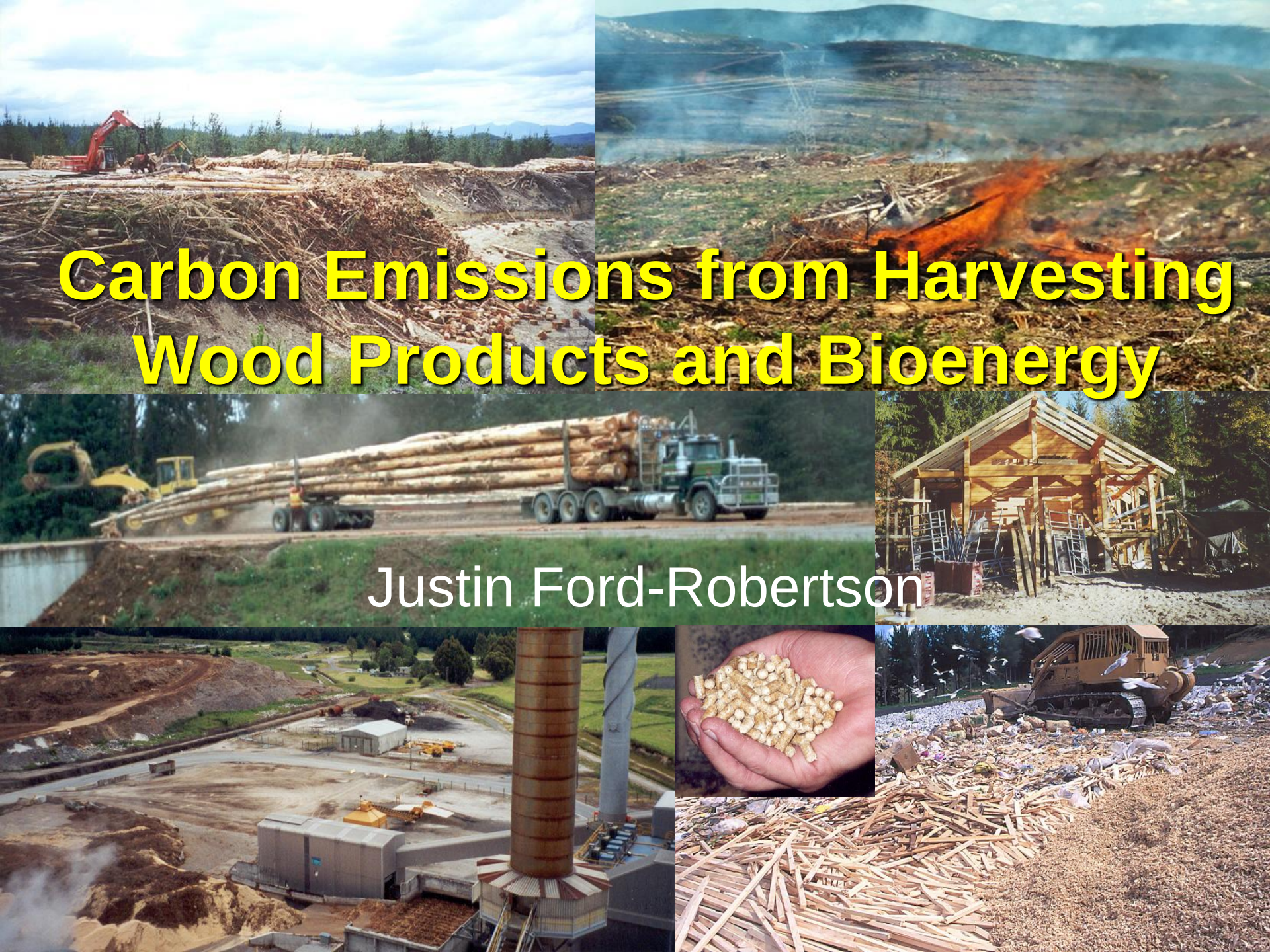
