



IAEA

60 Years

Atoms for Peace and Development

Climate Change and Nuclear Power

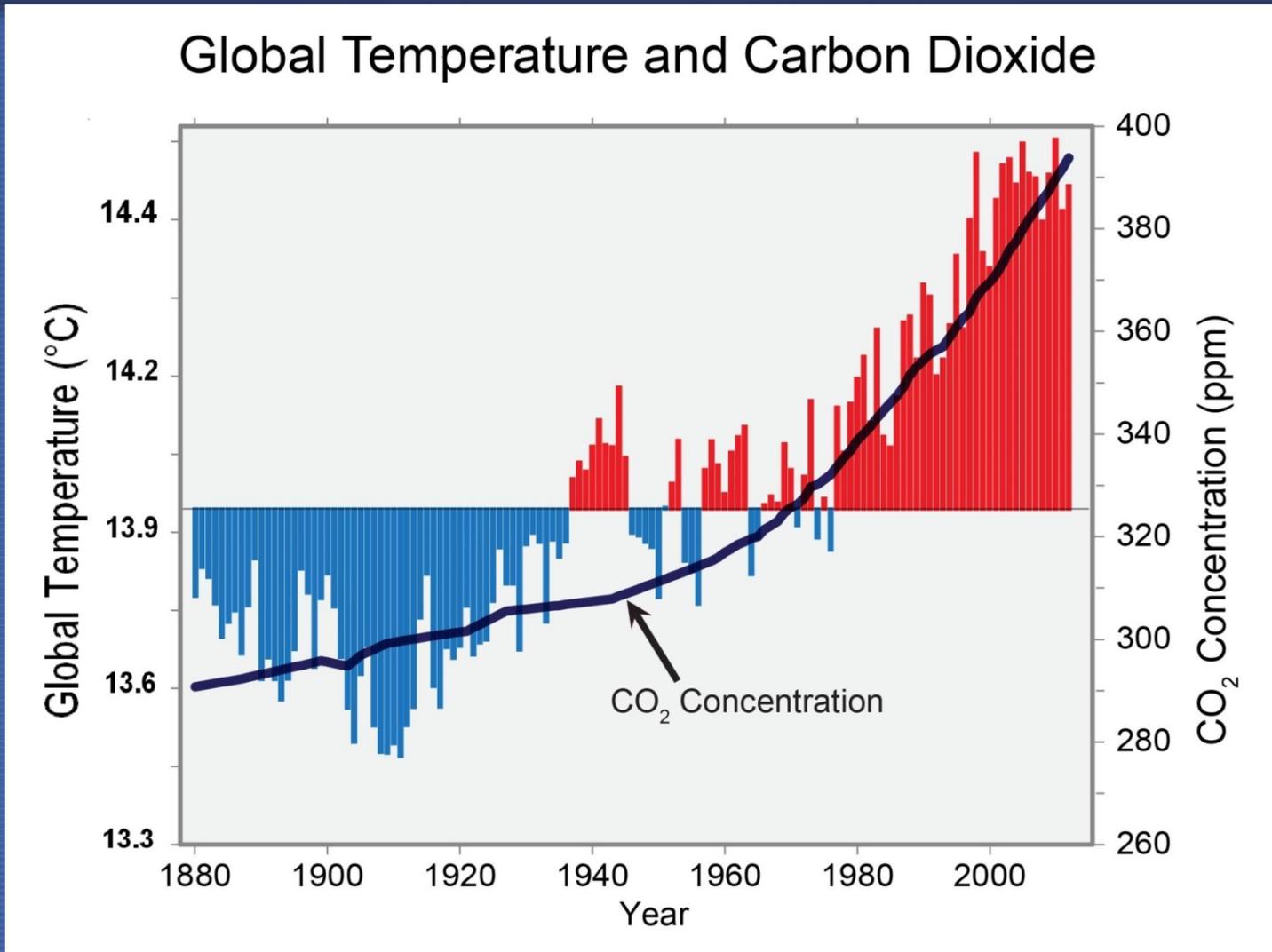
INPRO Dialogue Forum
IAEA Headquarters, Vienna, Austria
6-8 June, 2017

David Shropshire
IAEA Department of Nuclear Energy
Planning & Economic Studies Section (PESS)

Briefing Outline

- Energy/Climate Challenge
- Nuclear as a sustainable, low-C source
- Challenges to maintain energy share
- IAEA's activities in Climate Change

Changing climate



COP-21 is a good start to global climate action, ..but not the end point

Paris Agreement - “historic, durable and ambitious”

