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Update from the Data SWG: Subgroup on Harmonizing Regional Information in IAMs

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Why should we harmonize regional information in IAMs?

- **Global energy-economy and integrated assessment models (IAMs) have made different choices of native model regions.**
 - How many regions in the model?
 - Which countries are included in which model regions?
- **Classic example: Where to put Turkey?**
 - In some models => Europe
 - In other models => Ref-Econ, Mid-East, or Rest of World
 - Quickly growing country => regional choice has an impact
- **Objective of subgroup: *to facilitate better harmonization of regional information across IAMs in the future.***

What are the potential benefits of regional harmonization?

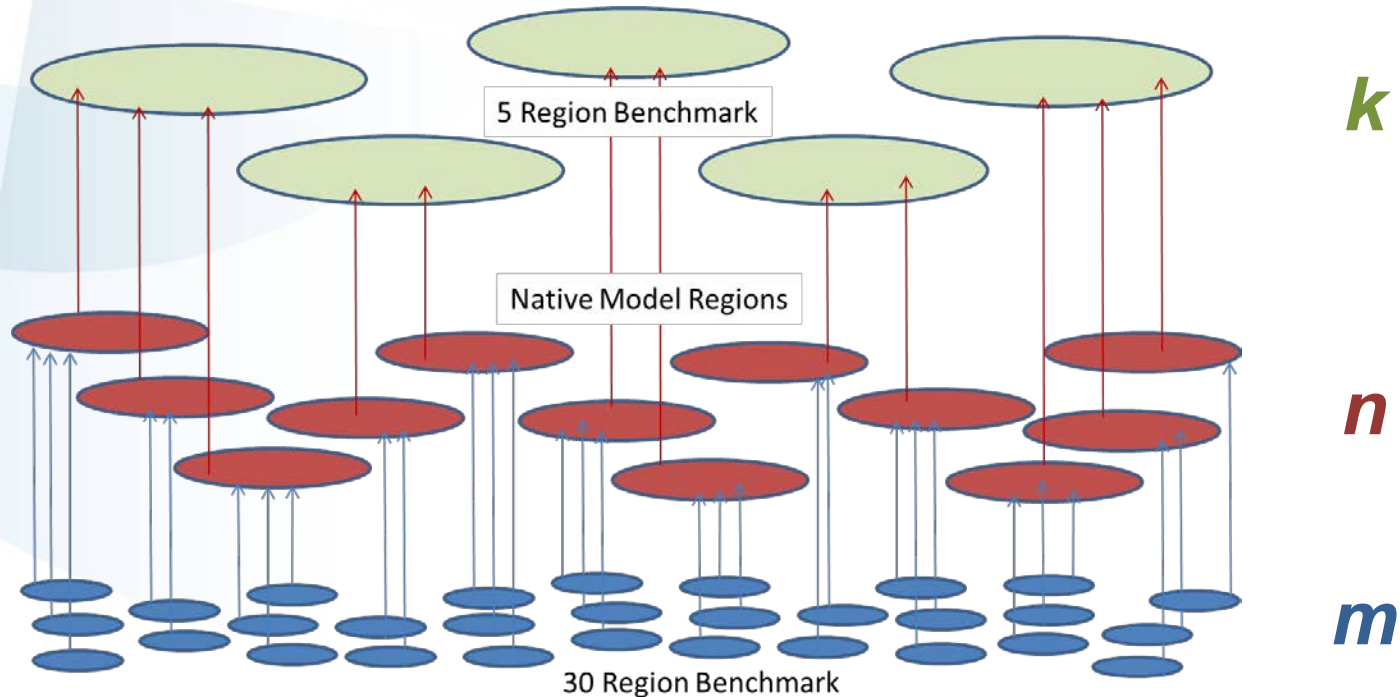
1. Improved comparability of regional model output
 2. Improved comparability of regional model input assumptions
 3. Better harmonization across models of regionally fragmented policies (e.g., national energy/climate/development targets, INDCs)
- **Main task of subgroup:** *to offer guidance to teams when doing analyses and undertaking model development in the future. (long-term and voluntary process)*

How to achieve a more harmonized treatment of regional information?

