Food Balance Sheets

Wheat

For this example, we'll first consider the commodity tree for wheat. We start off with an empty table:

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
0111	0	0	0	0	0	0	0	0	0	0	0	0	0
23110	0	0	0	0	0	0	0	0	0	0	0	0	0
23140.02	0	0	0	0	0	0	0	0	0	0	0	0	0
23140.03	0	0	0	0	0	0	0	0	0	0	0	0	0
23220.01	0	0	0	0	0	0	0	0	0	0	0	0	0
39120.01	0	0	0	0	0	0	0	0	0	0	0	0	0

Production

For production data, we first fill in the table with any available official figures.

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
0111	0	0	54418808	0	0	0	0	0	0	0	0	0	0
23110	0	0	18652048	0	0	0	0	0	0	0	0	0	0
23140.02	0	0	NA	0	0	0	0	0	0	0	0	0	0
23140.03	0	0	NA	0	0	0	0	0	0	0	0	0	0
23220.01	0	0	NA	0	0	0	0	0	0	0	0	0	0
39120.01	0	0	NA	0	0	0	0	0	0	0	0	0	0

Next, we run the production imputation module. Production is only imputed for primary products, and so in this case no imputation is done (and no changes occur in the table).

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
0111	0	0	54418808	0	0	0	0	0	0	0	0	0	0
23110	0	0	18652048	0	0	0	0	0	0	0	0	0	0
23140.02	0	0	NA	0	0	0	0	0	0	0	0	0	0

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
23140.03	0	0	NA	0	0	0	0	0	0	0	0	0	0
23220.01	0	0	NA	0	0	0	0	0	0	0	0	0	0
39120.01	0	0	NA	0	0	0	0	0	0	0	0	0	0

Trade

For the next example, we'll show how the imputation, mirroring and balancing works. In this case, we just take the country totals and insert into this table.

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
0111	0	0	54418808	760869	8001087	0	0	0	0	0	0	0	0
23110	0	0	18652048	336723	260274	0	0	0	0	0	0	0	0
23140.02	0	0	NA	189434	360146	0	0	0	0	0	0	0	0
23140.03	0	0	NA	305037	309519	0	0	0	0	0	0	0	0
23220.01	0	0	NA	312229	287944	0	0	0	0	0	0	0	0
39120.01	0	0	NA	271432	1819592	0	0	0	0	0	0	0	0

NOTE (Josh): The trade figures I quote here are based on the US data, but not exactly. We have HS6 trade data, and I can map that to CPC. However, some HS6 codes map to many CPC codes. My understanding is that the historical approach has been to not use split factors and to simply map the quantity straight into one of the CPC codes. For this simple example, I map the HS data to CPC and randomly split it.

Stock Changes

We now estimate the stock changes. Note that for most products, we assume that countries do not hold stocks. Generally, stocks will only be held for primary level products, and not even all of these products. The numbers below represent the estimated stock changes (by the stock imputation methodology described previously) for the example country we're considering.

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
0111	0	0	54418808	760869	8001087	-230630	0	0	0	0	0	0	0
23110	0	0	18652048	336723	260274	NA	0	0	0	0	0	0	0
23140.02	0	0	NA	189434	360146	NA	0	0	0	0	0	0	0
23140.03	0	0	NA	305037	309519	NA	0	0	0	0	0	0	0
23220.01	0	0	NA	312229	287944	NA	0	0	0	0	0	0	0
39120.01	0	0	NA	271432	1819592	NA	0	0	0	0	0	0	0

Food

The allocation to food, on the other hand, can potentially be considered at any processing level, although some commodities (such as wheat) are assumed to not be eaten as such. We impute food consumption numbers for the example country and update the FBS table below.