Goal: 2°C, aspire to 1.5°C

Nov. 2016: entry into force

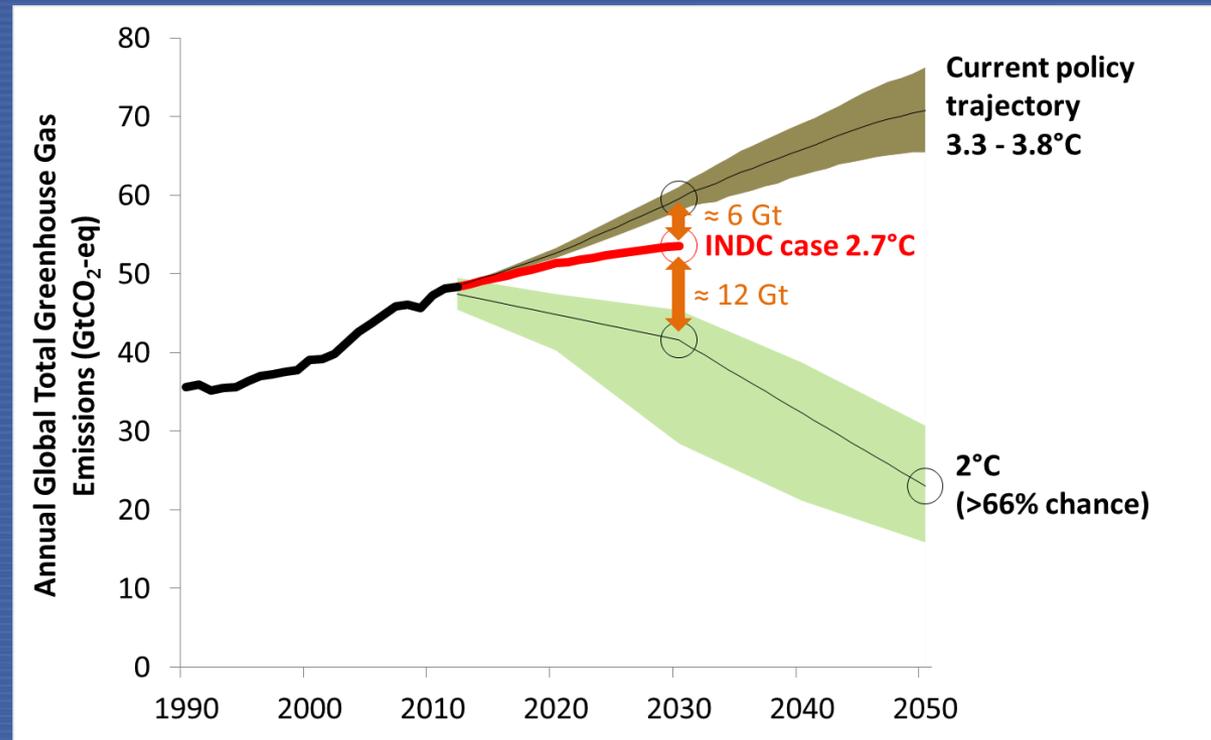
Bottom-up: action at the national level

Vital: design of rules, processes and institutions under negotiations



Country plans to curb emissions help, but fall well short of 2°C target, much less 1.5°C

- Much greater ambition needed from States to adequately address the problem
- Low-carbon govt. policies, actions, and investments must quickly follow



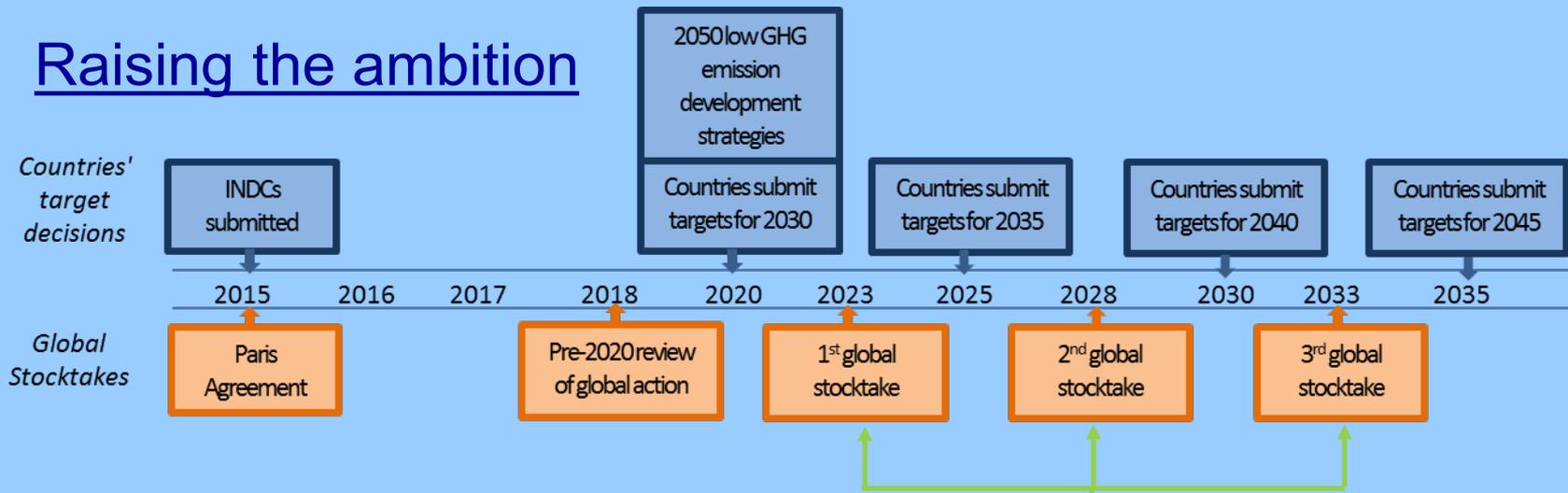
Source: Derived from Climate Action Tracker, UNEP and IEA

How will the climate gap be closed?

- Conversion of INDCs to real plans in “Nationally Determined Contributions”
- “Increased Ambition” ramped progressively in 5 year review cycles that are informed by IPCC measurements of climate change
- Government policy shifts regarding carbon price and capacity markets, views on nuclear.
- Investment in “Innovation” in all forms – policies, investment, energy technology, etc.

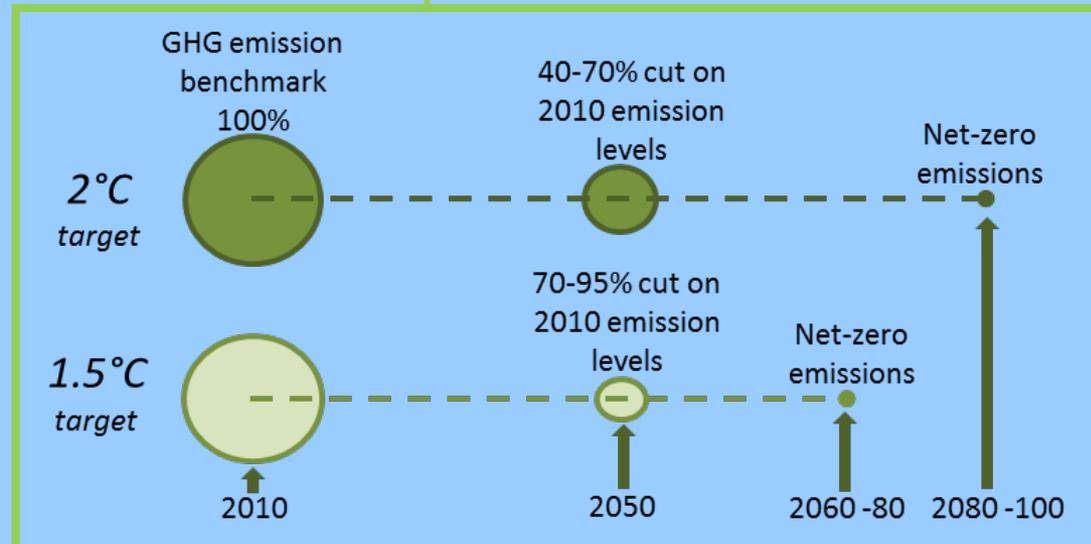
Ambition is stepped up in 5 year increments as informed by latest science on the climate