General concept: Establish benchmark region sets (with e.g. $k = 5, 10, 20 / m = 30, \dots$ regions)

Native region setting (n regions, $k < n < m$) could be chosen so that

- input on high-res m -benchmark set maps to model regions
- model output maps to low-res k -benchmark set.



Example: 5 SSP regions as benchmark set

SSP Region	Country	Country ISO Code	Population 2013 (Source: CIA World Factbook)	Area (square km) Source: CIA World Factbook 2013	GDP 2010 (billion \$ PPP) PWT7.1
ASIA	CHINA	CHN	1,349,585,838	9,596,961	9483.32755
ASIA	INDIA	IND	1,220,800,359	3,287,263	4079.258812
ASIA	KOREA, REPUBLIC OF	KOR	48,955,203	99,720	1294.164197
ASIA	INDONESIA	IDN	251,160,124	1,904,569	963.6219585
ASIA	TAIWAN, PROVINCE OF CHINA	TWN	23,299,716	35,980	739.2143705
ASIA	THAILAND	THA	67,448,120	513,120	534.9835086
ASIA	PAKISTAN	PAK	193,238,868	796,095	423.587916
ASIA	MALAYSIA	MYS	29,628,392	329,847	338.0540897
ASIA	PHILIPPINES	PHL	105,720,644	300,000	319.0712913
ASIA	HONG KONG (CHN)	HKG	7,182,724	1,104	274.2632554
ASIA	SINGAPORE	SGP	5,460,302	697	262.6130811
ASIA	VIET NAM	VNM	92,477,857	331,210	249.012154
ASIA	BANGLADESH	BGD	163,654,860	143,998	214.040499
ASIA	SRI LANKA	LKA	21,675,648	65,610	85.67097537
ASIA	NEPAL	NPL	30,430,267	147,181	33.15678336
ASIA	MACAU (CHN)	MAC	583,003	28	31.1185696
ASIA	AFGANISTAN	AFG	31,108,077	652,230	30.53655759
ASIA	CAMBODIA	KHM	15,205,539	181,035	27.34709723
ASIA	BRUNEI DARUSSALAM	BRN	415,717	5,765	17.60051875
ASIA	PAPUA NEW GUINEA	PNG	6,431,902	462,840	16.82581897
ASIA	LAO PEOPLE'S DEMOCRATIC REPUBLIC	LAO	6,695,166	236,800	16.70824277
ASIA	MONGOLIA	MNG	3,226,516	1,564,116	10.87507137
ASIA	FIJI	FJI	896,758	18,274	3.636857009
ASIA	BHUTAN	BTN	725,296	38,394	2.761874573
ASIA	MALDIVES	MDV	393,988	298	1.583995553
ASIA	VANUATU	VUT	261,565	12,189	1.483894955
ASIA	EAST TIMOR	TLS	1,172,390	14,874	1.292540456
ASIA	SAMOA	WSM	195,476	195,476	1.236326532
ASIA	SOLOMON ISLANDS	SLB	597,248	28,896	1.103782467
ASIA	TONGA	TON	106,322	747	0.796332542
ASIA	MARSHALL ISLANDS	MHL	69,747	181	0.454187906
ASIA	MICRONESIA, FEDERATED STATES OF	FSM	106,104	702	0.384879875
ASIA	KIRIBATI	KIR	103,248	811	0.364568459
ASIA	PALAU	PLW	21,108	459	0.321501017
ASIA	MYANMAR	MMR	55,167,330	676,578	
ASIA	KOREA, DEMOCRATIC PEOPLE'S REPUBLIC	PRK	24,720,407	120,538	
ASIA	NEW CALEDONIA (FR)	NCL	264,022	18,575	
ASIA	FRENCH POLYNESIA	PYF	277,293	4,167	
ASIA	GUAM (US)	GUM	160,378	544	

