

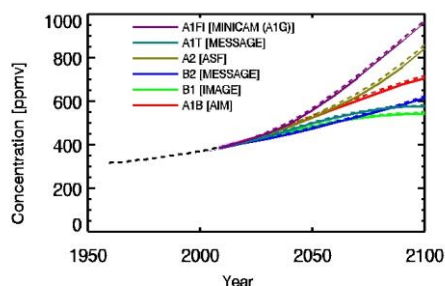
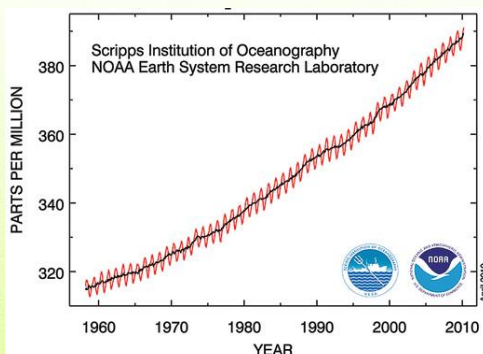
**Aleksandar Dedinec, Verica Taseska Gjeorgievska,
Vladimir Gjeorgievski, Vasil Bozhikaliev,
Valistimir Trajkovski, Viktor Andonov**
**Research center for energy and sustainable development-
Macedonian Academy of sciences and arts**





Introduction

- CO₂ emissions has increased for 26% in the period 1959 to 2014 (315 ppm to 398 ppm), temperature increase for 0.8 °C compared to preindustrial level



Introduction

- New global climate change agreement, all countries have developed and determined their own national contributions or INDC

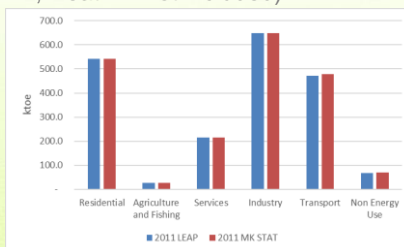


Macedonia INDC 30% WEM and 36% WAM compared to WOM (done with energy modelling) – 6000 domestic green jobs



Module 2 Task 1

- Checked
 - Energy balances (2006-2011)
 - Demand
 - Generation (CHP, Heat PP not included)



- Population – Source: UN World Population Prospects 2015 (low, medium), (more optimistic ☺)
- GDP - ? 2000 or 2005 or 2000 USD
- GHG emission factor – lignite country specific



Module 2 Task 2

- Residential
 - Urban (67.4%), demand (63)
 - Rural (32.6%), demand (37) , base on MAED modelling

- Transformation
 - CHP and Heat PP modelled

- Domestic production instead of import for:
 - Lignite
 - Hydro
 - Renewables
 - Heat

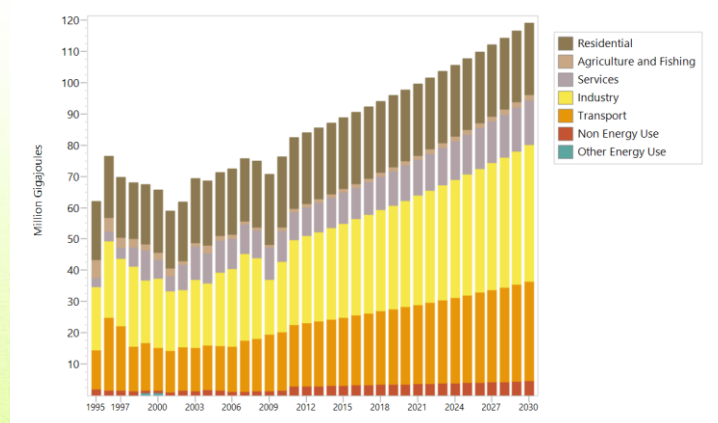
	Solid Fuels	Natural Gas	Hydropower	Renewables	Biomass	Electricity	Oil Products	Heat	Total
Production	-	-	-	-	-	-	-	-	-
Imports	1483.9	44.1	123.2	12.6	189.2	221.2	872.8	44.2	3011.1
Exports	-	-	-	-	-	-	-	-	-
From Stock Change	-	-	-	-	-	-	-	-	-
Total Primary Supply	1483.9	44.1	123.2	12.6	189.2	221.2	872.8	44.2	3011.1
Electric Generation	-1317.3	-	-123.2	-0.1	-	583.6	-17.2	-	-874.2
Chem Use	-	-	-	-	0.0	48.9	-	-0.3	48.6
Distribution Losses	-	-0.7	-	-1.6	-	-193.3	-	-4.6	-200.2
Total Transformation	-1317.3	-0.7	-123.2	-1.7	0.0	429.4	-17.2	-4.9	-1043.7
Statistical Differences	-	-	-	-	-	-	-	-	-
Residential	1.8	-	-	-	170.3	287.7	44.5	36.8	541.0
Agriculture and Fishing	-	-	-	8.6	1.2	1.6	14.4	-	25.8
Services	1.6	2.0	-	1.5	5.9	136.2	49.2	14.9	213.2
Industry	161.3	41.2	-	-	11.8	275.4	211.6	5.7	648.9
Transport	-	0.2	-	-	-	1.6	469.2	-	471.0
Non Energy Use	-	-	-	-	-	-	46.8	-	46.8
Other Energy Use	-	-	-	0.8	-	-	-	-	0.8
Total Demand	166.6	45.4	-	10.9	186.1	644.6	855.6	57.3	1567.5
Unmet Requirements (Waste)	-	-	-	-	-	-	-	-	-