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
0111	0	0	54418808	760869	8001087	-230630	NA	0	0	0	0	0	0
23110	0	0	18652048	336723	260274	NA	18539484	0	0	0	0	0	0
23140.02	0	0	NA	189434	360146	NA	3684	0	0	0	0	0	0
23140.03	0	0	NA	305037	309519	NA	98131	0	0	0	0	0	0
23220.01	0	0	NA	312229	287944	NA	NA	0	0	0	0	0	0
39120.01	0	0	NA	271432	1819592	NA	NA	0	0	0	0	0	0

Losses

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
0111	0	0	54418808	760869	8001087	-230630	NA	0	560306	0	0	0	0
23110	0	0	18652048	336723	260274	NA	18539484	0	NA	0	0	0	0
23140.02	0	0	NA	189434	360146	NA	3684	0	NA	0	0	0	0
23140.03	0	0	NA	305037	309519	NA	98131	0	NA	0	0	0	0
23220.01	0	0	NA	312229	287944	NA	NA	0	NA	0	0	0	0
39120.01	0	0	NA	271432	1819592	NA	NA	0	NA	0	0	0	0

Seed

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
0111	0	0	54418808	760869	8001087	-230630	NA	0	560306	1929614	0	0	0
23110	0	0	18652048	336723	260274	NA	18539484	0	NA	NA	0	0	0
23140.02	0	0	NA	189434	360146	NA	3684	0	NA	NA	0	0	0
23140.03	0	0	NA	305037	309519	NA	98131	0	NA	NA	0	0	0
23220.01	0	0	NA	312229	287944	NA	NA	0	NA	NA	0	0	0
39120.01	0	0	NA	271432	1819592	NA	NA	0	NA	NA	0	0	0

Industrial Utilization

Work in progress...

Tourist Consumption

Note: tourist consumption can only be computed after food consumption has been estimated. This is because the assumed consumption pattern of a tourist is assumed to follow the same consumption pattern as they had at home.
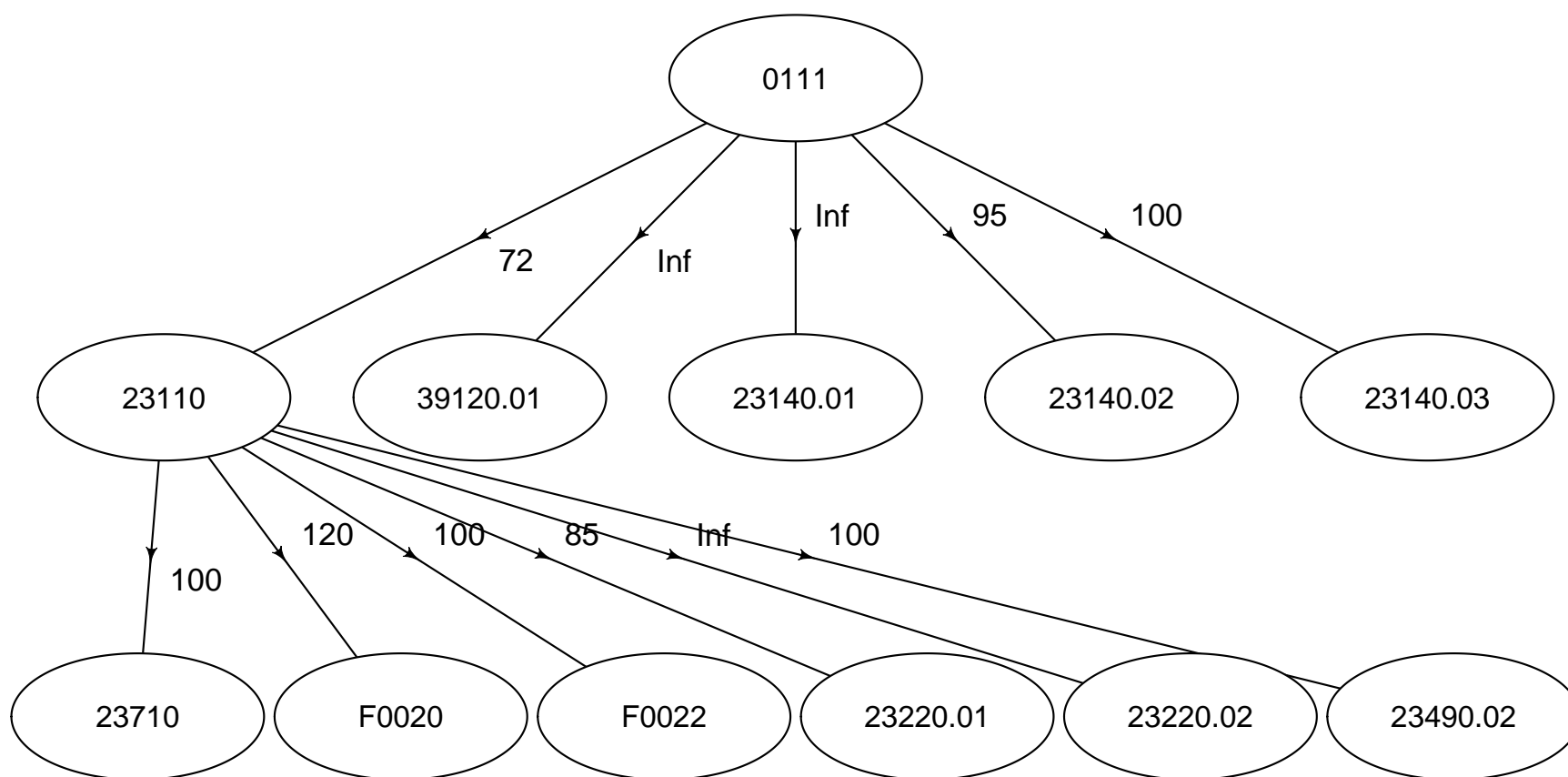
Work in progress...

