Energy sector contribution to climate action
- The case of Latin America

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Latin America: small yet growing emissions

- 450 Millions hab.
- 8% GDP 2012: 5,000 G$
- 6% 9% global GHG emissions
- +57% in 40 years
- CC cost: 1.5% to 5% of GDP

(Sources: CIA World Factbook, GIEC, CEPAL)
Latin America: small yet growing emissions

450 Millions hab. 8%

GDP 2012: 5,000 G$
6%

+57% in 40 years

CC cost: 1.5% to 5% of GDP

(Sources: CIA World Factbook, GIEC, CEPAL)
Energy sector is transforming fast

- Global average: 14%
- UE: 80%
- 2001-2010: +32% TPES
- X 2 in 40 years

Final consumption
- 2012: 460 Mtoe
- 5% of world’s consumption
- 2009: 30 millions w/o electricity

Energy share in regional emissions:
- UE: 80%
- UE: 20%

Average hydro share:
- 60%

(Sources: AIE, European Commission, CIER, GIEC)
Prospective tool: TIMES-ALyC (1)
Porspective tool: TIMES-ALyC (2)

T-ALyC’s primary energy potentials (EJ)

- Cumulative potentials 2010-2050
- Including (right) or not (left) oil/solar/biomass
National climate pledges: NAMAs

82 % oil in primary energy
80 % hydroelectricity
90 % de renewable electricity

77 % renewable electricity in 2020
20 % biofuels in 2020
Afforestation minimum 44 MtCO$_2$eq

-38 % GHG in 2020 compared to BAU

15 % renewable electricity
30 % Waste-to-Energy

-20 % GHG in 2020 compared to 2007 BAU

0 % net deforestation by 2021
33 % renewables in final energy

Biofuel support, energy efficiency, waste reduction, wind energy, national parks...

Non-exhaustive review based on National Communications to the UNFCCC
National climate pledges: INDCs

Reductions below BAU
- Energy: -25%/-45.8% GHG
- Forestry: reforestation of 1,300,000 ha

Non-exhaustive review based on National INDC submissions to the UNFCCC

Reductions below BAU
- Unilateral: -20% GHG
- Conditional: -30% GHG

- Forestry: store 13-19 PgCO₂/yr
  - Energy: -25%/-40% CO₂ intensity
  - Agric.: -33%/-40% N₂O,CH₄ intensity

- 43% GHG in 2020 below 2005 levels

Reductions below BAU
- Unilateral: -20% GHG
- Conditional: -30% GHG

- Non AFOLU: -30%/-45% CO₂ intens.
- AFOLU: 1.5 MtCO₂eq removal

- Forestry: reforestation of 1,300,000 ha
National commitments: scenarios

-20 % in 2020 compared to 2007 BAU
-38 % GHG in 2020 compared to BAU
77 % Renewable electricity in 2020
20 % biofuels in 2020
Minimal afforestation 44 MtCO\textsubscript{2}eq
82 % oil in primary energy
80% hydroelectricity
90 % electricity from RNW sources
0 % net deforestation in 2021
33 % Renewables in final energy
15 % renewable electricity
30 % Waste-to-Energy
### National commitments: scenarios

- **-20% in 2020 compared to 2007 BAU**
- **-38% GHG in 2020 compared to BAU**
  - 77% Renewable electricity in 2020
  - 20% biofuels in 2020
  - Minimal afforestation 44 MtCO$_2$eq
  - 82% oil in primary energy

- **NAMAs**
  - 90% renewables
  - 0% net deforestation in 2021
  - 33% Renewables in final energy
  - 15% renewable electricity
  - 30% Waste-to-Energy

#### Scenarios:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Uni_Nat</th>
<th>Cond_Nat</th>
<th>Cond_TALyC</th>
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<tbody>
<tr>
<td>GHG 2020</td>
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<tr>
<td>333 MtCO$_2$eq</td>
<td>277 MtCO$_2$eq</td>
<td>283 MtCO$_2$eq</td>
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<td>570 MtCO$_2$eq</td>
<td>469 MtCO$_2$eq</td>
<td>293 MtCO$_2$eq</td>
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<td>310 MtCO$_2$eq</td>
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<td>1,200 MtCO$_2$eq</td>
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<td>158 MtCO$_2$eq</td>
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<td>268 MtCO$_2$eq</td>
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<td>304 MtCO$_2$eq</td>
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INDCs vs. NAMAs: overall impacts

- NAMAs emissions are 21% below BAU in 2030
- INDCs emissions range from 24% to 32% below BAU
- Stringent past-2030 bound in INDCs.
Impact on ELC – a virtuous BAU
Impact on ELC – a virtuous BAU

Electricity production (TWh/yr)

2030

2050
Impacts on ELC: Electrification, decarbonization
Impacts on ELC: Electrification, decarbonization

Variation in electricity production (TWh/yr)

- Waste-to-energy
- Wind
- Solar
- Geothermal
- Biomass
- Hydro
- Nuclear
- Gas
- Oil
- Coal

Year:
- 2015
- 2020
- 2030
- 2040
- 2050

Scenarios:
- NAMAs
- Uni_Nat
- Cond_Nat
- Cond_TALyC
BAU Primary energy: room for improvement

Primary energy production (Mtoe/yr)

- Wind
- Solar
- Geothermal
- Biomass
- Hydro
- Nuclear
- Gas
- Oil
- Coal

2010 - 2050

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ETSAP Workshop – Sophia-Antipolis, France
BAU Primary energy: room for improvement

Primary energy production (Mtoe/yr)

- Wind
- Solar
- Geothermal

50 Mtoe
150 Mtoe
350 Mtoe

Coal
Gas
Geothermy
Hydro
Nuclear
Oil
Solar
Wind
Biomass
Impact on TPES: BSE drives decarbonization

Variation in primary energy consumption (Mtoe/yr)

(N.B.: includes external trade only)

-400 -300 -200 -100 0 100 200 300 400 500 600

2015 2020 2030 2040 2050

NAMAs

Uni_Nat

Cond_Nat

Cond_TALyC
Non-energy reductions

2030 sectorial emissions under two climate scenarios
Concluding remarks

• A quite specific climate-energy context
  – Clean electricity => the challenge is not EU’s one...
  – Non-energy GHGs => adapt the modeling framework

• Improvement of INDCs over NAMAs
  – But what’s next after 2030?
  – Ambitious strategy is achievable

• Relevance of energy exports
  – Interest of coupling TIAM and TALyC

• Climate change adaptation
  – A local, renewable energy mix
  – How to hedge against CC effects? => stoch. TIMES
  – Overcapacity versus regional integration....
Thank you for your attention!

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