Claims

1. A process for forming propylene comprising:
reacting a metathesis feed stream comprising butene with ethylene in the presence of a first metathesis catalyst via a first metathesis reaction to form a first metathesis product stream comprising propylene, ethylene, butene, and C_{5+} olefins, wherein the first metathesis reaction takes place at an first ethylene:butene molar ratio of 2.0;

separating at least a portion of the propylene and ethylene from the first metathesis product stream to form a first overhead stream and to form a first de-propenized bottoms stream comprising butene and C_{5+} olefins;

reacting at least a portion of the first de-propenized bottoms stream with ethylene in the presence of a second metathesis catalyst via a second metathesis reaction to form a second metathesis product stream comprising propylene, ethylene, butene, and C_{5+} olefins, wherein the second metathesis reaction takes place at an second ethylene:butene molar ratio of 6.6; and

separating at least a portion of the propylene and ethylene from the second metathesis product stream to form a second overhead stream; and

recovering propylene from the first overhead stream, the second overhead stream or combinations thereof.

2. The process of claim 1 further, wherein the first overhead stream comprises propylene and ethylene and the second overhead stream comprises propylene and ethylene.

3. The process of claim 1 further comprising:
separating at least a portion of the first overhead stream to form an ethylene stream and a propylene stream.

4. The process of claim 1 further comprising:
separating at least a portion of the second overhead stream to form an ethylene stream and a propylene stream.

5. The process of claim 1 further comprising:
separating at least a portion of the first overhead stream and at least a portion of the second overhead stream to form an ethylene stream and a propylene stream.