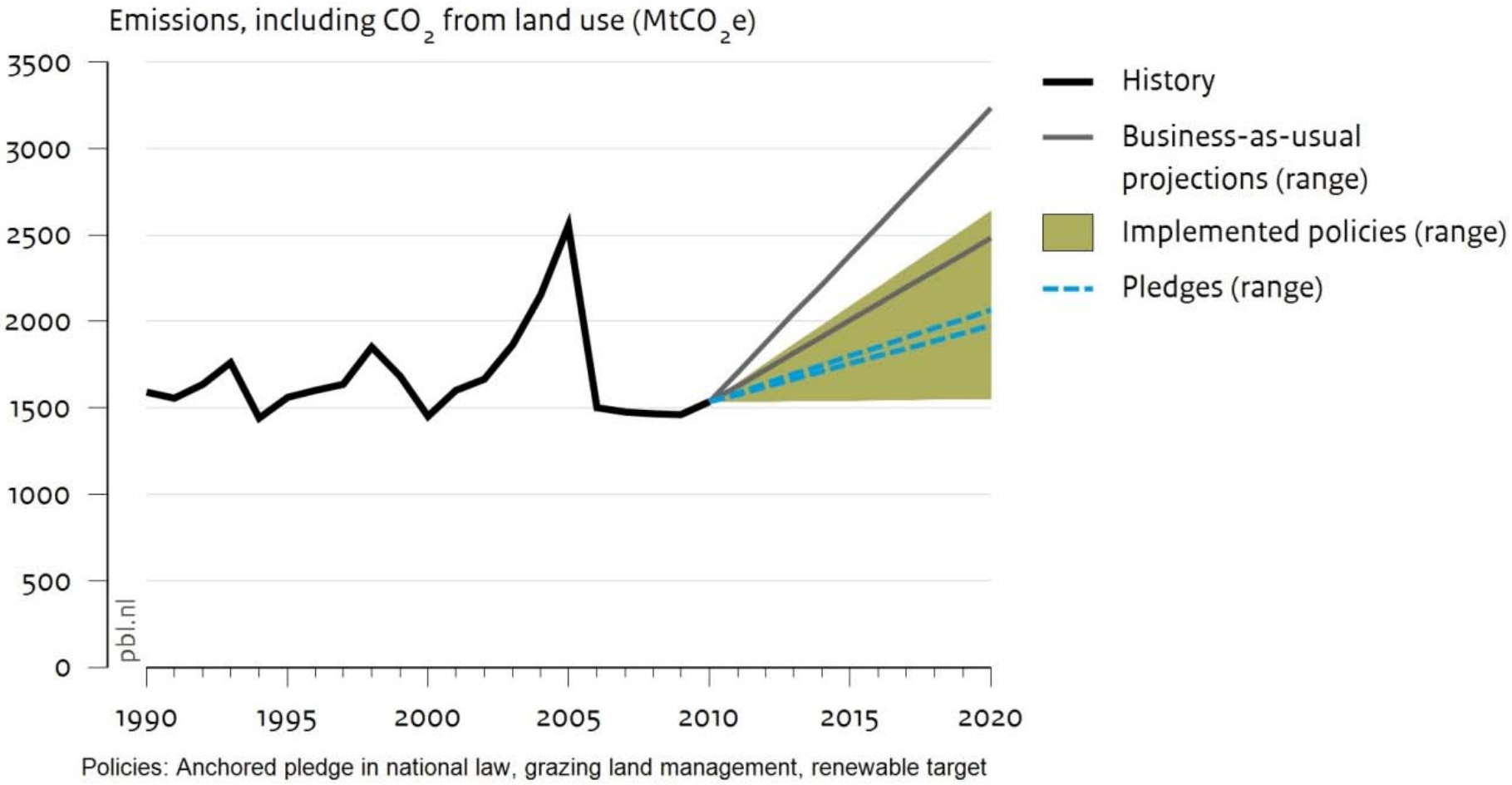

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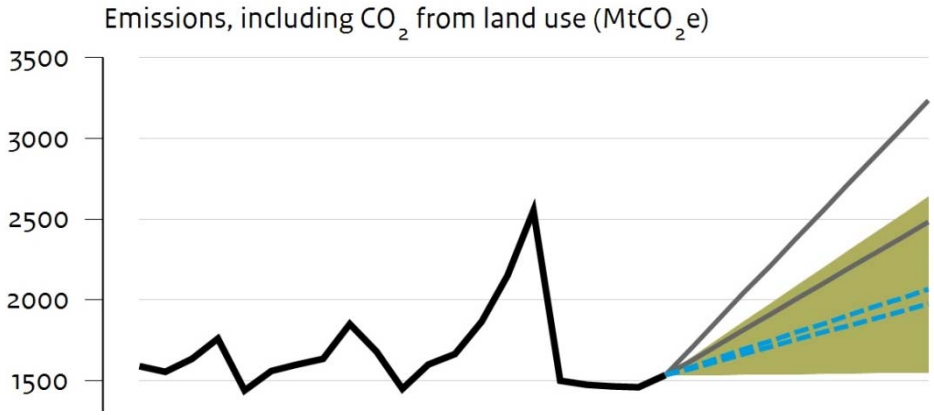

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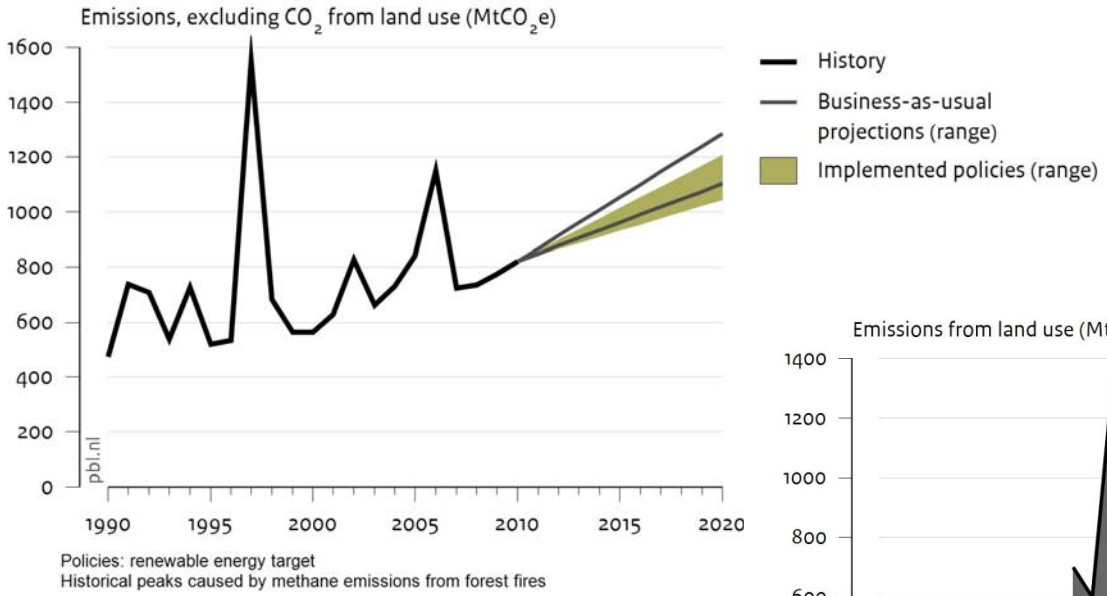