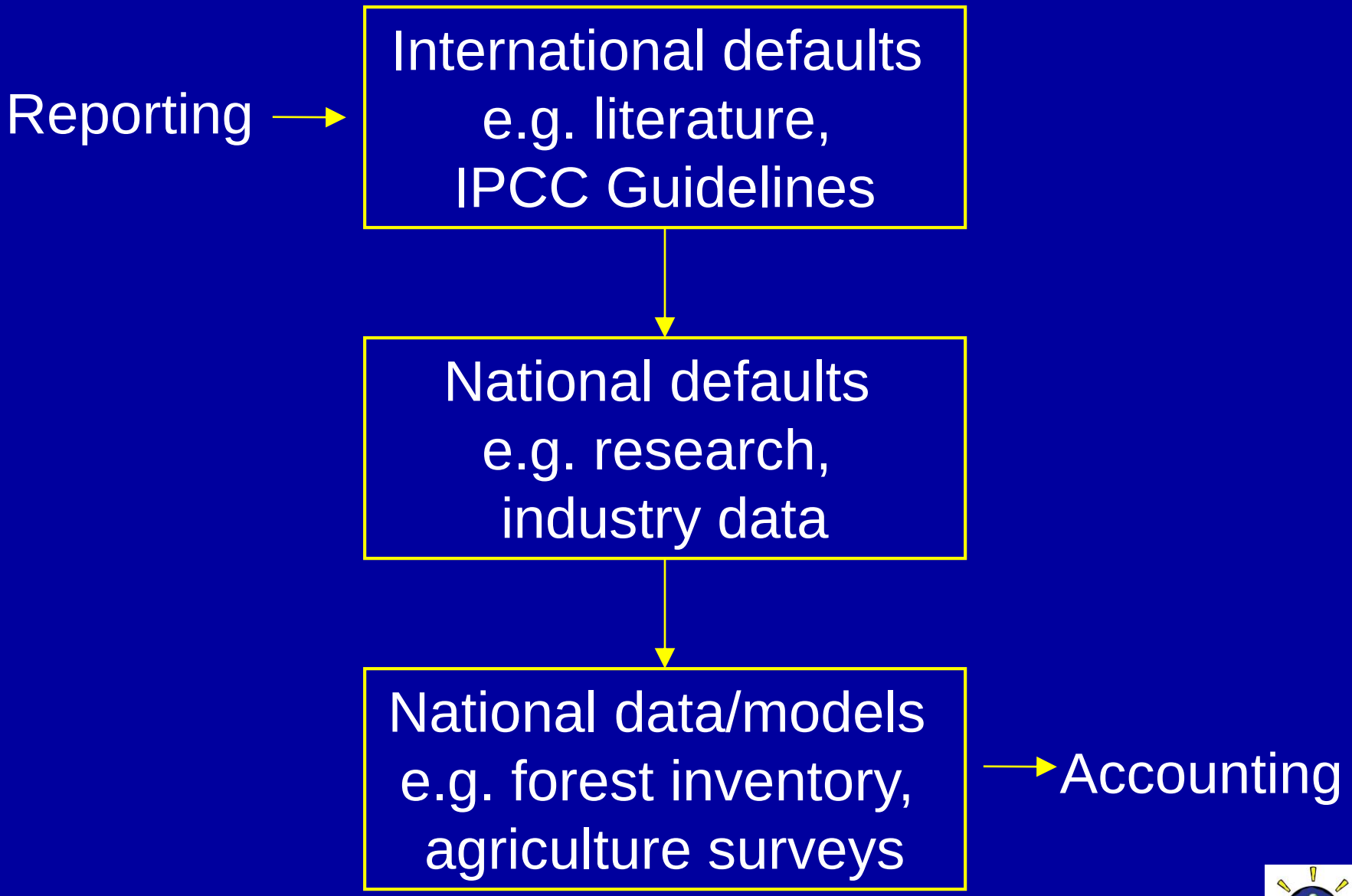