Raising the ambition



Based on latest science

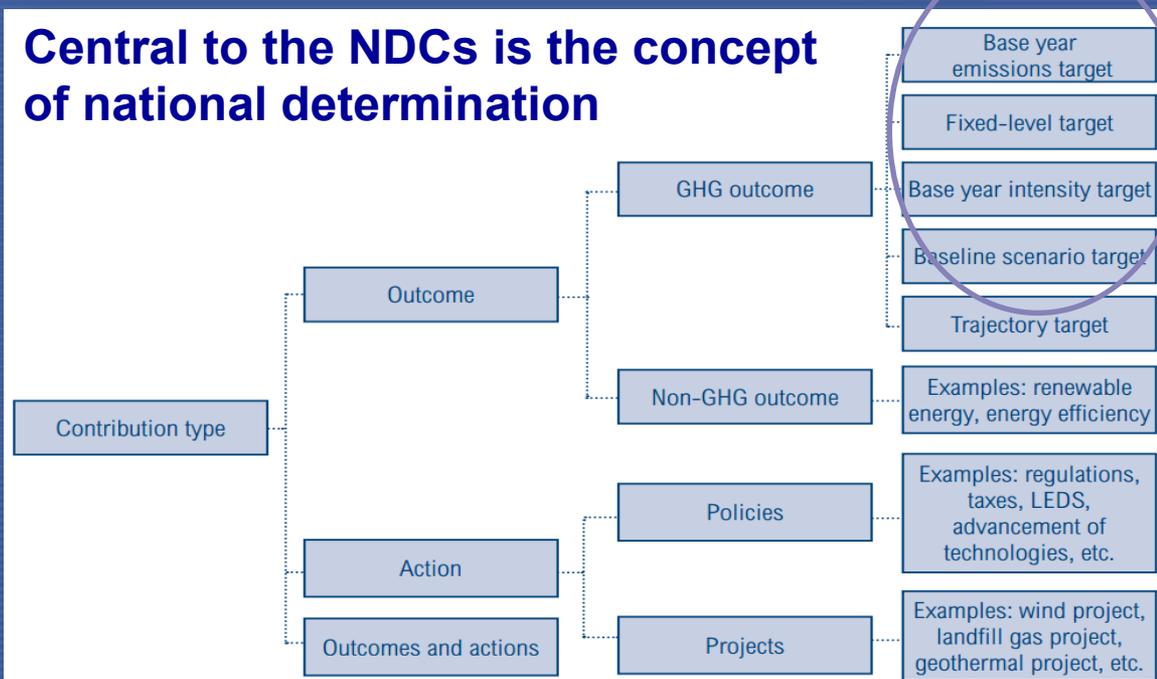
- Special IPCC report in 2018 on the impacts of 1.5°C and related global GHG emission pathways



Main elements of NDCs

- Climate related targets (economy-wide expressed either in outcomes or actions or both);
- Policies and measures governments aim to implement in response to climate change;
- Adaptation component;
- Developing countries: needs and priorities in INDC implementation (finance, technology and capacity building).

Central to the NDCs is the concept of national determination



Current status on first NDCs

190

Parties submitted their INDCs (162 w/o EU)

141

Parties have submitted their first NDCs (113 w/o EU)
(China, India, USA, EU, Australia, Brazil, Mexico, etc.)

10

Revision made to INDCs (Argentina, Belize, Indonesia, Mali, Morocco, Nepal, New Zealand, Panama, Paraguay, Sri Lanka)

5

Parties decided to do otherwise (currently preparing their first NDC for submission) (Brunei, Philippines, Uruguay, EU?)

What do country NDCs say about nuclear power?

Argentina

Argentina's goal is to reduce GHG emissions by **15%** in 2030 with respect to projected BAU emissions for that year. The goal includes, inter alia, actions linked to: the promotion of sustainable forest management, energy efficiency, biofuels, **nuclear power**, renewable energy, and

China

- The installed capacity of **nuclear power** is 19.88 gigawatts (2.9 times of that for 2005).

India

5) India is promoting **Nuclear Power** as a safe, environmentally benign and economically viable source to meet the increasing electricity needs of the country. With a 2.2% share in current installed capacity, total installed capacity of nuclear power in operation is 5780 MW. Additionally six reactors with an installed capacity of 4300 MW are at different stages of commissioning and construction. Efforts are being made to achieve 63 GW installed capacity by the year 2032, if supply of fuel is ensured.

Japan

- Utilizing **nuclear power** generations whose safety is confirmed

Jordan

The main goals of the Strategy are to secure reliable energy supply through increasing the share of local energy resources such as oil shale, natural gas in the energy mix, expanding the development of renewable energy projects, promoting energy conservation and energy efficiency and awareness and **generating electricity from nuclear energy.**

Niger

The conditional technologies for the energy sector in the medium and long terms relate to: exploitation of photovoltaic and thermal solar energy; exploitation of wind energy; construction of a **nuclear power** plant and a gas power plant; hydroelectricity; economising the use of wood for cooking; energy efficiency; use of biogas; and

UAE

The UAE has set a target of increasing clean energy contribution to the total energy mix from 0.2% in 2014, to 24% by 2021. **This will be achieved through renewable and nuclear energy, and is underpinned by detailed emirate level targets and policies.**