Policies: renewable energy target
Historical peaks caused by methane emissions from forest fires

Pledge:
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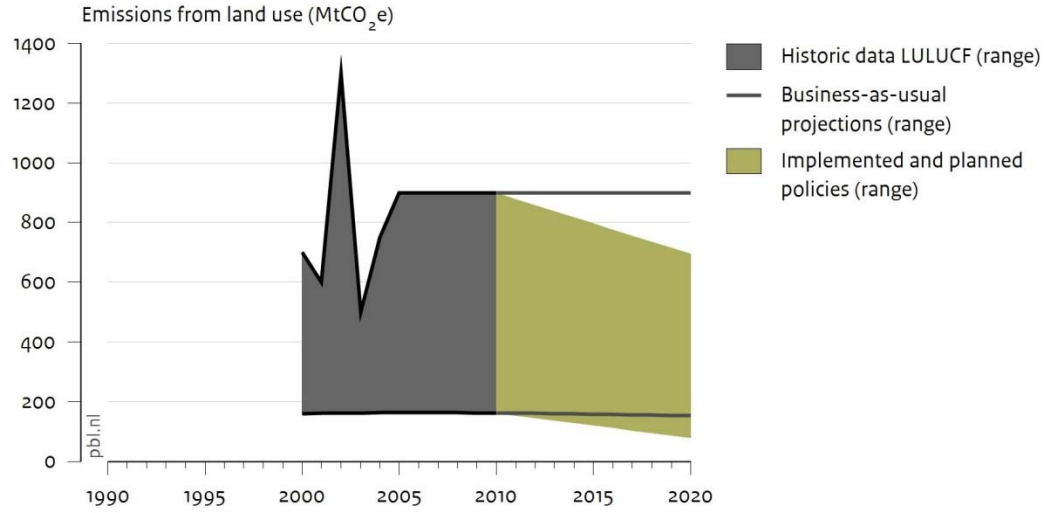