Carbon Emissions from Harvesting Wood Products and Bioenergy

Justin Ford-Robertson

Overview

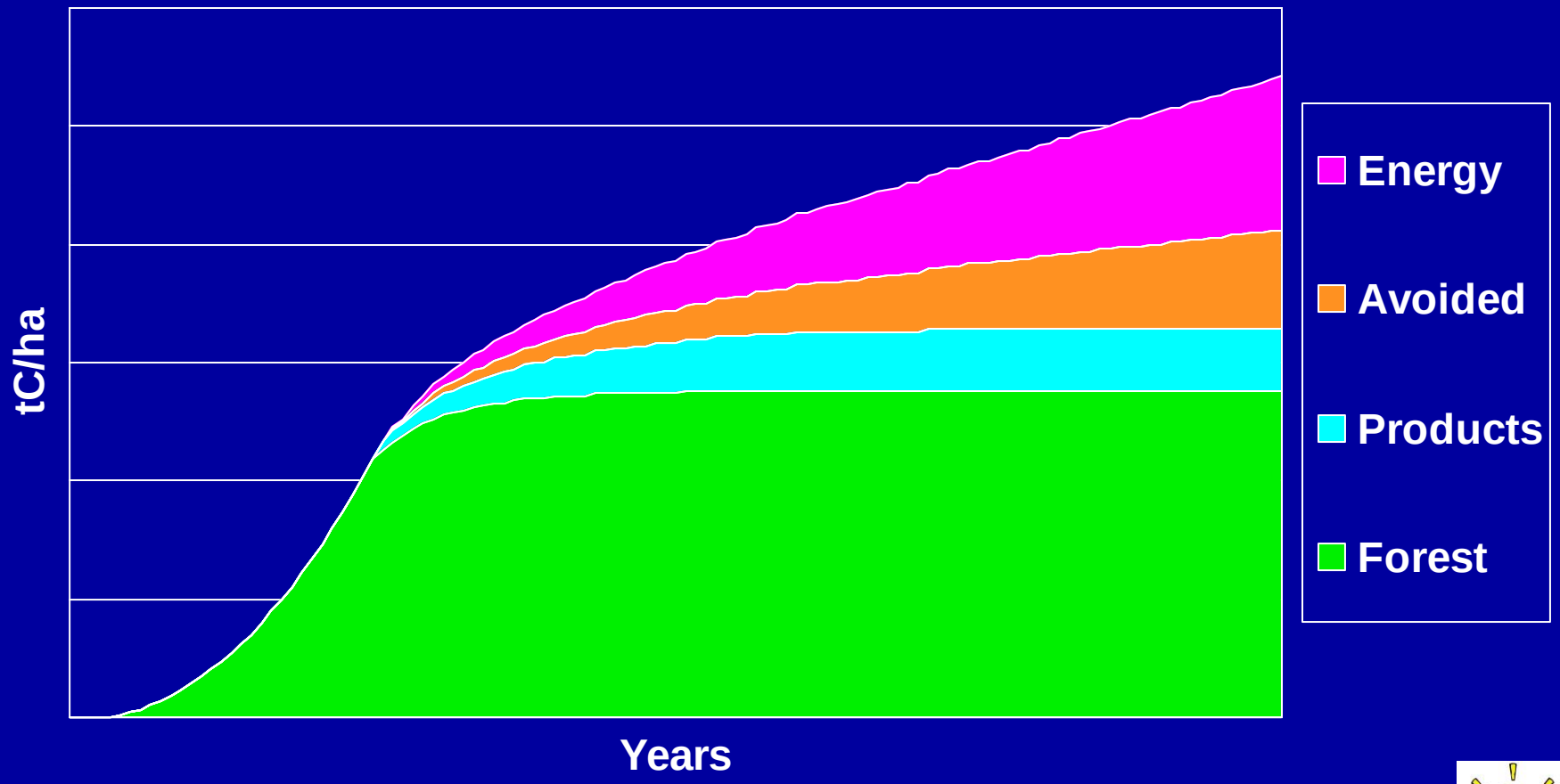
- Context – reporting and accounting
- Forestry stocks and flows
- Official guidance and principles
  - IPCC Guidelines
  - GPG LULUCF
  - Marrakesh Accords
- Simple Decay approach
  - Application and outcomes
- Conclusions


Reporting
International defaults
e.g. literature,
IPCC Guidelines
National defaults
e.g. research,
industry data
National data/models
e.g. forest inventory,
agriculture surveys
Accounting