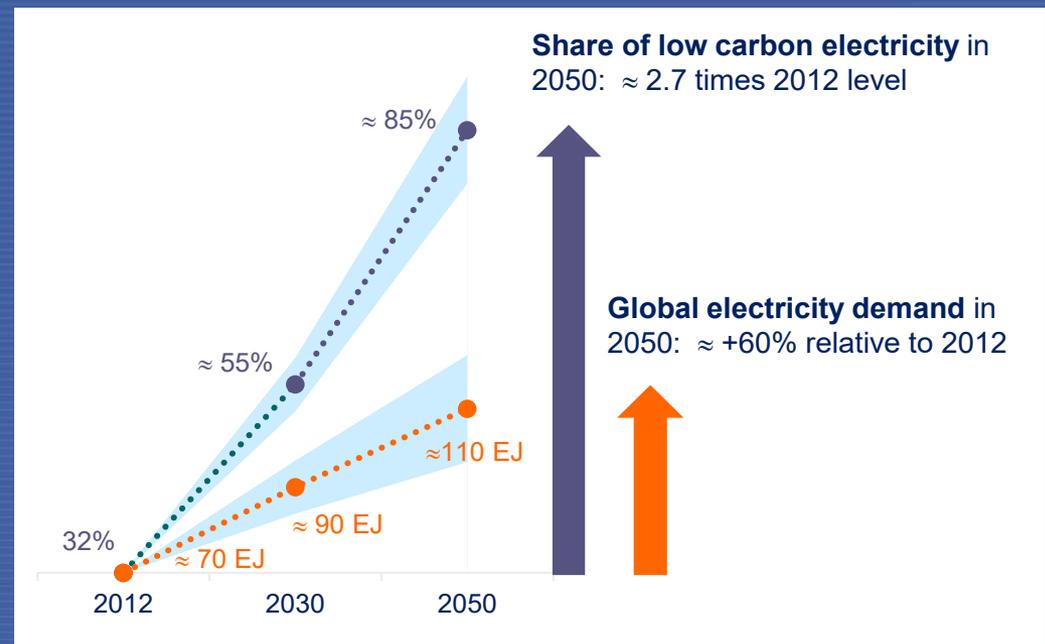
This level of unconditional emission reduction will be achieved through development of combined cycle power plants, renewable energies and **nuclear power**, as well as reduction of gas flare emissions, increasing energy efficiency in

Iran



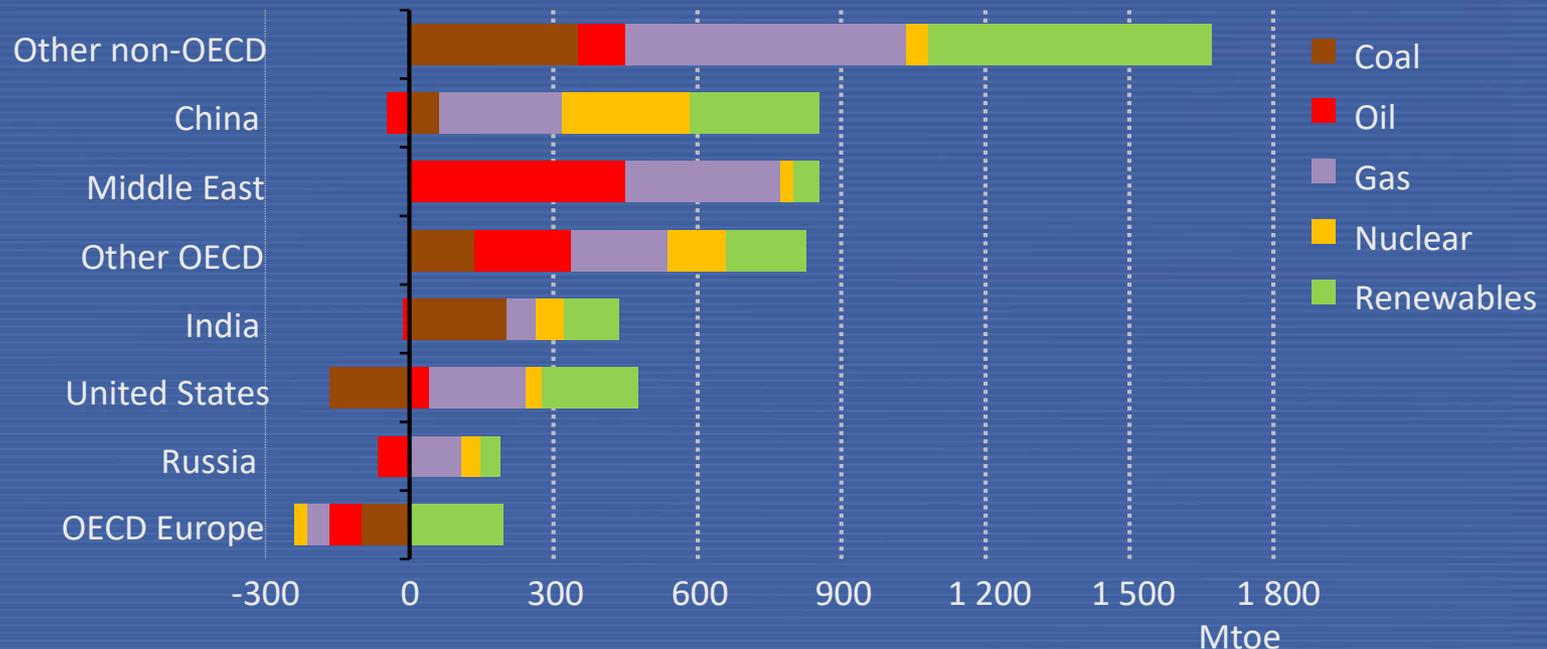
Decarbonizing the power sector is needed by 2050 to reach the 2°C target

- Beyond uncertainties of future developments, *three fundamental actions need to be undertaken simultaneously*:
 - Massive deployment of all low carbon source of electricity:
-renewables, nuclear, switch from coal to gas, and extensive use of CCS (coal and gas).
 - Improve efficiency of power plants
 - Apply stringent EE measures to moderate electricity demand