Residual Other Uses

Work in progress...

Standardization

Now, suppose we have the following commodity tree:

NOTE (Josh): This commodity tree above is derived based on the FCL commodity tree. It will likely need to be updated, but for now I just simply map the FCL elements to their corresponding CPC codes.

NOTE (Josh): At this point, we should also compute calories/proteins/fats.

NOTE (Josh): Need to keep track of the standard deviations as well so that we can balance at the end.

The first step in this process of creating the food balance sheets is to standardize all commodities up or down the commodity tree to the first processing level equivalent. Thus, our table is updated as follows:

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
23110	0	0	18652048	597511	3002647	-79048	18539484	0	192045	661375	0	0	0
23140.01	0	0	0	0	0	0	0	0	0	0	0	0	0

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
23140.02	0	0	5417628	265182	1156689	-22960	3684	0	55781	192101	0	0	0
23140.03	0	0	22810383	623965	3663283	-96672	98131	0	234860	808824	0	0	0
39120.01	0	0	0	271432	1819592	0	0	0	0	0	0	0	0

To illustrate the calculations occuring in this step, we first note that product focus on one specific element: the imports for 23140.02. This commodity originally had 189434 kg reported. However, all children commodities must be rolled up into this first level processing element (in this case there are none) and all primary products must be processed down according to the default shares and extraction rates. In this case, the share of 0111 to 23140.02 was 0111, 840, 2011, 23140.02, B, 1, 1, 10, 2, NA, 54418808, NaN, TRUE, 48% and the extraction rate was 95%. Thus, we will take the imports for 0111, i.e. 760869, and multiply it by the share while dividing by the extraction rate. This gives a increase of 8009 kg to the import of element 23140.02, thus the final import value is 197443.

NOTE (Josh): I'm not 100% confident this is the right approach, but it seems to make sense. We need to process wheat into flour so that we can create bran and germ, but we don't know how much to process down (as we haven't yet balanced the wheat). However, we could just simply standardize each element individually down into first level processing, and I think that should work.

Feed

Feed allocation must be done at this phase in order to ensure that we have reduced the feed demand by the corresponding amounts of feed products (i.e. wheat bran, wheat germ, etc.).

Balancing

Cattle Meat

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
21111.01	0	0	11921102	3190	86950	0	0	0	0	0	0	0	0
21111.02	0	0	0	122754	125163	0	0	0	0	0	0	0	0
21182	0	0	0	NA	NA	0	0	0	0	0	0	0	0
21185	0	0	0	NA	NA	0	0	0	0	0	0	0	0
21512.01	0	0	0	90902	351680	0	0	0	0	0	0	0	0

Production

Trade

Stock Changes

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
21111.01	0	0	11921102	3190	86950	-1431	0	0	0	0	0	0	0
21111.02	0	0	0	122754	125163	NA	0	0	0	0	0	0	0
21182	0	0	0	NA	NA	NA	0	0	0	0	0	0	0
21185	0	0	0	NA	NA	NA	0	0	0	0	0	0	0
21512.01	0	0	0	90902	351680	NA	0	0	0	0	0	0	0