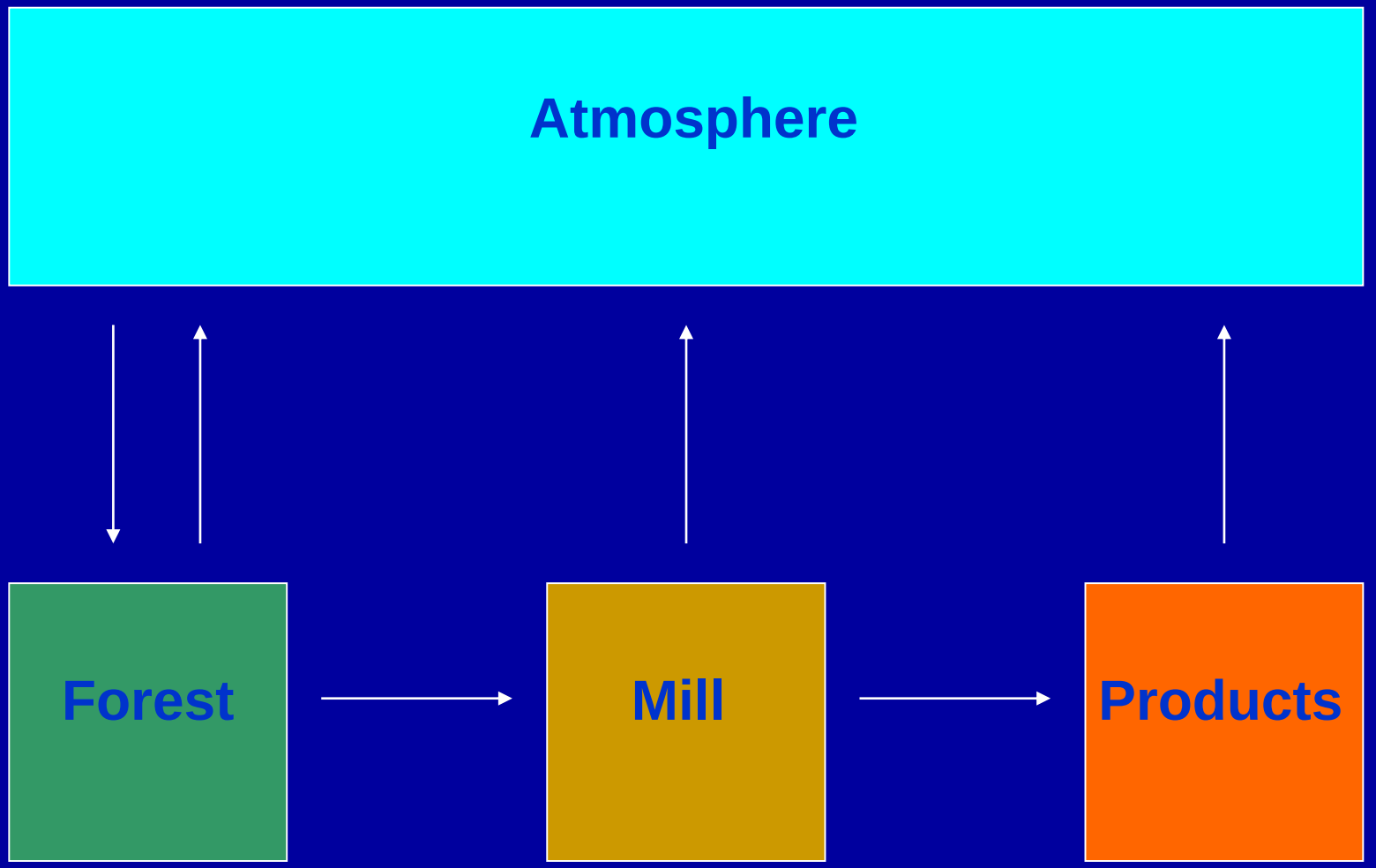
IPCC default

- Assumes no change in product stocks
- Emissions of C occur at harvest
- Emissions neither when nor where
- No incentive to conserve wood products
- No penalty on future emissions (products or bioenergy)
- Sustainable yield = no stock change
- Preservation forest = no stock change

GHG Impact of ‘Normal’ Forest



Forestry Stocks and Flows



IPCC 1996 Guidelines

- Changes in forest and other woody biomass stocks may be either a source or a sink for carbon dioxide
- annual biomass growth versus annual harvest, including the decay of forest products and slash left during harvest
- recommended default assumption is that all carbon removed in wood and other biomass from forests is oxidised in the year of removal
- not strictly accurate, but a legitimate, conservative assumption for initial calculations

IPCC Guidelines

Atmospheric impact = SF – DF – LM – DP

Where

SF = sequestration in the forest

DF = decay of residues in forest

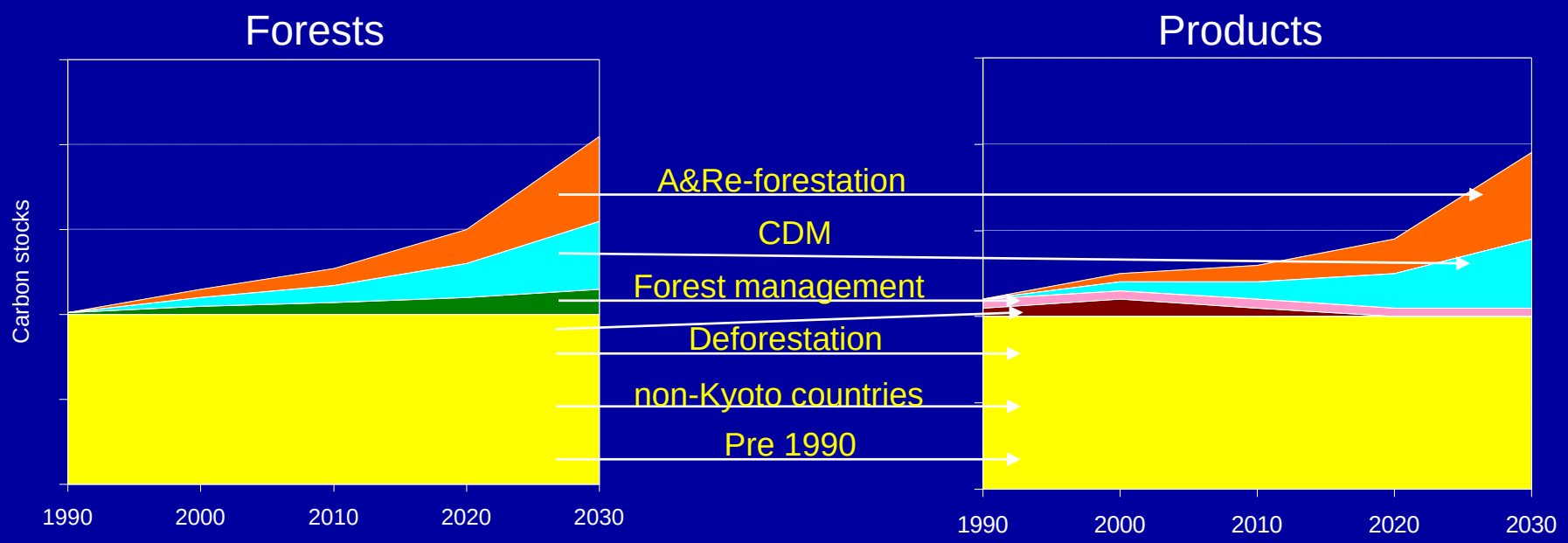
LM = losses at mills during processing (burnt to waste or used for energy)

