

# Europe's Share of the Climate Challenge

Domestic Actions and International Obligations to Protect the Planet

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[www.ClimateShareEurope.org](http://www.ClimateShareEurope.org)



[www.sei-international.org](http://www.sei-international.org)



[www.foeeurope.org](http://www.foeeurope.org)



# Examines how Europe can show climate leadership...

- ...by undertaking **domestic actions** to rapidly reduce emissions of greenhouse gases (GHGs),
- and by fulfilling its **international obligations** to help other countries address the twin crises of climate change and development.

# International Obligations

- Examines Europe's international obligations for assisting the world's developing nations make a transition to a low-GHG future.
- Uses the **Greenhouse Development Rights** framework to assess fair contributions to a global climate effort.
- This estimates Europe's fair share to be 103% below its 1990 emissions: only meaningful if interpreted as a two fold obligation to both domestic mitigation and investments in international action.
- International needs would ramp up to at least €150 billion in 2020 (assuming cost of mitigation=\$50/TCO<sub>2</sub>e) -- approximately 1% of the EU's projected 2020 GDP.

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aid

## The Greenhouse Development Rights Framework

The right to development in a climate constrained world

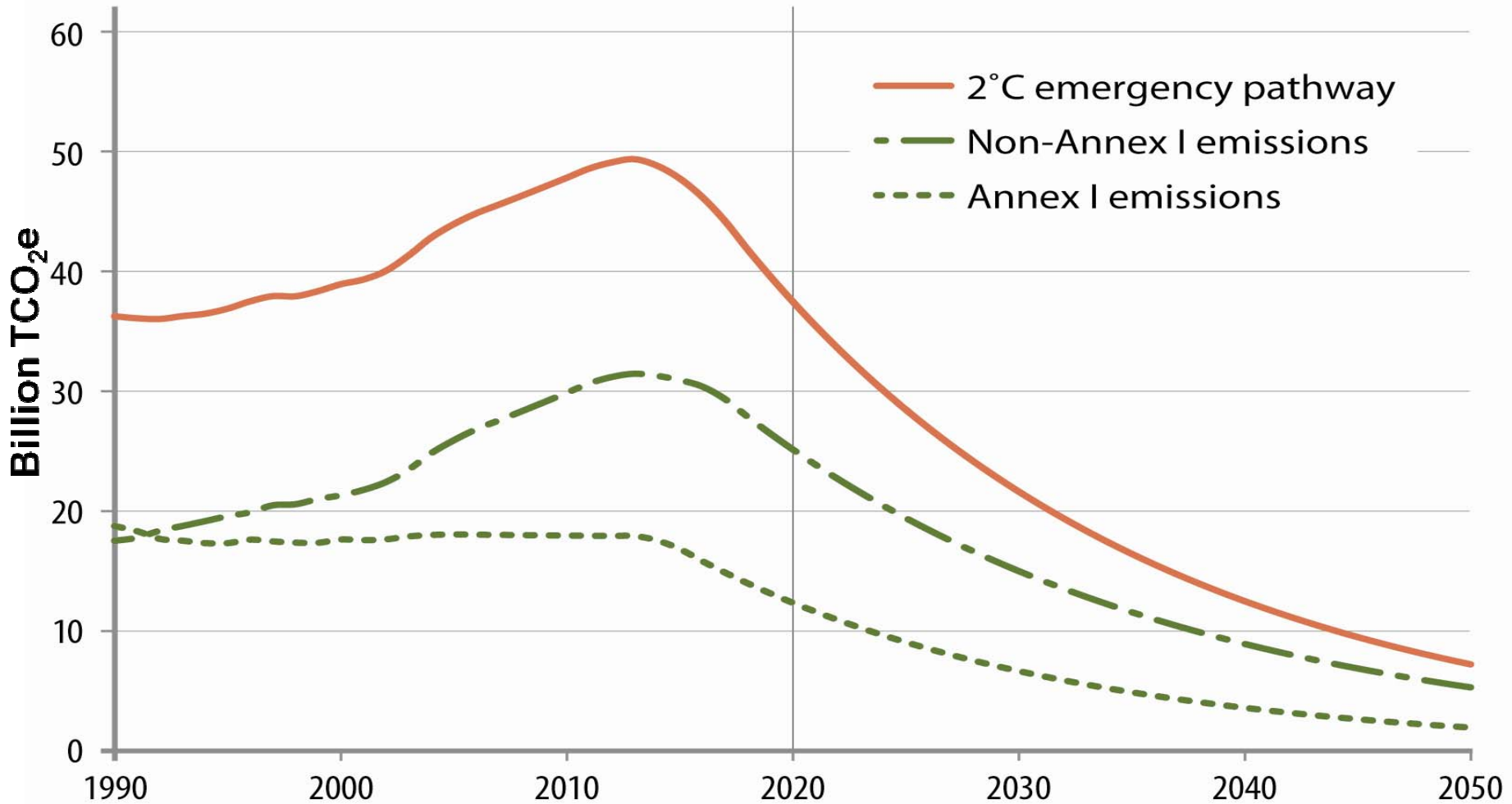
Revised second edition

Paul Baer, Tom Athanasiou, Sivan Kartha and Eric Kemp-Benedict

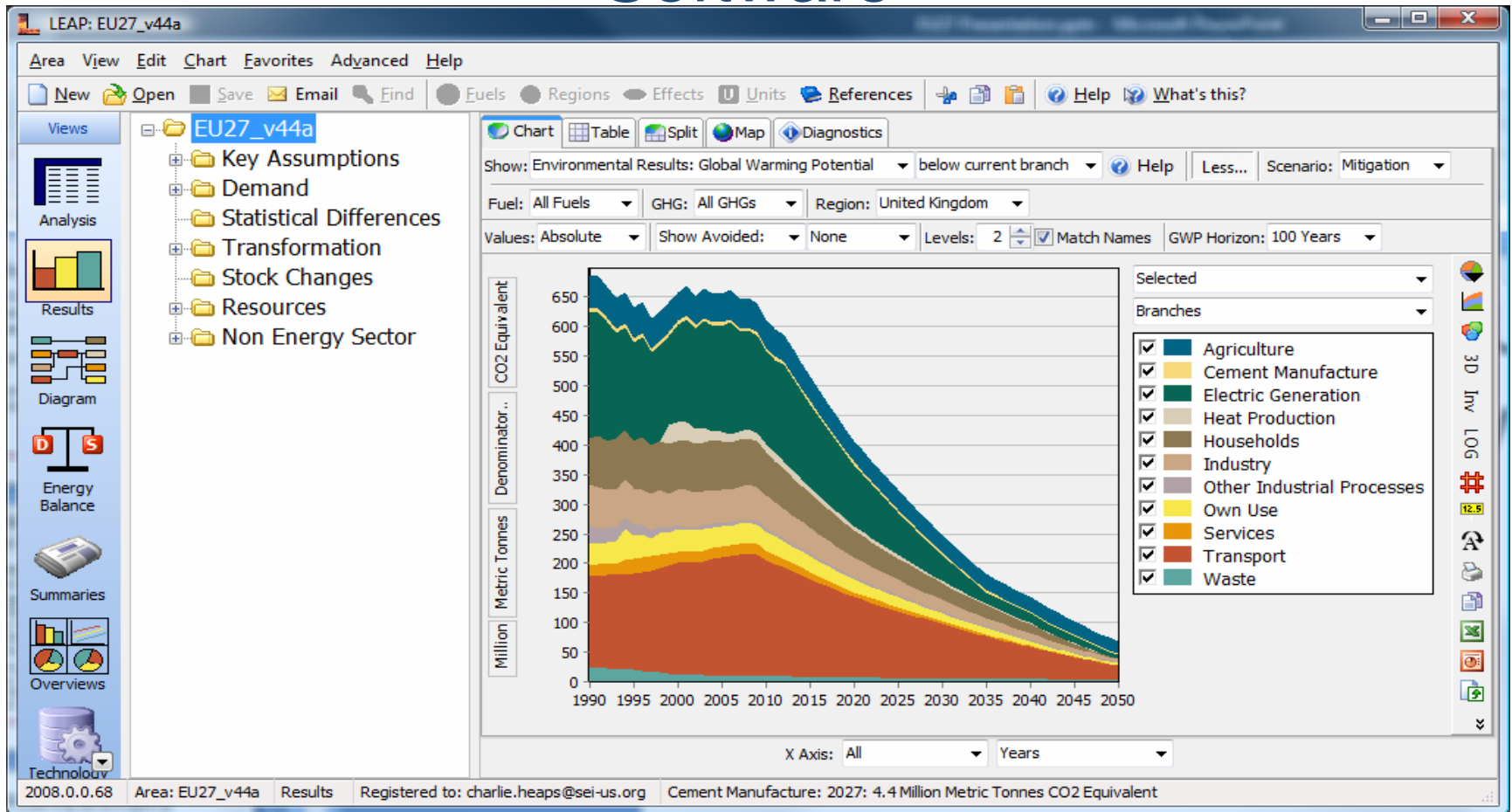


[www.gdrights.org](http://www.gdrights.org)

# Fair Shares of the Remaining Global Carbon Budget



# Developed as a Backcast in SEI's LEAP Software



[www.energycommunity.org](http://www.energycommunity.org)

# Domestic Actions

- A detailed sector-by-sector mitigation scenario for the 27 EU countries that aims for GHG reductions of 40% in 2020 and close to 90% in 2050 vs. 1990 levels.
- Requires radical improvements in energy efficiency, accelerated retirement of fossil fuels and a dramatic shift toward various renewables, including wind, solar, wave, geothermal and biomass-based combined heat and power.
- At request of FoEE, certain mitigation options excluded: nuclear power phased out, no carbon capture and storage (CCS), no biofuels, no offsetting.