Example: hierarchical region breakdown for ASIA region

Level 1 - 1 Region	Level 2 - 3 Regions	Level 3 - 4 Regions	Level 4 - 6 Regions	Level 5 - 8 Regions	Level 6 - 12 Regions	Level 7 - 16 Regions	Level 8 - 20 Regions	Country
ASIA	China (CHN)	China (CHN)	China (CHN)	China (CHN)	China (CHN)	China (CHN)	China (CHN)	CHINA
ASIA	China (CHN)	China (CHN)	China (CHN)	China (CHN)	China (CHN)	China (CHN)	China (CHN)	HONG KONG (CHN)
ASIA	China (CHN)	China (CHN)	China (CHN)	China (CHN)	China (CHN)	China (CHN)	China (CHN)	MACAU (CHN)
ASIA	China (CHN)	China (CHN)	China (CHN)	China (CHN)	China (CHN)	China (CHN)	Taiwan (TWN)	TAIWAN, PROVINCE OF CHINA
ASIA	India (IND)	India (IND)	India (IND)	India (IND)	India (IND)	India (IND)	India (IND)	INDIA
ASIA	Other Asia (OAS)	Indonesia (IDN)	Indonesia (IDN)	Indonesia (IDN)	Indonesia (IDN)	Indonesia (IDN)	Indonesia (IDN)	INDONESIA
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	East Asia (EAS)	Northeast Asia (NEA)	Northeast Asia (NEA)	Mongolia (MNG)	MONGOLIA
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	East Asia (EAS)	Northeast Asia (NEA)	Northeast Asia (NEA)	North Korea (PRK)	NORTH KOREA, DEMOCRATIC PEOPLE'S REPUBLIC OF
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	East Asia (EAS)	Southeast Asia (SEA)	Laos & Cambodia (LCA)	Laos & Cambodia (LCA)	CAMBODIA
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	East Asia (EAS)	Southeast Asia (SEA)	Laos & Cambodia (LCA)	Laos & Cambodia (LCA)	LAOS, PEOPLE'S DEMOCRATIC REPUBLIC
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	East Asia (EAS)	Southeast Asia (SEA)	Myanmar (MYA)	Myanmar (MYA)	MYANMAR
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	East Asia (EAS)	Southeast Asia (SEA)	Vietnam (VNM)	Vietnam (VNM)	VIETNAM
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	East Asia (EAS)	Thailand (THA)	Thailand (THA)	Thailand (THA)	THAILAND
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	AMERICAN SAMOA (US)
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	CHRISTMAS ISLAND (AUS)
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	COKOS (KEELING) ISLANDS (AUS)
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	COK ISLANDS
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	FIJI
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	FRENCH POLYNESIA
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	FRENCH SOUTHERN TERRITORIES
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	GUAM (US)
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	KIRIBATI
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	MARSHALL ISLANDS
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	MICRONESIA, FEDERATED STATES OF
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	NARU
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	NEW CALEDONIA (FR)
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	NILE
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	NORFOLK ISLAND (AUS)