DP = decay of products (related to lifetime in use or in disposal sites)

IPCC Good Practice LULUCF

"To elaborate methods to estimate, measure, monitor, and report changes in carbon stocks and anthropogenic greenhouse gas emissions by sources and removals by sinks resulting from land use, land-use change and forestry activities under Article 3, paragraphs 3 and 4, and Articles 6 and 12 of the Kyoto Protocol on the basis of the *Revised 1996 IPCC Guidelines*…"

Carbon stocks



Stock change
In all forests
Resulting from activities since 1990

Sinks
In all forests
Resulting from activities since 1990

Within national boundaries

Stock change
In all products
In products manufactured since 1990
In products resulting from activities since 1990

Sources from
All harvested wood burning and decay
Harvested wood since 1990
Harvested wood resulting from activities since 1990

Within national boundaries (incl import-export)
From domestic activities (excl import-export)

Marrakesh Accords

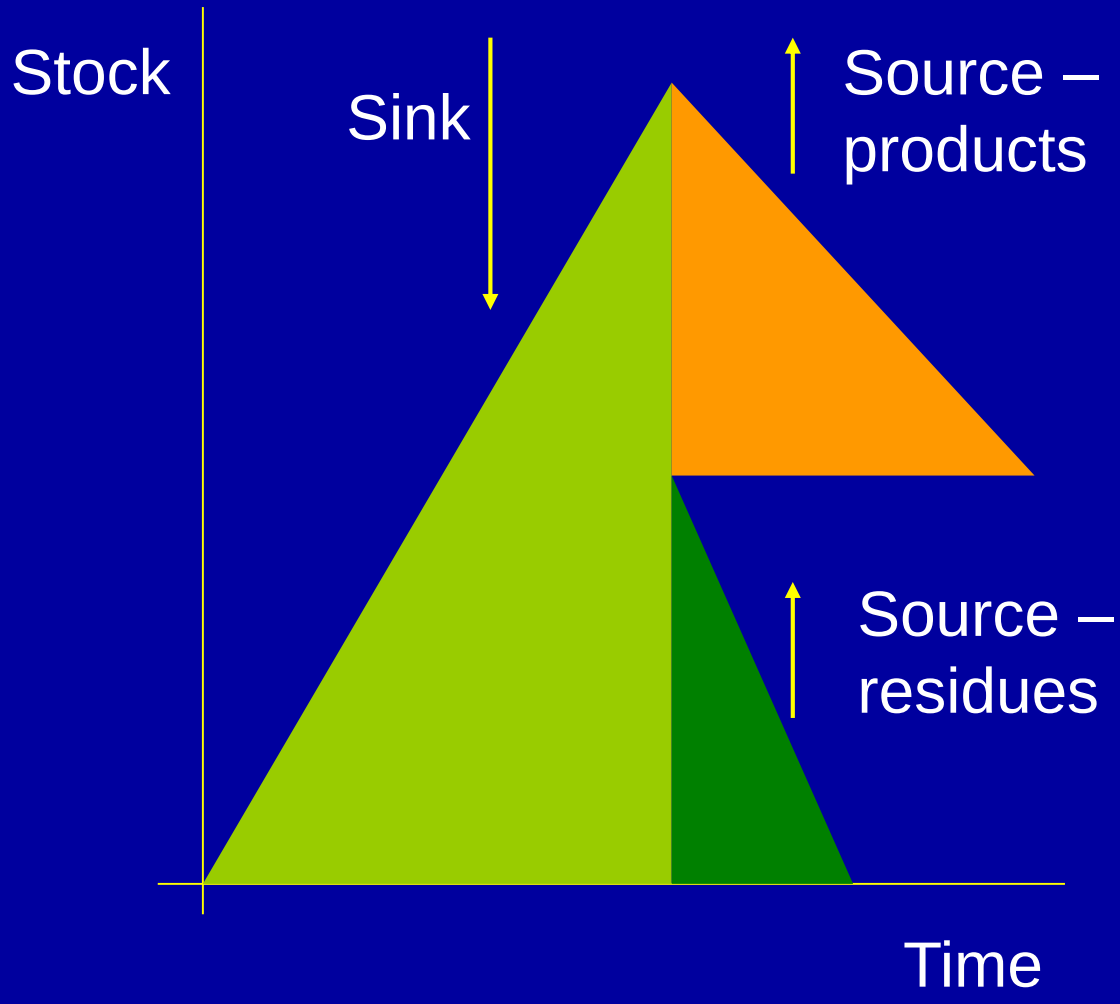
- accounting for emissions and removals resulting from specific activities since 1990
- reversal of a LULUCF removal be accounted for at an appropriate point in time
- the mere presence of stocks be excluded from accounting
- accounting applies to all forest pools unless evidence demonstrates the pool is not a source