Policies: Actions on forestry

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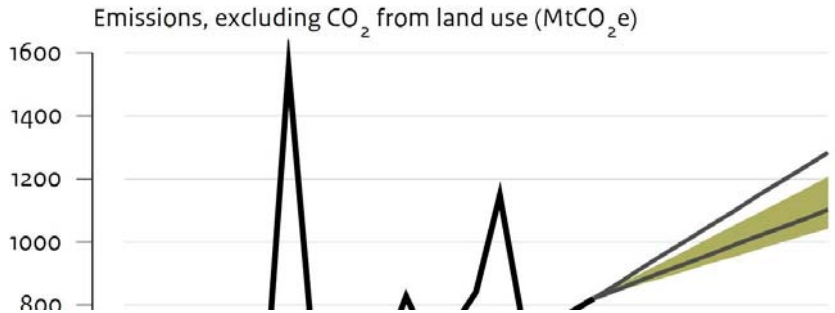
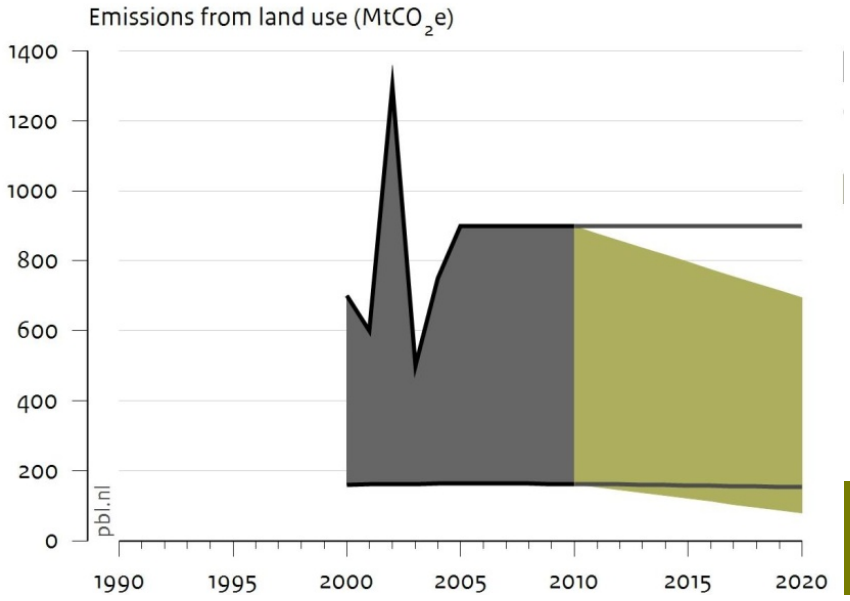
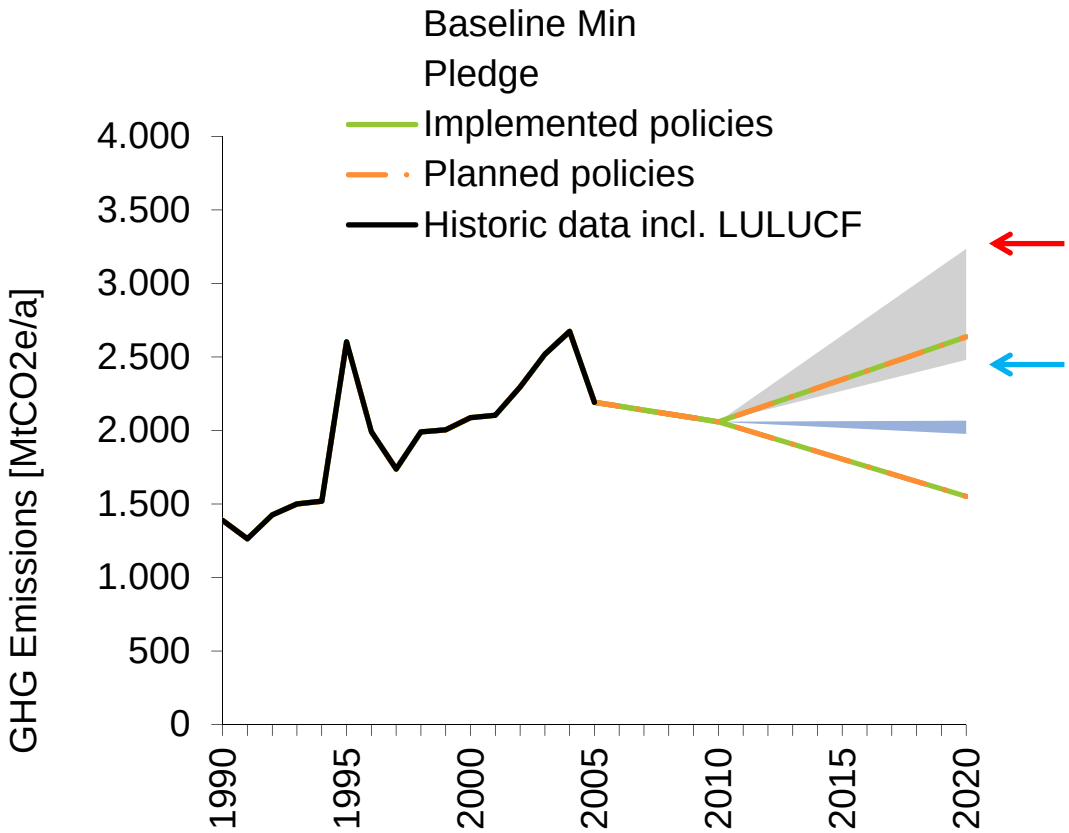