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	NORTHERN MARIANA ISLANDS (US)
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	PALAU
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	PAPUA NEW GUINEA
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	PITCAIRN ISLANDS (UK)
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	SAMOA
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	SOMON ISLANDS
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	TONGAREVA
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	TONGA
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	TUVALU
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	UNITED STATES MINOR OUTLYING ISLANDS (US)
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	VANUATU
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Oceania (OCE)	Oceania (OCE)	Oceania (OCE)	WALLIS AND FUTUNA (FR)
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Pacific Asia (PAS)	Other Pacific Asia (OPA)	Malaysia (MYS)	MALAYSIA
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Pacific Asia (PAS)	Other Pacific Asia (OPA)	Small Pacific Asia States (SPS)	BRUNEI DARUSSALAM
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Pacific Asia (PAS)	Other Pacific Asia (OPA)	Small Pacific Asia States (SPS)	EAST TIMOR
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Pacific Asia (PAS)	Other Pacific Asia (OPA)	Small Pacific Asia States (SPS)	SINGAPORE
ASIA	Other Asia (OAS)	Other Asia (OAS)	East Asia & Oceania (EAO)	Pacific Asia & Oceania (PAO)	Pacific Asia (PAS)	Philippines (PHL)	Philippines (PHL)	PHILIPPINES
ASIA	Other Asia (OAS)	Other Asia (OAS)	Korea (KOR)	Korea (KOR)	Korea (KOR)	Korea (KOR)	Korea (KOR)	NORTH KOREA, REPUBLIC OF
ASIA	Other Asia (OAS)	Other Asia (OAS)	Southcentral Asia (SCA)	Pakistan & Afghanistan (PAF)	Pakistan & Afghanistan (PAF)	Afghanistan (AFG)	Afghanistan (AFG)	AFGHANISTAN
ASIA	Other Asia (OAS)	Other Asia (OAS)	Southcentral Asia (SCA)	Pakistan & Afghanistan (PAF)	Pakistan & Afghanistan (PAF)	Pakistan (PAK)	Pakistan (PAK)	PAKISTAN
ASIA	Other Asia (OAS)	Other Asia (OAS)	Southcentral Asia (SCA)	South Asia (SAS)	Bangladesh (BGD)	Bangladesh (BGD)	Bangladesh (BGD)	BAHRAIN
ASIA	Other Asia (OAS)	Other Asia (OAS)	Southcentral Asia (SCA)	South Asia (SAS)	Other South Asia (OSA)	Other South Asia (OSA)	Nepal & Bhutan (NBH)	BHUTAN
ASIA	Other Asia (OAS)	Other Asia (OAS)	Southcentral Asia (SCA)	South Asia (SAS)	Other South Asia (OSA)	Other South Asia (OSA)	Nepal & Bhutan (NBH)	NEPAL
ASIA	Other Asia (OAS)	Other Asia (OAS)	Southcentral Asia (SCA)	South Asia (SAS)	Other South Asia (OSA)	Other South Asia (OSA)	South Asia Islands (SAI)	BRITISH INDIAN OCEAN TERRITORY
ASIA	Other Asia (OAS)	Other Asia (OAS)	Southcentral Asia (SCA)	South Asia (SAS)	Other South Asia (OSA)	Other South Asia (OSA)	South Asia Islands (SAI)	MALDIVES
ASIA	Other Asia (OAS)	Other Asia (OAS)	Southcentral Asia (SCA)	South Asia (SAS)	Other South Asia (OSA)	Other South Asia (OSA)	South Asia Islands (SAI)	SRI LANKA