Food

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
21111.01	0	0	11921102	3190	86950	-1431	NA	0	0	0	0	0	0
21111.02	0	0	0	122754	125163	NA	7793721	0	0	0	0	0	0
21182	0	0	0	NA	NA	NA	98	0	0	0	0	0	0
21185	0	0	0	NA	NA	NA	949	0	0	0	0	0	0
21512.01	0	0	0	90902	351680	NA	NA	0	0	0	0	0	0

Losses

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
21111.01	0	0	11921102	3190	86950	-1431	NA	0	22766	0	0	0	0
21111.02	0	0	0	122754	125163	NA	7793721	0	NA	0	0	0	0
21182	0	0	0	NA	NA	NA	98	0	NA	0	0	0	0
21185	0	0	0	NA	NA	NA	949	0	NA	0	0	0	0
21512.01	0	0	0	90902	351680	NA	NA	0	NA	0	0	0	0

Seed

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
21111.01	0	0	11921102	3190	86950	-1431	NA	0	22766	NA	0	0	0
21111.02	0	0	0	122754	125163	NA	7793721	0	NA	NA	0	0	0
21182	0	0	0	NA	NA	NA	98	0	NA	NA	0	0	0
21185	0	0	0	NA	NA	NA	949	0	NA	NA	0	0	0
21512.01	0	0	0	90902	351680	NA	NA	0	NA	NA	0	0	0

Industrial Utilization

Work in progress. . .

Tourist Consumption

Work in progress. . .

Residual Other Uses

Work in progress. . .

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                                    ┌──────────┐
                                    │ 21111.01 │
                                    └──────────┘
         80        Inf      36    20     62    76    500

  ┌──────────┐ ┌──────────┐ ┌────────┐ ┌────────┐ ┌──────────┐ ┌────────┐ ┌──────────┐
  │ 21111.02 │ │ 21512.01 │ │ 21182  │ │ 21185  │ │ 21184.01 │ │ F0875  │ │ 23991.04 │
  └──────────┘ └──────────┘ └────────┘ └────────┘ └──────────┘ └────────┘ └──────────┘
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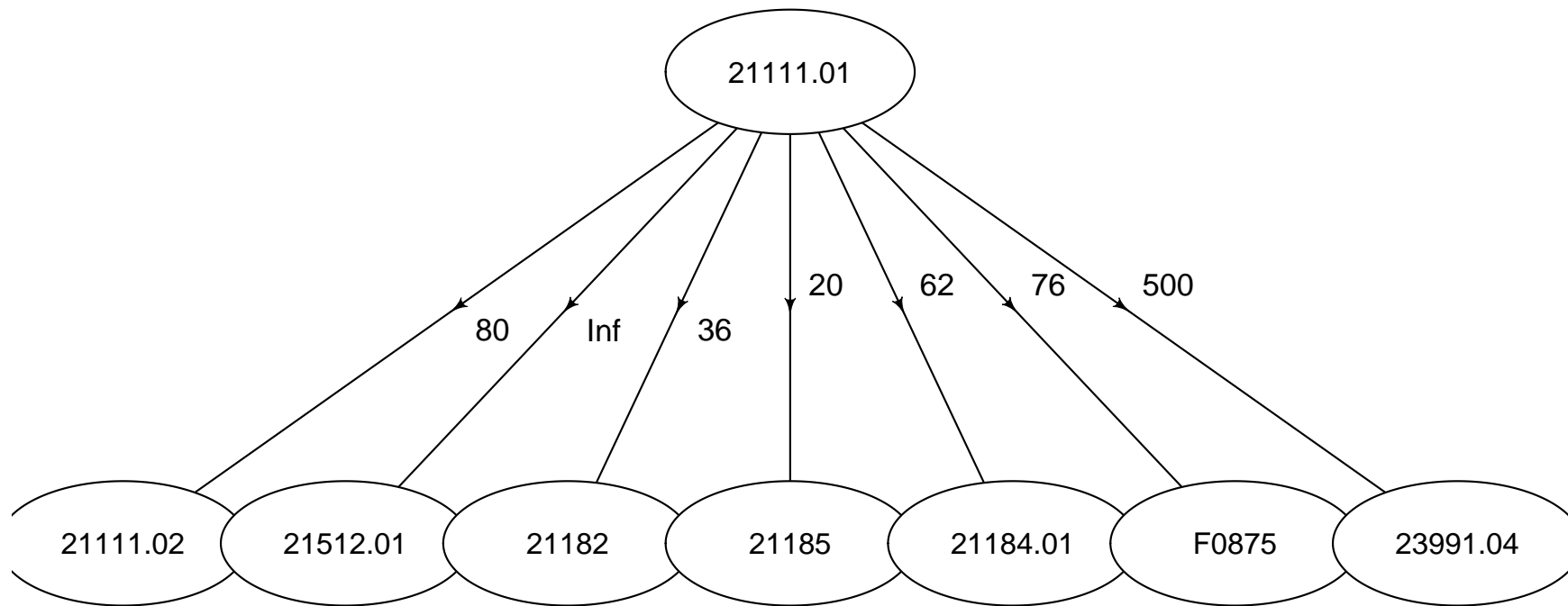
Feed