Projections suggest greater use of Gas and Renewables, some nuclear

Change in energy production by region in the New Policies Scenario, 2012-2040

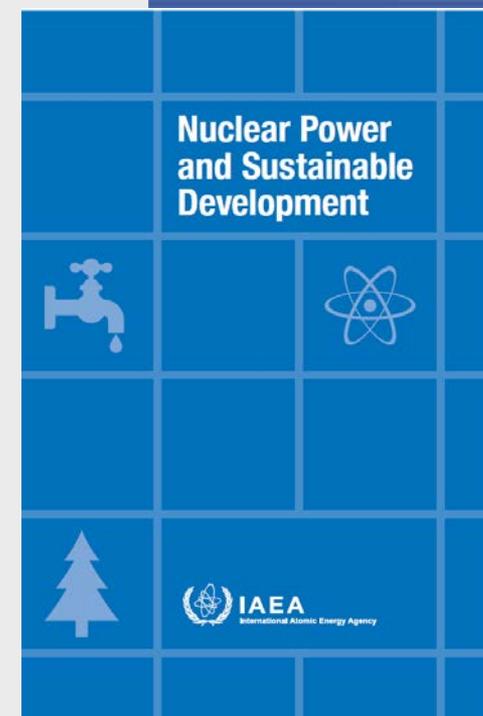
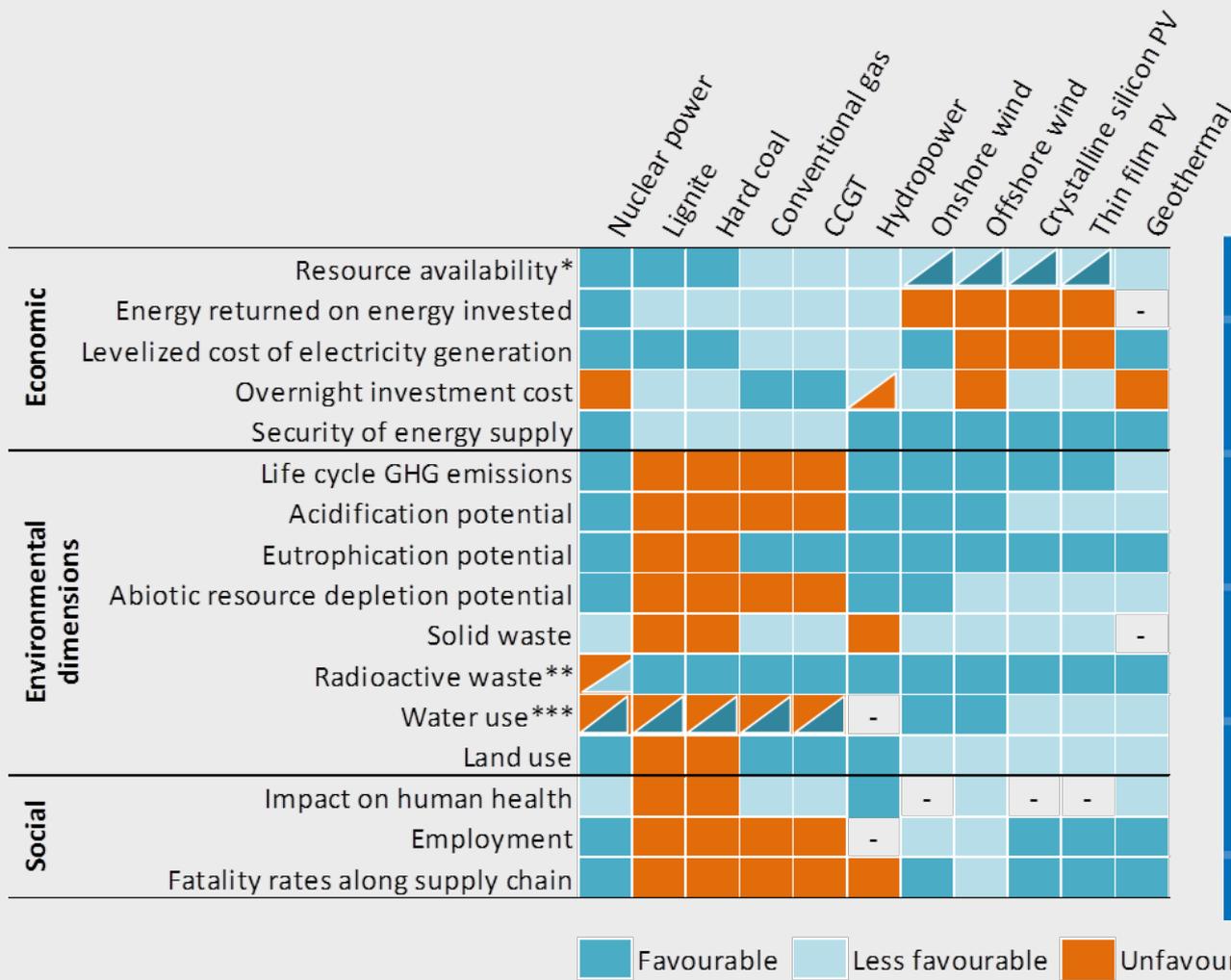


Source: OECD/IEA 2016, World Energy Outlook, 2014 data

So, which energy technology is best?

- All technologies are associated with some risk, waste or interaction with environment.
- None of the low-C technologies should be left aside when assessing the contribution to Climate Change and Sustainable Development.
- Suitability of nuclear power cannot be judged in isolation, but only in comparison with the best available alternatives.
- The use of nuclear is ultimately a country's sovereign decision.