3 regions (A3): China, India, Other Asia

6 regions (A6): China, India, Indonesia, South Korea, East Asia & Oceania, South-Central Asia

20 regions (A20): China, Taiwan, India, Indonesia, Mongolia, North Korea, Vietnam, Thailand, Pakistan, Bangladesh, Taiwan, ...

Example: benchmark region configurations

World Region Settings	ASIA	LAM	MAF	OECD+EU	REF	# REGIONS (# individual countries+EU)	Comments
Region Setting V1 (SSP)	A1 (Level 1)	L1 (Level 1)	M1 (Level 1)	O1 (Level 1)	R1 (Level 1)	5 (0)	
V2	A3 (Level 2)	L1 (Level 1)	M2 (Level 2)	O5 (Level 2)	R1 (Level 1)	12 (5)	Resolves Top 4 emitters + JPN (#7), REMIND-MAGPIE default
V3	A4	L2	M2	O5	R2	15 (8)	Resolves Top 7 emitters + IDN (#10)
V4	A6	L3	M3	O6	R2	20 (13)	Resolves 11 of top 13 emitters (except of Congo & Australia) and 12 G20 countries (not resolved AUS, SAU, ARG, TUR, DEU, ITA, FRA, UK).
V5	A6	L3	M5	O8	R2	24 (14)	As above plus Turkey, and introduction of more African Subregions
V6	A6	L5	M5	O8	R3	33 (18)	As above plus Argentina, Iran, Nigeria & Saudi-Arabia and introduction of more Latin American, Asian and African Subregions
V7	A12	L5	M12	O12	R4	45 (25)	Resolves all top 13 emitters, 18 of top 22 emitters (except of Bolivia, Myanmar, CAR, Sudan) and 19 G20 countries (not resolved AUS) plus Iran, Congo, Egypt, Nigeria, Thailand, Bangladesh
V8	A10	L10	M10	O15	R5	64 (40)	
V9	A20	L11	M25	O25	R7	88 (55)	Resolves most of top 40 emitters (except of Bolivia, CAR, Zambia, Venezuela, Mozambique) and (almost) all countries with population over 26 Mio., or area > 1.5 Mio km2 or GDP > 500 billion\$
EU Version	A3	L2	M2	O25	R3	35	

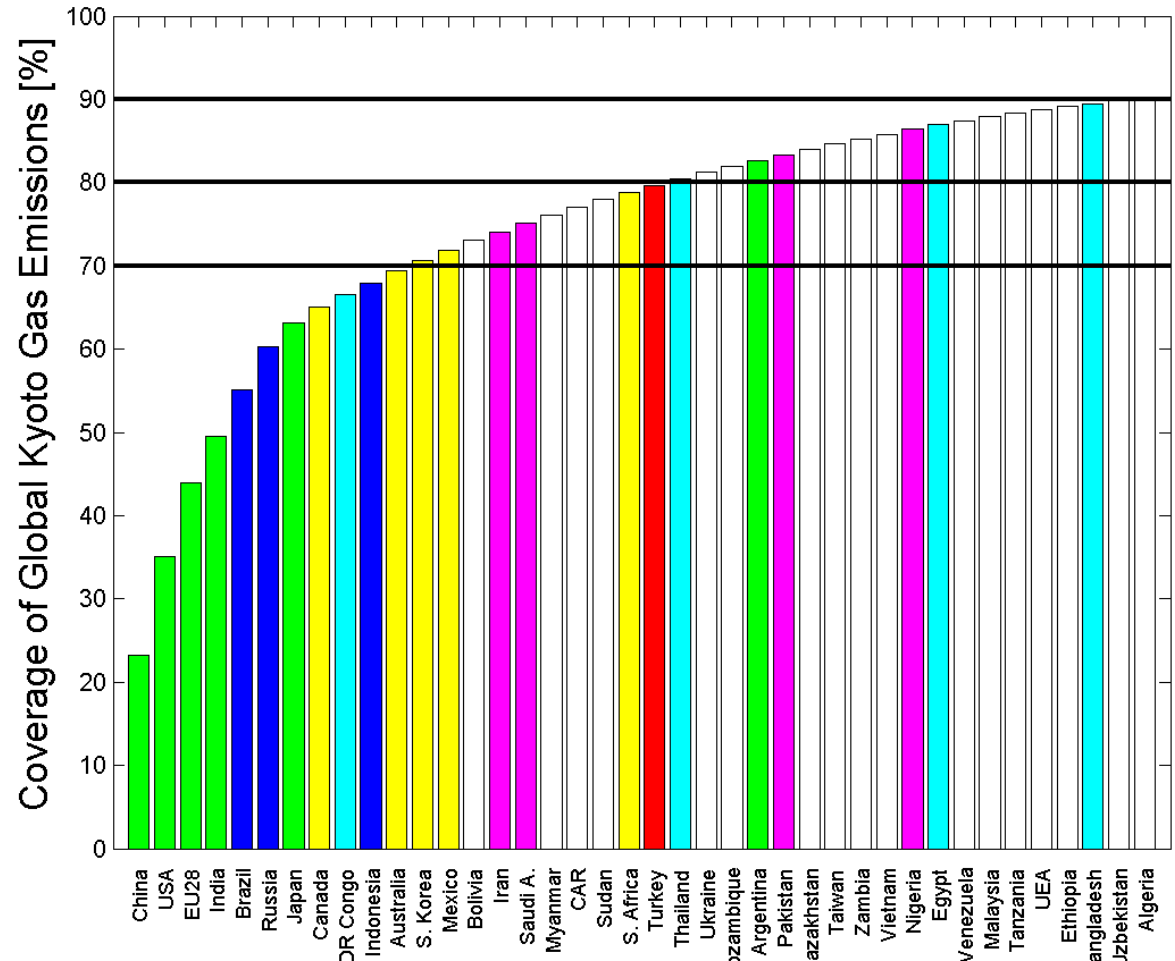
"A12-L5-M12-O12-R4"