Approaches

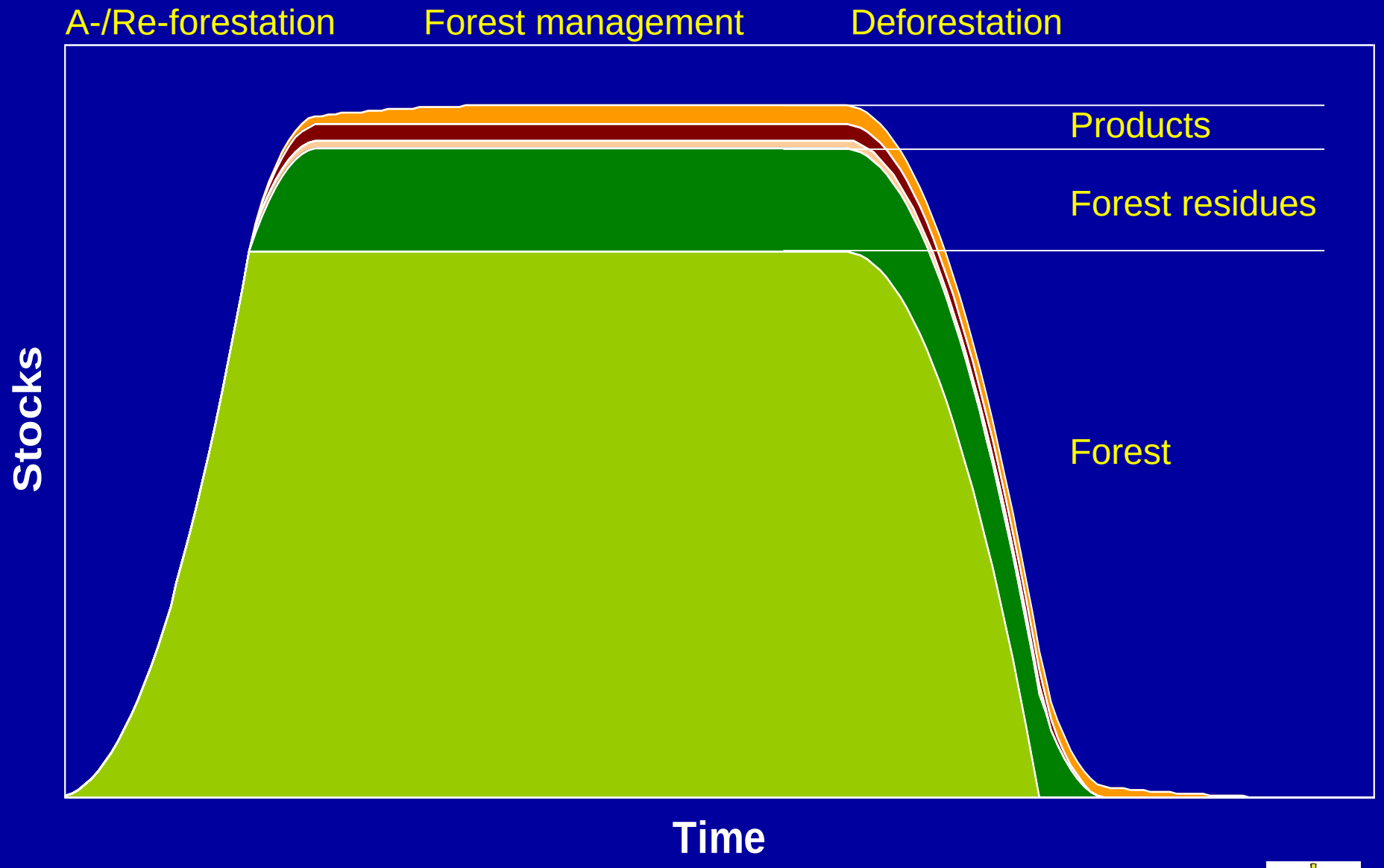
Estimates of:	When and where	When
Changes in stocks	Stock change	Production
Emissions	Atmospheric flow	Simple decay