# Concerns Over Excluded

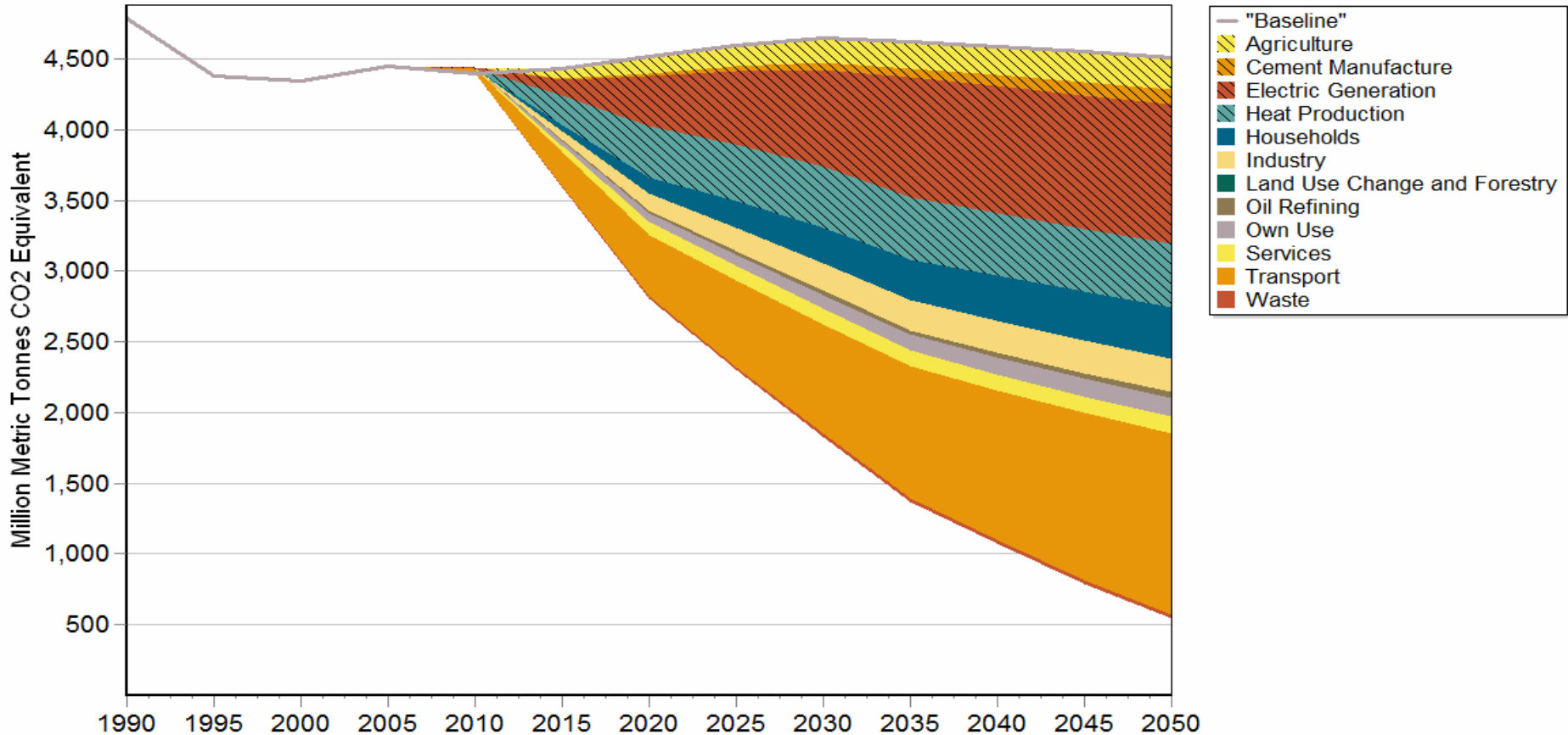
## Options:

- **Nuclear:** proliferation; safety, waste disposal & storage, high cost of R&D, likely to crowd out investment into renewables and efficiency.
- **Fossil Fuels with CCS:** high R&D costs, unlikely to be commercialized anytime soon, unclear if CO<sub>2</sub> storage reliable; “CCS ready” plants (with no storage) may never actually be used to capture CO<sub>2</sub>, CO<sub>2</sub> storage sites likely to be a scarce commodity – may be better used to store biogenic CO<sub>2</sub> – to reduce atmospheric CO<sub>2</sub> concentrations.
- **Biofuels:** currently have little if any mitigation benefits, 2<sup>nd</sup> generation (e.g. woody) biofuels also excluded up to 2050 due to concerns over land-use implications in developing countries, but may be an important option.
- **Offsetting:** excluded by definition since the focus of the study is domestic mitigation. Offsetting simply shifts reductions to other locations and would allow the EU to defer the changes described in our scenario.