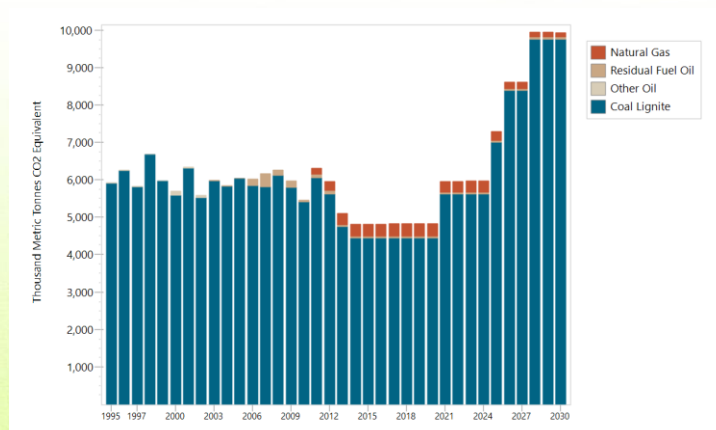
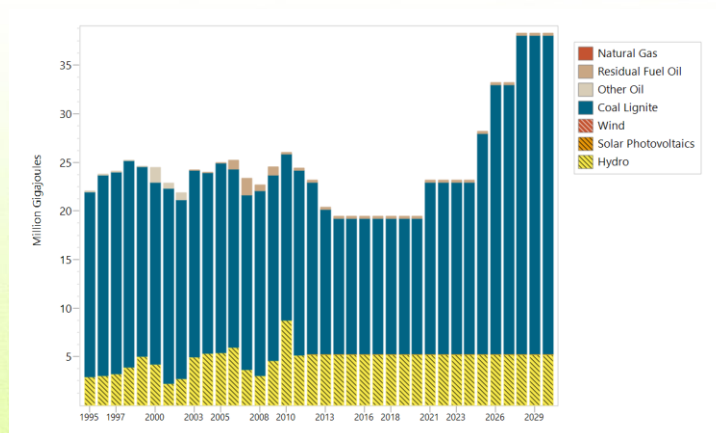
- Total GHG emission 2011 LEAP 9504 kt, MK Inventory 9559 kt
 - Difference 0.5% (emission factors, transport consumption)

Module 2 Task 3

- Correction
 - of the hydro capacities in the baseline scenario
 - of the lignite PP electricity production
- Lignite new capacities
- Comparison with the MARKAL household demand
 - Modelling household demand projections to be improved
 - Space heating/cooling area

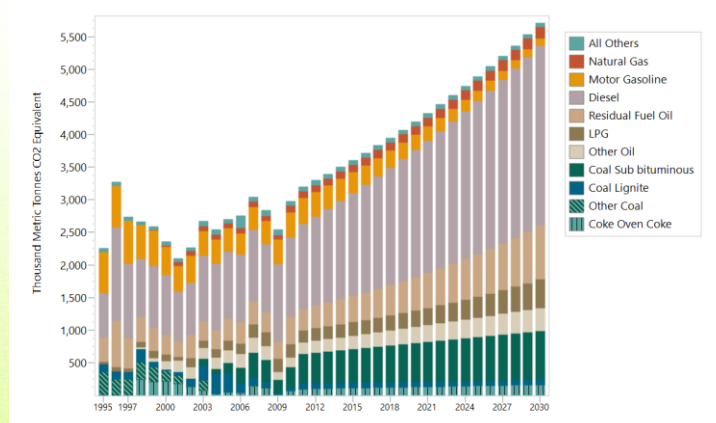
Energy Demand Final Units Baseline Scenario, All Fuels