Simple Decay approach

stocks resulting from activities



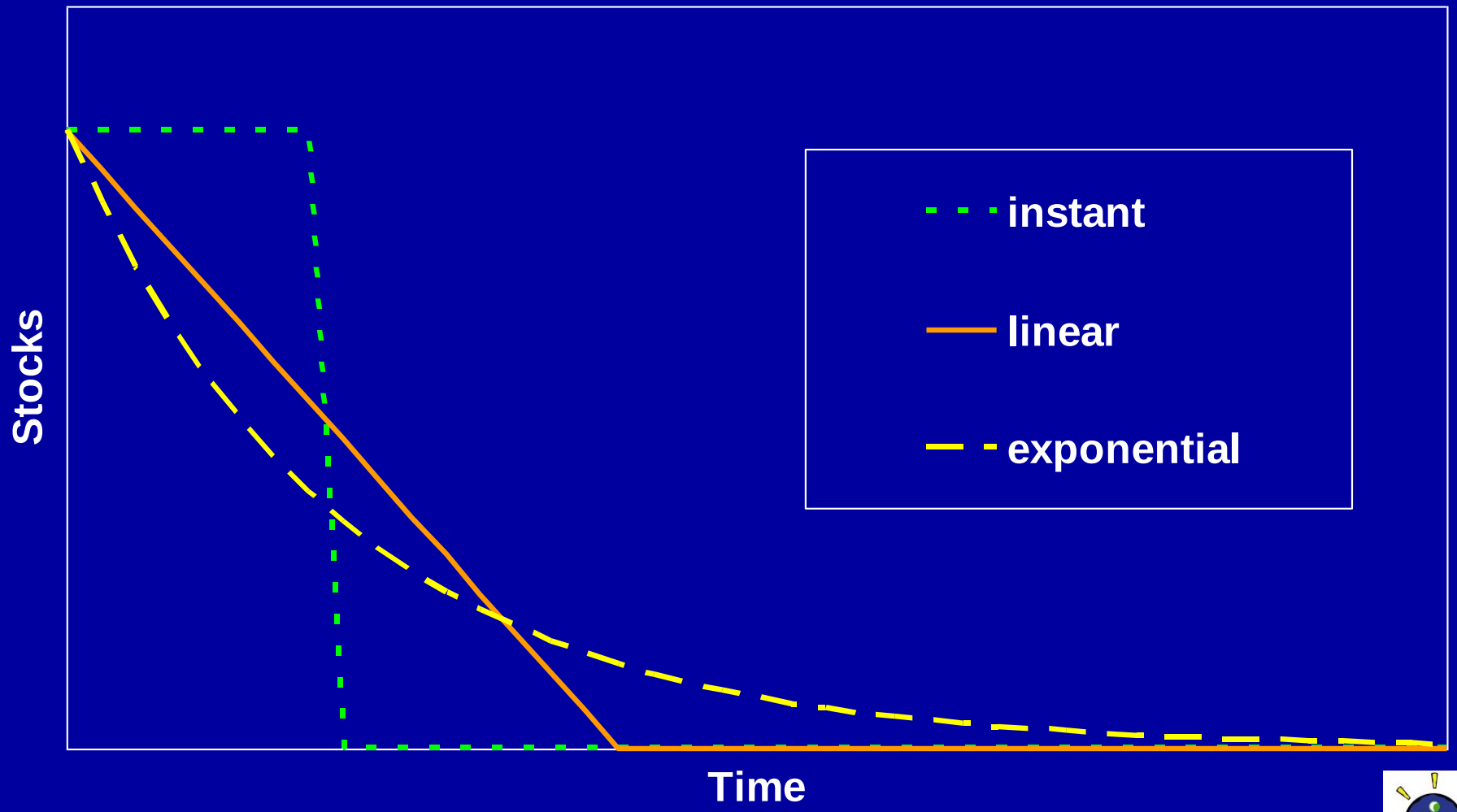
Tier 1 – at harvest
Tier 2 – default categories and lifetimes
Tier 3 – improved categories and lifetimes


A-/Re-forestation
Forest management
Deforestation
Products
Forest residues
Forest
Stocks
Time

Simple - Stocks or Emissions

Harvested		Stocks (end of year)						Emissions (during the year)				
Year	**tC**	**1990**	**91**	**92**	**93**	**94**		**1990**	**91**	**92**	**93**	**94**
1990	100	50	45	40	35	30		50	5	5	5	5
1991	100		50	45	40	35			50	5	5	5
1992	200			100	90	80				100	10	10
1993	200				100	90					100	10
etc	200					100						100
Total stock		**50**	**95**	**185**	**265**	**335**	**Emit/year**	**50**	**55**	**110**	**120**	**130**
Stock change		50	45	90	80	70						