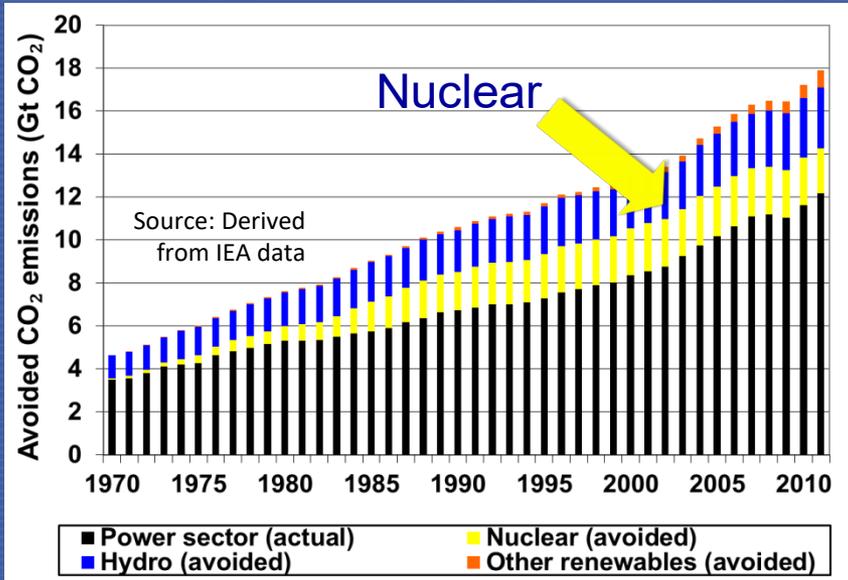
Nuclear compares favorably across many sustainability indicators



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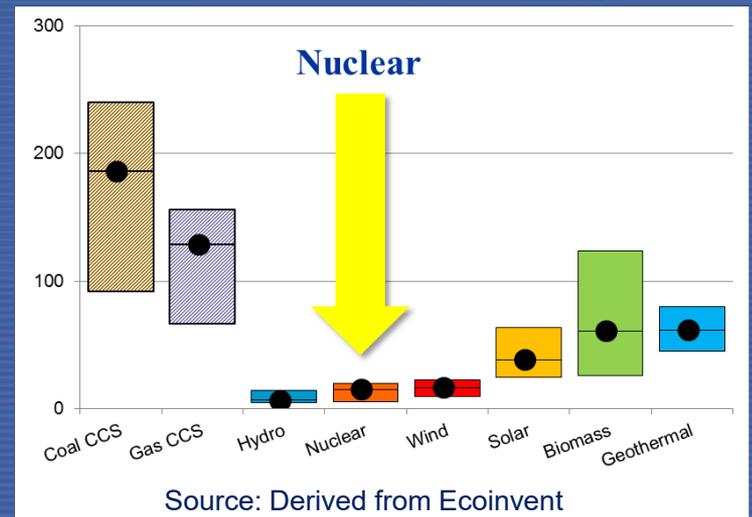
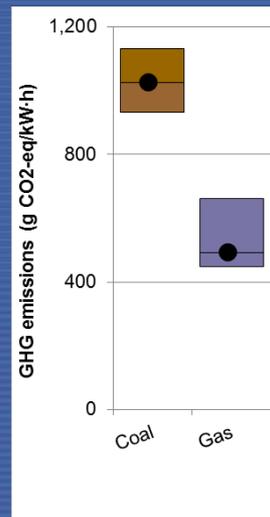
Paris Agreement + SDGs = Greater Action!

Nuclear power avoids huge amounts of CO₂ generation over long time scales



Nuclear power is very low life cycle emission source

Life cycle GHG emissions from electricity generation



Significant actions needed to awaken the “Sleeping Giant” we know as Nuclear Power

Competitiveness and Finance

Need:

Valuation on reliability, macro-economic, and environmental benefits; & financing certainty

Actions:

Full accounting of total system costs; tax on high-C consumption, production, and emissions; innovative financing and increased technology innovation

Clean-Energy Investments

Need:

Investments of at least US\$80B/year for nuclear power, potentially double if fossil CCS fails

Actions:

Realisation of all proposed nuclear projects worldwide by 2030, life-time extensions for existing NPPs

Climate and SDGs

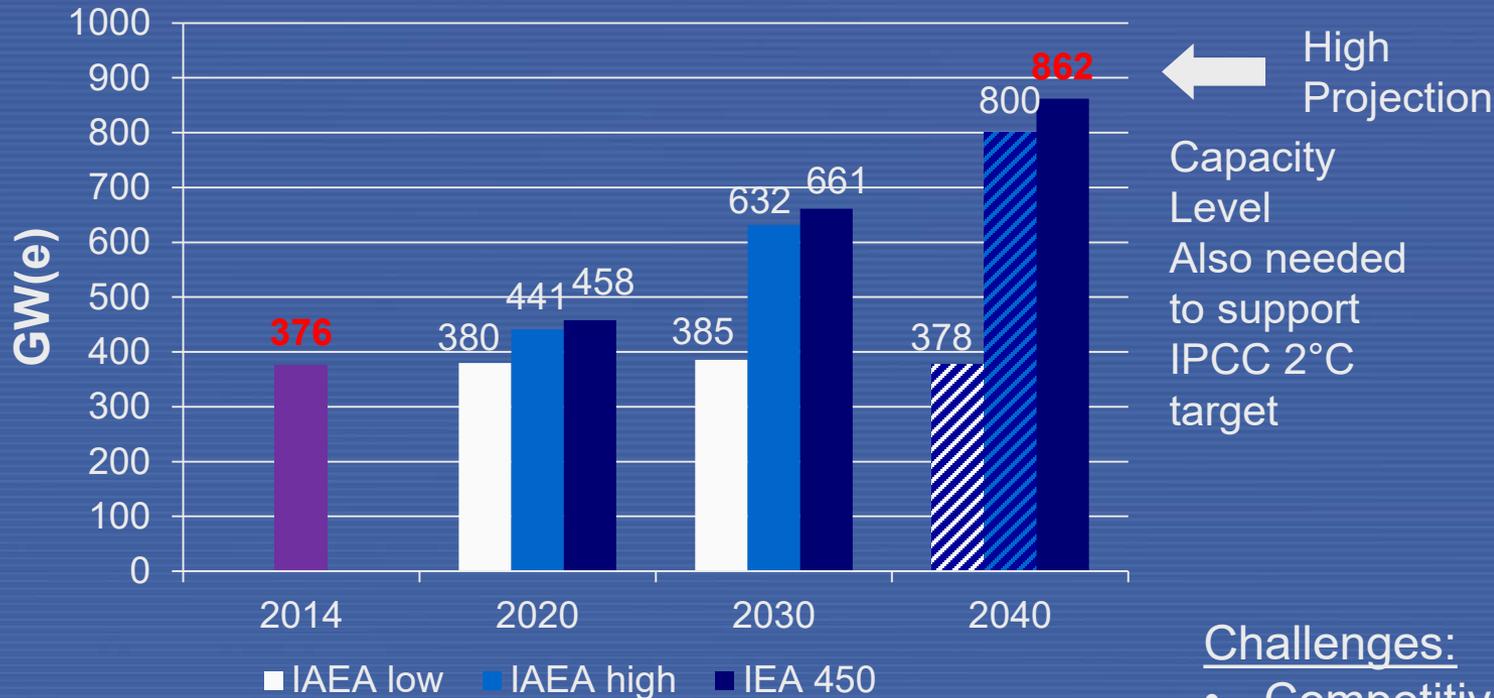
Need:

Anchor nuclear as a core asset for meeting 2°C goal and SDGs

Actions:

Make nuclear core to achieving countries NDCs and sustainable development vision

Ramping nuclear to support 2°C target will be difficult, but not impossible



Challenges:

- Competitiveness
- Nuclear investments
- Construction times
- Regulatory constraints
- Supply Chain limitations
- Skilled Workforce
- Public Acceptance

What services does NE currently offer to MS in support of NDCs?

- Energy Planning
- Collaborative Research
- Integrated Assessments
- Outreach and publications

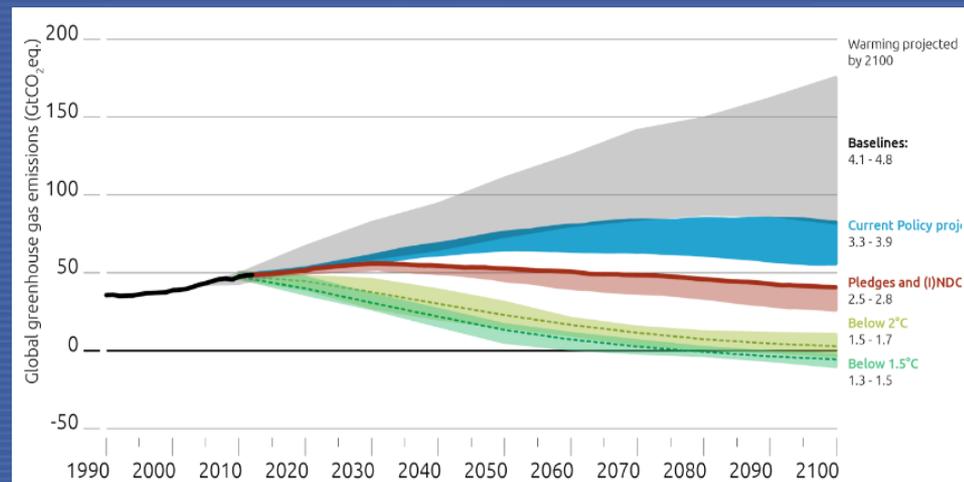
Organize Energy Planning Workshops

Assessing Nationally Determined Contributions (NDCs)

The Issue

Where would business as usual lead us?
Are we well on track towards Paris, taking into account:

- unconditional &
- conditional pledges?



Source: climateactiontracker.org/global.html

How PESS Contributes

- Regional Workshops on NDCs
- Lectures on evaluating energy technologies to tackle climate change
- Providing the PESS tool MESSAGE free of charge
- Developing country case studies

The Output

- Investment pathways
- Greenhouse gas (GHG) emission profiles
- Optimal technology mix to achieve GHG targets
- **Strengthened local expertise for evaluating energy options**

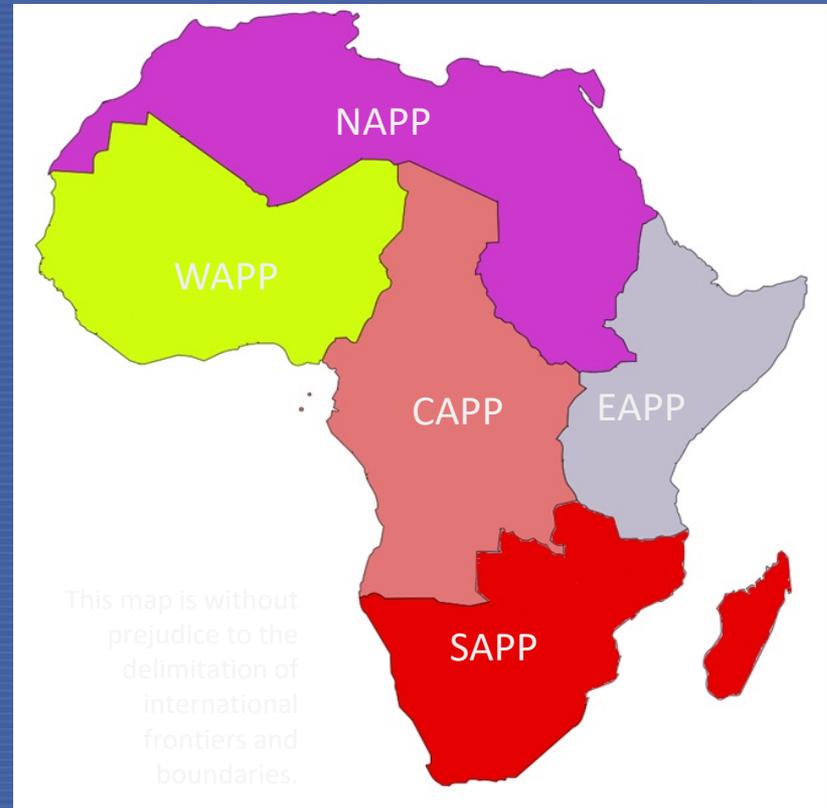
Examples of Our Work – Regional Projects

Bringing Countries together to Model their Power Pools

AFRA



- Sub-regional trainings for
 - North Africa – Tunisia
 - Central Africa – Cameroon
- Regional training on Energy Statistics and Energy Balances – Sudan
- Regional Conference on Energy and Nuclear Power in Africa and the Project Coordination meeting – Kenya
- Training for Islands and Small & Isolated Countries –Mauritius



PESS CRP – Collaborative Research Project

Assessments of the Potential Role of Nuclear Energy in National Climate Change Mitigation Strategies (2017-2020),

- Participation: Armenia, Australia, Chile, China, Croatia, Lithuania, Pakistan, South Africa, Viet Nam, Turkey, Ukraine, Ghana and USA
- Outputs:
 - Development and testing of analytical / methodological frameworks for comparing different low carbon energy supply options under various support policy mechanisms;
 - Country Studies assessing the role of nuclear energy in national CC mitigation strategies;
 - Generation of information package for MS in preparation of their NDCs.