Land use CO_2



Brazil: Total emissions and pledge

- Pledge: 36% to 39% below BAU in 2020, incl. forestry
- BAU emission in 2020 between 2,500 ← (PBL/IIASA) and 3,200 ← (national projection) MtCO2e (incl. forestry)
- BAU projections updated in 2011 leading to higher projections than previously reported
- Most reductions expected from agriculture and forestry



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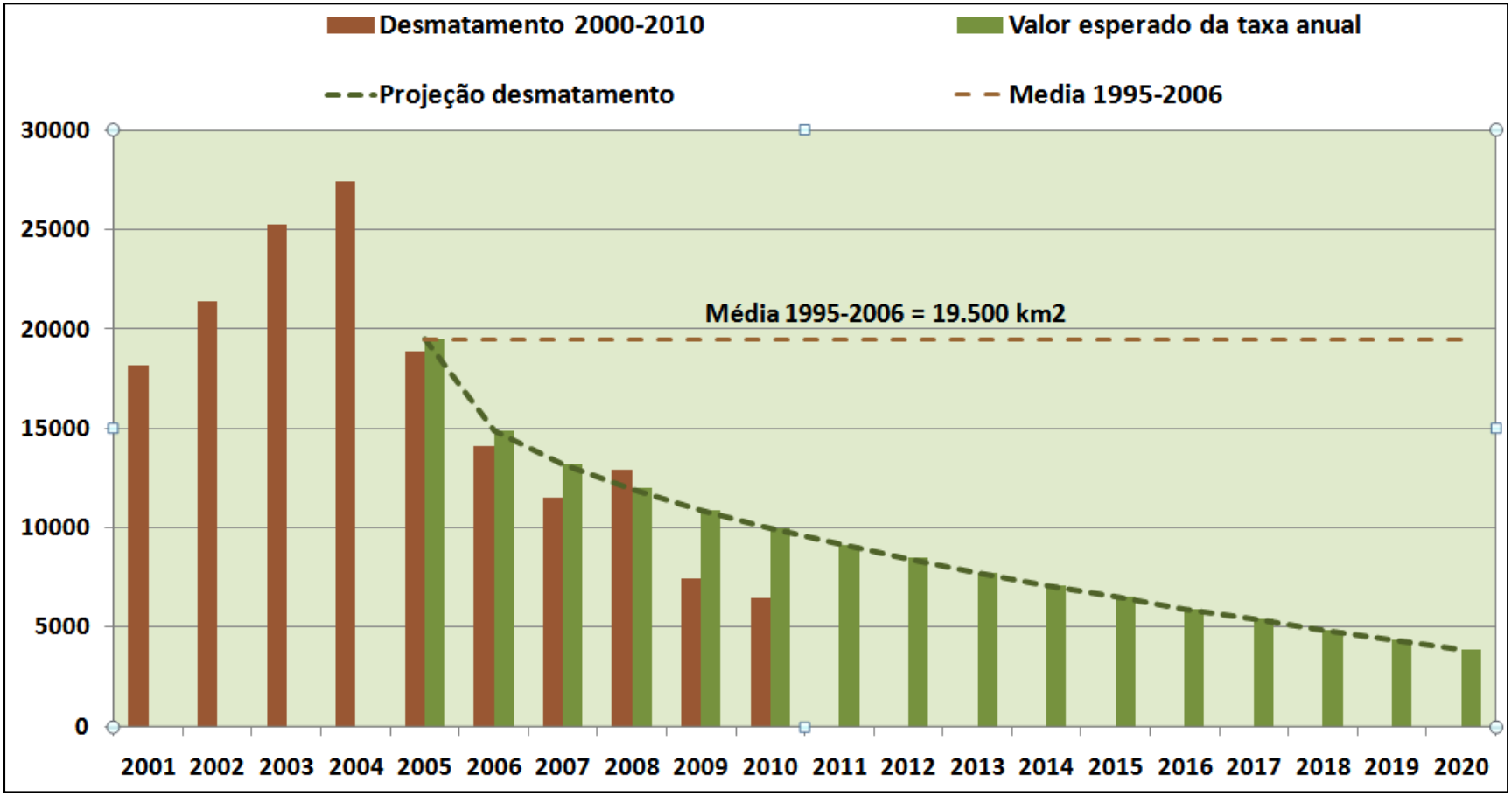
Brasil: Amazon deforestation (PPCDAm)