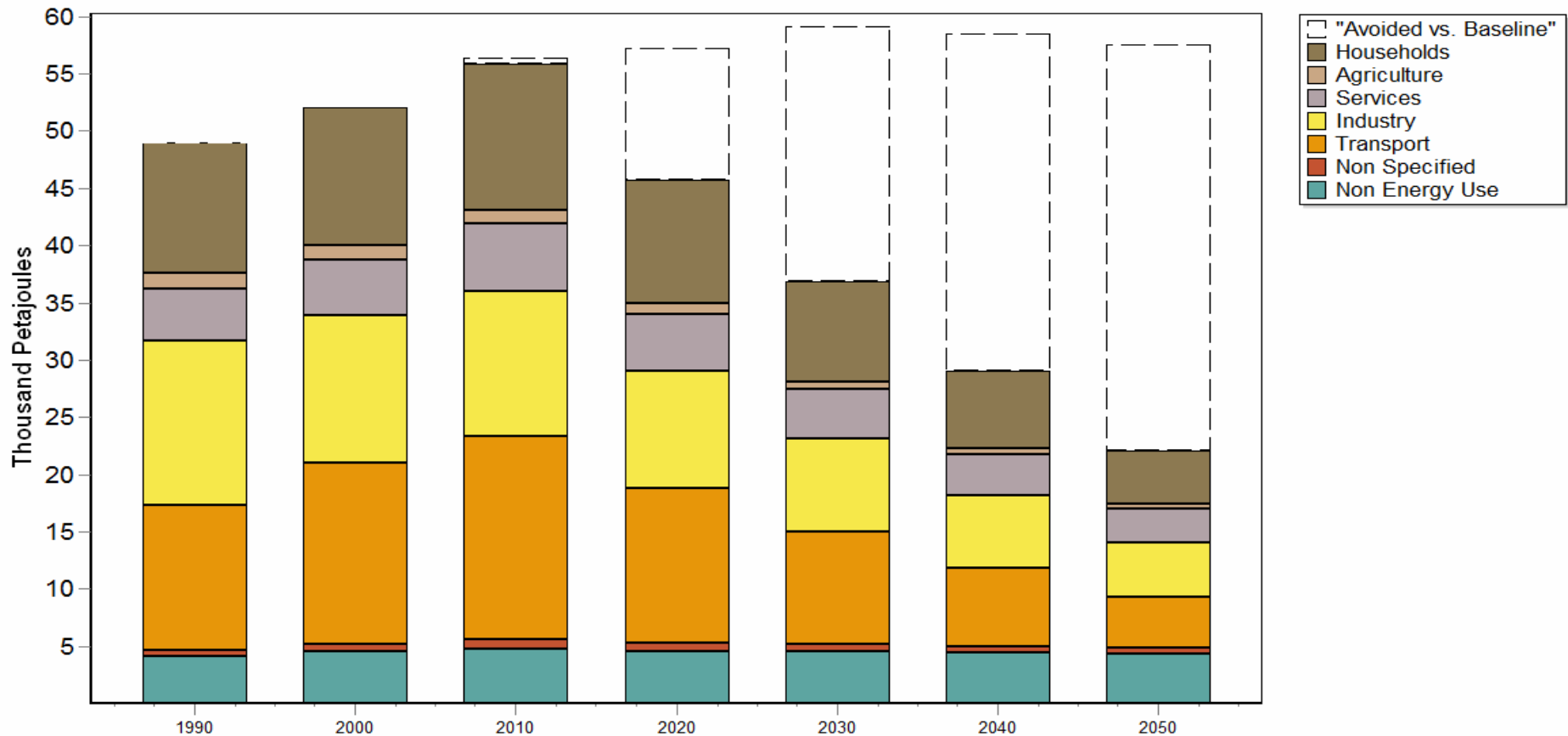
# Sufficiency and Equity

- Examines the role of sufficiency and equity in helping promote the needed transition to a low GHG future reflected in lower GDP vs. Baseline.
- Mitigation GDP grows by a factor of 1.6 between 2008 and 2050 versus the 1.8 times growth in the Baseline scenario.
- Increased equity among EU countries is also assumed, on the basis that achieving an EU-wide mobilisation on climate will require greater solidarity between nations.