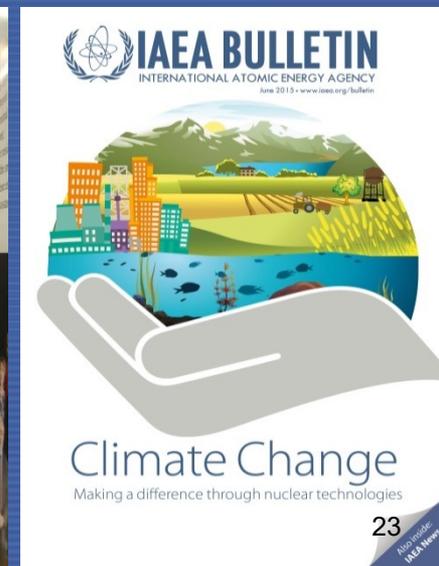
Framework for integrated assessment of the energy-food-water-climate nexus

- Explores energy sector policies in a broader national sustainable development context and explores trade-offs and synergies among different policy goals
- Deliver capacity building projects in Member States in collaboration with UNDP and UNDESA.
 - Support sustainable development policy and attainment of SDGs in Member States
 - Used in parallel with economy-wide modelling tools and sectoral models to conduct comprehensive assessment of development policy
 - Expanding number of national projects
 - Projects ongoing with Ghana and Nicaragua



IAEA performs outreach and informs MS on the role of nuclear and climate change

- Outreach through COP meetings, other UN orgs and participation on UN HLCP Working Group
- Produce Climate Change related publications
- Training (ICTP), presentations, national seminars
- Support IPCC Special Reports



In Summary

- To meet the scale of energy demand in the future, all low-C technologies are needed.
- Nuclear has significantly contributed to GHG mitigation, but now must accelerate growth.
- Significant hurdles exist for Nuclear to maintain share as a low-Carbon energy producer.
- IAEA assists Member States so they can make informed decisions about the use of nuclear power to address climate change.

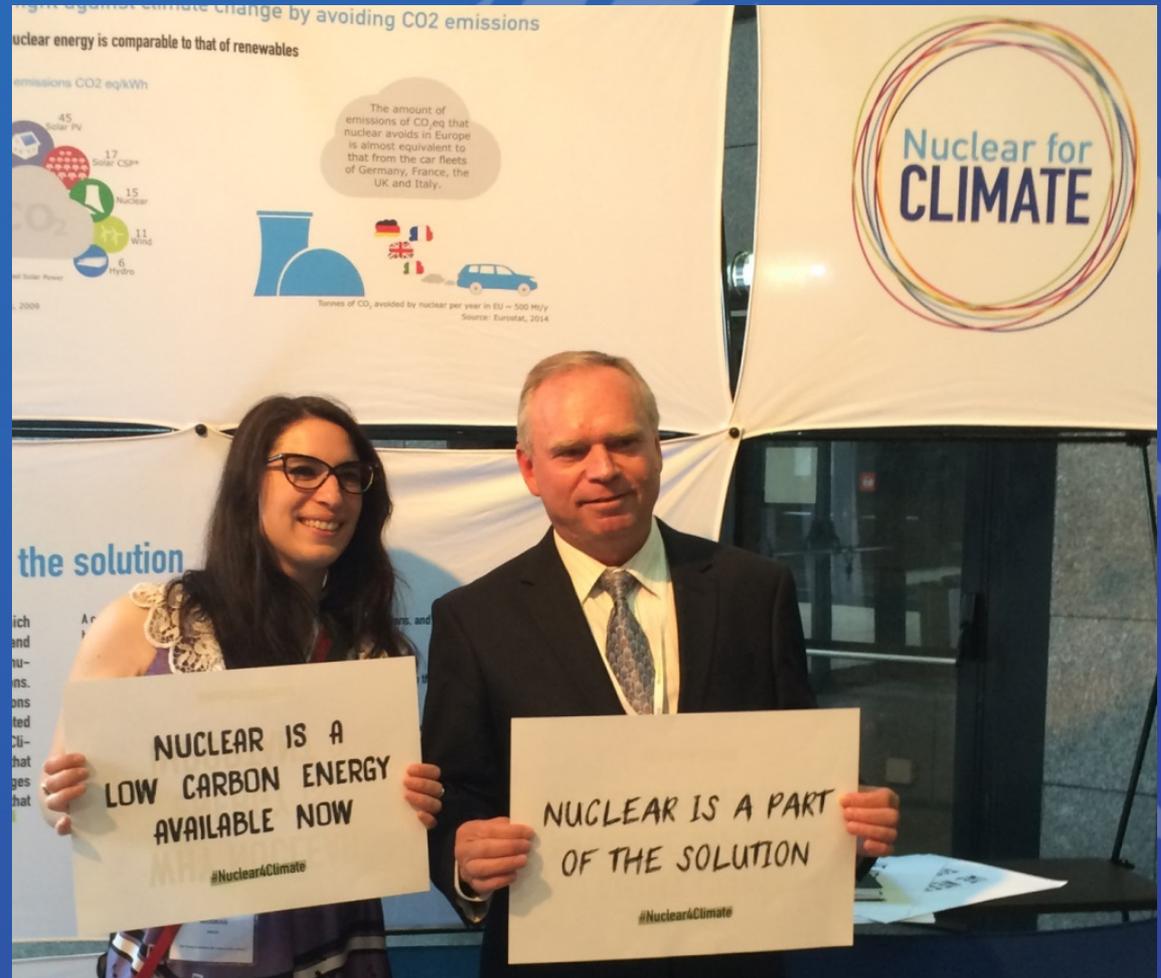


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Thanks!



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