GHG emissions:

Increasing national coverage with increasing resolution

**** 40 biggest emitters (EU28 + 39 countries) account for 90% of GHGs ****

Top 40 emitters (Kyoto gas emissions 2012; EDGAR v4.2)		
1	CHINA	G20
2	UNITED STATES	G20
3	EUROPEAN UNION	G20
4	INDIA	G20
5	BRAZIL	G20
6	RUSSIA	G20
7	JAPAN	G20
8	CANADA	G20
9	CONGO	
10	INDONESIA	G20
11	AUSTRALIA	G20
12	SOUTH KOREA	G20
13	MEXICO	G20
14	BOLIVIA	
15	IRAN	
16	SAUDI ARABIA	G20
17	MYANMAR	
18	CAR	
19	SUDAN	
20	SOUTH AFRICA	G20
21	TURKEY	G20
22	THAILAND	
23	UKRAINE	
24	MOZAMBIQUE	
25	ARGENTINA	G20
26	PAKISTAN	
27	UZBEKISTAN	
28	TAIWAN	
29	ZAMBIA	
30	VIETNAM	
31	NIGERIA	
32	EGYPT	
33	VENEZUELA	
34	MALAYSIA	
35	TANZANIA	
36	UEA	
37	ETHIOPIA	
38	BANGLADESH	
39	UZBEKISTAN	
40	ALGERIA	



Further ideas and considerations

- **Review and vetting of proposal by modeling teams from different regions (Asia, Europe, US & Canada, Latin America)**
 - Focusing in particular on the proposed hierarchical region setting for their region.
- **What about sub-national detail?**
 - Some models (e.g., GCAM, DNE21+) already split China and the USA into multiple sub-regions. Some of these sub-regions are considerably bigger than certain major economies!