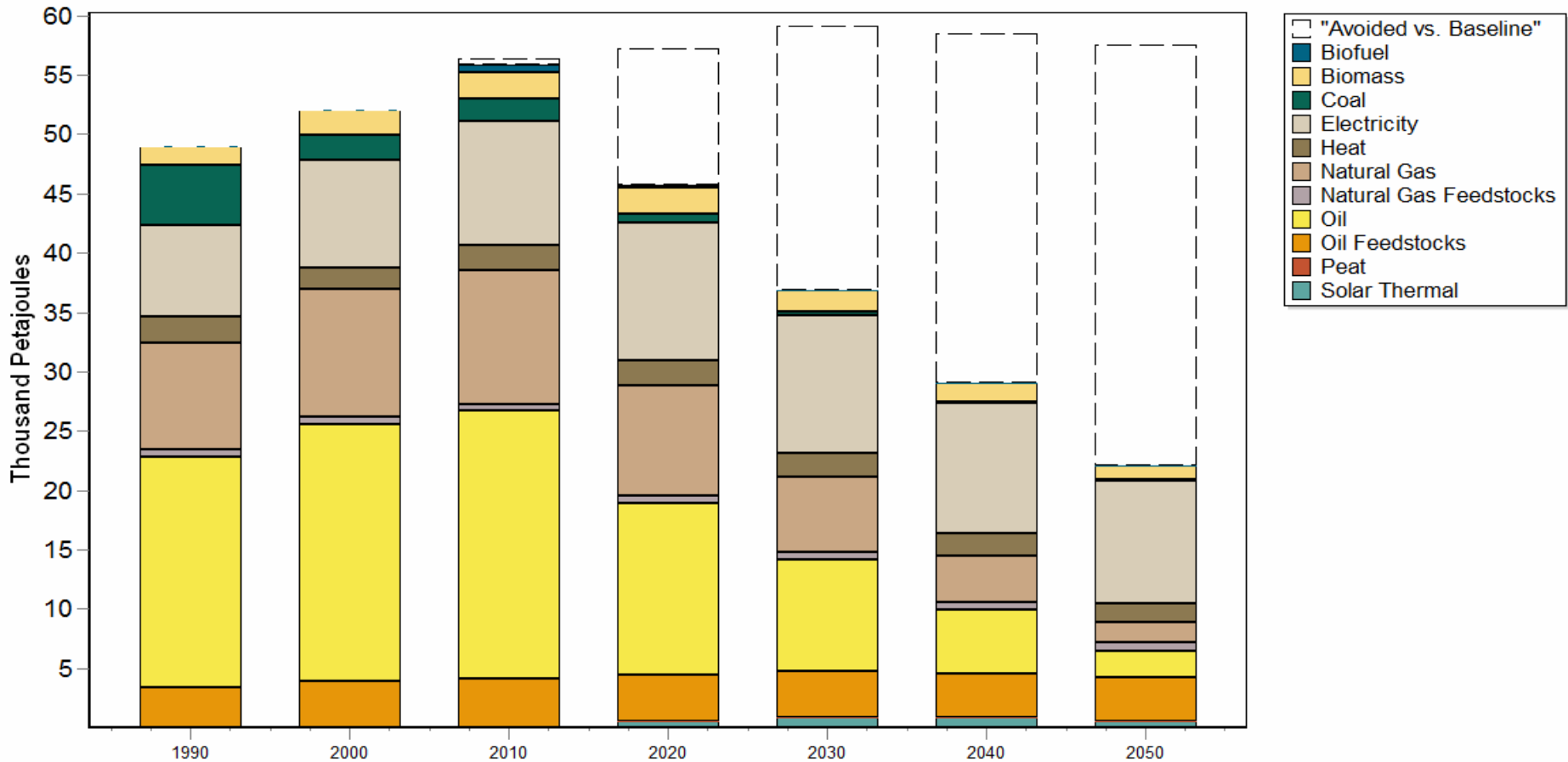
# 40% Reductions in 2020 Almost 90% in 2050 vs. 1990



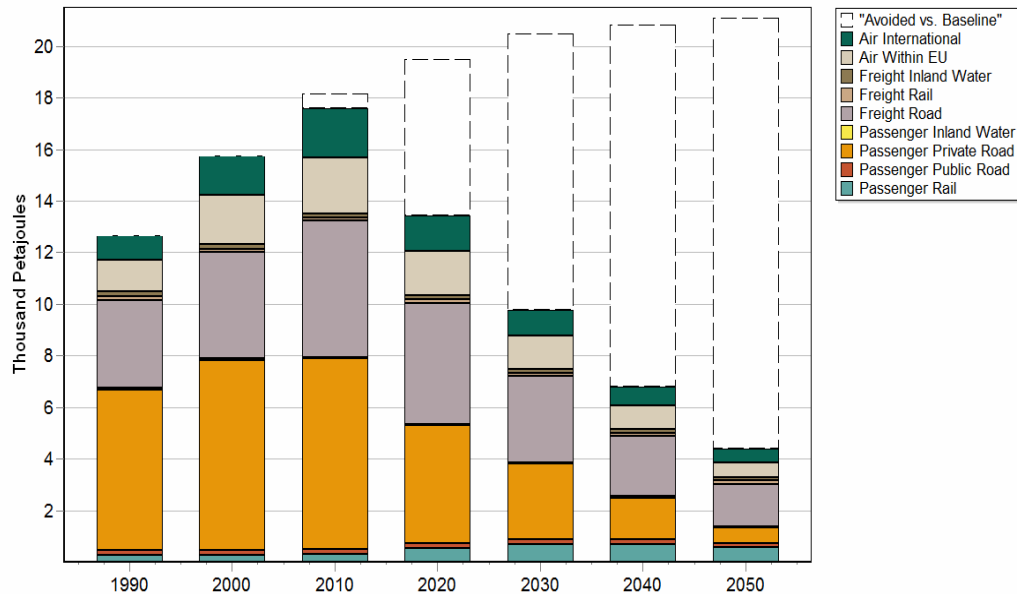
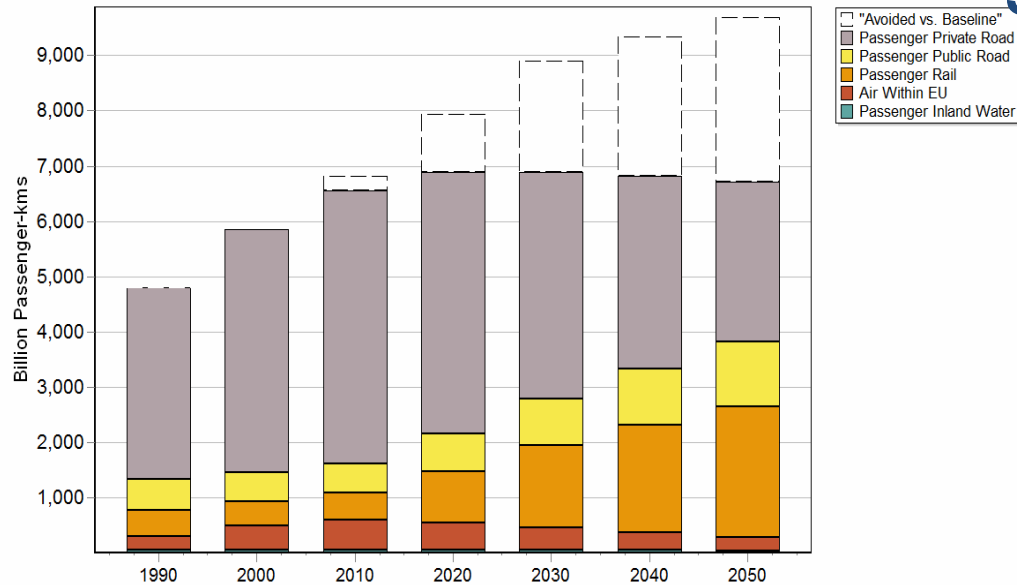
# Substantial Energy Efficiency Gains In All Sectors...