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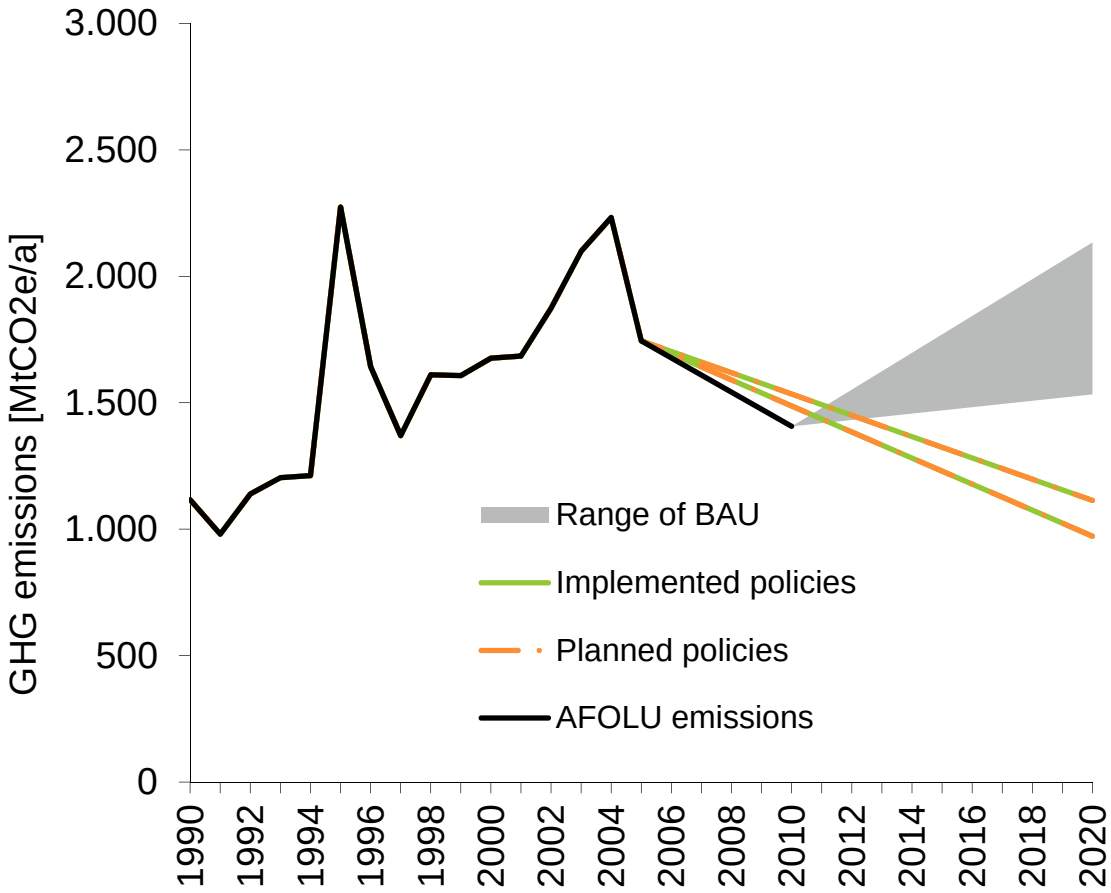
Brazil: National climate policies included in quantification