Balancing

Palm Oil

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
2165	0	0	0	NA	NA	0	0	0	0	0	0	0	0
21691.14	0	0	0	NA	NA	0	0	0	0	0	0	0	0
21700.02	0	0	3714000	NA	NA	0	0	0	0	0	0	0	0
34120	0	0	0	NA	NA	0	0	0	0	0	0	0	0
34550	0	0	0	NA	NA	0	0	0	0	0	0	0	0
F1243	0	0	260000	NA	NA	0	0	0	0	0	0	0	0

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
F1275	0	0	0	NA	NA	0	0	0	0	0	0	0	0

Production

Trade

Stock Changes

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
2165	0	0	0	NA	NA	NA	0	0	0	0	0	0	0
21691.14	0	0	0	NA	NA	NA	0	0	0	0	0	0	0
21700.02	0	0	3714000	NA	NA	3866	0	0	0	0	0	0	0
34120	0	0	0	NA	NA	0	0	0	0	0	0	0	0
34550	0	0	0	NA	NA	NA	0	0	0	0	0	0	0
F1243	0	0	260000	NA	NA	NA	0	0	0	0	0	0	0
F1275	0	0	0	NA	NA	NA	0	0	0	0	0	0	0

Food

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
2165	0	0	0	NA	NA	NA	0	0	0	0	0	0	0
21691.14	0	0	0	NA	NA	NA	15000	0	0	0	0	0	0
21700.02	0	0	3714000	NA	NA	3866	3729905	0	0	0	0	0	0
34120	0	0	0	NA	NA	0	NA	0	0	0	0	0	0
34550	0	0	0	NA	NA	NA	NA	0	0	0	0	0	0
F1243	0	0	260000	NA	NA	NA	175439	0	0	0	0	0	0
F1275	0	0	0	NA	NA	NA	NA	0	0	0	0	0	0

Losses

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
2165	0	0	0	NA	NA	NA	0	0	NA	0	0	0	0

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
21691.14	0	0	0	NA	NA	NA	15000	0	NA	0	0	0	0
21700.02	0	0	3714000	NA	NA	3866	3729905	0	NA	0	0	0	0
34120	0	0	0	NA	NA	0	NA	0	NA	0	0	0	0
34550	0	0	0	NA	NA	NA	NA	0	NA	0	0	0	0
F1243	0	0	260000	NA	NA	NA	175439	0	NA	0	0	0	0
F1275	0	0	0	NA	NA	NA	NA	0	NA	0	0	0	0

Seed

Item	AreaHarv	Yield	Production	Imports	Exports	StockChange	Food	Feed	Waste	Seed	Industrial	Tourist	Residual
2165	0	0	0	NA	NA	NA	0	0	NA	NA	0	0	0
21691.14	0	0	0	NA	NA	NA	15000	0	NA	NA	0	0	0
21700.02	0	0	3714000	NA	NA	3866	3729905	0	NA	NA	0	0	0
34120	0	0	0	NA	NA	0	NA	0	NA	NA	0	0	0
34550	0	0	0	NA	NA	NA	NA	0	NA	NA	0	0	0
F1243	0	0	260000	NA	NA	NA	175439	0	NA	NA	0	0	0
F1275	0	0	0	NA	NA	NA	NA	0	NA	NA	0	0	0

