

VLEEM - 2

Introduction to socio-economic scenarios for case studies

Koen Smekens - ECN



3 scenario story lines

1. **HiPop** with high demography in 2100 with near 12 billion people, corresponding to a very slow demographic transition process towards a low fertility rate in developing countries where religious and cultural determinism remain very strong and change only very slowly.
2. **MidPop** as middle storyline with a stabilization of the world population around 8 billion people (UN projection for 2050), which means that the demographic transition will be completed in most parts of the world by 2050, and that governments succeed in convincing educated women to get slightly more than two children in their life.
3. **LowPop** storyline with little growth, same or less population than today (+/- 5 billion). The demographic transition will have been completed by 2050, with a peak population around 8 billions at that time. After that, the combined effect of the inefficiency of nativity policies and human disasters (sanitary, wars) do not allow the fertility rate to rise again significantly (it remains below 1.8 in average) nor the mortality rate to drop significantly.



Story lines guide

- Qualitative description
- Demography development as primary lead
- Shell scenarios and IPCC SRES used to look for corresponding and narrative evolution and description
- Sustainability document from Enerdata used for criteria, driving forces and indicators



Criteria, indicators and driving forces

- GDP growth
- Migration patterns
- Land use changes – agricultural policies
- Resource availability
- Resource distribution – use
- Technological change
- Climate change
- Nuclear development
- Renewables development



Scenario comparison

	HiPop	MidPop	LowPop
IPCC SRES	A2	B2	B1
Shell	Prism but with Business Class elements		Business Class falling back to Prism after 2050
GDP	medium - low	high	medium - low
Migration	high - low	high - low	high - low - high
Land use changes - agricultural policies	medium - high	medium	medium - high
Resource availability	medium	high	medium
Resource distribution	low	high	medium - low
Technological change	medium - low	medium - high	medium - low
Climate change targets	medium	high	medium
Nuclear development	medium - low	medium	medium - low
Renewables development	medium	high	medium



GDP

- **HiPop:** Regionalised homogenous development and growth, global imbalance causes recurring growth interruptions, slower growth rate in developing regions
- **MidPop:** converging global economic growth
- **LowPop:** converging global economy first, after 2050 diverging growth for developed and developing regions



Migration pattern

- **HiPop:** high within and towards the developed regions, low in and towards the developing regions
- **MidPop:** high first, but slows down due to economic progress
- **LowPop:** high within and towards the developed regions, afterwards a homogenous level globally, turning back to a flow towards the developed world



Land use change - agriculture

- **HiPop:** food production dominates land use and land allocation, support for developed world products remains distorting; pressure on land however initiates conservation and degradation mitigation actions
- **MidPop:** lower land pressure and high concerns result in a well managed land use
- **LowPop:** land pressure is off set by increasing management effectiveness and results in a stable and diverse land use



Resource availability

- **HiPop:** conventional and unconventional resources are explored maximally, fossil energy remains the most important but may deplete by the end of the century
- **MidPop:** fossil resources are exploited with high efficiency, together with an increased use of renewables
- **LowPop:** fossils are used maximally, and reserves remain sufficient over the century



Resource distribution

- **HiPop:** security of supply drives the energy policy of the developed regions, dominating the energy market, renewables used for local markets
- **MidPop:** energy becomes a global commodity on a demand driven global market, energy portfolio becomes wider and diverse
- **LowPop:** high growth drives global energy markets, resulting in high price levels, relaxation of the market occurs in the second half of the century



Technological change

- **HiPop:** rapid and varied developments, large scale breakthroughs are limited; conservative approach in the developing regions
- **MidPop:** major transitions possible towards clean energy systems (H2, fusion, ..), widely spread diffusion
- **LowPop:** advance is based on current developments (IGCC), although new options (H2) emerge as well; diffusion slows down in the second half of the century



Climate change

- **HiPop:** weak global targets, policy aimed at adaptation
- **MidPop:** global targets resulting in climate change mitigation
- **LowPop:** regionalised and balanced efforts



Nuclear

- **HiPop:** regionally diversified and increased attention for safety, but little growth potential
- **MidPop:** advanced fission and fusion appear
- **LowPop:** fission development remains high



Renewables

- **HiPop:** very little large scale applications possible, diverse portfolio to maximise potential
- **MidPop:** large scale regionalised applications as addition to other supply options
- **LowPop:** regionalised but fragmented use of renewables