- Deforestation Action Plan in Legal Amazon and Cerrado
  - Amazon: 80% deforestation area reduction (compared to 1996-2005) ->760 $MtCO_2eq$ by 2020
  - Cerrado: 40% deforestation area reduction (compared to 1999-2008) -> 130 $MtCO_2eq$ by 2020
- Restoration of grazing land
  - Grassland restoration -> 83 to 104 $MtCO_2eq$
  - Policies on livestock management exist but not addressed here
- 16% renewable electricity in 2020 (excl. hydro)

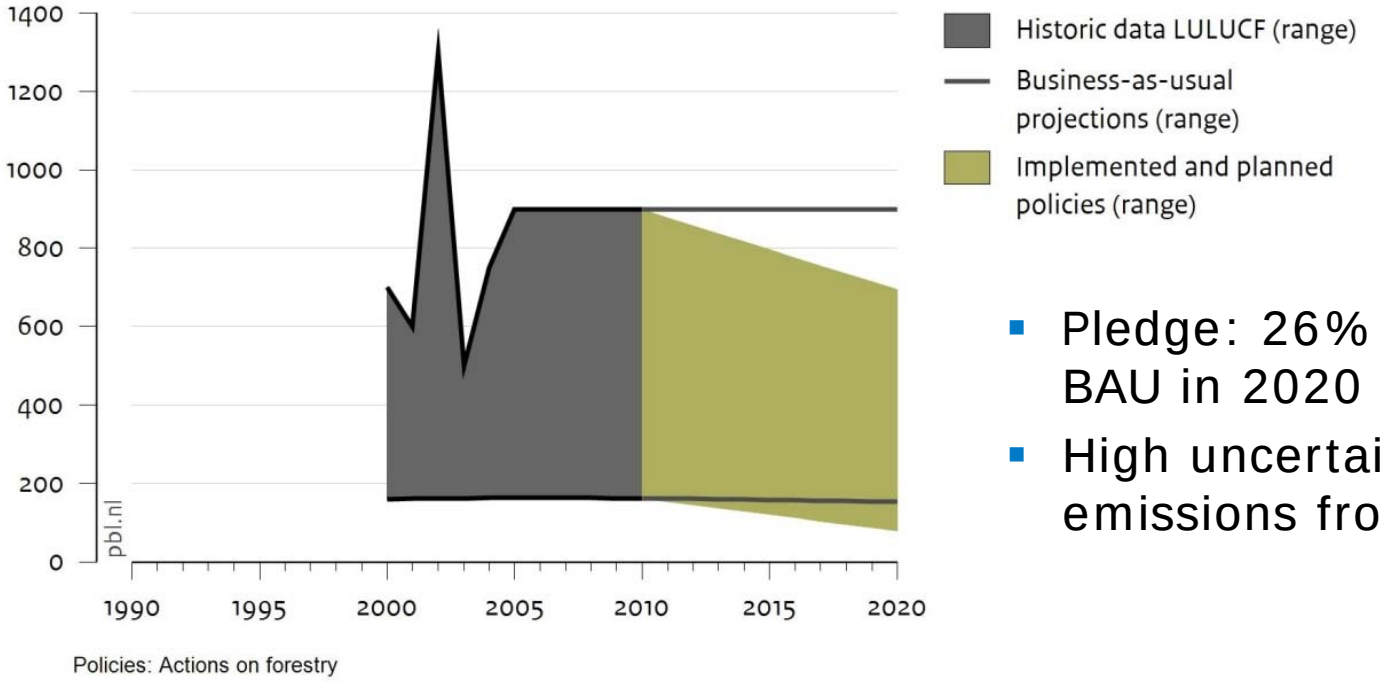
Brazil: Historic land use emissions and reduction



- Despite REDD the total AFOLU emissions are still large
- New forest code and commodity specific activities could be game changers

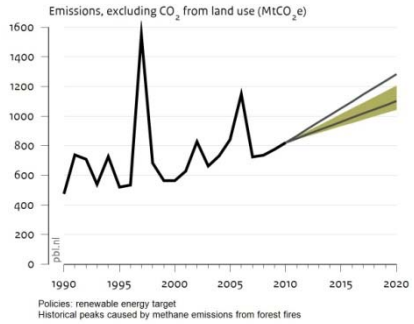
Indonesia: Total emissions and pledge

Emissions from land use (Mt CO_2eq)