# ...and Substantial Switching to Low Carbon Fuels

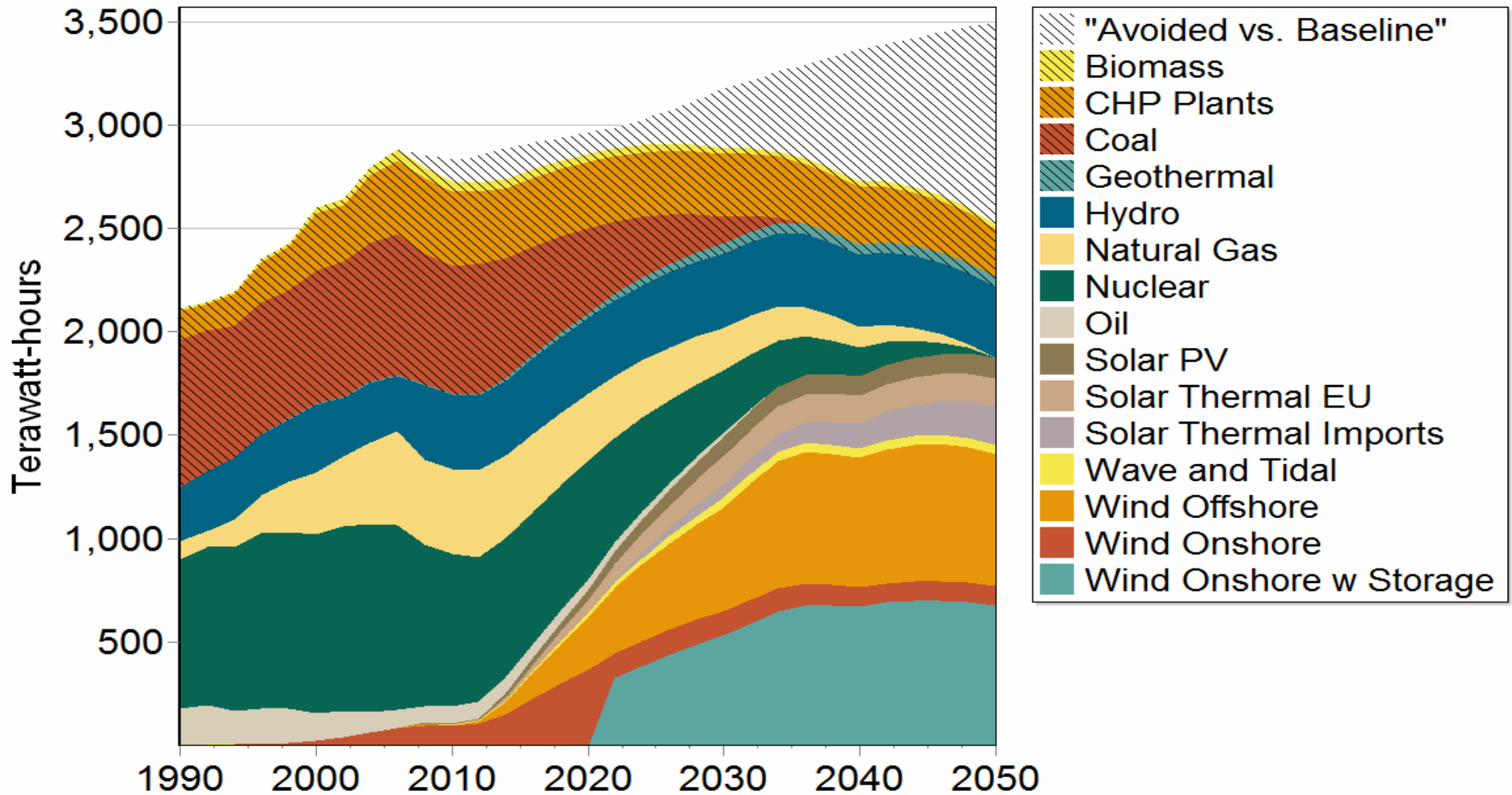


# Transport Demand and Transport Energy

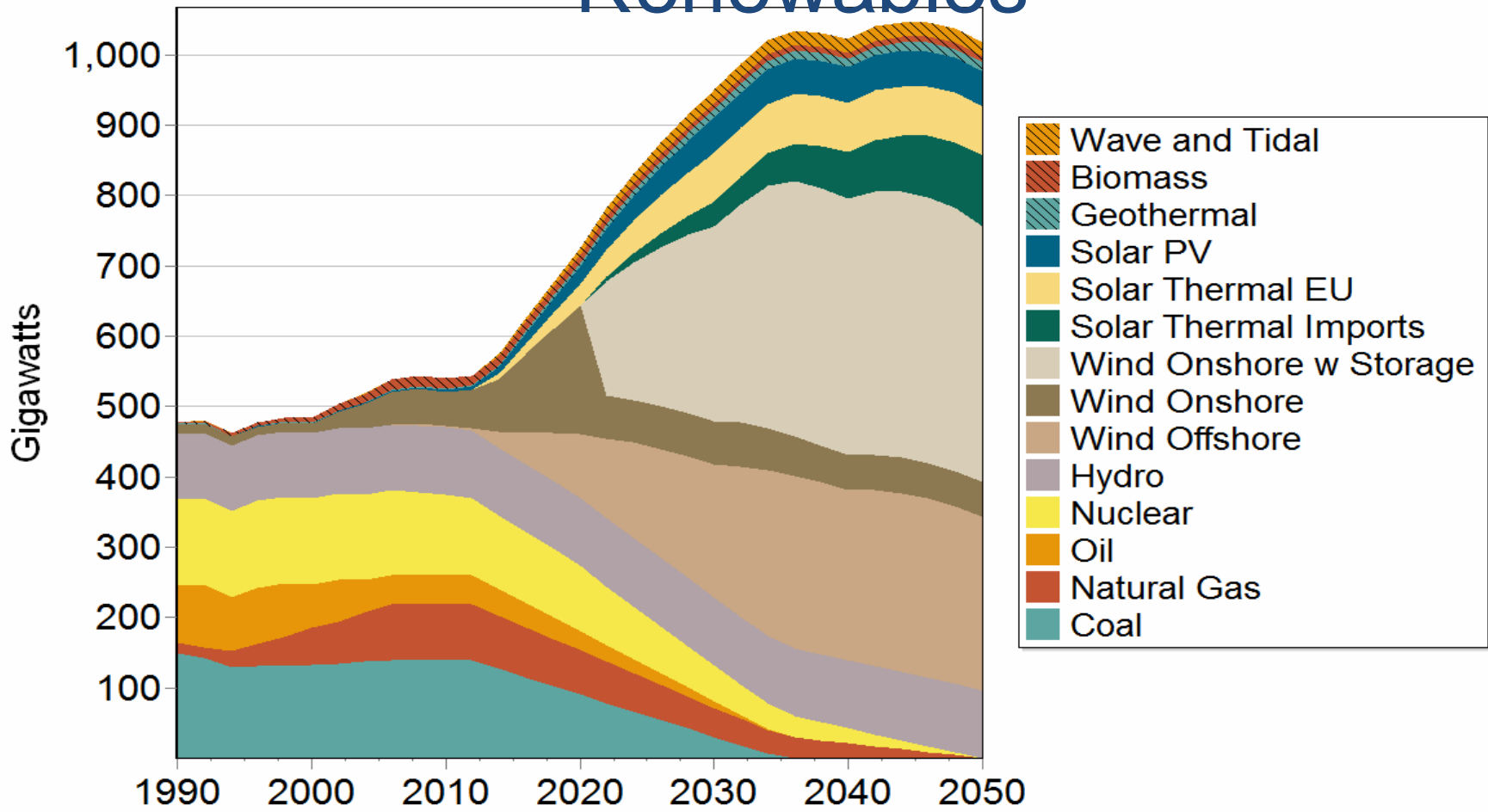


- Better urban and land use planning.
- Transit, bicycle, and pedestrian-friendly communities.
- More telecommuting and carpooling.
- Expansion of rail infrastructure and 100% electrified by 2050.
- Removing subsidies and taxing air travel.
- Congestion charges, car free city zones, road pricing, freight charges and weight taxes.
- Cutting fossil fuel subsidies and introducing carbon taxes.
- Aggressive efficiency standards.
- 100% electric cars by 2050.