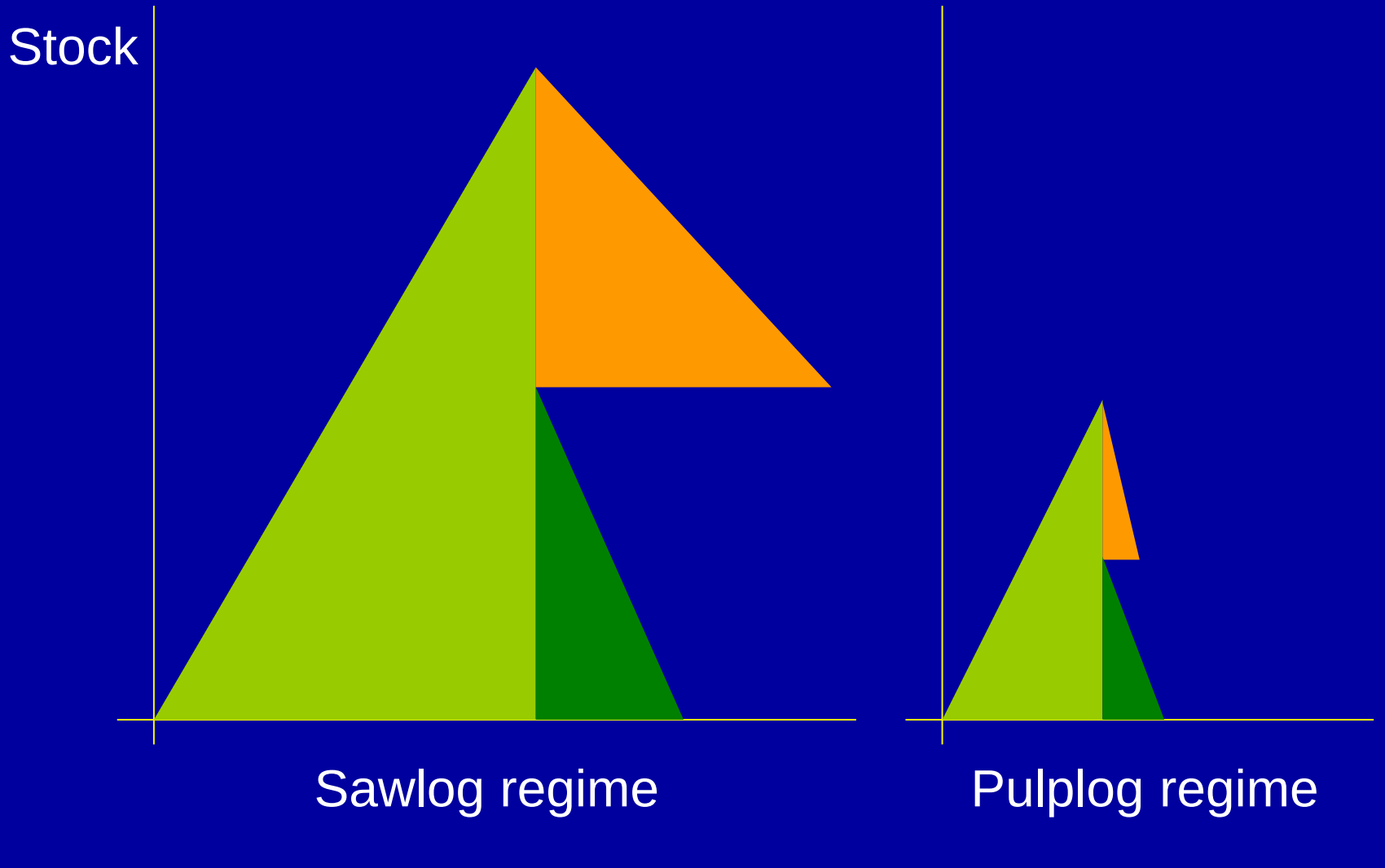
Decay (emission) patterns



Consistency

- Residues: oxidise immediately or decay (linear over 10yrs)
- Reversal of sink when it occurs
- Applicable at project or national scale
- Consistent reporting and accounting
- Pre90 stocks excluded for accounting
- Desirable outcomes

Sustainable Forest Management



Bioenergy and Processing

- Emissions remain responsibility of producer in all Tiers (no trade impacts)
- Appropriate time of emissions
- Favour long rotations for sawlogs
- Encourage high conversion (to product) efficiency
- Sawmills least energy intensive
- Opportunity for energy exporting sector
- Including waste disposal sites reduces incentive for bioenergy

Conclusions

Simple Decay approach

- Described in 1996 Guidelines (residues)
- Satisfies Marrakesh principles
- Simple to apply (all Tiers)
- National reporting and accounting
- Project application (permanence)
- Promotes sustainable forest management
- Promotes bioenergy

Management of products is subsequent issue