Policies: Actions on forestry

Other sectors



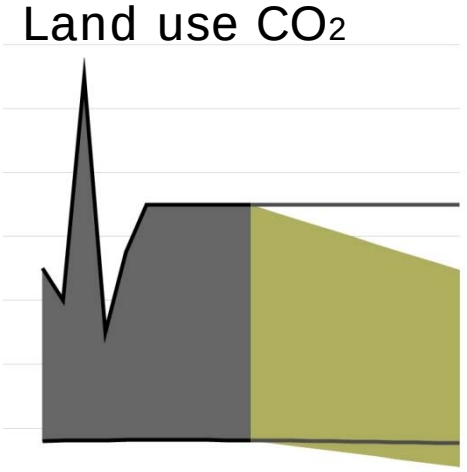
- Pledge: 26% to 41% below BAU in 2020
- High uncertainty regarding emissions from forestry

Indonesia: National climate policies included in quantification

- Forest Law Enforcement, Governance and Trade (FLEGT) programme targeting illegal logging ->70-130 $MtCO_2eq$ emission reduction in 2020
- Ban on legal logging (Oslo Pact), emission reduction depending on effectiveness but can be zero (threatened forests not targeted)
- Peat land policies not assessed here
- 15% renewable energy in 2020
- Biofuel target of 15% biomass in transportation in 2025

Indonesia: Expected reductions from policies within uncertainty range

- High uncertainties in historic emissions from forestry
- Emission target in 2020 with policies could be between 1.3 and 1.6 GtCO2e or 1.7 and 2.1 GtCO2e depending on baseline
- A quarter of total emissions in 2005 attributed to peat fires, dynamics to a large degree driven by weather



Land use policies: Challenges for quantification

- **MRV**: emissions from deforestation with wide uncertainty bands, projections from different sources differ substantially
- **Science**: non-permanence of sequestration (e.g. reduced tillage) and potentials challenged by science
- **Security of supply**: Pledges not really clear yet – REDD+ policy planning is in its infancy
- **Drivers**: Currently there is notable success due to law enforcement (e.g. Brasil) but underlying drivers are not addressed
- **Large sink**: If successful the sink from regrowth due to land sparing could be huge

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Overall results

- Likely to achieve or overachieve international pledge by implementing the policies portfolio we have assessed:
  - India, China, Russia, EU (unconditional pledge), Australia (unconditional pledge)
- Unclear
  - Japan (new energy strategy), South Korea (implementation of ETS), Brazil (forestry) and Indonesia (forestry)
- Emissions declining but yet insufficiently to meet the pledge
  - USA, Canada, Mexico, South Africa