**Questions?
Comments?**



Back-up slides

Example: hierarchical region breakdown for REF region

Level 1 - 1 Region	Level 2 - 2 Regions	Level 3 - 3 Regions	Level 4 - 4 Regions	Level 5 - 5 Regions	Level 6 - 7 Regions	Country
REF	Former Soviet Union States (outside Russia) (FSU)	Former Soviet Union in Central Asia (SCA)	Former Soviet Union in Central Asia (SCA)	Former Soviet Union in Central Asia (SCA)	Kazakhstan (KAZ)	KAZAKHSTAN
REF	Former Soviet Union States (outside Russia) (FSU)	Former Soviet Union in Central Asia (SCA)	Former Soviet Union in Central Asia (SCA)	Former Soviet Union in Central Asia (SCA)	Other Former Soviet Central Asia (OSA)	KYRGYZSTAN
REF	Former Soviet Union States (outside Russia) (FSU)	Former Soviet Union in Central Asia (SCA)	Former Soviet Union in Central Asia (SCA)	Former Soviet Union in Central Asia (SCA)	Other Former Soviet Central Asia (OSA)	TAJIKISTAN
REF	Former Soviet Union States (outside Russia) (FSU)	Former Soviet Union in Central Asia (SCA)	Former Soviet Union in Central Asia (SCA)	Former Soviet Union in Central Asia (SCA)	Other Former Soviet Central Asia (OSA)	TURKMENISTAN
REF	Former Soviet Union States (outside Russia) (FSU)	Former Soviet Union in Central Asia (SCA)	Former Soviet Union in Central Asia (SCA)	Former Soviet Union in Central Asia (SCA)	Uzbekistan (UZB)	UZBEKISTAN
REF	Former Soviet Union States (outside Russia) (FSU)	Former Soviet Union in Eastern Europe & Caucasus (FSE)	Former Soviet Union in the Caucasus (FSC)	Former Soviet Union in the Caucasus (FSC)	Former Soviet Union in the Caucasus (FSC)	ARMENIA
REF	Former Soviet Union States (outside Russia) (FSU)	Former Soviet Union in Eastern Europe & Caucasus (FSE)	Former Soviet Union in the Caucasus (FSC)	Former Soviet Union in the Caucasus (FSC)	Former Soviet Union in the Caucasus (FSC)	AZERBAIJAN (incl. NAGORNY-KARABAKH)
REF	Former Soviet Union States (outside Russia) (FSU)	Former Soviet Union in Eastern Europe & Caucasus (FSE)	Former Soviet Union in the Caucasus (FSC)	Former Soviet Union in the Caucasus (FSC)	Former Soviet Union in the Caucasus (FSC)	GEORGIA (incl. ABKHAZIA, SOUTH OSSETIA)
REF	Former Soviet Union States (outside Russia) (FSU)	Former Soviet Union in Eastern Europe & Caucasus (FSE)	Former Soviet Union in Eastern Europe (FSE)	Moldova & Belarus (MBE)	Moldova & Belarus (MBE)	BELARUS
REF	Former Soviet Union States (outside Russia) (FSU)	Former Soviet Union in Eastern Europe & Caucasus (FSE)	Former Soviet Union in Eastern Europe (FSE)	Moldova & Belarus (MBE)	Moldova & Belarus (MBE)	MOLDOVA, REPUBLIC OF (incl. TRANSNISTRIA)
REF	Former Soviet Union States (outside Russia) (FSU)	Former Soviet Union in Eastern Europe & Caucasus (FSE)	Former Soviet Union in Eastern Europe (FSE)	Ukraine (UKR)	Ukraine (UKR)	UKRAINE
REF	Russia (RUS)	Russia (RUS)	Russia (RUS)	Russia (RUS)	Russia (RUS)	RUSSIAN FEDERATION

How do we identify the most favorable benchmark regional configurations?

Four criteria:

1. Current regional breakdowns used by IAMs (to identify differences and commonalities)
2. Regional resolution of key data sources used by IAMs (e.g., PWT, IEA, GTAP, policy and technology databases, etc.)
3. Relevance of regions for current climate policy considerations (e.g., major economies, largest emitters and regional blocks may be resolved, etc.)
4. Similarity of countries within a region with regard to pertinent characteristics for energy/climate/development policy analysis (e.g., growth dynamics, income, fossil resource endowment, institutional and cultural factors, etc.)

Next steps for subgroup

- **Compare regional configurations of a subset of IAMs**
 - What countries are included in models' native regions?
 - How do these native regions map to existing harmonized regions, and what benchmark regional set-ups would provide a particularly good match to the existing native model configurations?
 - How do these native regions compare across models in terms of GDP, population, energy demand, etc. – both now and in the future and under different scenarios (e.g., SSPs)?
 - The benchmark regions ultimately proposed would ideally be robust across different future pathways.

Next steps for subgroup

- **Conduct a simple survey of IAMs**
 - To better understand from where IAMs obtain data for building and defining their native model regions
 - To compare certain information across the most used data sources in order to spot any major data inconsistencies, which would then, by extension, be incorporated into the models
 - It would be useful to piggy-back on other activities of the SWG and on other projects.