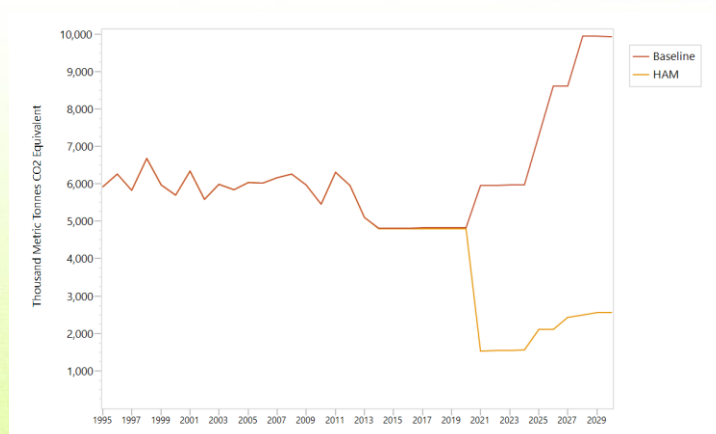
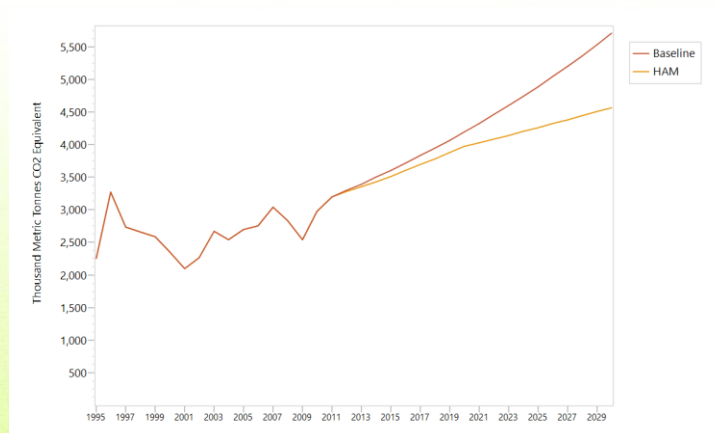


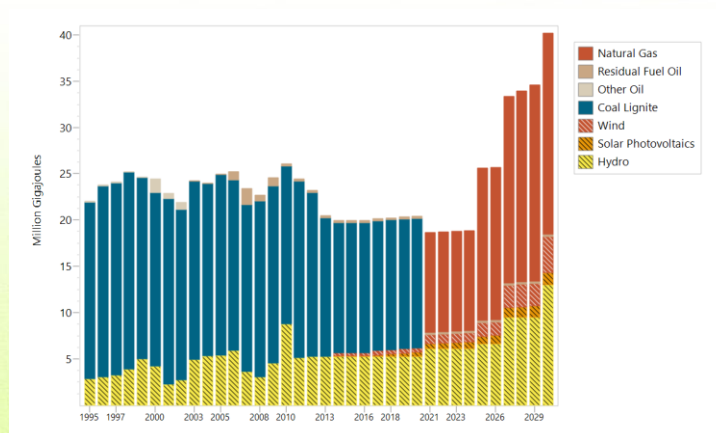
One Hundred Year GWP: Direct (At Point of Emissions) Baseline Scenario, All GHGs



Module 3 Task 2

- New generation capacities
 - Wind
 - Solar PV
 - Solar rooftop
 - Hydro
 - Natural gas
- Phase out of existing lignite PP 2017 - 2021(LCPD)
- Demand
 - Residential
 - Natural gas 10% 2030
 - LPG, biomass, same share as in 2011
 - Diesel replaced with natural gas
 - Electricity – decrease by 1% urban, 0.5% rural
 - Transport
 - Electricity 1%2020 - 10% 2030
 - Industry Iron and Steel
 - Coal and diesel replaced by natural gas





	1990	LEAP 2011	Base 2030	HAM 2030
Year/emissions	9415	9504	15519	7126
LEAP 2011	0.9%			
Base 2030	65%	63%		
HAM 2030	-24%	-25%	-54%	

***Thank you for your
attention***