# Switch to Renewables for Electric Generation...



# ...Will Require Huge Increase in Capacity due to Intermittency of Renewables



# Estimates of Renewable Potentials Indicate Primary Requirements Can Be Met from Renewables

2030 Economic Potential (TWh/yr)	Geo-	Solar	Solar	Wind	Wind	Wave			
Country	Hydro	thermal	Biomass	Thermal	PV	Onshore	Offshore	& Tidal	Total
Austria	56.0	4.1	101.2		2.9	56.0	-		220.2
Belgium	0.5		26.7		2.1	425.0	30.0	0.2	484.6
Bulgaria	12.0	0.8	-		2.0	112.0	22.5		149.3
Cyprus	1.0		3.5	20.0	0.1	25.0	3.0	0.2	52.8
Czech Republic	3.0		58.2		1.1	85.0	-		147.3
Denmark	-		29.1		1.3	751.0	420.4	2.2	1,204.0
Estonia	0.4		30.2			597.0	105.1		732.7
Finland	20.0		109.3		1.7	3,359.0	210.2	2.0	3,702.2
France	72.0	14.1	551.3		23.4	3,115.0	300.3	12.0	4,088.0
Germany	26.0	28.2	502.4		23.4	2,467.0	270.3	7.0	3,324.3
Greece	12.0	9.4	44.2	4.0	3.9	372.0	120.1	4.0	569.6
Hungary	4.0	51.9	65.1		2.0	1.0	-		124.0
Ireland	1.3		15.1		1.1	1,315.0	150.1	4.0	1,486.7
Italy	65.0	19.6	288.4	7.0	17.6	334.0	127.6	3.0	862.2
Latvia	4.0		27.9			593.0	90.1		715.0
Lithuania	1.5	0.8	115.1			442.0	11.3		570.7
Luxembourg	1.0		-		0.8	10.0	-		11.8
Malta			0.5	2.0	0.1	7.0	-	0.1	9.7
Netherlands	0.1	1.3	27.9		4.3	533.0	345.3	1.0	912.9
Poland	7.0	1.7	457.1		3.1	2,609.0	75.1	1.0	3,153.9
Portugal	20.0	14.1	47.7	142.0	3.9	152.0	52.6	7.0	439.2
Romania	18.0	1.0	-		2.0	99.0	15.0		135.0
Slovakia	6.0	3.1	41.9		2.0	11.0	-		64.0
Slovenia	8.0	0.4	20.9		1.0	2.0	-		32.3
Spain	41.0	28.2	291.9	1,278.0	19.5	682.0	75.1	13.0	2,428.7
Sweden	90.0	1.3	157.0		3.7	2,539.0	225.2	2.0	3,018.2
United Kingdom	8.0	0.3	284.9		7.8	4,409.0	750.7	60.0	5,520.8
<b>Total EU 27 Potential</b>	<b>477.8</b>	<b>180.3</b>	<b>3,297.6</b>	<b>1,453.0</b>	<b>130.8</b>	<b>25,102.0</b>	<b>3,400.0</b>	<b>118.7</b>	<b>34,160.2</b>
<b>2006 Production</b>	<b>307.7</b>	<b>5.6</b>	<b>46.3</b>	<b>2.5</b>	<b>2.5</b>	<b>82.0</b>		<b>0.5</b>	<b>447.1</b>
<b>2050 Mitigation Production</b>	<b>399.2</b>	<b>68.7</b>	<b>1,393.1</b>	<b>295.0</b>	<b>104.3</b>	<b>898.2</b>	<b>700.0</b>	<b>46.6</b>	<b>3,905.1</b>
<b>2050 Mit Prod/Poten (%)</b>	<b>84%</b>	<b>38%</b>	<b>42%</b>	<b>20%</b>	<b>80%</b>	<b>4%</b>	<b>21%</b>	<b>39%</b>	<b>11%</b>

# Costs of Mitigation

- An initial estimate of costs covering households, services, transport, electric generation and avoided fuel purchases for 2010-2020 comes to €1.94 trillion, or about 1.7% of GDP over the same period (€111tn) using conservative cost estimates.
- A fuller accounting of costs including industry, agriculture and non-energy sectors would likely be in the range of 2% to 3% of GDP – broadly consistent with other studies.
- To this we add Europe's international obligations for helping the world's poorer nations make a transition to a low-GHG future: likely to be at least €150 billion in 2020 assuming a cost of mitigation of \$50/TCO<sub>2e</sub>, or a further 1% of GDP.
- So costs of action likely to be at least 4% of GDP.
- By comparison, the Stern review estimated global **costs of inaction** as at least 5% but perhaps more than 20% of GDP.

# Next Steps

- Updating and improving data and assumptions
  - reflect recent financial crisis
  - better country-specific data
  - better cost estimates
  - more realistic energy efficiency potential estimates, etc.
- Intermittency, storage and load management.
- Materials requirements (steel, concrete, lithium, etc.) and EROEI issues.
- Sharing model with energy and climate community to get feedback and improve data and assumptions.
- Assessment of additional policy options.