We make no judgement on the level of ambition of the pledge

Back-up slides

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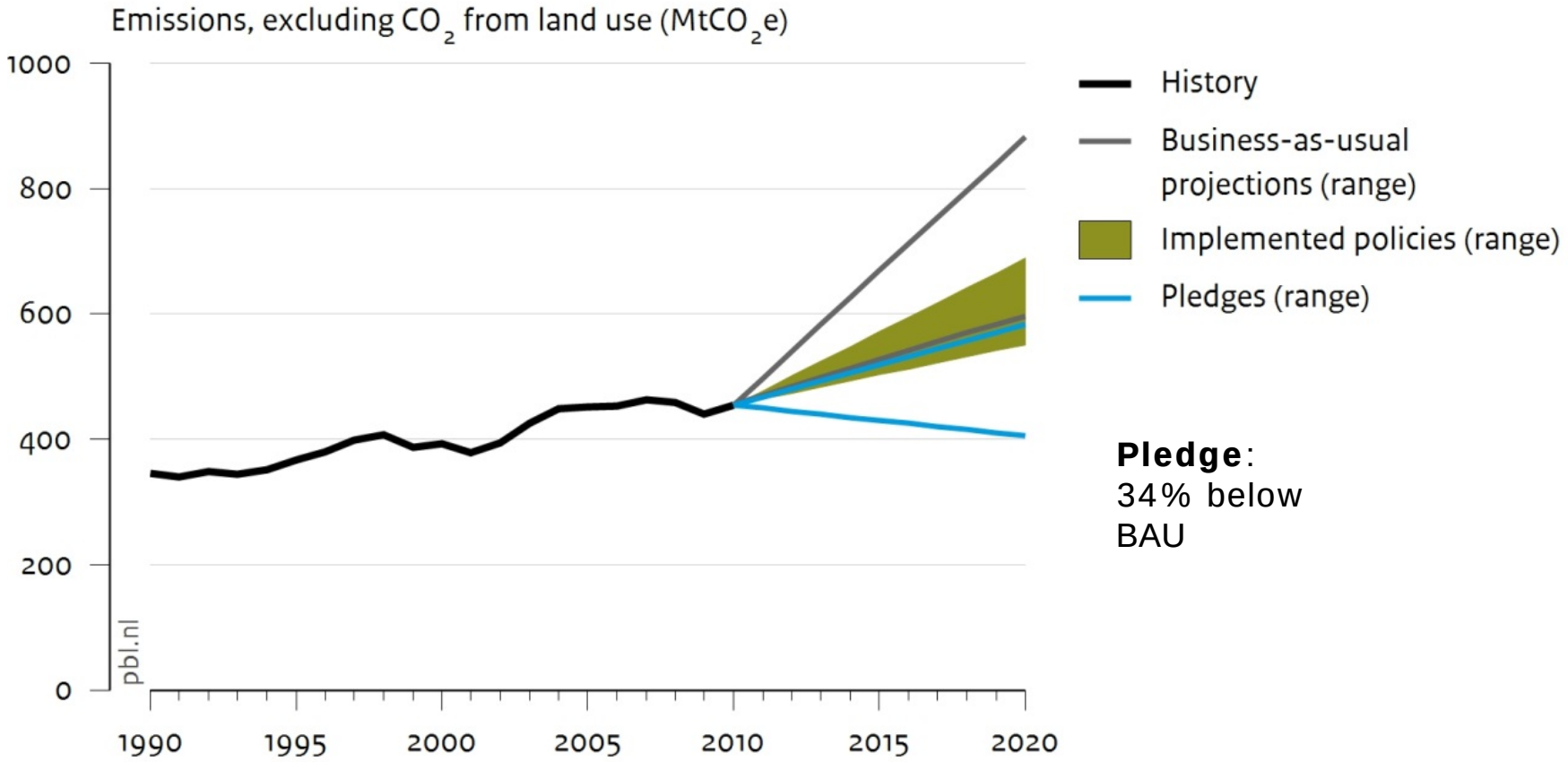
South Africa: current policies above pledge, implementation issues



Pledge: 34% below BAU

Policies: Renewable target and respective support mechanism

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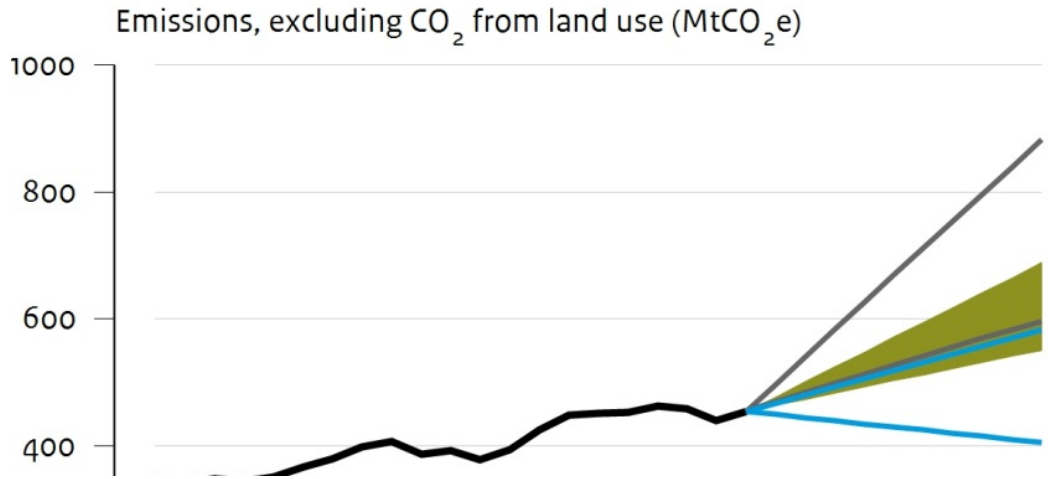
South Africa: domestic climate policies

Policy framework

- 10,000 GWh generated electricity in 2013
- Installed renewable capacity target of 18 – 24.5 GW in 2030



Results

- National baseline projections is a range
- Proposed feed-in-tariff (2009), not been implemented yet

Uncertainties

- Implementation of climate policies (carbon tax)
- Uncertainty in BAU emission projection