Industrial Utilization

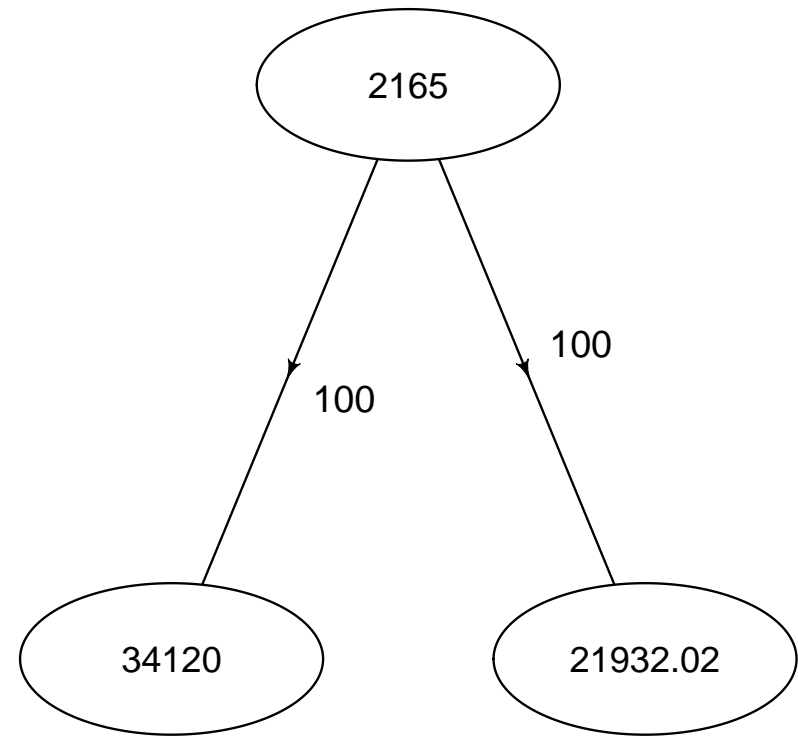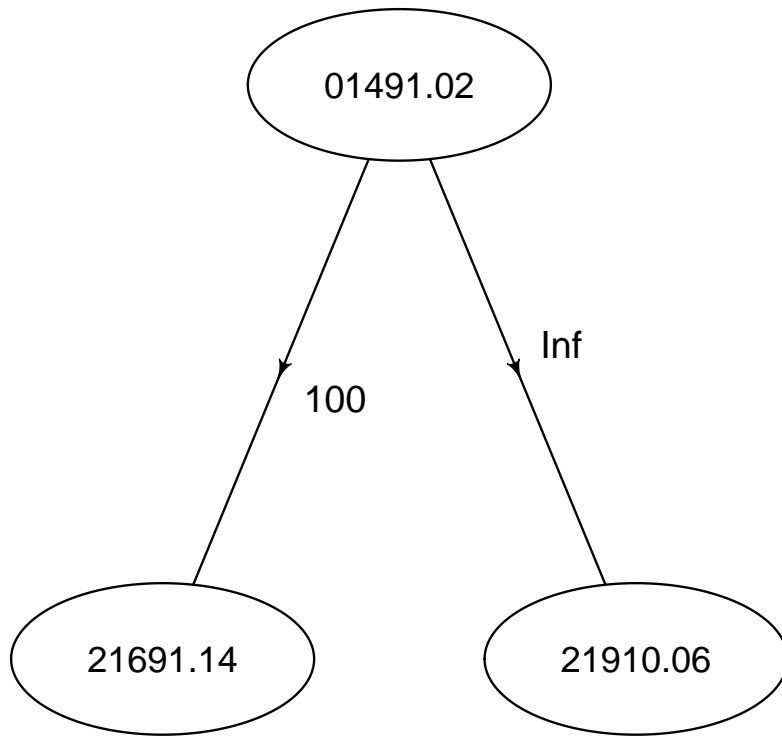Work in progress. . .

Tourist Consumption

Work in progress. . .

Residual Other Uses

Work in progress. . .

Standardization

NOTE (Josh): This commodity tree looks like two separate trees. But, the two parent nodes can actually be processed into many of the same children. I'm not sure what the logic was for historically rolling up some of the children into one of the parents and some of the children into the other parent, but that would presumably need to be reviewed/revised.

Feed

Balancing